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Australian Ilmenite Resources Pty Ltd
SILL80 Project

2012



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Executive Summary

Australian Ilmenite Resources Pty Ltd (AIR) proposes to develop its SILL80 Ilmenite Project, within Mineral Lease (ML) 27422 and Mineral Lease Application (MLA) 29042, located on Numul Numul Station in the Roper River Region of the Northern Territory, approximately 105 km east of Mataranka Township and 8km south of the Roper Highway.

A Notice of Intent (NOI) was submitted to the Northern Territory Minister for Natural Resources, Environment and Heritage (the Minister); who has determined that this proposal requires formal assessment under the NT *Environmental Assessment Act 1982* (EA Act) at the level of a Public Environmental Report (PER). The Minister has provided *Guidelines for the Preparation of a Public Environmental Report, SILL80 Project, Roper River area, NT* (hereafter called Guidelines) (see Appendix A). The PER was compiled and submitted for assessment on the 28th January 2012. On the 6th March 2012 the Northern Territory Government (NTG) requested further information about the project, the proponent asked for the approvals process to be stopped while this request was fulfilled. The NTG subsequently provided a *Further Information Required* (Appendix A1). This revised PER responds to the Guidelines and Further Information Request.

Four key risks were identified in relation to this project:

1. Extraction of water from the Roper River used for processing ore;
2. Effectiveness of the proposed rehabilitation over large areas;
3. Potential impacts to threatened species; and
4. Potential Impacts to Current Land Use.

The information in this PER is provided to facilitate a formal assessment under the NT *Environmental Assessment Act 1982* (EA Act) at the request of the Northern Territory Minister for Natural Resources, Environment and Heritage (the Minister). The PER provides the Minister with the required information to make informed recommendations to the Responsible Minister/relevant consent authority in accordance with the EA Act.

Specifically, this PER has been developed to examine the potential impact the proposed development will have on the environment.

PROJECT ALTERNATIVES

Alternatives to the proposed development were considered. The SILL80 site was selected due to the resource richness, transportation access and water resources. Alternative water resources were explored and are discussed within this report. A 'no development' option would result in the land continuing to be used as a pastoral enterprise but with a lost opportunity for employment and economic development for the region.

PROJECT DESCRIPTION

The development plans to extract up to 300,000 tonnes of Ilmenite concentrate per annum. Operations will utilise strip mining, excavating to a maximum depth of 4m (300m long and 200m wide). Strips will be developed in a campaign mining style. Ore will be processed through a series of wash trommels to create concentrated Ilmenite which will be transported to the Port of Darwin via truck. Regolith material will be returned to the mining pit. Once regolith material has been returned, the pit will be fenced and revegetated with improved pasture grasses and progressively grazed under the management of Numul Numul Station.

Water for processing will be sourced from the Roper River. A pump will transport water to Numul Numul Station where it will be held in existing dams. Water will then be transferred from the holding dams to the mineral lease as required. A detailed water balance has been calculated for the project and the maximum predicted water usage (without rainwater inputs) is 1,649 ML/year sourced from the Roper River.

Vehicles will access the mine from a road to be constructed from the Roper Highway to the mineral lease through Numul Numul station.

It is envisaged that this project will employ up to twenty five staff. Of these, three positions will be made available to local indigenous persons.

RISK ASSESSMENT

Key risks associated with AIR's SILL80 Project were provided by NRETAS through the PER Guidelines (Appendix A) and the request for further information (Appendix A1). Secondary risks identified during the development of this PER are also presented. A preliminary risk assessment, focussing on environmental risks, was completed in accordance with the following:

- AS/NZS ISO 31000:2009: Risk management - Principles and Guidelines (Standard)
- HB 203:2006: Environmental risk management - Principles and process (Guide)
- HB 158:2010: Delivering assurance based on ISO 31000:2009 - Risk management - Principles and Guidelines (Guide)

A combination of physical and procedural measures will be applied to the project and its activities to either eliminate or reduce and manage identified risks.

ENVIRONMENTAL MANAGEMENT

A Draft Environmental Management Plan (EMP, Appendix L) incorporating the findings of this PER has been prepared specifically for the SILL80 project. A Mining Management Plan (MMP) will be developed incorporating detail from the EMP. The MMP will be the principal guiding document in relation to environmental management for the Project.

MANAGEMENT OF KEY RISKS

Surface Water

AIR will access water for processing Ilmenite from the Roper River at the waterhole currently used for extraction by Flying Fox Station. Water for the AIR project will be pumped via a 12 km pipeline to a 50ML pastoral dam and then relayed to the processing plant as required. There are concerns that extraction of water for this development may lead to deleterious changes in the hydrology of the Roper River affecting the river's integrity leading to a deleterious impact on threatened species and also water quality at Ngukurr. Water resource modelling was performed to investigate the impacts of abstraction on the Roper River. From this modelling a number of mitigation measures have been developed to minimise the risk to the environment, additional users and future water resources.

Mitigation measures include:

- Monitoring of flows within the Roper River through established monitoring sites and a site developed specific to the extraction point;
- Not exceed a diversion rate of 100L/s from the Roper River;
- Not extracting more than 1649ML/a from the Roper River;
- Ceasing abstraction when flow in the Roper River reaches 900L/s;
- Monitoring of extraction rates and water usage rates through AIR's process plant;
- Engage NRETAS to monitor ecological response to extraction within the Roper River; and
- Present water quality monitoring information obtained by PowerWater within an Annual Water Summary Report.

Ground Water

AIR will not utilise groundwater in the SILL80 project however, geochemical assessments highlight potential leaching of heavy metals from the placement of tailings into the mined out open pits. As a result of this a groundwater monitoring program to assess potential seepage of leachate from the open pits will be implemented. In the event leaching and/or heavy metals exceed current predictions and/or Australian

Drinking Water Guidelines, action will be taken to further investigate and quantify impact and mitigation measures will be employed such as compaction of the pit floors and/or addition of bentonite to inhibit migration of leachates.

Rehabilitation

Current land managers, in consultation with traditional owners, suggested the rehabilitation program focus on instating pasture species in disturbed areas post mining works.

Mined areas will be rehabilitated in a co-ordinated program between AIR staff and station managers in order to develop the area as a perennial grass rangeland for cattle grazing. As a perennial grass rangeland develops, the area will be grazed systematically. Native grasses, small shrubs and trees will also be encouraged. Success and failure will be determined through the use of photo monitoring, the presence/absence of weeds, and presence/absence of erosion. In general terms, it is expected that more than 80% perennial groundcover will be achievable and will indicate success.

Threatened Species

Flora and fauna surveys were conducted within and adjacent to ML27422; a desktop survey also was performed and all threatened species that may be found on the leases were considered. Two recorded species are considered threatened under the TPWC Act: the Australian Bustard (*Ardeotis australis*) and Mertens' Water Monitor (*Varanus mertensi*). It is considered unlikely that threatened or migratory species will be affected by this development.

MANAGEMENT OF OTHER RISKS

Transportation

AIR intends to transport concentrated Ilmenite to a Darwin warehouse using road trains, prior to shipping overseas. The proposed route for the road transport will utilise the Stuart and Roper Highways, and then join a new road, constructed by AIR through Numul Numul Station. At full scale production this will result in up to 20 road trains per day travelling on the Stuart and Roper Highways. With the increase in trucks for this development there is an increase in chance of road accidents, road degradation, congestion and emissions including noise. AIR will aim to minimise these risks through the development of a Standard Operating Procedure (SOP) aimed at limiting accidents particularly on the Roper Highway.

Erosion and Sedimentation

The Erosion and Sediment Control Plan (ESCP – Appendix H) outlines strategies for works to be undertaken to minimise soil erosion and the discharge of sediment to land and waterways as a result of mine development or operations, including stormwater controls, maintenance and monitoring programs and site specific ESCPs.

Construction design and management will comply with the Department of Natural Resources, Environment, the Arts and Sport (NRETAS) *Erosion and Sediment Control Plan Content* (2006). As such, principles of effective erosion and sediment control will be employed to minimise the extent and duration of any erosion and sediment generating activities and ensure the prompt stabilisation of land.

The integrity of receiving water bodies will not be adversely impacted as a result of this development, provided that the sediment control measures described in Appendix H are implemented.

Social and Cultural

Mitigation and management of social and cultural impacts will focus on protection of known archaeological, historical and cultural features as well as the encouragement and incorporation of continued consultation and feedback through:

- Bi-annual consultation with traditional owners and affected land holders; and
- Maintenance of a complaints register.

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- A. NRETAS PER Guidelines.
- A1. NRETAS – Request for Further Information.
- B. Flora and Fauna Report.
- C. Aquatic Vertebrate Survey.
- D. Social and Cultural Aspects Report.
- E. Archaeology Report.
- F. Radiation Survey.
- G. Water Management Plan.
- H. Erosion and Sediment Control Plans.
- I. Weed Management Plan.
- J. Biting Insect Management Plan.
- K. Rehabilitation Management Plan.
- L. Environmental Management Plan.
- M. AIR Commitments Table.
- N. Geochemical Characterisation.

Acknowledgements

We would like to thank the following organisations, groups and individuals for their time, experience, input and knowledge which assisted in the preparation of this report and the associated appendices.

- The Department of Natural Resources, Environment, The Arts and Sport – (Natural Resources Division, Water Resources Branch, and Environmental Planning, Policy and Regulation Branches), particularly Anthony Knapton and Des Yin Foo for assistance in the modelling of flows within the Roper River, Simon Townsend for assistance with the aquatic monitoring program, Ian Lancaster and Lisa Bradley for clarification and advice on requested information.
- The Department of Resources
- The Herbarium.
- The Northern Land Council.
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- David Wilson (Aquagreen Pty Ltd) - Aquatic Vertebrate Survey - for preparation of equipment, relevant permits, sampling method development, project execution and peer review of the Aquatic Vertebrate Survey. Thanks are also extended to the Darwin Museum for the generous loan of their boat for sampling purposes.
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- Bruce Ryan (Paulka Radiation Services Pty Ltd) – Radiation Assessment Report.

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- Special thanks is extended to Moira Lanzarin (Numul Numul Station) for ongoing assistance and input to ensure successful rehabilitation practices be developed for the benefit of land owners and managers as well as preventing adverse impacts to the land. Thanks are also extended for accommodating field studies and the warm hospitality provided during site visits.

1 Document Cross- Reference

As part of the environmental impact assessment process the Northern Territory Government (NTG) outlines the content of the Public Environmental Review (PER) document. The table below lists each of these content items and where they are discussed within the PER. Furthermore, after the PER was submitted the NTG asked for more detail about some of the items within the original PER; these items are similarly outlined in the subsequent table; the Further Information Cross-Reference.

1.1 PER Cross-reference

PER Guideline Section	Detail Requested in PER	PER Section / Appendix
General Content pg. 1-3	Copy of PER guidelines; request for Further Information	Appendix A; Appendix A1
	List of persons and agencies consulted during PER	Section 9.3
	Contact details for the proponent	Section 2.3
	Names of, and work done by, the persons involved in preparing the PER	Section 9.1
	Expertise of the people involved in work contributing to the PER	Section 9
General Information pg. 4	Title of the action/proposal	Section 2.2
	Name and postal address of designated proponent	Section 2.3
	Description of proposal location	Section 2.4
	Description of vegetation and land resources	Appendix B
	Outline of project objective	Section 5.1.1
	Legislative background for the proposal	Section 3
	Background to the development of the action	Section 2
	How the project relates to other projects within the region	Section 2.6
	Current status of the action	Section 2.7
	Consequence of not proceeding with action	Section 2.8
Description of Proposal General Aspects pg. 4-5	Objectives, benefits and justification for the action	Section 5.1
	Layout for the proposed action	Section 5
	Schedule for all relevant aspects of proposal	Section 5.2
	Tenure/s and any native title issues concerning the proposal	Section 2.4.1 and Section 3.1.2
	Relevant legislation	Section 3
	Standards, codes of practice and guidelines	Section 6 and Appendix L
	Employment and business opportunities	Section 5.6

PER Guideline Section	Detail Requested in PER	PER Section / Appendix
	Greenhouse gas emissions	Section 6.7.4
	Storage, handling, containment and emergency management of hazardous substances	Section 6.7.3
	Rehabilitation objectives	Section 5.7
	Detail on:	
	Ore characterisation	Section 2.7
	Radiation levels	Section 6.7.4
	Chemical and physical fate of flocculants	Section 6.7.3
	Information on transport impacts	Section 6.7.1
Description of Proposal Social and Cultural Aspects pg. 5-6	Archaeological survey	Appendix E
	Demonstrate aboriginal sacred sites protection	Section 3.2.6
	Social impact assessment	Appendix D
Alternatives pg. 6-7	Alternatives to proceeding with action	Section 4
	Alternative sites	Section 4.1
	Alternative rehabilitation methods	Section 4.6
	Alternative sources of water	Section 4.5
	Alternative environmental management techniques	Section 4.6
Risk Assessment pg. 7	Acknowledge and discuss project risks	Chapter 6
	Quantify and rank risks	Chapter 6
	Acknowledge uncertainty of risks	Chapter 6
	Potential scenario of benefits not reaching community	Chapter 6
	Members of community accepting residual risks	Chapter 6
Key Risks: Water Management including Extraction from Roper River pg. 7-9	Water Management Plan	Appendix G
	Detail of flow monitoring	Appendix G
	Assess salinity impacts at downstream sites	Section 6.2
	Estimate annual cease to flow events in Roper River	Appendix G
	Determine period river side pumps would need to be removed to mitigate flooding	Section 5.4.1.1
	Provide details and methods for rainfall collection	Section 5.4.5
	Provide indication of communities extracting from Roper River will be impacted by AIR operations	Section 6.2
	Provide assessment of flocculants fate	Section 6.7.3
	Provide a Biting Insect Management Plan	Appendix J
Key Risks: Rehabilitation of Disturbed Areas pg. 10-11	Provide Rehabilitation Management Plan	Appendix K
	Provide description of existing vegetation at an improved scale to 1:1,000,000	Appendix B
	Provide list of species to be used for rehabilitation	Appendix K
	Provide a list of landforms within MLA27422	Appendix B

PER Guideline Section	Detail Requested in PER	PER Section / Appendix
	Provide a list of soil types within MLA27422	Appendix B
	Discuss rehabilitation methodologies	Appendix K
	Detail water and fertiliser requirements for rehabilitation	Appendix K
	Indicate whether rehabilitation activities can provide local employment opportunities	Appendix K
	Provide an Erosion and Sediment Control Plan	Appendix H
	Provide a Weed Management Plan	Appendix I
	Discuss review and monitoring to gauge rehabilitation success	Appendix K
	Detail how flora surveys will inform rehabilitation in the case of threatened species	Appendix K
	Identify sources of top soil for rehabilitation	Appendix K
Key Risks: Potential Impacts to Threatened Species pg. 12	Provide results of formal flora and fauna surveys	Appendix B
	Provide details of threatened species identified through surveys	Appendix B
	Identify significant vegetation communities, fauna aggregations or colonies	Appendix B
	Provide assessment of impacts on aquatic vertebrate communities	Sections 6.2, 8.2 and Appendices C and G
Environmental Management pg.13	Provide management structure and roles in environmental management	Appendix L
	Management targets and objectives for environmental factors	Appendix L
	Proposed measures to minimise adverse impacts	Appendix L
	Performance indicators	Appendix L
	Proposed monitoring programs	Appendix L
	Information on land management if taken out of production	Appendix K
	Summary table detailing commitments made in PER – including timelines	Appendix L
	Provision for periodic review of EMP	Section 8
Environmental Offsets pg. 14	Identified impacts or detriments that cannot be avoided, reduced or mitigated at reasonable cost.	Section 7.1
	Risks of failure of management actions	Section 7.2

1.2 Further Information Cross-reference

On the 6th March the NTG requested further information (see Appendix A1) about the project so that it could be properly assessed. On the 29th of March a meeting was held between the NTG, the proponents and consultants to clarify some of the requested information. The table below outlines these requests, where required clarifies these requests from the 29th March meeting and shows where the relevant information is shown in the PER.

