

# **SILL80 Project**

## **Mining Lease Application 27422**

### **Ilmenite Mine Proposal**

**Numul Numul Station via Mataranka**

#### **NOTICE OF INTENT**

**October 2010**

**DW090024**

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# 1. INTRODUCTION

## 1.1 Overview

Australian Ilmenite Resources Pty Ltd (AIR) proposes to develop its *SILL80 Ilmenite Project*, within Mining Lease Application (MLA) 27422, located in the Roper River region of the Northern Territory, approximately 105 km east of Mataranka Township and 8 km south of the Roper Highway (Figure 1-1).

The SILL80 Project forms part of AIR's larger Roper Heavy Minerals Project (Figure 1-2) and arises from exploration results within AIR's Exploration Leases (EL23048, EL24655, and EL24986, soon to be amalgamated into Substitute Exploration Licence [SEL] 28291) indicating a resource of approximately 120 million tonnes at 10% - 25% ilmenite ( $\text{FeTiO}_3$ ). The SILL80 Project is currently in the feasibility stage focussing on infrastructure and mining development within a portion of SEL 28291 namely, Mining Lease Application (MLA) 27422 (dimensions shown in Figure 1-3). As such, this Notice of Intent (NOI) specifically relates to development of the SILL80 Project within MLA 27422.

MLA 27422 contains an estimated ilmenite ( $\text{FeTiO}_3$ ) 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 have a life well in excess of 20 years dependent on further ore body definition. Details of any mining planned for ore that extends beyond MLA 27422 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 an average depth of 1.2 m (maximum 3 m). Excavations will progress along 50 - 100 m wide strips, allowing for successive rehabilitation of mined strips, which are backfilled with the residual material following extraction of the ilmenite. Note that only water is used in separating the ilmenite, leaving between 75 – 90 % of the original regolith material for infilling excavations once excavations move to the next strip.

Initially, it is planned to recover 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. This equals an area of between 13 and 33 hectares if excavations are 1 m depth and will be less if the ilmenite ore extends to greater depths and excavations are deeper.

The project will be owner operated and comprise:

- **Open cut mine** using excavators to remove 50 – 100 m wide x 1 - 3 m deep strips of regolith (approx area 13 - 33 ha / year). Initial operations (that which is covered by this NOI) will be confined to MLA 27422 (Figure 1-3).
- **Stockpiles** located within the disturbed area of the open cut mining area:
  1. Excavated regolith awaiting processing (<10 ha);
  2. Dried ilmenite concentrate in 2 tonne 'bulka' bags awaiting transport (<2 ha);
  3. Post-processed regolith (about 75 – 90 % of the original material) prior to returning to open pit (<2 ha);
  4. Topsoil (if available) for progressive rehabilitation of excavated strips (<2 ha).
- **On-site processing** (1000 m<sup>2</sup>) wash / trommels and a series of gravity separation spirals that use water to separate the ilmenite from the regolith.
- **Concrete pad** (700 m<sup>2</sup>) for drying ilmenite concentrate.
- **Small on-site office and ablutions** (150 m<sup>2</sup>)
- **Power generation shed** (70 m<sup>2</sup>) to supply power to processing plant, water pumps, and office.

- **Fuel storage area** (100 m<sup>2</sup>) to safely store fuel for machinery, power generation, and water pumps.
- **Vehicle wash down bay** (100 m<sup>2</sup>)
- **Water pump and pipeline** (approx 12 km long) to pump water from the Roper River to water storage tanks at the proposed mine. This will be parallel to the existing pump and pipeline supplying Flying Fox and Numul Numul stations.
- **Water storage tanks** located next to existing Numul Numul station water tanks to store water collected from the Roper River (3 x 25 000 gallon tanks) and also water recovered (recycled) from the processing plant (2 x 10 000 gallon tanks). These tanks will allow for flexibility in the timing of water extraction from the Roper River, where extraction can be limited to times of high flow. During times of low flows, water for mining operations will come from the tanks. Ore processing is the largest water requirement (estimated 3 tonne of water to produce 1 tonne ilmenite). Other water requirements include dust suppression during excavations and along roads, ablutions, laundering, the vehicle wash down bay, and for revegetation of mined areas (together 2 tonne of water per day).
- **Road transport** of dried ilmenite concentrate by road train (2 per week) via Roper and Stuart Highways to Darwin Port for shipment.
- **Site access** from the Roper Highway (approx 8 km) using existing Numul Numul Station tracks. These provide good dry and wet season access and will be continually maintained to handle B Class trucks and small road trains.