Activity	Comments and/or Cross Reference
Water Management	
Surface water catchment areas, runoff and relevant watershed information, plans and images, showing contours, drainage lines, and significant features, including existing pastoral lease water storage infrastructure	PER Current Land-Use section 6.5, ESCP Appendix H
Water management infrastructure: detail the type, numbers, storage capacity and construction details, dimensions and design of water management infrastructure e.g. ponds, tanks, pipes	PER Water Infrastructure section 5.4, Water Management Plan- Appendix G
Conceptual water balance taking into account inputs, outputs and interactions between surface and ground water, surface area stores and total catchment surface area per store/pit/dam	Water Management Plan- Appendix G
Water account for proposed operation which include modelled scenarios for periods of high and low rainfall	Water Management Plan- Appendix G
Overview of surface water monitoring program with maps showing locations of statutory and operational monitoring sites and details of site, sample type, parameters measured and frequency	Water Management Plan- Appendix G
Overview of groundwater occurrence locally and location of existing bores and whether groundwater monitoring would be required	Water Management Plan- Appendix G
Overview of biological/aquatic monitoring program and sample monitoring program including maps of monitoring sites and frequency	Water Management Plan- Appendix G, PER Environmental Management and Monitoring section 8.2
Water quality trigger levels	Meeting with NRETAS and DoR this was clarified as referring to surface and groundwater salinity at Ngukurr as well as groundwater and erosion and sediment control measures at the development site. PER Groundwater section 6.2.2, Water Management Plan- Appendix G and ESCP see Appendix H
Commitments to continuous improvement (e.g. maximising water recycling, minimising raw water usage) with defined objectives and completion dates	Water Management Plan-Appendix G

Activity	Comments and/or Cross Reference
Surface Water Extraction	
Define annual extraction limits and extraction regime	Water Management Plan-Appendix G and Commitments - Appendix M
Demonstrate how extraction limits and monitoring will show that natural river flow is not reduced at any time by more than 20% at the extraction site due to the combined effects of all extractions within the catchment	Meeting with NRETAS and DoR it was concluded that it was not feasible to know instantaneous extraction rates of other users; for this project it is expected that extraction not exceeding 20% of the instantaneous flow at the extraction point (pers. comm. Ian Lancaster) Water Management Plan-Appendix G.
Demonstrate how extraction limits and monitoring will show that natural river flow is not reduced at any time by more than 20% at Roper Bar due to the combined effects of all extractions within the catchment	See comment above. Water Management Plan-Appendix G.
Detail monitoring programs that would confirm a nominal 20% limit is adequate to prevent unacceptable impact on the downstream aquatic environment and prevent unacceptable impact to the water supply to the downstream community Ngukurr.	PER Water section 6.2, PER Biological/Aquatic Monitoring Program section 8.2, Water Management Plan Appendix G
Provide an assessment and report on the impact on salinity downstream from the extraction point caused by increased extraction by the Project	Water Management Plan-Appendix G
Provide location and details of alternative water sources or additional on-site water storage to minimise potential environmental impacts associated with surface water extraction during low flows	Water Management Plan-Appendix G
Water Quality	
Historical downstream water quality data at Ngukurr to describe existing baseline conditions and natural variations	Water Management Plan-Appendix G
Surface water quality monitoring program included in an updated Water Management Plan that is consistent with the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000b) including sample sites, frequency, parameters	Water Management Plan-Appendix G
Identification of alternative water supply for the Ngukurr community in the event water quality deterioration (e.g. increased salinity) is detected	Meeting with NRETAS and DoR it was clarified that Power and Water are currently exploring options for an alternative water supply at Ngukurr. Water quality measurements are to be incorporated into monitoring. Water Management Plan-Appendix G

Activity	Comments and/or Cross Reference
Water Re-Use	
Details on how raw water consumption will be minimised and re-use maximised, including design and location details on the proposed dewatering screened dams, must be provided.	PER Water Re-Use section 5.4.4
Clarify how the mostly dry waste regolith, after it has been through the screened dams, would remain dry during the wet season or when new waste from the wash trommels are being continually added.	PER Mining Process section 5.3
Informed quantitative water volume estimates, based on results of the bulk sample testing, are to be incorporated into the conceptual site water balance	Bulk sample has not been performed, however, water volume estimates are shown in Water Management Plan-Appendix G
Erosion and Sediment Control	
An Erosion and Sediment Control Plan that complies with Land Resources requirements must be provided to complete assessment of this Project. This includes: • Where clean surface water runoff would be diverted away from disturbed areas • Interception of runoff from disturbed areas into sediment control structures • Location, size, capacity and designs required for sediment basins, silt fences, mulch bunds and catchment drains • Proposed maintenance schedule and management of erosion and sediment controls • Proposed erosion and sediment control of haul roads, pipelines and other structures that may change surface water patterns	Erosion and Sediment Control Plan-Appendix H
Deposit Geochemistry	
Geochemical characterisation of the regolith must be provided to determine whether certain elements occur at elevated concentrations, solubility of dissolved constituents and how these results may impact water quality and management. This would also inform what elements should be included in site water quality monitoring programs.	Geochemical Characterisation - Appendix N and Water Management Plan-Appendix G
Current Land Use	
Conduct a risk assessment on potential social, environmental and economic impacts to the current land use and provide mitigation measures to reduce those risks	PER Current Land-Use section 6.5
Provide a general plan of the project infrastructure with key pastoral activity areas (including homestead, holistic management improved paddocks and stock yards)	PER Current Land-Use section 6.5
Provide detail on how the commitments made in the Social Cultural Aspects Report (Appendix D, PER) have been implemented to date and in the future. This includes how disruption to landowners and third parties would be minimised and communication to ensure access and pastoral business is maintained	PER Current Land-Use section 6.5, PER Social and Cultural section 6.7.2 Social and Cultural Aspects Report - Appendix D

Activity	Comments and/or Cross Reference
Provide details of the social management plan that would be developed for the SILL80 Project to ensure strategies are in place to address social impacts (as mentioned in section 6.4.3.2, PER)	PER Social and Cultural section 6.7.2 Social and Cultural Aspects Report - Appendix D
Formal agreement of maintaining access to existing infrastructure required to operate a pastoral lease and compensation of disturbance need to be addressed between all relevant stakeholders	PER Current Land-Use section 6.5
Provide details on how Project activities will be managed so that the existing pastoral land use is not compromised e.g. development of road access usage protocols to ensure cattle mustering and access to stockyards is not disrupted	PER Current Land-Use section 6.5

2 General Information

2.1 Purpose of this Public Environmental Report

This Public Environmental Report (PER) provides information to allow a formal assessment under the *NT Environmental Assessment Act 1982* (EA Act) at the request of the Northern Territory Minister for Natural Resources, Environment and Heritage (the Minister). The PER will provide the Minister with the necessary information to make informed recommendations to the Responsible Minister/relevant consent authority in accordance with the EA Act. This PER has been prepared in accordance with the NRETAS *Guidelines for the Preparation of a Public Environmental Report, SILL80 Project, Roper River area, NT* (NRETAS April 2011, Appendix A).

The PER was submitted to the Northern Territory Government (NTG) on 28th January 2012. In February 2012, the NTG requested that further information be provided to enable a full and proper assessment of the project and its environmental impacts and risks. On the 1st March 2012 the proponent asked the NTG to stop assessing the project to allow this information to be provided. The request for further information is attached as Appendix A1.

The key risks identified by the Northern Territory Government in the original guidelines, through analysis of the Notice of Intent (NOI) for the SILL80 Project, were:

1. Extraction of water from the Roper River used for processing ore:
 - Average cease to flow occurrences in the Roper River may increase with significant amounts of extraction; and
 - Impacts may be caused downstream from the extraction point to water quality and supply for other users and wildlife.
2. Effectiveness of the proposed rehabilitation over large areas:
 - Identification of suitable revegetation species;
 - Supply and sources of an adequate seed bank or seedlings;
 - Soil erosion and weed management over large areas; and
 - Timing of establishment and water requirements.
3. Potential impacts to threatened species:
 - Annual clearing and strip mining of 15-25 ha of native vegetation could impact on local threatened species; and
 - Identifying any listed threatened species, particularly flora, will provide better information for management and rehabilitation.

Since NRETAS provided the Request for Further Information, impacts to Land Use has also been added as a key risk.

2.2 Proposal Title

SILL80 Ilmenite Project.

2.3 Name and Address of Proponent

Proponent: Australian Ilmenite Resources Pty Ltd
Contact: Geoff Fanning, Director
Main Office: 8/4 Shepherd Street, Darwin NT 0800
Postal Address: PO Box 947, Darwin NT 0801
Phone: 08 8941 3213; Fax: 08 8941 3498
Email: geofffanning@Ilmenite.com.au

2.4 Land Tenure and Location

2.4.1 Land Tenure

Australian Ilmenite Resources Pty Ltd (AIR) proposes to develop its SILL80 Ilmenite Project (ML27422), within Substitute Exploration License (SEL28291), located within the Roper Gulf Shire, Perpetual Pastoral Lease 1161, Land Parcel NT Portion 4970 Chatterhoochee (Namul Namul) (Figure 2-1). The Indigenous Land Corporation (ILC) acquired Numul Numul station in 2000, on behalf of the Traditional Owners (Namul Namul Aboriginal Corporation). The area was sub-leased in 2001 to the O'Brien family who continue to manage the property as a cattle station. The area is under Native Title Claim Chatterhoochee lodged with the Federal Court in 2001 by the Traditional Owners represented by the Northern Land Council (NLC).

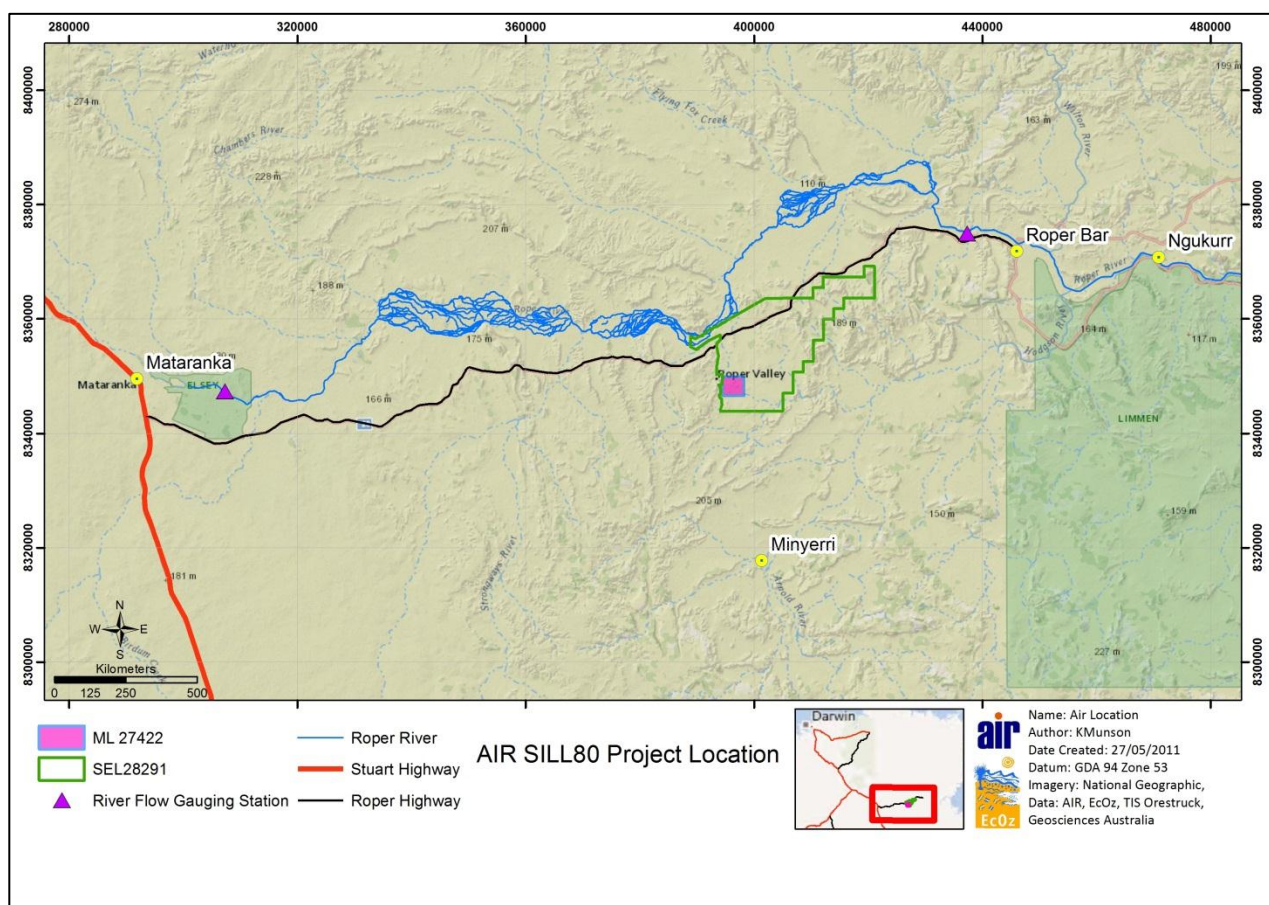


Figure 2-1. Location of Proposal.

2.4.2 Project Location

The property is located in the Roper River Region of the Northern Territory, 8 km south of the Roper Highway. The major townships in the area are Mataranka (Population ~ 600) 105km to the West and Ngukurr (Population ~ 1,600) 80km to the East. The proposed mine site is approximately 12km south of the Roper River, 4km south-east of the Kewulyi Aboriginal Community Outstation (old Roper Valley Homestead) and 1km south-west of Numul Numul homestead.

2.5 Resource

The SILL80 Project forms part of AIR's larger Roper Heavy Minerals Project and arises from exploration results within AIR's Exploration Leases (EL23048, EL24655, and EL24986), which were amalgamated into Substitute Exploration Licence (SEL28291) indicating a resource of approximately 120 million tonnes at 10% - 25% Ilmenite (FeTiO_3). This PER specifically relates to development of the SILL80 Project within ML27422 (mining) and MLA29042 (infrastructure).

ML27422 contains an estimated Ilmenite (FeTiO_3) resource of approximately 4.5 million tonnes (non- JORC compliant, as AIR is a Private Company and not required to report to ASIC). Based on this, the mine could operate in excess of 20 years dependent on further ore body definition. Details of any mining planned for ore that extends beyond ML27422 will be submitted separately for assessment if considered desirable.

The Ilmenite mineralisation results from the weathering of dolerite sills within the top 3 m of regolith. As such, Ilmenite recovery will require strip mining using excavators to remove the regolith to a maximum depth of 4m. Excavations will progress along 300m x 200m wide strips, allowing for successive rehabilitation of mined strips, which are backfilled with the residual material following extraction of the Ilmenite. Only water is used in separating the Ilmenite, leaving between 75 – 90 % of the original regolith material for infilling mined pits once excavations move to the next strip. Initially, AIR proposes to produce 100,000 tonnes of Ilmenite concentrate per annum, requiring the excavation and processing of between 400,000 and 1 million tonnes of regolith per year. Each pit will cover an area of approximately 6ha.

The Roper Heavy Minerals Project, incorporating the SILL80 Project, covers a large area of heavy minerals prospective ground in the Roper River Region of the Northern Territory. Ilmenite mineralisation in the project region results from weathering of dolerite sills close to the surface (within the top 3m of regolith), where Ilmenite grains have been liberated from the host rock and lay in-situ. The Ilmenite-bearing dolerite sills and their associated deep red-purple-brown, clay-rich soils have been mapped throughout the SILL80 Project area. To date, exploration has focussed on locating and characterising these sills using remotely sensed data (geophysics, satellite imagery, and aerial photography), helicopter-supported sampling, GPS-assisted gridding, soil and lag sampling, and hand/mechanical auger drilling. Over 6,000 auger and RC holes have been drilled and in excess of 20,000 samples taken, analysed, and reported to the Department of Resources. ML27422 within the SILL80 Project area was identified for mine development based on exploration results, ease of access, proximity to existing highways, and the relatively flat topography, simplifying mining operations. The land is currently used for cattle grazing.

2.5.1 Project Period

Exploration results within ML27422 indicate an Ilmenite (FeTiO_3) resource of 4.5 million tonnes, which would sustain a mine life in excess of 20 years. Representative samples are being used to further refine Ilmenite grade estimates and plan open pit mining operations. They will also be used to test the processing plant to determine specifications and practically test the planned water usage requirements.

Further ore body definition and characterisation will continue within ML27422 and SEL28291 and future mining will follow the most economic mineralisation. Any mining that extends beyond ML27422 however, is beyond the scope of this PER and would be submitted as a separate application for environmental approval.

2.5.2 Ilmenite Uses

Ilmenite is a metallic to submetallic mineral that is generally iron black. It is now the most important ore from which titanium is sourced. Titanium is light weight, non-corrosive, able to withstand temperature extremes (melting point, 1800°C) and it has good strength (as strong as steel and twice as strong as aluminium). Titanium alloys have found many applications in high tech airplanes, missiles, space vehicles and even in surgical implants.

Titanium dioxide (TiO₂) is a white pigment that is used more and more in paints as lead paint is discontinued due to health considerations. In fact, the largest percentage (up to 95%) of worldwide use for titanium is for the production of this white pigment. The pigment has great lustre, good endurance, high opacity and a pure white colour. The pigment is also used to provide colour for rubber, plastics, textiles, ink, cosmetics, leather, ceramics and paper (Mineral Zone 2005).

Extracted ilmenite (FeTiO₃) from ML27422 is to be shipped to China where it will be used to produce titanium dioxide (TiO₂), an important base pigment in paint, paper, and plastics. Market demand for titanium dioxide is growing rapidly in China and further processing will occur to produce Synthetic Rutile or Titanium Sponge.

2.6 Related Proposals

Western Desert Resources Limited and Sherwin Iron Limited are both currently in the process of developing Iron Ore projects in the Roper River Region. The Western Desert Resources Roper Bar Iron Ore project is situated approximately 80km south east of the Roper Bar. An Environmental Impact Statement concerning the development is currently under assessment with Iron Ore exports predicted for 2014.

Sherwin Iron Limited has expressed intention to develop their Hodgson Downs Iron Ore Project, 40kms to the south west of SILL80. The potential development of additional transport options, although possibly beneficial to this project, is beyond the scope of this report and therefore will not be explored in detail.

2.7 Current Status of Proposal

AIR's SILL80 Ilmenite project is currently awaiting relevant environmental approvals before mine development can progress. A brief outline of the process to date is listed below:

- Ilmenite resource has been explored and defined within AIR's exploration Licenses EL23048, EL24655 and EL24986.
- Granting of Mineral Lease 27422 at the end of 2011.
- Mineral Lease Applications submitted for ancillary area MLA29042.
- Northern Land Council consulted on potential issues with proposed development.
- Notice of Intent (NOI) to develop the SILL80 Ilmenite mine project within ML27422 submitted to the Northern Territory Government and other interested parties.
- AIR amalgamated exploration Licenses EL23048, EL24655 and EL24986 into Substitute Exploration License (SEL) 28291.
- Public Environmental Report (PER) requested to provide information to the Minister of the Environment for this proposal under the *Environment Assessment Act 1982*; and
- Aboriginal Areas Protection Authority (AAPA) consulted concerning ML27422 and pipeline route – with results included in this PER.
- Stakeholder and authorities consultation undertaken, field studies performed and development of PER document.

- The PER submitted on the 28th January 2012.
- After consultation with government authorities, AIR elected to stop the assessment process, and develop and provide further information to ensure sufficient information was provided for the adequate assessment of the environmental impacts from the project.

Simultaneous to the development of the additional information to the PER, the proponent has:

- Begun purchasing and assembling processing equipment and infrastructure for the mine and preparing for construction; and
- Prepared to perform a bulk sample test to analyse ore characteristics and provide grade estimates (scheduled for late 2012).

2.8 Consequence of Not Proceeding with Proposal

The primary consequence of not proceeding with this proposal would be lost economic opportunity from the Ilmenite resource contained within land currently used for pastoral purposes.

This lost opportunity will impact the Traditional Owners, the pastoral lease holders, the owners of the pastoral lease containing the camp infrastructure, local people and contractors, Mataranka, Katherine and Darwin businesses and councils as well as the proponent.

Impacts might include:

- Loss of royalties for land owners and traditional owners;
- Loss of employment opportunities, particularly for people from the local communities, such as Kewulyi (Roper Valley Homestead), Minyerri, Jilkminggan, Mataranka and Ngukurr; and
- Loss of revenue for businesses that might otherwise have the opportunity to supply goods and services to the mine.

3 Legislative Background

This section identifies the legislation relevant to this development and introduces the aims and intent of the legislation and how these intents have been addressed in this development.

3.1 Commonwealth Legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

Assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is required for actions that are likely to have a significant impact on a matter of national environmental significance, or on the environment in general by Commonwealth agencies, or on Commonwealth land.

The matters of national environmental significance are:

- World Heritage properties
- National Heritage places
- Wetlands of international importance (Ramsar wetlands)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park, and
- Nuclear actions (including uranium mines)

The Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) administers the Act and has established a formal referral and assessment process. If SEWPaC determines a project will likely significantly impact a matter of national significance it is declared a “controlled action” and is required to undergo assessment and approval under the EPBC Act. In the Northern Territory this will be through the bilateral agreement between the Northern Territory and Australian governments. If the project is not a controlled action, assessment will proceed under the Northern Territory legislative approvals process.

Environments affected by the SILL80 Project include those within the mining and processing plant area, the immediate areas surrounding these operations, and along the road used by mine vehicles and trucks to access the mine. The Roper River section located 12 km north of the mine used for water extraction (Figure 3-1) will also be affected. An EPBC Act Protected Matters Report generated on these locations and the 10 km wide area surrounding them indicates neither the mine site nor the section of Roper River used for water extraction is within or near a site mentioned in the matters of national environmental significance mentioned above.

In regards to nuclear actions, the project does not involve uranium mining. Additionally, the EPBC Act excludes the mining of potentially radioactive mineral sands or rare earths as a nuclear action. Therefore, the project is not considered a nuclear action.

The project is in the vicinity of recorded habitats for nationally listed threatened species and nationally listed migratory and marine species (discussed in Appendix B). Potential impacts on the overall status of these species are considered minimal, and the terrestrial and aquatic ecology investigations have supported this (Appendices B and C). Therefore this project has not been referred to the EPBC Act.

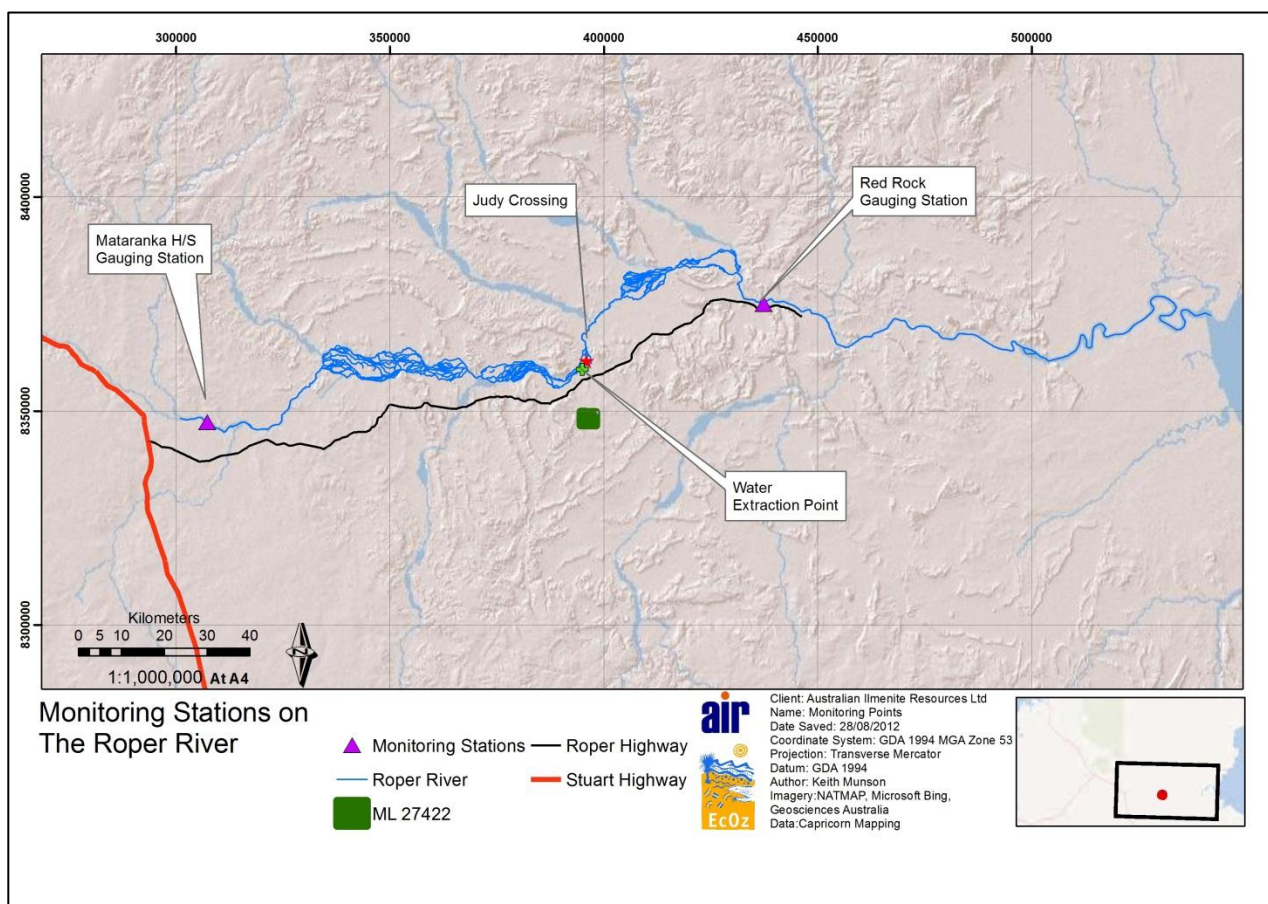


Figure 3-1. The Roper River Extraction Point in Relation to ML27422.

3.1.2 Native Title Act 1993

The *Native Title Act 1993* provides legal recognition of the rights and interests of the Aboriginal people over land and water possessed under their traditional laws and customs. The Act sets out basic principles regarding native title in Australia and establishes a regulating and governing body, the National Native Title Tribunal.

The Act also sets out processes by which native title rights are established, protected and compensation determined. Another important function of the Act is through facilitating Indigenous Land Use Agreements between native title parties and other interest holders.

Exploration Licence and Mineral Lease applications on Pastoral Lease land in the NT are subject to the Native Title Act. ML27422 is wholly within Perpetual Pastoral Lease 1161. The Indigenous Land Corporation (ILC) acquired this land in 2000, granting it to the Traditional Owners (Namul Namul Aboriginal Corporation) who currently sub-lease it to the O'Brien family who manage it as a cattle station. The Traditional Owners, represented by the Northern Land Council (NLC), have also lodged a Native Title Claim *Chatterhoochee* with the Federal Court in 2001. All activities associated with the proposal are proceeding under the assumption that Native Title exists.

Australian Ilmenite Resources Pty Limited has instigated a community consultation strategy based on open sharing of information with all stakeholders and communities including the NLC and Northern Territory Government. AIR has developed a stakeholder matrix and consultations with key stakeholders such as Australian and Northern Territory Government departments, land councils, land managers, land owners and traditional owners has been open and ongoing since exploration began in the area.

AIR collaborates with Indigenous communities by identifying and protecting areas of cultural significance while it consults with traditional owners and land councils about the company's current and planned activities. This ensures that respect and trust occurs both ways with AIR respecting the connections of Aboriginal people with their land and sites of significance and the Aboriginal people and their Councils respecting the staff and the work carried out by AIR.

3.1.3 Aboriginal Land Rights (Northern Territory) Act 1976

The *Aboriginal Land Rights (Northern Territory) Act 1976* provides for the granting of inalienable freehold title to traditional Aboriginal owners of land in the Northern Territory, the establishment of Land Councils, and the establishment and management of Land Trusts to hold the Aboriginal land for the benefit of traditional owners of the land. The Act also regulates exploration and mining on Aboriginal land and sets out the processes to be followed when negotiating with Traditional Owners for access to and leases over Aboriginal land. An exploration license cannot be granted in relation to Aboriginal land without the consent of the relevant Land Council (for the traditional owners) and the Minister. A mineral lease cannot be granted unless an agreement has been entered into under the act.

ML27422 is wholly within pastoral lease land, which is owned by the local Aboriginal Traditional Owners but it is not Aboriginal freehold title.

3.2 Northern Territory Legislation

Environmental permitting of mining activities is regulated in the Northern Territory by both the Mining Management Act and the Environmental Assessment Act.

A decision on the appropriate permitting route for new mining proposals in the Northern Territory is initiated by the proponent's submission of a NOI to the Northern Territory Government through the Minerals and Energy Referral Assessment branch of the Department of Resources (DoR). If assessment under the Environmental Assessment Act is thought to be required, the NOI is referred to the Minister for Natural Resources, Environment and Heritage through NRETAS for determination of the appropriate level of assessment. This project has been determined as requiring a PER. The Environment and Heritage Division (E&H) prepares Draft Guidelines for a project which is required to be assessed under the *Environmental Assessment Act* in consultation with relevant advisory bodies. The Draft Guidelines provide advice to the proponent regarding the issues that will need to be addressed in the PER.

Draft guidelines are made available to the public for comment and review for a period of 14 days. At the close of this period, E&H takes into consideration any public comments and advice from relevant advisory bodies and finalises the Guidelines for approval by the Minister for Natural Resources, Environment and Heritage. Once approved, the Minister forwards the final Guidelines to the proponent to prepare the PER. Reports are available to the public as a hard copy at the E&H Division.

Once the proponent receives a copy of the final Guidelines and a direction from the Minister for Natural Resources, Environment and Heritage to prepare a Public Environmental Report (PER), the proponent prepares the PER. There is no statutory timeframe in which the proponent is to prepare the PER unless specified by the Minister.

Once the PER has been prepared it undergoes a maximum public review period of 28 days. During this time, the PER is also circulated to various government advisory bodies for comment in their area of expertise. Invitation for public comment is advertised by the proponent in various media, and copies of the PER are placed on display at NT libraries and other suitable locations as well as the Northern Territory Government website. The proponent also makes copies available for sale.

At the close of the public review period, the Minister has 14 days in which to make a determination about the proposal. This decision is based upon the contents of the PER, issues raised in any comments received and advice from the various advisory bodies. The Minister's determination is included in the Assessment

Report which also includes any suggestions or recommendations concerning conditions which should apply to the proposal in order to minimise potential environmental impacts and to protect the environment. The Assessment Report is forwarded to the approving Minister for consideration (that is, the Minister responsible for approving the proposal).

The Assessment Report is publicly available through the web site. All Assessment Reports are available to the public as a hard copy at the Environment & Heritage Division.

Following completion of the assessment and approval process under the Environmental Assessment Act the DoR proceeds with the approval process under the *Mineral Titles Act 2010* and *Mining Management Act*.

3.2.1 Mineral Titles Act 2010 and Mining Management Act 2011

The *Mineral Titles Act 2010* and the *Mining Management Act* are the principal legislation for the regulation of mining proposals in the Northern Territory, both of which are administered by the DoR.

The *Mineral Titles Act 2010* establishes the framework within which activities to explore for and mine mineral resources can occur. The Act sets out the administrative processes for authorising these activities through the granting of a title.

AIR currently holds the Exploration Licences encompassing the proposed mine area (SEL28291, an amalgamation of EL23048, EL24655, and EL24986) as well as ML27422. A Mineral Lease Application is current for MLA29042.

Prior to any activities taking place on a granted Mineral Lease, an authorisation to carry out mining activities under the Mining Management Act must be obtained. The objectives of the Mining Management Act are to ensure that the development of mineral resources is in accordance with the best practice health, safety and environmental standards and to protect the environment and health and safety of all persons on mining sites.

Under the Mining Management Act, an application for an authorisation to carry out mining activities must be accompanied by a Mining Management Plan (MMP). An MMP includes information relating to the description of mining activities, the management system to be implemented for the management of health, safety and environmental aspects, costing of closure activities and particulars of organisational structure. Plans of any existing or proposed mine workings and infrastructure must also be included. The MMP is required to be reviewed at intervals specified in the authorisation to carry out mining activities.

3.2.2 Environmental Assessment Act 1994

The *Environmental Assessment Act* and the *Environmental Assessment Administrative Procedures* establish the framework for the assessment of potential or anticipated environmental impacts of development, and provide for protection of the environment. The Northern Territory Minister for Natural Resources, Environment and Heritage is responsible for administering the Act. The Minister also determines the appropriate level of assessment for new developments or material changes to existing operations, based on the sensitivity of the local environment, the scale of the proposal and its potential impact upon the environment.

This PER reports to the administrators of the Environmental Assessment Act and members of the public the potential impacts of the project and demonstrates that the risks have been appropriately addressed.

3.2.3 Water Act 2011

The *Water Act* is administered by the Water Resources Branch of the NRETAS and provides for the investigation, allocation, use, control, protection and management of surface water and groundwater resources, as well as the administrative process for licensing these activities. The Act allows the

enforceable allocation of water to various declared beneficial uses including; agriculture, aquaculture, public water supply, riparian and industry, while ensuring that adequate provisions are made to maintain cultural and environmental requirements.

Water Control Districts are declared in areas where it is recognised that increasing development and demand for water have the potential to cause degradation to water quality and reduce flows required to maintain water dependent ecosystems in the region. Water extraction licences are required for extraction greater than 5 ML/year within a Water Control District however mining activities are exempt from this requirement as well as water extraction for domestic or stock watering purposes. A water control district has been declared for the Daly Roper Region, which includes ML27422 and MLA29042. The project will be exempt from requiring a water extraction licence, however in order to ensure sustainable use of the water resource, and to fulfil Guideline obligations, a Water Management Plan has been developed detailing metering, monitoring and reporting requirements to minimise negative impacts on the environment and other users from the Roper River (Appendix G).

Water allocation plans are developed for specific areas within water control districts, ensuring water is equitably managed. Water allocation planning has commenced for the area around Mataranka, which does not include ML27422 and MLA29042 but is relevant to the project since it involves the allocation of groundwater from aquifers that supply important baseflows to the Roper River, and the subsequent water users downstream.

In regards to waste disposal licensing, this project is not planning to discharge any waste off the Mineral Lease, if off-lease discharge is required a waste discharge licence will be sought. Waste is defined in the Water Act as any solids, liquids or gas, which, if added to the water, may pollute the water.

3.2.4 Territory Parks and Wildlife Conservation Act 1976

This Act applies statutory obligations in relation to the protection of flora and fauna. This Act allows the listing of threatened species with special conservation status, and requires a permit to be obtained prior to interference with these species.

3.2.5 Pastoral Land Act (NT) 1992

The *Pastoral Land Act 1992 (NT)* makes provision for the conversion and granting of title to pastoral land as well as the administration, management and conservation of pastoral lands. The objects of the Act are, amongst other things, to provide a form of tenure of Crown land that facilitates the sustainable use of land for pastoral purposes, recognise the right of Aboriginal people to follow traditional pursuits on pastoral land, and provide a procedure to establish Aboriginal Community Living areas on pastoral land.

Pursuant to the terms of the Act a pastoral lease is subject to a reservation in favour of the Aboriginal inhabitants of the NT and of the leased land. It allows for the Aboriginal inhabitants to take and use the water, flora and fauna on the leased land subject to certain restrictions and conditions.

The Act allows for a pastoral lessee, with the consent of the Minister, to sublet part of the leased land for Aboriginal community living purposes to an incorporated body set up for the management of the Aboriginal community. The Act also provides for Aboriginal people to apply to the Minister for an area of land comprised in a pastoral lease to be removed from the pastoral lease and granted to the applicant as freehold land for the purpose of a community living area (this provision is similar to provision repealed in the Crown Lands Act).

AIR has been consulting with both the lease owners and the lease holders. Both stakeholder groups have been kept informed of the proposals progress and plans and have provided valuable feedback as to their rehabilitation desires.

3.2.6 Northern Territory Aboriginal Sacred Sites Act 1989

The *Northern Territory Aboriginal Sacred Sites Act 1989* recognises the need to preserve and enhance Aboriginal cultural tradition in relation to certain land in the NT and Aboriginal self-determination. The Act provides for the protection and registration of sacred sites by the traditional owners of the sacred sites or the custodians who have the responsibility for protecting a sacred site in accordance with Aboriginal tradition.

The Aboriginal Areas Protection Authority (AAPA) is responsible for administering the Act and records and maintains a sacred sites register. Custodians may apply to the AAPA to have a sacred site included in the Register and may also include, amongst other things, restrictions on activities that may be carried out on or in the vicinity of the sacred site.

Unauthorised entry on to a sacred site is an offence under the Act and penalties are prescribed accordingly. A person or entity may apply to the Authority to issue an Authority Certificate to allow a person or entity to undertake work on or in the vicinity of a sacred site. Again, unauthorised entry to undertake work on or in the vicinity of a sacred site is an offence under the Act and penalties are prescribed.

The Minister may issue a Minister's Certificate for work to be undertaken on or near a sacred site when an Authority Certificate has not been issued. Whilst a Minister's Certificate has the same effect as an Authority Certificate, in the event of variance the Authority Certificate will have no force or effect.

The Act provides for the preservation of proprietary rights of owners of land comprised in a sacred site. Proprietary owners may enter and remain on that land and do anything on that land for the normal enjoyment of that owner's proprietary interest in the land.

AIR have made application to AAPA for an authority certificate to perform works in within ML27422 as well as the location of the water pipeline (Figure 3-2). Note – pipeline has since been relocated to prevent passage through restricted works areas.