Improved transport options may be developed at a later stage after undergoing feasibility assessment. These include linking to the existing railway line near Mataranka for transporting the ilmenite concentrate to Darwin, or preferably, transport through Port Roper to a loading facility 14 km offshore on Maria Island, details of which will be submitted for assessment in a separate proposal.

Purchase and testing of the pre-assembled processing plant using a representative bulk sample excavated from the site is scheduled for early 2011. Production is expected to commence late in 2011 depending on the results of processing trials. Mining will initially aim to produce 100 000 tonnes per annum of ilmenite concentrate, increasing to 200 000 tonnes per annum in 2012.

## 1.2 Project Area and Land Tenure

AIR is the registered holder of a Miners Right and is currently in the process of applying for a Mineral Lease (MLA 27422) under the Northern Territory *Mining Act*. MLA 27422 is wholly within Substitute Exploration Licence (SEL) 28291 which is an amalgamation of AIR's Exploration Licences EL23048, EL24655, and EL24986 (Figure 1-2).

This NOI refers to AIR's intent to develop ilmenite mining operations within MLA 27422.

Located within the Roper Gulf Shire, land tenure of MLA 27422 is Perpetual Pastoral Lease 1161, Land Parcel NT Por 4970 *Chatterhoochee* (*Namul Namul*). The Indigenous Land Corporation (ILC) acquired Numul Numul station in 2000, granting it to 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).

The proposed mine site is approximately 4 km south-east of the Kewulyi Aboriginal Community Outstation (old Roper Valley Homestead) and 3 km south-west of Numul Numul homestead. Vehicles and trucks will access the mine through Numul Numul Station from the Roper Highway using existing station roads (shown in Figure 1-3) currently managed by the sub-leaseholder. AIR will upgrade and maintain these roads to handle mine traffic and road trains. Similarly, the water pipeline from the Roper



River to the mine will traverse through Numul Numul Station parallel to the existing station pipeline. The water pump itself will be located on the Roper River within Flying Fox Station (shown in Figure 1-3) next to the existing pump used to supply water to Flying Fox and Numul Numul stations.

### 1.3 Purpose of this Notice of Intent

This Notice of Intent (NOI) provides formal notification to the Northern Territory Government and other interested parties of AIR's intent to develop the SILL80 ilmenite mine project within MLA 27422. It provides the required information to the Department of Resources (DoR) and Department of Natural Resources, Environment, the Arts and Sport (DNRETAS) to determine the appropriate level of environmental assessment for the Project.

This NOI has been prepared in accordance with the DNRETAS *Information Guidelines for a Notice of Intent* (DNRETAS 1996, Appendix 1), as summarised in (Table 1-1), and the DoR *Environmental Assessment of Mining Proposals Advisory Note* (DoR 2008).

**Table 1-1: Information requirements for a NOI (NRETAS)**

NOI Requirement	Report Section
1. Name of proponent and consultant	Front page and 1.4.1
2. Address and contact details of proponent	1.4.1
3. Location of proposal	1.1 and 2.1
4. Description of a proposal	Chapter 2
5. Outline of legislative consent and licensing requirements	Chapter 3
6. Description of site and existing environment	Chapter 4
7. Description of existing marine and land uses in and adjacent to proposal	N/A
8. Description of waste management and pollution control on and offsite	2.5
9. Description of other environmental factors	Chapter 4
10. Identification of greenhouse gas emissions from the proposal	4.1
11. Aboriginal and sacred sites clearance	2.11
12. Description of timing, including stages and decommissioning	2.8
13. Description of environmental commitments, safeguards, and monitoring	Chapters 4 and 5
14. Description of proposed rehabilitation and decommissioning	2.10

### 1.4 Proponent Details

Australian Ilmenite Resources Pty Ltd (AIR) is an Australian registered Propriety Company incorporated in the Northern Territory.