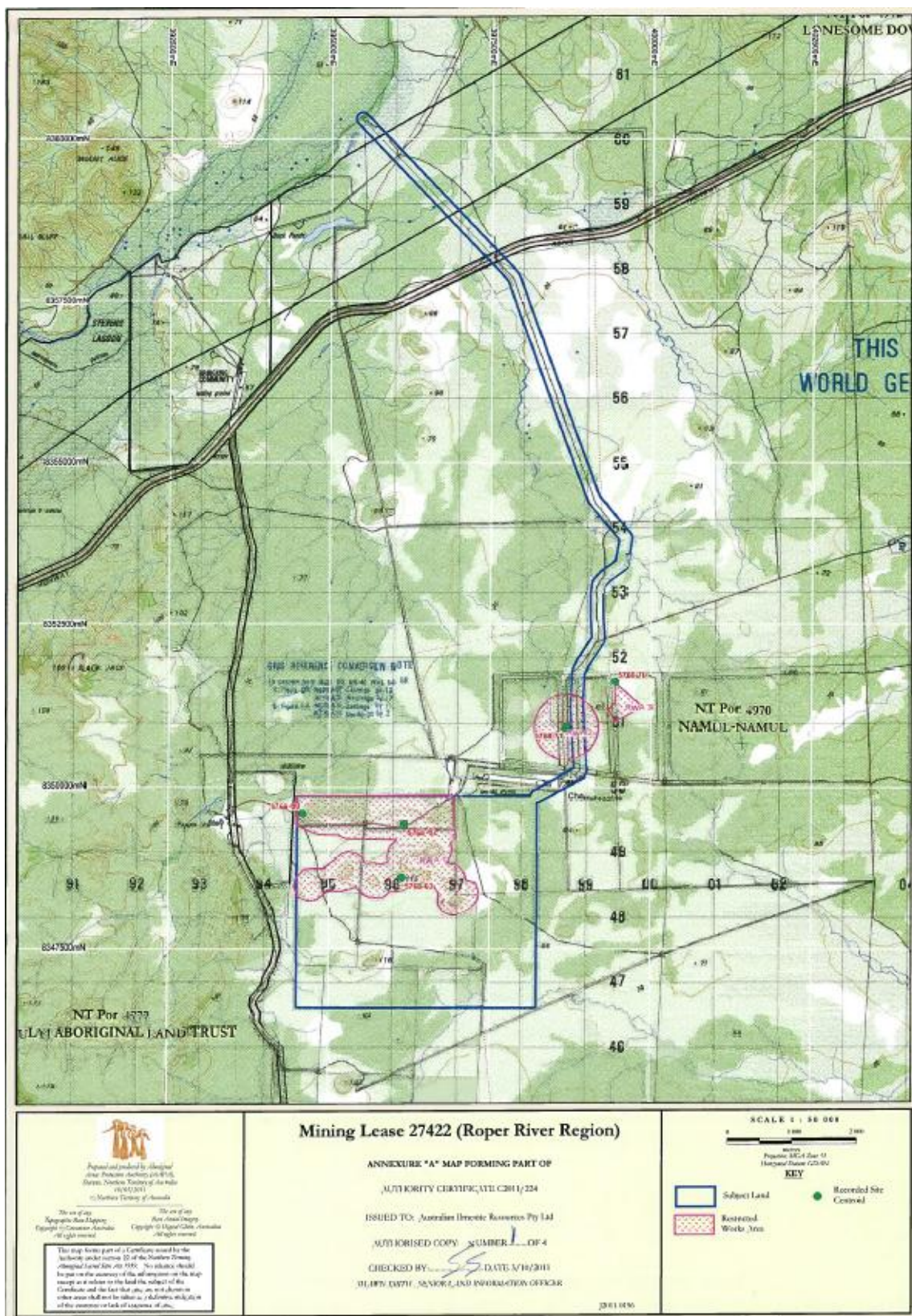


Figure 3-2. Initial AAPA identified restricted works areas in relation to SILL80 Project

3.2.7 Other Relevant Legislation

Other Northern Territory legislation relevant to the project includes the following acts and their associated amendments and regulations:

- *Bushfires Act 2009.*
- *Control of Roads Act 2011.*
- *Dangerous Goods Act 1998.*
- *Environmental Offences and Penalties Act 1996.*
- *Heritage Conservation Act 1991.*
- *Planning Act 1999.*
- *Soil Conservation and Land Utilisation Act 1980.*
- *Traffic Act 1987.*
- *Waste Management and Pollution Control Act 1998.*
- *Weeds Management Act 2001.*
- *Work Health and Safety (National Uniform Legislation) Act 2011.*

4 Alternatives

4.1 Site Alternatives

AIR's SILL80 Project has been selected for development due to the relatively rich Ilmenite deposit, minimal excavation requirements, viable transportation option and necessary water for processing requirements. AIR investigated other potential deposits such as their BUKA and BMC deposits.

ML27422 and MLA29042 occur wholly within Numul Numul Station. The area proposed for mining and the associated infrastructure exists entirely within an area currently used for cattle production. Sections of the Mineral Lease are within the laneway and cattle mustering area of the property meaning this area is regularly subject to high stocking numbers associated with mustering practices.

4.1.1 Infrastructure Development

Immediately adjacent to ML27422 has been identified for location of the processing plant, drying pad, office, camp and stock pile areas. An application for ancillary MLA29042 has been lodged to include these areas (Figure 5-1). This area will house all relevant supporting infrastructure associated with the mineral processing plant. This reduces the distance materials need to be transported for processing and return to mined areas. The area will require clearing prior to development. This location has been nominated as there is no Ilmenite within this area and therefore the plant will not require relocation. This allows permanent structures to be developed and potentially utilised by land owners and managers post completion of the SILL80 Project.

4.2 No Development Option

Should the SILL80 project not proceed to development, the land would continue to be utilised for cattle production. Economically, this would mean a lost business opportunity for the traditional owners of the land. Further to this, additional employment opportunities for the local community would not be created, which may be particularly detrimental in a region with limited opportunities for employment, and local businesses would lose an opportunity to supply directly or indirectly to the mine (including transportation companies). Infrastructure improvements on Numul Numul Station, particularly access tracks, would continue at the existing rate of development.

4.3 Alternative Sources of Raw Materials for the Project

Raw materials can be separated into those supplied on site i.e. ore, water and earthen materials for construction and processing, and those purchased and brought to site. Earthen and gravel material will be utilised to construct and maintain the site. This will be supplied through the development of gravel pits on site. Environmental and cultural clearances are to be sought prior to development in line with processes outlined in EMP and MMP, before any new ground disturbing activities take place.

Water requirements for the site are detailed in Chapter 4 (alternative water sources) and Chapter 5 (water infrastructure).

Fuel will be the major product required during mining and processing and fuel purchase and supply arrangements have been made with a Darwin Company. Fresh goods and supplies for the camp will be offered on a competitive basis to the supplier who can provide the most efficient and effective service.

4.4 Alternative Transport Corridors

AIR had intended to use the existing Hodgson River Road to access Numul Numul Station. During the consultation process it was highlighted that the existing Numul Numul Station tracks are within a cultural exclusion area and any road work beyond maintenance was not permitted. AIR discussed the possibility of constructing an access road to Numul Numul Station further south along the Hodgson River Road that would bypass all exclusion zones. This proposal was viewed positively by stakeholders on the condition that the final path is confirmed by traditional owners of Numul Numul station prior to any excavation works. This road, however, still required access using Hodgson River Road potentially resulting in increased noise, dust and road degradation. After consideration of minimising negative impacts on the local community, improving station access and developing worthwhile infrastructure to exceed the life of the mine AIR committed to constructing a road from the Roper Highway through Numul Numul Station, to join existing station tracks at the cattle yards (Figure 5-3). This road will be 6m wide, within a 15m wide corridor, of gravel construction that will allow good dry season access for road trains and access for maintenance vehicles during the wet season.

4.5 Alternative Water Sources

4.5.1 Groundwater

The Tindall Limestone, Dook Creek dolomitic and other smaller carbonate aquifers maintain dry season river flows in the Roper River, and as such, their water dependant ecosystems. Except for these aquifers, which are located at the far edge of the catchment, and scattered pockets within, the region is generally poor in groundwater. Groundwater resources near ML27422 are typical for the catchment, comprising fractured and weathered rocks with bores yielding less than 1L/s. Groundwater is utilised in the area for some stock and domestic supply, however yields are inadequate to meet the water use requirements for AIR's SILL80 project.

4.5.2 Catchment Dam

The Roper River Region has a significantly high evaporation rate (mean annual rate about 2400mm), which exceeds annual rainfall, even in particularly wet years.

Roper Bar store, 60km downstream of AIR's proposed water extraction point, provides the nearest point for which there are rainfall records. Average rainfall is 787.7mm/year with observations ranging from 502.6 - 1133mm/year. This, measured against the average evaporation rate of 2400mm, poses significant losses to water stored in an open dam.

ML27422 is surrounded by areas of generally flat topography with small intermittent water courses which flow only during periods of significant rainfall. The black and red soils present throughout Numul Numul station are porous and display poor water retention abilities. The topography of the area and surface water resources available are not conducive for construction of a catchment dam – particularly due to the low level of ground fall and high evaporation rates. For a catchment dam to meet the needs of AIR's proposed operations, significantly greater volumes of water would need to be stored, than required for processing, to compensate for evaporation and transpiration losses. The high levels of evaporation coupled with the variation in seasonal rainfall observed in the Roper River catchment renders open earthen catchment dams to be an un-reliable water source for AIR's Ilmenite processing requirements.

4.6 Alternative Environmental Management Techniques

The evolving mine decommissioning and closure plan will research and possibly trial several different surface stabilisation and erosion prevention strategies, revegetation methods and other strategies that will benefit final closure and relinquishment.

Environmental management is addressed in detail in Chapter 8 and their implementation is documented in the EMP provided in Appendix L.

4.7 Alternative Decommissioning Options

Conceptual plans for the decommissioning of the site are detailed in Chapter 5.7 Rehabilitation and Mine Closure. ML27422 is located in a highly prospective region and there may be opportunities to utilise the facilities for Numul Numul Station. All such alternatives will be explored throughout the life of the project.

5 Proposal Description

5.1 Objectives, Benefits and Justification for the Action

5.1.1 Objectives

Objectives for the SILL80 project can be summarised to:

1. Develop a profitable business venture;
2. Support and meet future demand for raw Ilmenite and Ilmenite products;
3. Operate in an environmentally sustainable manner; and
4. Create and support socio-economic opportunities for the local communities.

5.1.2 Benefits

Benefits for proceeding with this project include:

1. Economic and employment opportunities;
2. Opportunities for local businesses;
3. Training opportunities;
4. Positive legacy for future generations; and
5. Create a profit for shareholders.

5.1.3 Justification

This project is important to support a rapidly growing demand for Ilmenite and Ilmenite containing products. ML27422 contains a resource considered capable of supporting a project in excess of 20 years.

5.1.4 Project Infrastructure

The project will be owner operated and comprise (refer to Figure 5-1 for location of infrastructure).

Within ML27422:

Infrastructure	Size	Description
Process and refinement plant	520 m ²	Adjacent to storage shed will be a two level structure housing 120 nylon wash spirals, associated pipework, and storage tanks.
On-site drying pad	800 m ²	40m by 20m pad of 100mm thick concrete used to dry refined Ilmenite prior to packaging and transportation to markets.
Storage shed	2000 m ²	Used to stockpile refined Ilmenite prior to transportation to Darwin.
On-site office	20 m ²	Fabricated office building for daily operation purposes.
Workers camp	12 persons	Camp will be located adjacent to processing plant and will

		comprise 5 relocatable buildings including. Of these 3 will be accommodation units (4 rooms per building), 1 communal kitchen unit with dining area and 1 communal W.C and laundry unit.
Camp and process area power generator	1.3 mega-watt plant	Located adjacent to the storage shed to supply power to processing plant, camp and office.
Self-bunded fuel storage station	61,000 litre diesel capacity	For machinery and power generation.
Vehicle wash down bay	400 m ²	Concrete pad with appropriate drainage pits for washdown.
Septic unit		Ozzikleen RP10 sewerage treatment plant.

Outside ML27422

Infrastructure	Size	Description
Submersible water pump	16L/s	240 volt pump located in the Roper River
Water storage	50ML	AIR will utilise Numul Numul Station dams to store water from the Roper River.
Pump generator	50kV	Genset unit to power pump located on a 4m high earthen mound constructed adjacent to the Roper River.
Pump generator self-bunded fuel storage station	10,000 litre diesel capacity	Located next to Genset unit on 4m high earthen mound
Pipeline	12km length of 225mm poly pipe (PN16)	To deliver diverted water from Roper River to ML27422. Water will be delivered to Numul Numul Station dams before being relayed to the processing plant.
Private access road	8km	From the Roper Highway (approx. 8 km) through Numul Numul Station. 15m wide corridor, 6m wide road capped with gravel.

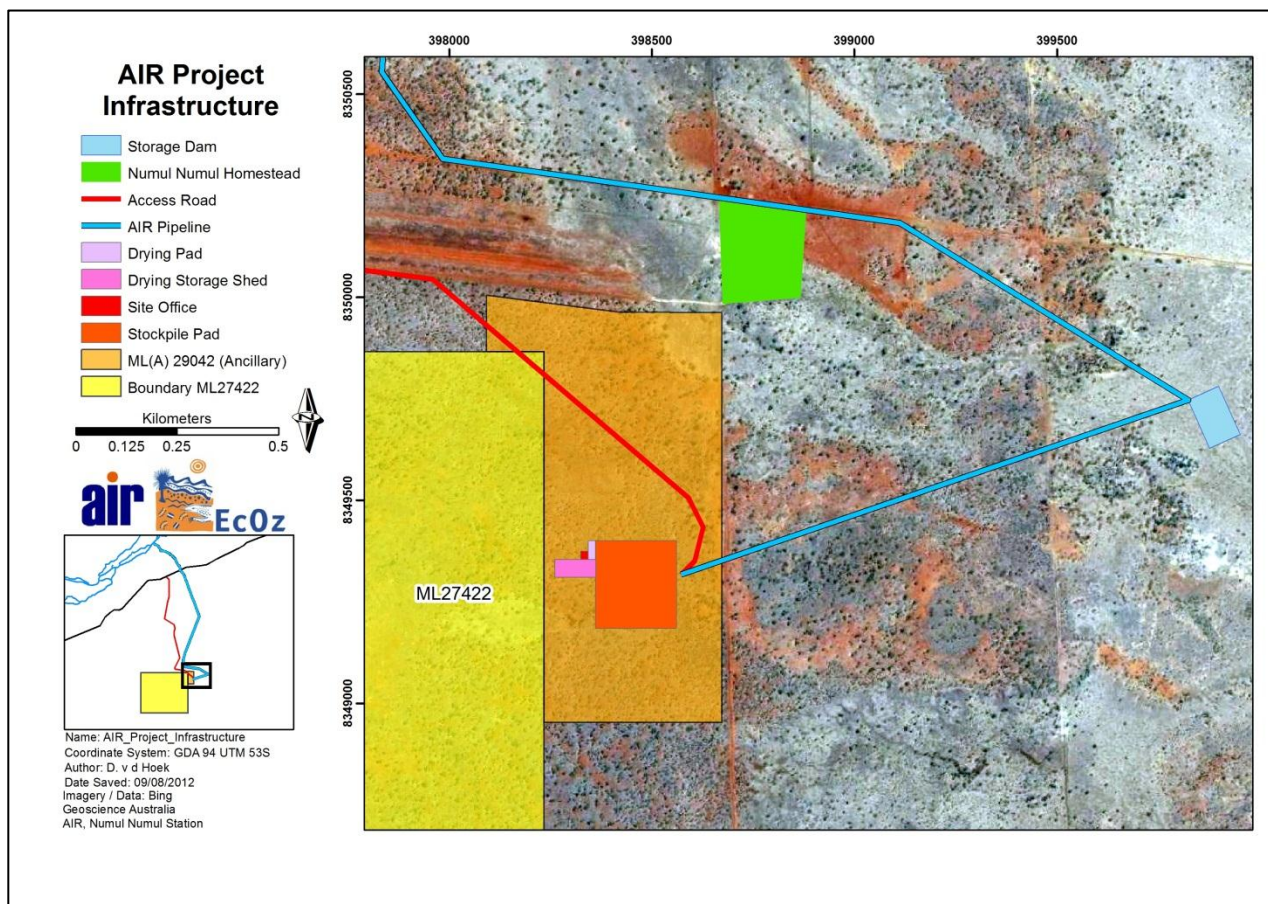


Figure 5-1. Location of MLA29042 and Infrastructure.

5.2 Project Schedule

Testing of the processing plant using a representative 10,000 tonne bulk sample excavated from the site is scheduled for late 2012 and production is scheduled to commence in the 2013 dry season pending environmental, legislative, and traditional owner approvals.

Mining will aim to initially produce 100,000 tonnes of Ilmenite concentrate per annum, increasing to up to 300,000 tonnes in the subsequent years.

5.3 Mining Process

Operations will utilise strip mining to excavate Ilmenite rich soils for refinement. Excavations will be to a maximum depth of 4m, 200m wide and 300m long. Strips will be developed in a campaign mining style. Mining will take place according to the sequence shown in the AIR mining sequence plan below (Figure 5-2).

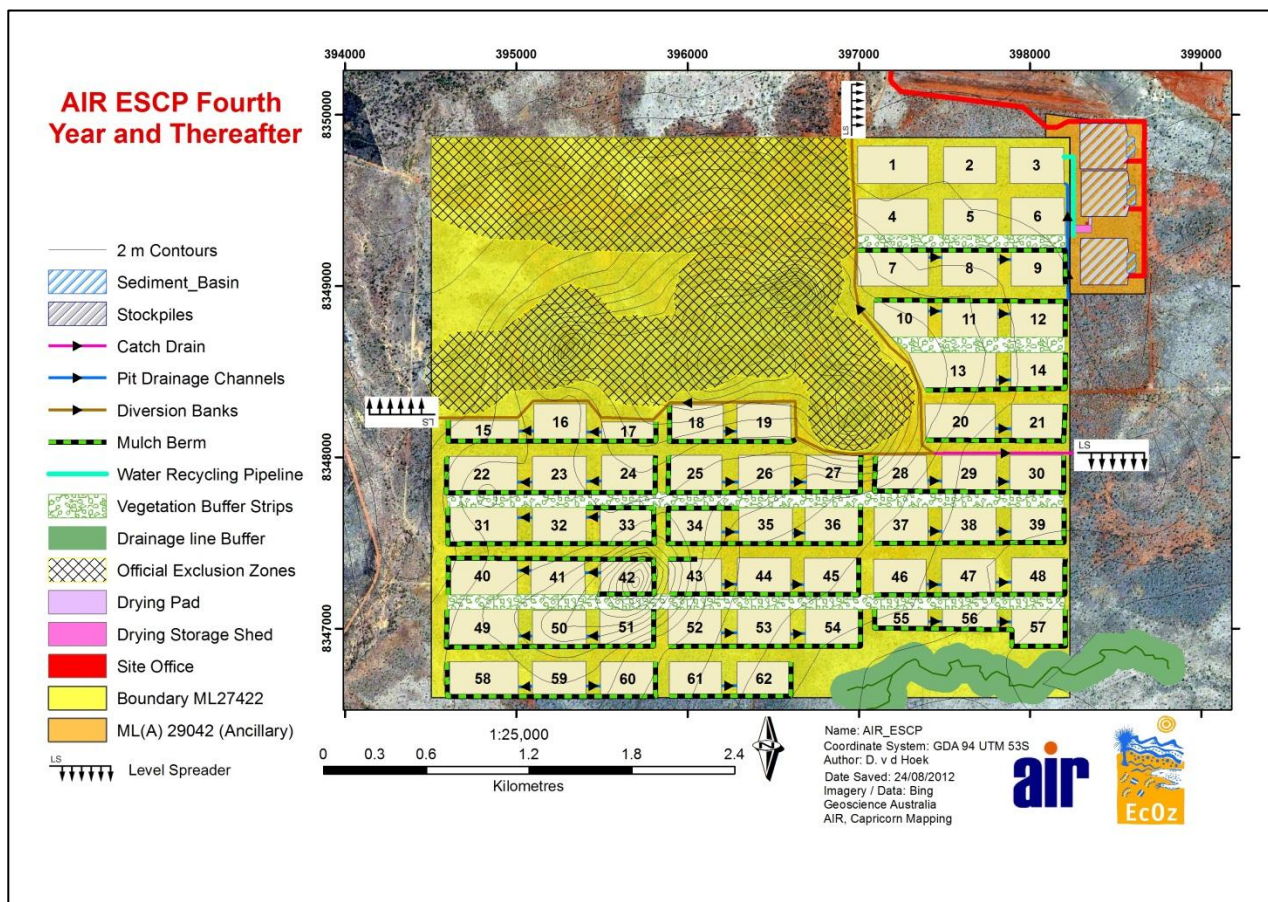


Figure 5-2. Mining Sequence

Clearing will be undertaken at the beginning of the dry season to minimise erosion potential. Grass and shrubs will be pushed into piles and incinerated to prevent weed dispersal. Woody material will be mulched while green to create sediment control berms and assist in the rehabilitation process. Berms will be placed down slope of cleared areas to trap sediments from surface flows.

Areas between pits will alternate from 100m access lanes and 100m vegetation buffers where vegetation is left intact. Mining will progress at a rate of three pits excavated each year until all pit areas have been mined, once this is completed the lane ways and vegetation buffers will be mined. Mined material will be transported for processing via a portable conveyor belt to the stockpile area, 11 hours a day.

Stockpiled material will be loaded into a hopper and combined with water sourced from the Roper River and processed through wash spirals to refine Ilmenite. This will produce concentrated Ilmenite sludge and waste regolith to be returned to the mining pit. Concentrated Ilmenite will then be transferred to the concrete pad to dry prior to being stockpiled in the shed facility until loaded into covered side tipper trailers for transport to Port Darwin via truck.

Waste material will be pumped back to the mined pits with excess water decanted and returned to the process circuit. Pits will be placed back slightly domed to accommodate swell, approximately 1200mm above ground level. Mulch berms will then be levelled across the filled pit and planted with grass seed, spread with hay and fenced. Cattle will later be introduced for a restricted period to graze, trampling seed into the ground, before being excluded from the area.

Open pits will be used to store reclaimed process water for continuous circulation back through to the processing plant.

5.4 Water Infrastructure

5.4.1 Pump

AIR will install a submersible pump on the Roper River that will not exceed a diversion rate of 100.0L/s. The pump used to extract water will be equipped with a caged foot valve to minimise potential for aquatic vertebrates to be drawn into the pump and impeller (location of the pump is shown in Figure 5-3).

5.4.1.1 Site Flooding

AIR will construct a 4m rock armoured island, 40m from the Roper River. This island will have a concrete pad on which 50kV Genset and a 10,000 litre self-bunded diesel storage will be mounted. The suction line to the pump will be housed inside a 9" steel bore casing that will be staked down to prevent movement during flood periods.

5.4.2 Pipeline

Approximately 12 kilometres of 225mm polyethylene pipe (PN16) will be laid above ground to deliver water to ML27422 (Figure 5-3).

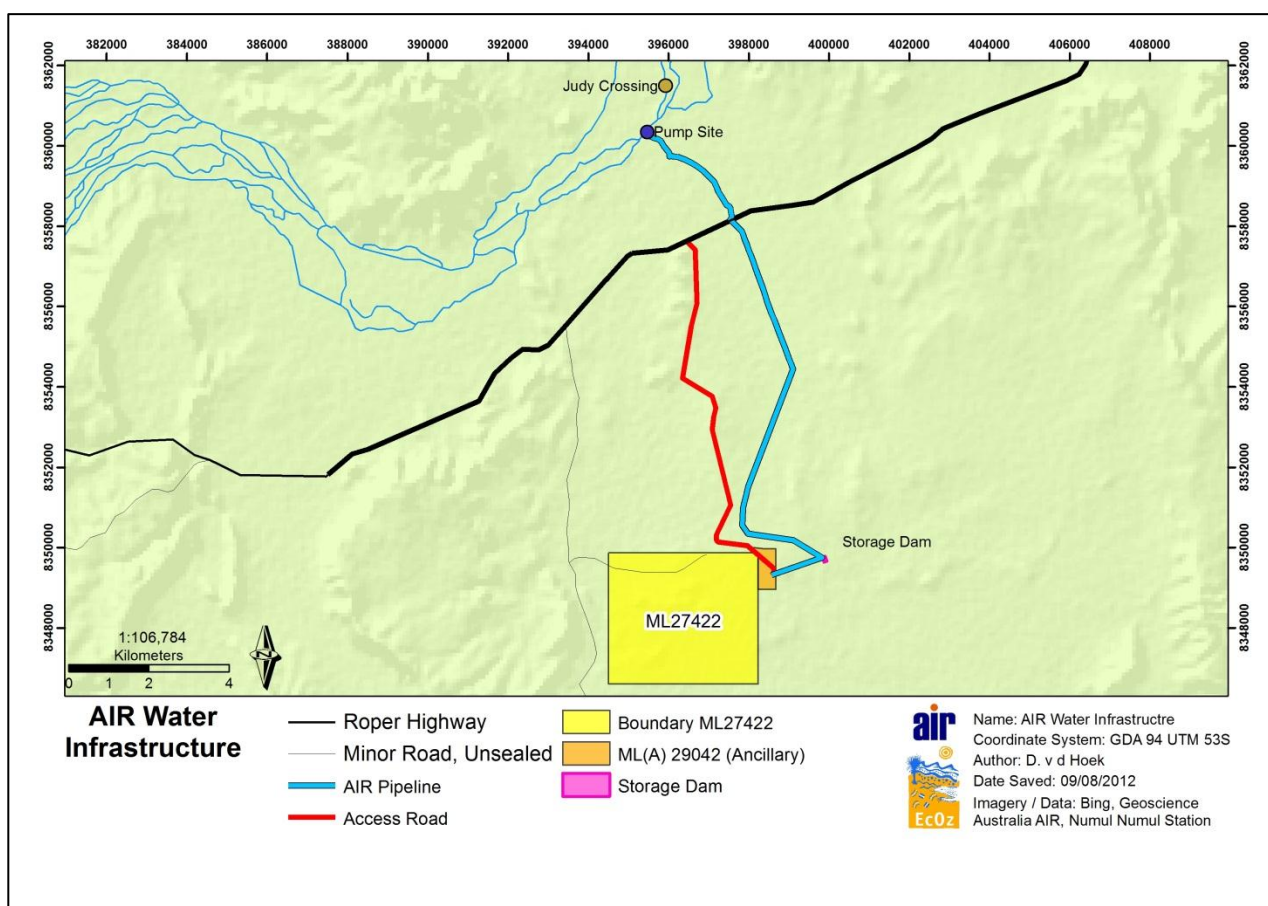


Figure 5-3. Pipeline, Pump and Access Road Locations.

5.4.3 Water Storage

AIR will store water from the Roper River on-site in tanks and water dams present on Numul Numul Station with an approximate storage capacity of 55ML.

5.4.4 Water Re-Use

AIR will store process water in previously mined pits to be re-used through the process plant as much as possible (see Figure 5-2).

5.4.5 Rainfall Collection

AIR will construct sheds to house the processing plant. Rain water will be captured and stored to supply potable water at the camp facilities.

5.5 Transportation

5.5.1 Mine Access

Vehicles and trucks will access the mine from the Roper Highway through an access road to be constructed through Numul Numul Station (Figure 5-3). This road will be 6m wide, gravel based and capped within a 15m wide corridor, providing good dry season access for road trains and access for maintenance purposes during the wet season. This road will be maintained through continued grading and water spraying for dust suppression as required. Workers will access the site using personal vehicles and will rotate shifts as per a roster system.

5.5.2 Ilmenite Concentrate to Darwin

AIR will purchase a fleet of trucks to transport the Ilmenite concentrate from the mine site to the storage warehouse in Darwin. Truck numbers will increase as the mine production increases.

Trucks to be used will be either road trains (up to 107 tonne) or 60 tonne B-double trucks, dependent on cost and availability. If/when AIR's production reaches 300,000 tonne of Ilmenite concentrate per year, approximately 1,000 tonne of Ilmenite concentrate would be transported to Darwin along the Roper and Stuart Highways each day for 300 days of the year. This would be achieved through;

- 10 x 107 tonne road trains per day; or
- 16 x 60 tonne B-double trucks per day.

The distance from ML27422 to Darwin is approximately 550km and travel time for return passage is estimated to be 11 hours excluding loading and unloading. Return trips would be largely empty unless freight to Katherine, Mataranka or surrounds could be arranged.

As transportation is not AIR's primary expertise, AIR is open to the development of an additional party performing the transportation under contract.

5.6 Project Employment

5.6.1 Employment for Mining Operations

Increased opportunities for training and employment will help to offset, to some degree, the disturbance to country caused by mining. It is envisaged that this project will employ up to 25 staff. AIR has also commenced negotiations to employ three local community members at the mine site equating to a minimum of 12% indigenous workforce.

AIR will also engage local pastoralists for contracted work to retain the economic benefits of the project in the local community.

5.6.2 Employment for Product Transportation

AIR will initially purchase a series of trucks to transport concentrated Ilmenite to Darwin. Additional employees will be required to operate these vehicles. AIR envisages contracting the transportation requirements to a private company once processing rates have stabilised.

5.7 Rehabilitation and Mine Closure

AIR will progressively rehabilitate throughout the life of mining to stabilise the land to protect it from problems associated with erosion and sedimentation.

The rehabilitation program will focus on instating pasture species; sabi grass and stylo legumes (seca, verano) in disturbed areas post mining works. Mined areas will be rehabilitated in conjunction with station managers in order to develop the area as a perennial grass rangeland for cattle grazing.

Annual reporting on rehabilitation methods will be presented in the Mining Management Plan and reported to the Department of Mines. Further information is available within Appendix K Rehabilitation Management Plan.

Mine closure planning will be conducted in consultation with land owners and other stakeholders to ensure that the final rehabilitation and mine closure objectives incorporate their requirements (e.g. retention of certain infrastructure or a specific alternate land use).

The mine closure plan will be developed according to objectives developed from the NT Department of Resources *Mine Close Out Objectives* (DoR 2008).

6 Risks

6.1 Risk Assessment

This risk assessment describes the process and presents results of an assessment of the environmental risks relevant to the AIR Project. It is designed to identify the potential hazards that affect human health, the socio-cultural environment, and the natural environment. The approach is systematic and congruous with international best practice standard methodologies including:

- AS/NZS ISO 31000:2009: Risk management - Principles and Guidelines (Standard)
- HB 203:2006: Environmental risk management - Principles and process (Guide)
- HB 158:2010: Delivering assurance based on ISO 31000:2009 - Risk management - Principles and Guidelines (Guide)

The project's key risks were provided by NRETAS through the PER Guidelines (Appendix A) and the request for further information (Appendix A1). Secondary risks identified during the development of this PER are also presented.

The implementation of the risk management program is outlined within the Environmental Management Plan (EMP); Appendix L.

6.1.1 Data Supporting Risk Assessment

Preliminary risk assessments were carried out using available data to generate a baseline understanding of potential risks and mitigation strategies. A range of environmental surveys were undertaken for this risk assessment; including:

- Terrestrial fauna and flora studies (appendix B)
- Aquatic vertebrate study (Appendix C)
- Archaeology (Appendix E)
- Radiation (Appendix F)
- Geochemical Characterisation (Appendix N)

A number of plans support mitigation of risks, these including:

- Social and Cultural (Appendix D)
- Water Management Plan (Appendix G)
- Erosion and Sediment Control (Appendix H)
- Weed Management Plan (Appendix I)
- Biting Insect Management Plan (Appendix J)
- Rehabilitation Management Plan (Appendix K)
- Environmental Management Plan (Appendix L)

6.1.2 Risk Groupings

The Guidelines and 'Request for Further Information' present four key risks relevant to this development; these along with the expected outcomes (from the guidelines) are given below:

- (i) Extraction of water from the Roper River used for processing ore:
Outcome: The proponent will demonstrate that water extraction from the Roper River will not significantly impact the aquatic environment or affect water supply to other downstream users.
- (ii) Effectiveness of the proposed rehabilitation over large areas:
Outcome: The proponent will demonstrate that impact caused by strip mining and disturbance to riparian habitats can be mitigated through effective and timely rehabilitation with appropriate species, erosion and sediment control, and weed management.
- (iii) Potential impacts to threatened species:
Outcome: Impacts to threatened species are avoided or mitigated with effective rehabilitation.
- (iv) Land use risks:
Outcome: risks to current land use are identified and mitigated.

6.1.3 Risk Assessment

Risk is defined as the chance of something happening that will have an impact on objectives. The risk assessment process involved reviewing the objectives and outcomes from the Guidelines and identifying the hazards (defined as anything that will cause harm and can affect meeting of outcomes and objectives). Each hazard was analysed for likelihood and consequence and a risk ranking was developed for the inherent value. Management programs were considered for each hazard and a new likelihood, consequence and risk ranking (now the residual risk) was defined.

The ranking for event consequence is shown in Table 6-1. The likelihood of an event occurring provides a measure of the known or anticipated frequency of occurrences (see Table 6-2). Combining likelihood with consequence (see Table 6-3) provides guidance on risk levels of each aspect and enables ranking of priorities.

The following sections describe in detail for each risk the development of the inherent risk rankings, the proposed hazard management and the subsequent residual risk. These sections also make reference to the data and information that supports these decisions.

Table 6-1: Criteria and Consequence of the Activity Occurring.

Consequence		
1	Insignificant	No measurable impact on the environment. No injuries. Low-nil financial loss.
2	Minor	Minor, temporary environmental impact. No publicity likely and no stakeholder concerns. First aid treatment required. Medium-low financial loss.
3	Moderate	Substantial temporary or permanent minor, localised environmental damage. Stakeholder enquires (this may include government, unions or public). Medical attention required. High-medium financial loss.

4	Major	Substantial or permanent environmental damage. Prosecution possible. Loss of company credibility and high stakeholder interest. Permanent injuries. High financial loss.
5	Catastrophic	Widespread severe and permanent environmental damage. Major stakeholder and media interest. Prosecution likely. Permanent injury or death. Extreme financial loss.

Table 6-2: Qualitative Measures of Likelihood.

Probability/Likelihood		
A	Rare	Practically impossible, will only occur in exceptional circumstances. Has never occurred in the industry.
B	Unlikely	Could occur at some time but highly unlikely. Has occurred in the industry previously.
C	Moderate	Might occur at some time. Has occurred in associated companies previously.
D	Likely	Known to occur or will probably occur in most circumstances. Has occurred several times/year in associated companies.
E	Almost Certain	Common or repeating occurrence. Is expected to occur several times/year in any associated business.

The likelihood of an event occurring provides a measure of the known or anticipated frequency of occurrences. Combining likelihood with consequence provides guidance on risk levels of each aspect and enables ranking of priorities. The risk levels used in this risk assessment are given below in Table 6-3.

Table 6-3: Risk Rankings Combining Consequence with Likelihood.

		Consequence				
Likelihood		1	2	3	4	5
	A	1	3	6	10	15
	B	2	5	9	14	19
	C	4	8	13	18	22
	D	7	12	17	21	24
	E	11	16	20	23	25

Where:

-  = extreme risk- intolerable
-  = high risk - intolerable or tolerable
-  = medium risk - tolerable or acceptable
-  = low risk – acceptable

6.2 Water

This section examines the potential impacts from this development on water resources in regards to extraction. Issues of water quality due to erosion are dealt with in later sections of this risks chapter.

AIR will access water for processing Ilmenite from the Roper River at the waterhole currently used for extraction by Flying Fox station. Water flowing in the Roper River at the proposed point of extraction is fed by groundwater flows from the Tindal Limestone aquifer at Mataranka during the dry season and from combined rainfall, surface water flows and groundwater flows during the wet season. Groundwater in the source Tindal Limestone aquifer will be allocated under the Mataranka Water Allocation Plan to approximately 19,365 ML/year.

Water for the AIR project will be pumped via a pipeline 12 km south to the processing site. Current data indicates that the Roper River, on average, ceases to flow at Red Rock gauging station (60 km downstream of the proposed extraction point) approximately 18 days of the year, and with full allocation of groundwater entitlements from the Tindal Limestone Aquifer this would increase to 73 days per year at Red Rock (Knapton 2002). There is a subsequent future risk to environmental values and also the AIR project if ground water entitlements are fully allocated. Appendix G gives further detail about the hydrology of the Roper River.

The community of Ngukurr rely on water from the Roper River to supplement the town's groundwater supplies. Communities and cattle stations adjacent to the Roper River utilise the stream for reliable water supply. Cattle stations nearby to ML27422 have reported dams drying up late in the dry season due to extended periods of minimal to no rain and high evaporation rates. Historically, Numul Numul and Flying Fox stations have drawn water from permanent water holes in the Roper River to supplement dam and groundwater infrastructure during dry periods.

The Ngukurr community downstream of the Roper Bar divert water from the Roper River for drinking; approximately 80% of the community's water comes from the river with another 20% sourced from groundwater. Power and Water (P&W) are currently exploring options for an alternate water supply and have identified three bores, two of which are not suitable (due to presence of Barium and/or low potential extractions); a third bore closer to the river is now being examined further.

The Australian Drinking Water Guidelines recommend that communities with >1000 people (for example Ngukurr) have water quality monitoring based on a risk assessment; the outcomes of the risk assessment for the Ngukurr region is that there is bacteriological monitoring weekly and physical chemicals monitored quarterly. These are reported annually (see http://www.powerwater.com.au/news_and_publications/reports/water_quality_reports).

The diversion point for the Ngukurr community is located below Roper Bar, in the tidal section of the Roper River, therefore in an area susceptible to migration of the salt water interface during low flow conditions. Continued freshwater inflow across Roper Bar can assist in slowing salt water incursion upstream. Predicting the impact of increased water diversion on salinity within the Roper River is complicated as the geology, groundwater interaction, rainfall and water residence times all affect salinity within the system.

The primary risks to achieving environmental objectives are over-extraction leading to decrease in flow and/or an increase in cease-to-flow events of the Roper River having consequences on:

- a. Water quality at Ngukurr
- b. In-stream ecology including threatened species.

Because of the interaction between water quality and quantity they are treated together.

6.2.1 Surface Water

There are concerns that extraction of water for this development may lead to deleterious changes in the hydrology of the Roper River affecting the river's integrity having a deleterious impact on threatened species and also water quality at Ngukurr.

Surface Water Inherent Risk Profile

Unrestrained extraction of water from the Roper River may lead to realisation of these concerns and, in addition, may cause an increase in the number of cease to flow events and allow the salt water interface to migrate upstream. Determining the inherent risk ranking for this development requires some restraint in that the proposed water extraction is not very large. The inherent ranking incorporates the modelling results (Appendix G) but no other specified mitigation procedures; the model concluded that:

- A 24-hour pumping schedule will have a much lower impact on minimum observed instantaneous flows at Judy Crossing and probably Red Rock.
- Evapo-transpirational (ET) losses along the section from Judy Crossing to Red Rock are approximately $0.6 \text{ m}^3/\text{s} \pm 0.1$. It would be expected that these losses would show a diurnal response, although the observed record at Red Rock shows no such daily variation. It is suggested that there is considerable buffering due to pool storage and the ET losses are observed as an averaged response. Based on this assumption it would be expected that the 12-hour pumping regime would create a similar averaged response at Red Rock and flows to the pool downstream of Roper Bar.
- Based on observed and simulated flows at Judy Crossing under recent climatic conditions (1970-2008) the maximum pumping rate should be no more than $480 \text{ m}^3/\text{hr}$ (instantaneous extraction of $0.133 \text{ m}^3/\text{s}$ or 133 L/s). This means that an upstream cut-off of $0.67 \text{ m}^3/\text{s}$ should be applied.
- Based on the 1970-2008 historic exceedances a cut-off of $0.67 \text{ m}^3/\text{s}$ (or 670 L/s) will result in extraction being stopped for less than 1% of the time.
- Based on the historic exceedances a cut-off of $0.67 \text{ m}^3/\text{s}$ (or 670 L/s) will result in extraction being stopped for 5% of the time (i.e. 18 days).