#### 1.4.1 Name and Address of Proponent

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 PO Box 39447, Winnellie NT 0801  
 Phone: 08 8941 3213; Fax: 08 8941 3498  
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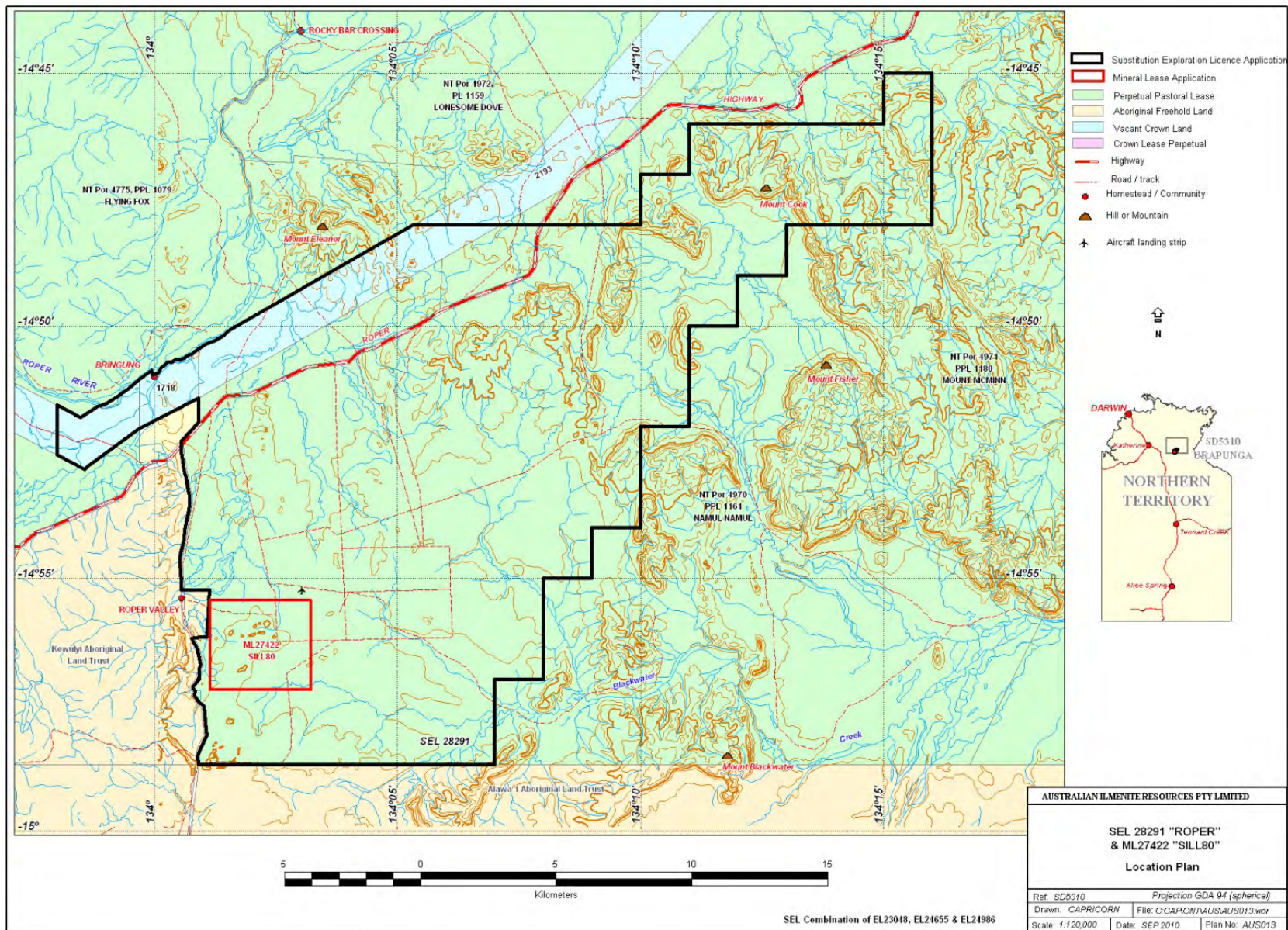


Figure 1-1: The SILL80 Project located south of the Roper River, NT, showing land tenure and the boundaries of MLA 27422 and SEL 28291.