Thus it seems that abstraction at a rate of 133 L/s will not increase cease to flow events and/or impact on water quality at Ngukurr.

Without any mitigation such as setting a maximum abstraction rate and/or cut-off, the consequence of abstraction from the Roper River at this location may be considered moderate (3) and since the event is likely (D), the risk is ranked High.

Surface Water Mitigation and Residual Risk

Modelling indicated that the following two controls (inherently considering and incorporating the 20% rule) are to be implemented:

- The maximum pumping rate should be no more than instantaneous extraction of 133 L/s .
- This means that an upstream cut-off of $0.67 \text{ m}^3/\text{s}$ should be applied.

Cognisant that the SILL80 Project requires only 64 L/s , the following controls are committed to:

- Limit the capacity of the submersible pump to 100 L/s .

- Install a gauging plate at the abstraction point and set a level at which 900L/s passes (the 670L/s cut-off plus an arbitrary safety factor).

Ensuring that water quality and aquatic biodiversity objectives are met a monitoring program is being established. Section 8.2 describes the aquatic monitoring program; the water quality program is outlined in Appendix G.

With this mitigation strategy (coupled with an adaptive management loop informed by the monitoring programs) the risk profile will change. The consequence is reduced as the frequency and probability of chance of crossing abstraction thresholds is reduced to be minor (2). These events are now unlikely (B) to occur, giving a risk ranking of Low.

6.2.2 Groundwater

The groundwater level at the open pits is at approximately 35m below ground level whilst the pits will only extend to 4m below surface. Thus mining will not intersect groundwater. Groundwater will not be exploited but the geochemical assessments (Appendix N) identified potential concerns surrounding leaching of heavy metals from the placement of tailings into the mined out open pits (see Water Management Plan Appendix G).

Groundwater Quality Inherent Risk

Drilling records indicated that the site is underlain by a dolerite sill which is weathered at the top (about 10m deep) with hard rock dolerite beneath. The weathered strata are relatively impermeable and dry. Ground water occurs at depth in confined fractured hard rock.

Tailings (washed soil) will be placed in the mined out pits from where excess water will be drained for recycling to the plant. The tailings are expected to consolidate and dry as a fine silty clay in due course.

The consequence of metals leaching is considered Minor (2) and with a likelihood of Likely, the risk is ranked Medium at worst. This rating is considered to be tolerable or acceptable given the location and its prevailing geological, hydrological and hydrogeological characteristics. The consequence and likelihood ratings are considered to be conservative as they are based upon field descriptors, permeability based upon grading's and leaching with de-ionised water under laboratory conditions. It is possible that the consequence may change to insignificant and the likelihood to moderate under field conditions, hence the implementation of a monitoring program.

Groundwater Quality Mitigation

As a result of the medium risk rank, a monitoring program is to be established. Should leachates and elevated metal concentrations in the monitoring bores be encountered at levels exceeding the thresholds in the Australian Drinking Water Guidelines (NHMRC/NRMMC, 2011), then several actions may be taken including further investigation and assessment to quantify the impact that may culminate in mitigation measures such as compaction of the floors of the open pits and/or the addition of bentonite to inhibit migration of leachates.

Groundwater Quality Residual Risk

If monitoring demonstrates that the risk was over estimated and that concentrations of heavy metals and distances of migration of the leachates are within current predictions, then the residual risk will be low.

If monitoring indicates that mitigation measures are to be implemented, then compaction and/or amendment by the addition of bentonite to the floors of the open pits will reduced the risk to Low.

6.3 Rehabilitation

This section examines the potential impact associated with the rehabilitation of the project. The related issues of erosion and sediment control and weeds are dealt with elsewhere in the risks chapter.

The draft Rehabilitation Management Plan (RMP) is presented as Appendix K to this PER. The rehabilitation of mine pits for this project aims to return the land back to pastoral production. The RMP outlines the process and procedures to achieve a stable soil surface (thereby partially mitigating erosion and sedimentation issues) and progressive rehabilitation. Pastoral production is the preferred end land use that has been nominated by the land owners. Specifically, the land will be rehabilitated to a healthy perennial grass rangeland with a diverse mix of plants, both native and introduced (i.e. non-declared species).

The Guidelines specifically identify riparian vegetation impacts; there is not expected to be any riparian vegetation impacts from this development.

Rehabilitation Inherent Risk Profile

There are three aspects around a failure of the rehabilitation program:

- (i) It will leave soil surface exposed giving the potential for erosion and possibly sedimentation into waterways;
- (ii) Can allow for the establishment and spread of weeds. This may also have financial implications for the land manager; and
- (iii) As one of the intents of the rehabilitation program is the return of mined land to grazing land any failure will mean land will be taken out of pastoral production indefinitely potentially imposing economic implications on land managers.

Without effective management the risk calculation for each of the above aspects are:

- (i) Erosion and Sedimentation - the generally subdued nature of the landforms and soil type would alleviate some potential erosion. The development is distant from substantial water bodies. The consequence is considered minor (2), the likelihood moderate (C) giving a risk ranking of Medium.
- (ii) Weeds - there are already weeds in the area and any unmanaged soil disturbance would allow for further weed spread. The biological survey done for this development (Appendix B) found declared weed species. The consequence for this development without any mitigation measures is considered moderate (3), the likelihood is likely (D) giving a risk ranking of High.
- (iii) Pastoral productivity - under the worst case scenario a relatively small area will be taken out of production (from a pastoral lease area of 49,800 ha). Without mitigation it can be assumed that this scenario will be realised; as this is a medium financial loss (see Table 6-1) the consequence is considered minor (2), the likelihood is moderate (C) giving a risk ranking of Low.

Rehabilitation Mitigation

Mitigation strategies for the above aspects are outlined in several places within the PER. The Rehabilitation Management Plan (RMP) Appendix K is the basis for this. The RMP outlines the strategy to return the mined pits back to grazing land; this strategy has been developed by the land managers. The RMP also specifically outlines timeframes, objectives and a monitoring strategy to ensure effectiveness of rehabilitation.

The RMP is also supported by a Weed Management Plan; Appendix I. The Weed Management Plan aims to limit the introduction of weeds to the area, the spread of weeds across the site and the establishment of weeds throughout the operations area.

An Erosion and Sedimentation Control Plan (ESCP) is presented in Appendix H. The ESCP outlines the strategy and associated commitments for managing erosion in and around the mine site and associated infrastructure.

Rehabilitation Residual Risk Profile

The introduction of the management strategies outlined above modifies the risk ranking for each of the aspects within this risk grouping. For erosion and sedimentation the consequence is still considered minor (2) but the likelihood has been reduced to unlikely (B) giving a risk ranking of Low. A strategic and audited approach to managing existing weeds, reducing the opportunity for new weed establishment and controlling weed spread changes the risk ranking. After mitigation there is a reduced consequence as the weed infestation extent will be reduced compared to the no management scenario; consequence is now considered minor (2) i.e. small, isolated infestations; the likelihood is also reduced to moderate (C) giving a risk ranking of Low.

The threat to pastoral productivity and lost economic opportunity has also been substantially reduced through a systematic and audited rehabilitation program that has a stated aim of returning land to grazing. The risk ranking is still considered to be Low as the consequence is still considered minor (2), but the likelihood is now unlikely (B).

6.4 Threatened Species

This section examines risks related to terrestrial threatened species; aquatic threatened species are dealt with in the surface water section of this risks chapter. Threatened species here are those species considered threatened under either Northern Territory (*Territory Parks and Wildlife Conservation Act 1976*), or Commonwealth legislation (*Environmental Protection and Biodiversity Conservation Act 1999*).

One of the studies done specifically for this development was a field and desktop study of the regional species assemblage. This work was done, in part, to identify the species that are known to or may occur within the development envelope or could be impacted by the development. Appendix B gives the detailed results from this work. That Appendix used the term conservation significant species and communities thus defined as:

- Any species considered threatened (see definition above);
- Any species identified as migratory by any of the Migratory Bird Agreements; and
- Any vegetation community listed as threatened (EPBC Act) or identified in the Northern Territory Parks and Conservation Masterplan (NRETAS 2005) as rare or high conservation value, or identified as “sensitive” or “significant” under the NT Planning Scheme and NT Land Clearing Guidelines (NRETAS 2010).

There were no listed vegetation communities in the area; nor any threatened flora found or expected. Few of the regional threatened fauna species in the area were deemed likely to be on the mine area; those that were (for example the Australia Bustard) are considered wide ranging species that would not be affected by this development. There is the possibility of Merten’s Water Monitor occurring at or nearby the extraction point. But, for the reasons outlined in the water section it is thought that this development would not affect this species.

Appendix B concludes that the nature of impact of this development on terrestrial and wading conservation significant species is considered very small for two reasons. Firstly, for those species that may use the river from where water is being extracted, there is very little chance that these species will be affected as the volume of water extracted is comparatively small and the Water Management Plan (Appendix G of the PER) precludes any extraction beyond the sustainable limit of 20% of inflows (NT Government 2006). For all other species the footprint of the development is relatively small compared to the distribution and habitat requirements of these species. However, it is noted that noise and dust may extend beyond the cleared

area, but is not considered to be significant. It is therefore concluded that this development poses no substantial threat to any of these species.

Because of this there are no special management requirements for threatened species and that the inherent and residual risks are the same: consequence of minor (2) with a likelihood of unlikely (B) giving a risk ranking of Low.

6.5 Current Land Use

This section examines the 'request for further information' request for a risk assessment on the potential social, environmental and economic impacts to the current land use and mitigation measures to reduce those risks. Numul Numul Station is a working pastoral lease and there are concerns that the mining operation may interfere with the pastoral operation. There are three aspects to these concerns:

- (i) Social, specifically interference from mine operations on pastoral operations such as changes to fencing and vehicle movement; this aspect also includes amenity such as noise and visual and the land manager's residence.
- (ii) Environmental, specifically changes in land and water leading to changes in pastoral productivity as well as weed invasion and disposal of wastes.
- (iii) Economic, lost production due to mine activities including land being taken out of pastoral production for the mining process and not returned due to failure of the rehabilitation program; this may also include lost pastoral productivity due to changes in hydrology.

Land Use-Social Risks and Mitigation

AIR's Mineral Lease overlaps the existing Perpetual Pastoral Lease 1161, which is sub-leased from Traditional Owners through the Namul Namul Aboriginal Corporation. The SILL80 Project is located within close vicinity to the Numul Numul Station homestead and its cattle management infrastructure. This includes holistic management paddocks, stockyards and laneway (see Figure 6-1 and Figure 6-2). Aspects of the SILL80 project may interfere with the current land use operations. For this reason a formal agreement is being developed between AIR and the current managers of Numul Numul and Flying Fox Stations, further to the lease agreement brokered with the lands traditional owners. The agreement with the land managers of both Numul Numul Station and Flying Fox Station will contain detail concerning:

- Protocol of Entry;
- Contracted Work;
- Agreement to ensure operation of pastoral lease will be maintained despite AIR's operations;
- Shared infrastructure, agreement of use and communication methods and procedures; and
- Annual Compensation.

There have been recent meetings between the parties with proposed terms and conditions being developed into a draft agreement, good faith negotiations are continuing. Without this agreement there would be substantial potential for interference with pastoral activity. The agreement will formalise the relationship structures and on-going dialogue between these stakeholders. With this consideration it is expected that the consequence of social risks is moderate (3) and the likelihood is also moderate (C) giving a risk ranking of Medium.

Land Use- Environmental and Economic Risks and Mitigation

The environmental risks here relate to those issues that deleteriously affect pastoral productivity and hence the economy of the pastoral lease such as weeds, altered hydrology, clearing and waste materials. These issues are dealt with in other areas within the risks section such as rehabilitation, water, erosion and sediment control, and wastes.

In a strictly economic sense that the land manager agreement outlines the annual compensation which is partly dependent on rehabilitation success; it is thought that this agreement should mitigate any economic loss due to mining activities. Subsequently, the consequence is considered minor (2); the likelihood is unlikely (B) and risk ranking is Low.

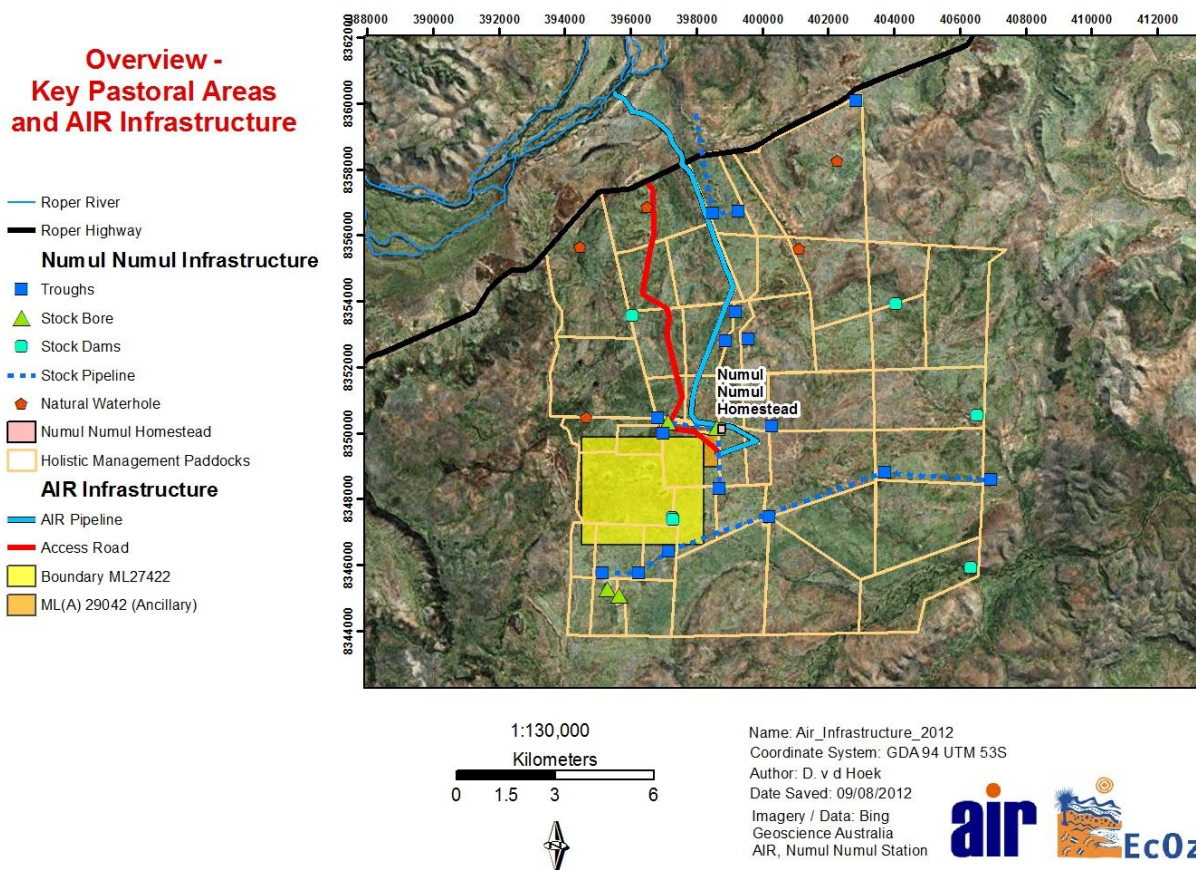


Figure 6-1. Key pastoral area overview with proximity to AIR infrastructure

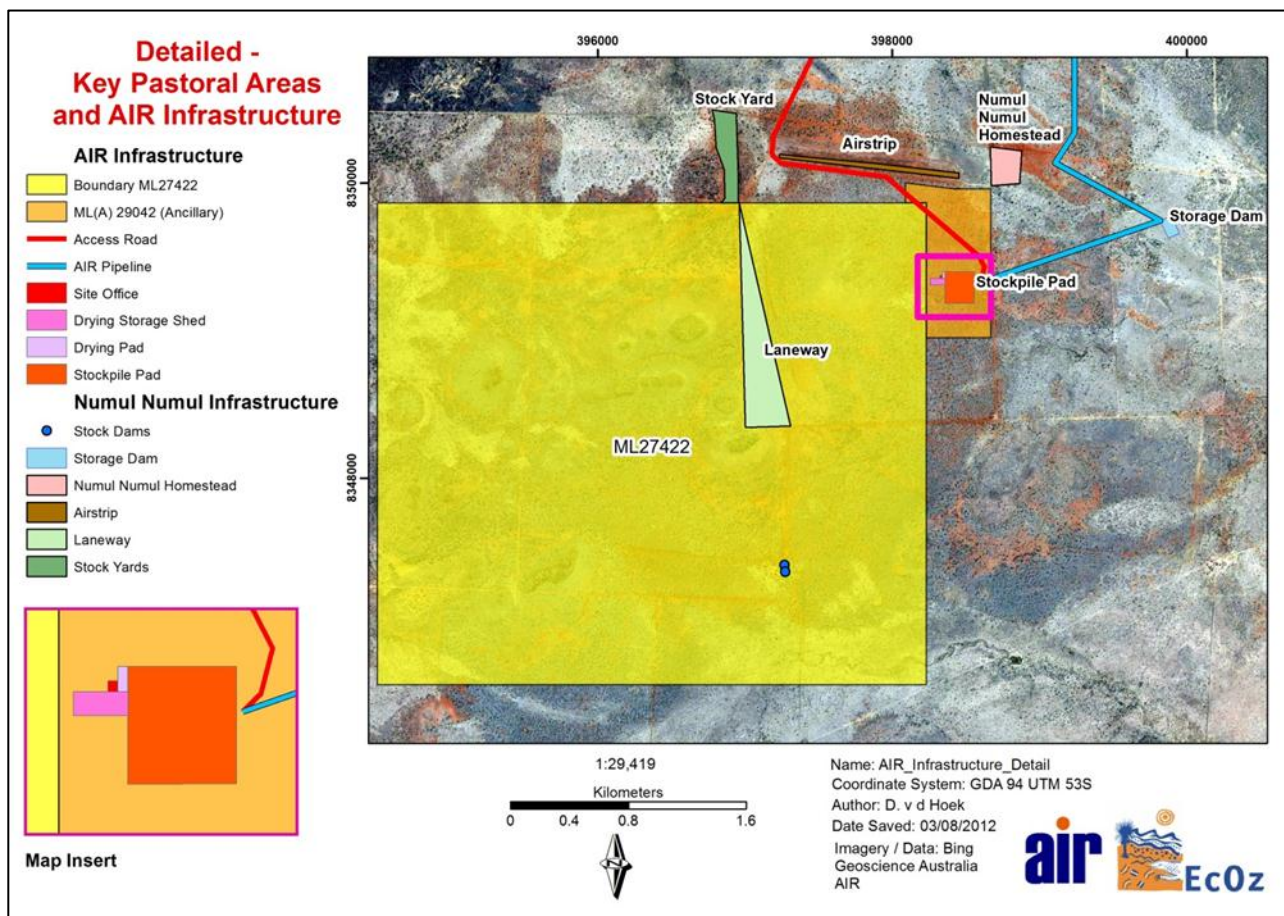


Figure 6-2. Key pastoral area overview with proximity to AIR infrastructure

6.6 Erosion and Sedimentation

The SILL80 Ilmenite Project is situated on a relatively flat to low lying area currently utilised as pastoral grazing paddocks and subject to stock trampling, grazing, weed incursion, and occasional controlled burning. There is also some evidence of erosion on the land and increased sedimentation and turbidity in nearby watercourses and drainage areas.