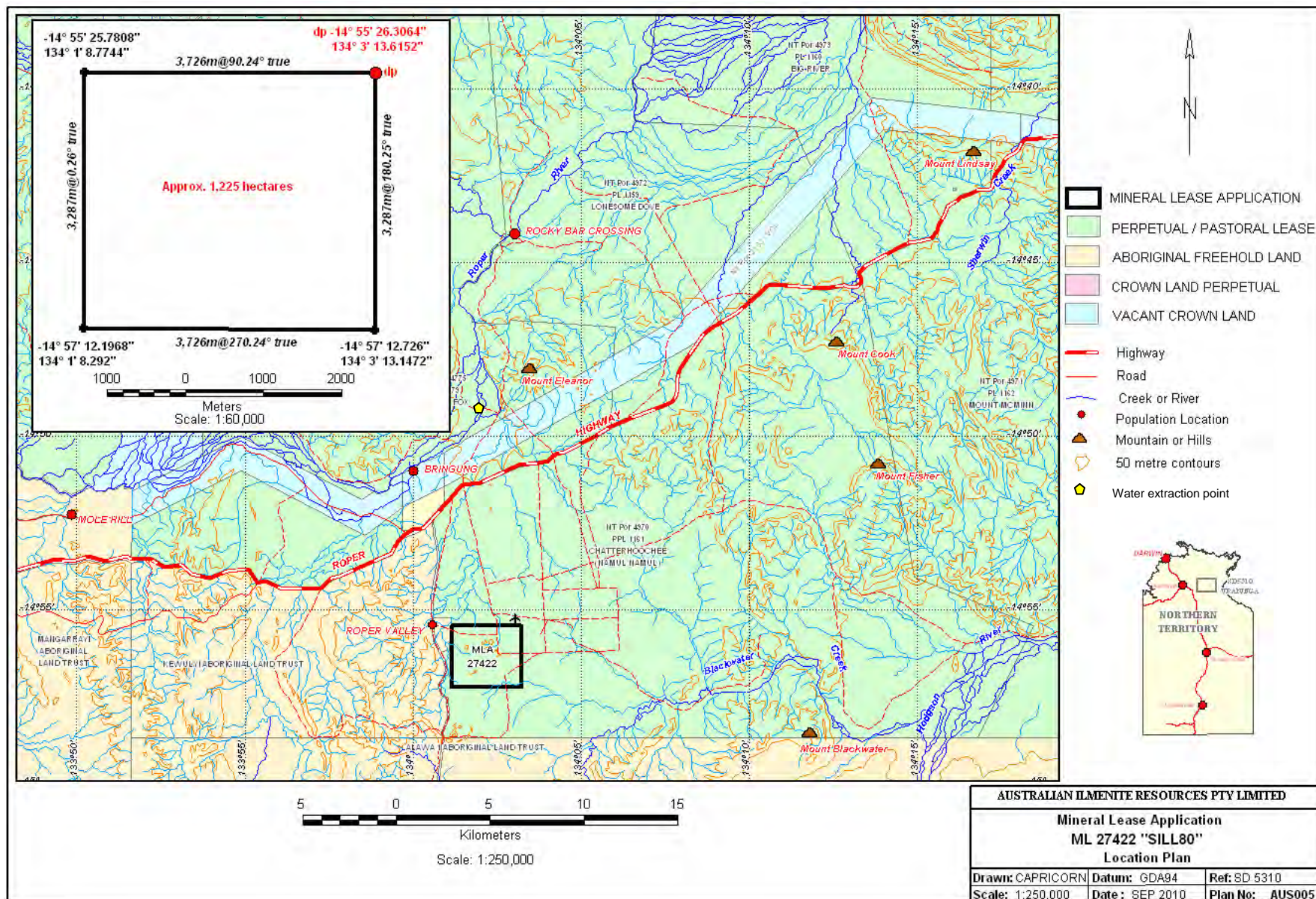


Figure 1-3: MLA 27422 location, dimensions, access roads, water extraction point, and land tenure.



## 2. PROJECT DESCRIPTION

### 2.1 Project History and Site Selection

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 (Figure 1-2). The Project intends to mine ilmenite ( $\text{FeTiO}_3$ ), a black iron-titanium oxide mineral, most commonly used to produce titanium dioxide ( $\text{TiO}_2$ ), which is an important base pigment in paint, paper, and plastics. AIR plans to export ilmenite concentrate to China for further processing into Synthetic Rutile or Titanium Sponge, and where market demand for titanium dioxide is growing rapidly.