This terrain is characterised by broad alluvial valleys between low rubbly hills and prominent strike ridges of resistant Roper Group strata. These areas are considered highly erodible, especially the sloping red soils.

The Erosion and Sediment Control Plan (ESCP – Appendix H) outlines strategies for works to be undertaken to minimise soil erosion and the discharge of sediment to land and waterways as a result of mine development or operations. Specifically, the plan details the following:

- Stormwater Management Controls;
- Maintenance and Monitoring Programs; and
- Site specific Erosion and Sediment Control Plans

The overall objectives are:

- Control soil erosion and sediment generation from areas disturbed by construction and mining activities; and

- Minimise potential project related activities resulting in decreased water quality (particularly suspended solids) in downstream local watercourses.

Construction design and management will comply with the Department of Natural Resources, Environment, the Arts and Sport (NRETAS) *Erosion and Sediment Control Plan Content* (2006). As such, principles of effective erosion and sediment control will be employed to minimise the extent and duration of any erosion and sediment generating activities and ensure the prompt stabilisation of land.

Where possible, stormwater will be diverted around any active or rehabilitated mine areas. This will minimise both the flow rate and volume of runoff to be handled by on-site water management structures and enable them to perform more effectively.

Water quality measurements will be performed with results used as indicators of success for the construction and operational phases. Should deterioration in water quality be evident, remedial actions will be triggered.

The integrity of the receiving environment will not be adversely impacted as a result of this development, provided that the sediment control measures described in Appendix H are implemented.

The Erosion Sediment Control Plan (Appendix H) will be reviewed periodically to determine success of mitigation and management. If any sedimentation or erosion is occurring on site a full review will be made to assess the effectiveness of current control measures and/or the requirement for more intensive control measures.

Without any mitigation activities erosion and sedimentation would be established and on-going; the consequence would be, due to the nature of the disturbance and soil types, would be moderate (3); the likelihood moderate (C) giving a risk ranking of Medium. The mitigation measures outlined above change the risk rankings reducing the consequence by limiting the extent of erosion, to minor (2) with likelihood also reduced to unlikely (B) giving a risk ranking of Low.

6.7 Other Risks

The risks described here are those not considered to be key risks in that they are often generic or of comparatively small impact and/or mitigated by existing and known processes and procedures. Consequently, they are generally not presented in the Risks table (Table 6-5).

6.7.1 Transportation

AIR intends to transport concentrated Ilmenite to a Darwin warehouse using road trains, prior to shipping overseas. The proposed route for the road transport will utilise the Stuart and Roper Highways, and then join a new road, constructed by AIR through Numul Numul Station. At full scale production this will result in up to 20 road trains per day travelling on the Stuart and Roper Highways.

Large scale transport can impact on social amenities in a number of ways. These include but are not limited to:

- Increased noise associated with trucking activity (e.g. air brakes, vibration, engine noise);
- Increased air emissions i.e. dust (particularly on sections of dirt road);
- Mine traffic resulting in increased road congestion;
- Increase in animal fatality through vehicle strike;
- Increased degradation of road infrastructure; and
- Increased risk of accidents.

The Roper Highway is a narrow road linking the Stuart Highway with the Gulf of Carpentaria. The stretch discussed here is sealed. With the increase in trucks for this development there is an increase in chance of an accident. The nature of the consequence (possible fatality) gives the consequence of major (4); the likelihood of such an event is considered moderate (C) giving a risk ranking of High. Mitigating this risk would be through reducing the chance of an accident through speed reductions on the Roper Highway, covering loads and careful driving techniques.

AIR commits to developing a standard operating procedure (SOP) aimed at limiting accidents particularly on the Roper Highway. Even with this mitigation strategy this risk remains High.

6.7.2 Social and Cultural

A report investigating Social and Cultural values within proximity and affected by AIR's SILL80 Project are detailed in Appendix D. This report also presents the commitments made by AIR to mitigate impacts to Social and Cultural values. Public involvement and consultation in relation to this project is detailed in Section 9 of this report. Rather than duplicate the details of the Social and Cultural work, a general summary of the risks identified are as follows:

- Changes to pastoral land use of Numul Numul Station;
- Risks associated with development within proximity of sites of Cultural and Heritage significance;
- Changes to the natural environment as a direct result of the development ; and
- Water abstraction from the Roper River and changes to the amenity of the region through construction and operations of the mine, as well as increased local traffic.

6.7.2.1 Management of Social and Cultural Risk

AIR will minimise risk to Social and Cultural values through;

- Continued consultation;
- Maintenance of complaints register;
- Implementation and enforcement of company policies preventing disturbance of Cultural and Heritage sites; and
- Annual update of MMP incorporating continued improvements and addressing concerns/issues resulting from consultations and complaints.

Additional to this AIR will follow a strict protocol of personnel and contractor induction to prevent social and/or cultural impact covering the following topics as a minimum:

- General health and safety;
- Environmental management and awareness;
- Management and awareness of cultural assets within the lease and surrounding area; and
- Waste management.

6.7.2.2 Aspirational Targets

Additional to the commitments made in Appendix M (Commitments Table) AIR has identified a series of aspirational targets intended to reduce risk to Social and Cultural values:

- Continuously review processes through regular internal and external audits to maintain industry best practice;

- Maintain an open dialogue with stakeholders regarding all aspects of the mines development, operation and closure;
- Engage appropriately trained personnel to perform regular inspections of archaeological/historical sites;
- Endeavour to minimise disruption to landowners and traditional owners with regards to current pastoral use and access to sacred sites;
- Prevent development of biting insect breeding sites as a result of the mines development;
- Promote training programs to engage stakeholder / community members in particular management tasks such as surveying or rehabilitation;
- Employ stakeholders / community members as contractors to assist in the development, operation and closure of the mine;

Results and findings from monitoring will be fed back into management plans and strategies to allow for continual improvements and adaptive management.

6.7.3 Waste and Hazardous Substance Management

6.7.3.1 Processing Waste

The only waste generated from ore processing is washed regolith, which will be dried prior to being returned to the mining pit for site rehabilitation. No chemicals or reagents (such as flocculants) are to be used during the Ilmenite separation process. Other wastes associated with mining operations, such as standard wastes associated with the operation of machinery (e.g. oils and replacement parts), will be minimised and all waste materials collected, contained and removed from the site and disposed of at an approved waste disposal facility. Washed regolith will be the only substance replaced into mined pits.

6.7.3.2 General Waste

AIR will reuse and recycle as much waste as possible to minimise disposal in the on-site landfill. Recyclables will be separated out and stored for transport to a designated recycling facility, most likely the registered recycling facility in Mataranka. Remaining non-hazardous (inert and putrescible) solid wastes will be disposed of at a putrescibles tip constructed onsite where most general wastes will be sent and burnt as required. A license for the tip will not be required as personnel utilising this facility will not exceed 1000 people (NRETAS 2010). The tip will be constructed in accordance with the Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NRETAS 2010) and operated in accordance with the *Waste Management and Pollution Control Act 1998*. This landfill will service the main camp and mine site.

6.7.3.3 Listed waste

'Listed waste' is a term used in the *Waste Management and Pollution Control Administration Regulations* to describe materials that are considered to be harmful to people and/or the environment if disposed of incorrectly. No chemicals are required for the processing of Ilmenite. Hydrocarbons are the primary type of hazardous material anticipated to be required on site. Hazardous materials and wastes will be stored in appropriately labelled containers within purpose built dangerous goods and chemical storage containers. These are self-bunded, ventilated and are compliant with AS1940-2004 Storage and Handling of Flammable and Combustible Liquids. These containers are suitable for the storage of paint, thinners, oils, diesel, chemicals, Class 3 flammables substances (as classified in the *UN Recommendations for the Transport of Dangerous Goods – Model Regulations*) and other potentially dangerous liquids.

Empty fuel drums shall be stored in plastic lined, earth walled and bunded areas. Drums will be returned to the supplier where possible. Otherwise they disposed of at the nearest approved waste disposal facility for re-use or recycling.

All listed wastes generated by the operation will be transported off-site to licensed waste disposal facilities by a suitably licensed contractor. This is likely to include waste oil, grease, batteries and heavy equipment fuel filters.

MSDS data sheets will be available for all hazardous substances on site.

6.7.3.4 Fuel

Diesel fuel will be stored adjacent to the processing shed in a relocatable self-bunded 61,000 litre fuel storage tank in an area selectively cleared to prevent fire risk and allow for heavy vehicle access. An appropriately built refuelling station will be established so as to reduce the potential impacts of refuelling spillages. Additional to this, a relocatable self-bunded 10,000 litre fuel storage tank will be located adjacent to the pumping station on the 4m high earthen mound and concrete pad. Refuelling stands and equipment will be in accordance with Australian Standard AS1940.

Spill kits will be located on site.

6.7.4 Emissions

6.7.4.1 Radiation Survey and Assessment

A baseline gamma dose survey was performed at ML27422 prior to the commencement of mining (Appendix F Radiation Assessment Report). As the mine area is reasonably large, 1225 hectares, a gridded ground gamma survey over a portion of the area was conducted. AIR identified this area as containing the greatest Ilmenite concentration from their sampling program (Figure 6-3). Multi-purpose radiological survey meters were used with measurements taken one metre above the ground, with over 400 measurements taken to establish the baseline gamma radiation levels over this portion of the mineral lease.

Once mining and processing begins it will be necessary to conduct a radiological survey over the stockpile and processing area. This survey will establish the activity and the activity concentrations of the possible radionuclides of interest in the ore concentrates to determine if radiation levels fall below exemption levels.

The low gamma dose rates are assumed to be caused by two main factors. Firstly, the area does not have high concentrations of naturally occurring radionuclides in the surface materials. Secondly, the Ilmenite is low in monazite sands, the source of radiation in most mineral sands. ML27422 is not a placer deposit, it is an in-situ deposit that has not been transported away from its parent rock and therefore has not had the concentration mechanisms of nature most mineral sand deposits have experienced and, consequently, the introduction and concentration of monazites. This has led to very low levels of radionuclides which are reflected in the results of the radionuclide analysis.

The radionuclide activity concentrations in the soils associated with the Ilmenite deposit surveyed are low. The gamma dose rate over the deposit is also low and is equal to or less than background levels in the area.

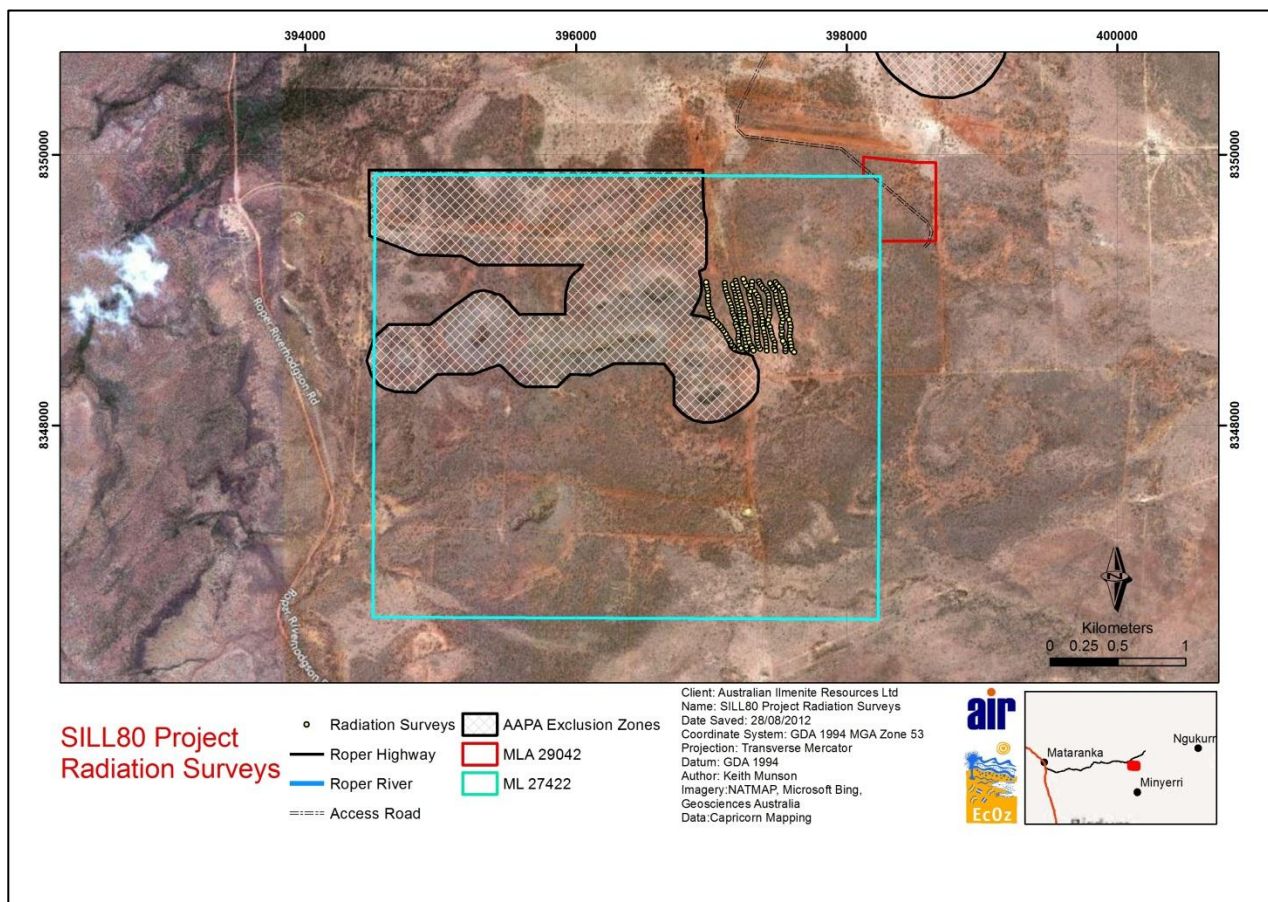


Figure 6-3. Radiation Survey Location.

6.7.4.2 Greenhouse Gas Emissions

Due to the nature of the mining process, greenhouse gas emissions will be emitted over the duration of the SILL80 project. The emissions will vary according to the stage of the operation. During construction, the main emission source will be the burning of diesel fuel by the mobile equipment required to carry out construction work. Additional emission sources will include diesel generators at the mine site, the pump at the water extraction site and aviation fuel required when utilising the nearby Numul Numul Station Airstrip for site access.

During operations, primary emission sources will result from:

- Mining and transport to processing plant;
- Ilmenite refinement practices at the processing plant;
- Transport of Ilmenite to the Port of Darwin;
- Operation of power generators, pumps, and the small vehicle fleet required for daily operation of processing facilities; and
- Ongoing land clearing to access the mineral resources.

An estimate of the fuel consumption and approximate greenhouse gas emissions are given in Table 6-4.

The nature of this project offers few if any alternatives to the use of diesel for activities such as transportation and power generation. The SILL80 project and its associated greenhouse gas emissions will be in an area not subject to other concentrated sources of greenhouse gases.

Table 6-4: Estimated fuel consumption and greenhouse gas emissions of AIR's plant and machinery

Equipment	Diesel Per Year (cubic meters)	Approximate Greenhouse Emissions (kg/year)
Bulldozer	174.2	464,557
Dump Trucks (x3)	457.5	1,219,462
Excavator	123.4	329,061
Grader	90.8	241,957
Front-End Loader	163.4	435,522
Power House	435.6	1,161,393
Water Pump	49.0	130,643
Road Trains (x20)	7260.0	19,356,545
Total	8753.9	23,010,408

6.7.5 Greenhouse Sinks

The clearing of vegetation for project related activities will result in the removal of approximately 800 ha of existing woodland. This comprises the processing and general work area, open cut pits and access roads. Land clearing contributes to Greenhouse Emissions via the use of machinery to remove vegetation but importantly it is recognised that removal of vegetation generally contributes to a loss of a carbon sink. The rehabilitation proposed should improve the overall ability of the land to sequester carbon. Recent studies (i.e. Chan *et al.* 2009 & Tyrchniewicz Consulting 2006) indicate that improved pasture and grazing management can lead to increased Soil Organic Carbon (SOC) sequestration potential and reduction in greenhouse gas emissions (when compared to traditional grazing practices and unmanaged grazing).

6.7.6 Noise and Dust

Industry best practice techniques and adherence to the relevant Australian Standards will be used when performing activities likely to create excessive noise or dust. Specifically this means track, vehicle and plant maintenance including mufflers.

6.7.7 Biting Insects

A Biting Insect Management Plan has been prepared (Appendix J), developed with reference to the Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites 2005 by the Northern Territory Government – Department of Health and Families.

Mine site infrastructure has the potential to create new mosquito breeding sites or increase the yield at existing sites. Potential breeding areas can be created in or around construction works, water storage facilities, sediment traps, pit dewatering, waste water disposal, mine waste dumps, site clearing borrow pits and storage of artificial receptacles. Any equipment sourced from North Queensland that is capable of holding even a small amount of water can potentially harbour the eggs of the dengue mosquito *Aedes aegypti*.

Management actions will be incorporated into the development and management of the mine site to prevent mosquito breeding opportunities, reduce the potential for contact between personnel and mosquitoes and detail monitoring and response strategies to severe outbreaks or incidence of disease.

A decommissioning and rehabilitation plan will be in place to ensure no actual or potential mosquito breeding sites remain after cessation of mining operations. All disturbed areas will be rehabilitated to be free draining where practical.

Table 6-5: Risk Assessment of the Proposed Development

Risk Group	Aspect	Potential Impact/Hazard	Inherent Risk (C=Consequence; L=Likelihood; RS=Risk Score)			Mitigation Measures	Residual Risk (C=Consequence; L=Likelihood; RR=Residual Risk)		
			C	L	RS		C	L	RR
Surface Water	Water quantity/quality	Extraction leading to increase in cease-to-flow events along the Roper River	3	D	H	- Modelling shows that proposed extraction should not lead to substantial increase in cease-to-flow events or water quality as the 20% threshold will not be crossed. - Mitigation procedures including shutting down when flow reaches 900L/s - Ngukurr water supply alternatives are currently being explored (irrespective of this development)	2	B	L
Groundwater	Water quality	Leaching of heavy metals from tailings disposal into soils and groundwater	2	D	M	- Monitoring to ascertain migration of leachates and heavy metals. - Elevated (i.e. above ADWG thresholds) levels of heavy metals will trigger further investigation and assessment that may culminate in mitigation measures such as compaction of the floors of the open pits and/or the addition of bentonite to inhibit migration of leachates	2	B	L
Rehabilitation	Rehabilitation failure	Bare/disturbed soil leading to increased erosion and sedimentation	2	C	M	- Rehabilitation Management Plan (RMP); Appendix K - Erosion and Sedimentation Control Plan (ESCP); Appendix H	2	B	L

Risk Group	Aspect	Potential Impact/Hazard	Inherent Risk (C=Consequence; L=Likelihood; RS=Risk Score)			Mitigation Measures	Residual Risk (C=Consequence; L=Likelihood; RR=Residual Risk)		
			C	L	RS		C	L	RR
Rehabilitation	Weeds	- Bare soil/disturbance aiding weed establishment - Weeds being moved due to vehicle movement	3	D	H	- Rehabilitation Management Plan (RMP) Appendix K limiting exposed soils. - Weed Management Plan (WMP); Appendix I managing existing and reducing probability of new introductions.	2	C	L
Rehabilitation	Pastoral production	Land taken out of pastoral production	2	C	L	Rehabilitation Management Plan (RMP) Appendix K; tripartite agreement and associated compensation to land managers and owners while land is non-productive.	2	B	L
Threatened Species	Terrestrial	Mining removing/disturbing habitat.	2	B	L	No special management measures required (see text above).	2	B	L
Current Land-Use	Social	Reduced amenity due to pastoralists proximity to mine (visual, noise, dust, disruption); access; interruption to daily operations			N/A	Formal agreement between AIR and land-holders specifically dealing with these issues with agreed ongoing to communication.	3	C	M
Current Land-Use	Environmental	Reduced pastoral productivity due to mining activities	3	C	M	Dealt with in other sections of risks: Rehabilitation Management Plan (RMP) Appendix K; tripartite agreement and associated compensation to land managers and owners while land is non-productive.	2	B	L

Risk Group	Aspect	Potential Impact/Hazard	Inherent Risk (C=Consequence; L=Likelihood; RS=Risk Score)			Mitigation Measures	Residual Risk (C=Consequence; L=Likelihood; RR=Residual Risk)		
			C	L	RS		C	L	RR
Current Land-Use	Economic	Reduced economy of pastoral enterprise due to mining activities.			N/A	The land manager agreement determines yearly compensation to offset any losses to pastoral productivity.	2	B	L
Transportation	Road traffic	Increased road traffic resulting in potential accidents and road degradation	4	C	H	- Driver training - Adhere to road rules including speed limits - SOPs developed regarding product transport	4	C	H
Erosion and Sediment Control		Sedimentation of creeks and rivers; declines in pastoral productivity; failed rehabilitation and closure objectives.	3	C	M	- Erosion and Sedimentation Control Plan (ESCP); Appendix H. - MMP auditing and continued monitoring.	2	B	L

7 Environmental Offsets

7.1 Unavoidable Impacts

Identified impacts or detriments that cannot be avoided, reduced or mitigated at reasonable cost:

- Abstraction of water from the Roper River – Options have been explored to either reduce volume of water required or manner in which it is obtained. Pumping water from the River was identified as the most appropriate with safeguards in place, to ensure the on-going operation of the mine.
- Clearing of vegetation to make way for the mine and associated infrastructure – Clearing is essential to allow AIR access to the mined resource.

7.2 Management Failure

Risks of failure of management actions:

- Failure to manage abstraction of water from the Roper River will potentially result in increases in 'cease to flow' events, reduction in availability of water for local communities, death of riparian vegetation, impacts on aquatic fauna, impacts to threatened fauna (Merten's Water Monitor), and loss of production time due to reduction in availability of water for processing.
- Failure to manage clearing may result in excessive clearing, changes to hydrology and landform, direct impact on vegetation through removal of flora over a wide area, indirect impacts to fauna through removal of habitat.
- Failure of rehabilitation leading to lost pastoral production.

7.3 Identification of Appropriate Offsets

The following section has been developed using the NT Governments *Draft NT Environmental Offsets Policy* (2010).

As the development occurs on a pastoral lease, the land owners and leasers of that land are eager to investigate the potential benefits of studying the increase in soil carbon via the rehabilitation planned, and therefore the environmental benefit of increases in soil carbon.

This will be the focus of the offsets plan proposed by AIR; however consultation will take place moving forward to determine if this is the most appropriate offsets for the proposed mining operation. Consultation will be done with land owners and land managers, government, and the general public.

Methods for measuring carbon sequestration are being developed (M Lanzarin 2012, pers. comm., 10 Jan.) and will enable estimates to be made of the effectiveness of the planned rehabilitation in creating an offset for mining. Interest in this work is high and it is envisaged that results from planned rehabilitation by AIR will feed into what is already known about carbon sequestration in other parts of Australia, leading to improvements in the future management of land in the NT.

AIR will consider options for contributing to better management of other pressing environmental issues, ensuring that measurable benefits are developed to determine that the offset is of equivalent value to residual impacts. While the focus will be on carbon offsets, AIR will look for other opportunities that may exist.

Offsets will be designed to avoid risks of obligation, or cost-shifting. Costs of long-term maintenance, for all parties involved, will be taken into account in building and assessing quality of offset arrangements.

Wherever possible, delivery of offsets will utilise skills and physical infrastructure available in the region or show how local capability will be accessed in a reasonable time. In particular, AIR will seek the advice of

Holistic Land Managers with experience in carbon sequestration and local land managers with experience in managing land in the NT.

AIR will give particular regard to offsets that have benefits for:

- Local land managers;
- Local communities; and
- The management of pastoral land in the NT.

The period over which offsets will be maintained will be specified in any agreements. Any agreed offsets will be subject to monitoring to verify delivery of benefits. An agreed monitoring, reporting and review framework will be developed and upheld. Specifically, a section on offsets reporting will be included within the Mining Management Plan. AIR will also consult with Government regulators throughout the design and selection process for offsets.

8 Environmental Management and Monitoring

8.1 Introduction to the AIR Draft EMP

This PER and the draft Environmental Management Plan (draft EMP, Appendix L) aim to address the issues of concern highlighted in the *Guidelines for the Preparation of a Public Environmental Report, SILL80 Project, Roper River area, NT* (see Appendix A) and the *Request for Further Information* (see Appendix A1).

Specifically, the three major key risks identified in relation to this project:

- Extraction of water from the Roper River used for processing ore;
- Effectiveness of the proposed rehabilitation over large areas; and
- Potential impacts to threatened species.

8.1.1 Environmental Management

An essential part of AIR's commitment to environmental management will be their compliance with environmental performance obligations, which will be demonstrated throughout the Project by monitoring; auditing and inspection, conducted internally by AIR and an appointed independent auditor, and externally via relevant authorities (refer to Draft EMP in Appendix L).

Additional to the EMP, AIR has a number of management plans to maintain environmental standards at the SILL80 project site. These include:

- Water Management Plan (refer to Appendix G);
- Erosion and Sediment Control Plan (refer to Appendix H);
- Weed Management Plan (refer to Appendix I);
- Biting Insect Management Plan (refer to Appendix J); and
- Rehabilitation Management Plan (refer to Appendix K).

These management plans and their associated commitments (Appendix M) have been developed specifically for AIR's SILL80 project and will be utilised in the development of a Mining Management Plan (MMP) for the project. All management plans detail the monitoring programs and control measures employed to mitigate identified environmental issues. These plans have been developed to be implemented across the entire life of the project from construction to mining and rehabilitation.

8.1.2 Current and Future Locations of the EMP

The draft EMP is included in Appendix L of this document. It is anticipated that changes will be made to the draft EMP to address comments that may be received through the public review phase for this PER. The draft EMP will be finalised at the conclusion of the assessment, taking into consideration comments on the PER, and incorporating recommendations and conclusions.

It is also anticipated that ongoing changes to the EMP will be necessary throughout the life of the mine:

- To reflect newly available research or information;
- To keep up with best practice environmental management; and
- To respond to monitoring results with an adaptive management approach.

Thus, although the draft EMP may be finalised at the conclusion of the assessment, it will be updated each year, and submitted to N.T. Government authorities as part of AIR's annual MMP. The annually updated

EMP will be provided in a form suitable for inclusion in the MMP, as required under the *Mining Management Act*.

8.1.3 Maintenance Log

AIR will develop and utilise a routine maintenance log including but not limited to; monitoring and maintenance of sediment dams, daily vehicle pre-start inspections, maintenance of waste and hazardous substance storage and bunding, mosquito controls etc. Identified issues will be placed in the Maintenance Log and remedied in a timely manner and reviewed during internal and external audits.

8.2 Biological/Aquatic Monitoring Program

This section gives the project outline for the Aquatic Biodiversity Monitoring Program for the AIR Project. NRETAS will lead, manage and report on this project. The project outline below was supplied by Simon Townsend (NRETAS).

Background

Australian Ilmenite Resources Pty Ltd (AIR) plans to extract water from the Roper River as part of the development of an Ilmenite mine on Numul Numul Station. As part of the government approvals process the Northern Territory Government (NTG) has requested that an aquatic monitoring program is established that will contribute to our understanding of the impact of water extraction on the biodiversity from the Roper River.

This document aims to broadly outline the monitoring program including parameters measured, frequency of sampling, outputs and costs. The intent of this paper is to inform the NTG of the monitoring intentions as well as the proponent (AIR) of monitoring obligations and proposed costs.

Project Detail

Riffle habitats are vulnerable to reduced flows. The aquatic biodiversity monitoring program for this development will annually monitor, in the late dry season, riffle ecological condition. The following will be monitored: habitat extent and spatial heterogeneity, fish and macroinvertebrate abundance, and benthic algal biomass at a to-be-selected site(s) downstream of the water extraction point for the mining development. An up-stream reference site will also be considered.

A number of physical parameters will also be measured, these include: water depth, current speed, flow, temperature, pH, dissolved oxygen, conductivity, total and soluble nitrogen and phosphorus, turbidity and suspended phytoplankton as chlorophyll-a.

Reporting will be annual. Over the life time of monitoring, and with each annual monitoring event, the relationship between flow and (1) aquatic biota, (2) water quality and (3) habitat physical features will be evaluated, and reported.

Scheduling

September 2012 Establish monitoring site(s), and undertake first survey.

September 2013 (and ongoing) resurvey

9 Public Involvement and Consultation

9.1 Social Consultation to Date

Formal meetings involving the Traditional Owners and other community members have been supervised and co-ordinated by the Northern Land Council on behalf of AIR since 2009. During this period there have been 3 on-country presentations and 10 consultative discussions in the development of the tripartite agreement. The final tripartite agreement was signed 05th September 2011.

Consultation with land managers has been on-going since the original exploration activities in 2005.

9.1.1 Future Social Consultation

AIR will undertake half yearly committee meetings with Traditional Owners and representatives from the Northern Land Council to discuss project operation, issues and commitments.

Consultation with Numul Numul and Flying Fox Station land managers will be performed on a regular informal basis concerning access and daily operations to be detailed in the Formal Agreements with the current Land Managers. For this reason a formal agreement is being developed between AIR and the current managers of Numul Numul and Flying Fox Stations, further to the lease agreement brokered with the lands traditional owners.

9.2 Public Review

The initial PER for AIR's SILL80 project was submitted to the Northern Territory Government (NTG) on 28th January 2012. In accordance with direction provided by NRETAS the report and all appendices were placed on the NRETAS website for public review. Advertisements were placed in the *Katherine Times* (26th January 2012) and the *NT News* (28th January 2012) notifying the public that the PER was available for Public Review until the 24th February 2012. Additional to this bound copies were made available for review at:

- Environment and Heritage Division, NRETAS, Darwin
- NRETAS, Katherine
- Katherine Town Council Library
- Katherine Government Centre
- Roper Gulf Shire Office, Mataranka
- Roper Gulf Shire Office, Ngukurr
- Northern Territory Library, Darwin
- The Environment Centre, Darwin

Post completion of the public review period the NTG requested further information be provided to enable a full and proper assessment of the project and its environmental impacts and risks. A document detailing the further information required for assessment of the project was developed, which also incorporated the public comments received during the review period (Appendix A1). All additional information requested has been incorporated into and addressed within this latest version of the AIR SILL80 PER and its associated appendices.

9.3 Persons Involved in Preparation of this PER

Name	Company	Position	Tasks
James Adcock	VDM Consulting	Civil Engineering Manager	Water MP
Edgardo Alarcon Leon	Pendragon Environmental Solutions	Senior Hydrogeologist and Hydrochemist	Deposit Geochemistry
Kate Bauer	EcOz Environmental Services	Senior Environmental Scientist	Fieldwork, Flora and Fauna Report
Ian Brown	EcOz Environmental Services	Environmental Scientist	Aquatic Vertebrate Report, Document Review
Jyoti Choudhary	EcOz Environmental Services	Environmental Scientist	Digital Data Requests, GIS Mapping
Huon Clarke	EcOz Environmental Services	Environmental Scientist	Document Review
Brad Comley	VDM Consulting	Discipline Manager – Water	ESCP
Christine Crassweller	Begnaze Pty Ltd	Archaeologist	Archaeology survey and report
Pablo Elizondo	VDM Consulting	Civil Engineer	ESCP
Ann Grattidge	EcOz Environmental Services	Senior Environmental Scientist	Community Consultation
Ray Hall	EcOz Environmental Services	Manager and Principal	Project Development, Document Review
Casey Hawkey	EcOz Environmental Services	Environmental Scientist	All Reports and MP's, Consultations, fieldwork
Erin Hogan	VDM Consulting	Senior Stormwater Engineer	ESCP
Alice Parawa	EcOz Environmental Services	Administration Manager	Project Administration
Thomas Reilly	EcOz Environmental Services	Senior Environmental Scientist	Document Review
Jeff Richardson	EcOz Environmental Services	Principal Environmental Scientist	Flora and Fauna Report, EMP, Document Review
Justine Shailes	EcOz Environmental Services	Senior Environmental Scientist	SCAR, ESCP, RMP, EMP, Document Review
Keith Munson	EcOz Environmental Services	Environmental Scientist	GIS Mapping
Emma Murray	EcOz Environmental Services	Senior Environmental Scientist	Flora and Fauna Report, Fieldwork
Bruce Ryan	Paulka Radiation Services Pty Ltd	Radiation Principal	Radiation Surveys and Report
Carel Van Der Westhuizen	Pendragon Environmental Solutions	Principal Hydrogeologist	Water Balance, Water MP, ESCP
David Van Den Hoek	EcOz Environmental Services	Environmental Scientist	ESCP, GIS Mapping
Dave Wilson	Aquagreen Pty Ltd	Aquatic Flora and Fauna Specialist	Aquatic Vertebrate Surveys - Roper River

EcOz Environmental Services (EcOz) is a fully Australian-owned and well-respected environmental consulting business providing services to industry, communities and government in northern, western and central Australia. The company was established in the Northern Territory in 1990. EcOz provides a broad range of environmental services to a diverse range of local, national and international clients. EcOz have bioregional expertise in the wet/dry tropics and the arid zones of Australia, and can provide a wide range of additional services and expertise from national resources. EcOz work closely with their clients to provide rigorous and practical solutions to environmental problems whilst maintaining integrity in environmental practice.

9.4 Persons, Department and Organisations Consulted During PER Development

Consultation	
Flying Fox Station	Mark Sullivan
Northern Land Council	Charlotte Deans: Senior Project Officer, Mining and Major Projects
	Daniel Maher: Katherine Regional Officer
	Howard Smith: Manager, Mining and Major Projects
	Tamara Cole: Legal Advisor
	Gaye English: Regional Anthropologist
	Emma King: Regional Anthropologist
	Therese Cramb: Special Planning Officer, Mining and Major Projects
NRETAS	Natural Resources Division
	Ralf Koberstein: Resource Information Officer
	Water Resources Branch
	Chris Wicks: Manager, Planning and Regulation
	Simon Cruickshank: Senior Manager, Water Monitoring
	Ian Lancaster: Director, Water Resources
	Brendan Dimech: Water Resource Planner
	Lisa Bradley- Manager, Environmental Assessments
	Simon Townsend – Manager, Aquatic Health Unit
	Anthony Knapton – Manager Water Resource Modelling
	Des Yin Foo – Senior Manager Water Resources Assessment
Numul Numul Station	Moira Lanzarin
	Rory O'Brien
	Patrick O'Brien
	Mike O'Brien
	Claire O'Brien
Traditional Owners and Native Title Claimants	Moses Silver
	Steven Sandy
	Mildred Ponto
	Estelle Farrar
	Jojo Huddleson

10 Acronyms

AAPA	Aboriginal Areas Protection Authority
AIR	Australian Ilmenite Resources
DoR	Northern Territory Department of Resources
E&H	Northern Territory Department of Natural Resources, Environment, The Arts and Sport, Environment and Heritage Division
EA Act	<i>Northern Territory Environmental Assessment Act 1982</i>
EL	Exploration Lease
EMP	Environmental Management Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act, 1999 (Commonwealth)</i>
ESCP	Erosion and Sediment Control Plan
ILC	Indigenous Land Corporation
ML	Mega litres
MLA	Mineral Lease Application
MMP	Mining Management Plan
MSDS	Material Safety Data Sheet
NLC	Northern Land Council
NOHSC	National Occupational Health and Safety Commission
NOI	Notice of Intent
NRETAS	Natural Resources, Environment, The Arts and Sport
NT	Northern Territory
PER	Public Environmental Report
RMP	Rehabilitation Management Plan
SEL	Substitute Exploration License
SEWPaC	Australian Government Department of Sustainability, Environment, Water, Population and Communities
SOP	Standard Operating Procedure
WCD	Water Control District
WDL	Waste Discharge Licence
WMP	Water Management Plan

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