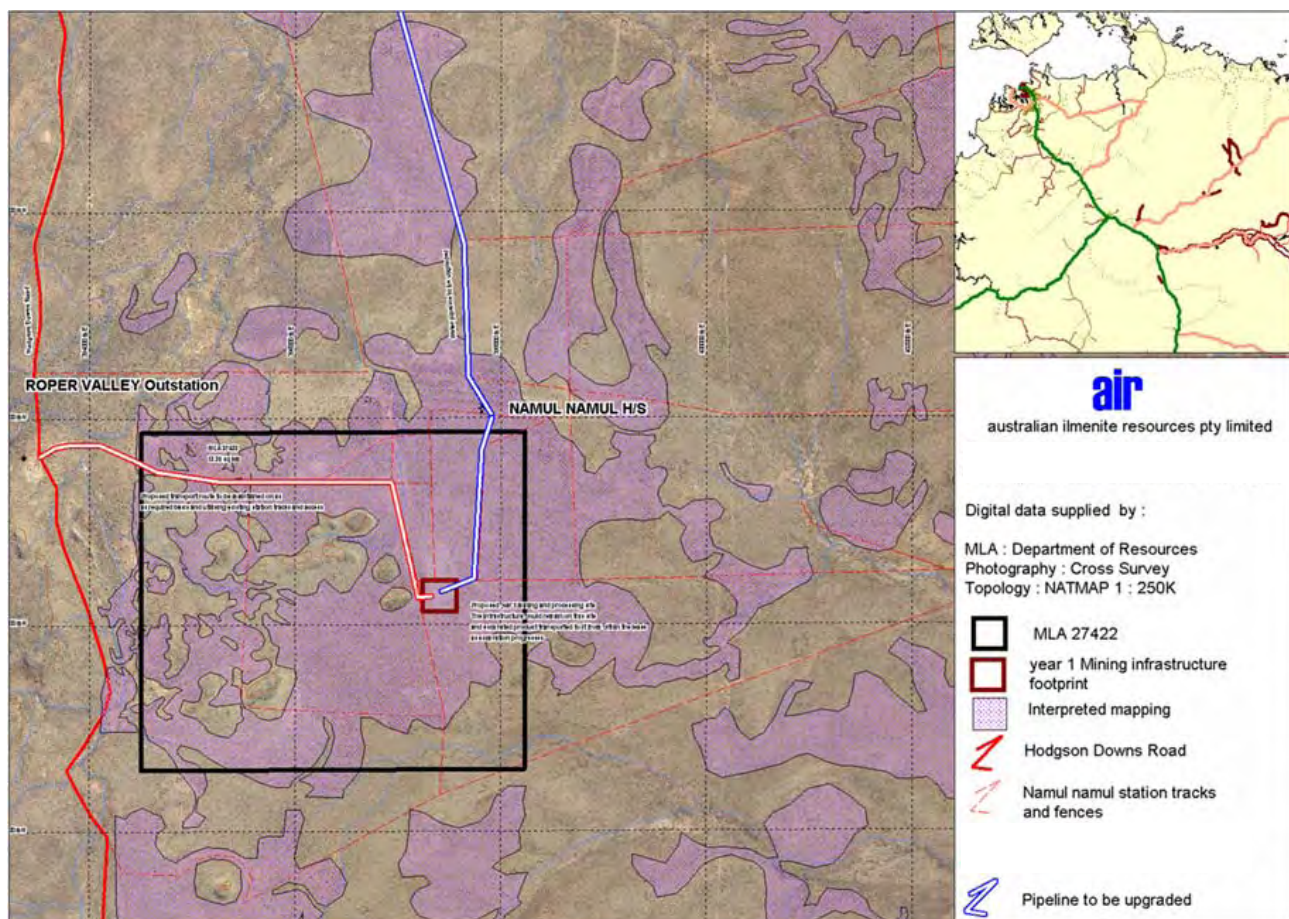
Ilmenite mineralisation in the Project region results from weathering of dolerite sills close to the surface (within the top 3 m of regolith), where ilmenite grains have been liberated from the host rock and lay in-situ. The ilmenite-bearing dolerite sills and their associated deep red-purple-brown, clay-rich soils (for example in Figure 2-1) have been mapped throughout the SILL80 Project area (Figure 2-2; see also Section 4.3.1 *Geology and Soils*). To date, exploration has focussed on locating and characterising these sills using remotely sensed data (geophysics, satellite imagery, aerial photography), helicopter-supported sampling, GPS-assisted gridding, soil and lag sampling, and hand/mechanical auger drilling. Over 6000 auger and RC holes have been drilled and in excess of 20,000 samples taken, analysed, and reported to the Department of Resources.

MLA 27422 within the SILL80 Project area (Figure 1-3) was identified for mine development based on exploration results, ease of access, nearness to existing highways, and the relatively flat topography and sparse vegetation, simplifying mining operations and lowering the risk of environmental impacts. The land is also currently used for cattle grazing, so is already subject to human disturbances.

Exploration results within MLA 27422 indicate an ilmenite ( $\text{FeTiO}_3$ ) resource of 4.5 million tonnes, which would sustain the mine in excess of 20 years. Excavation of a test pit at the proposed mine site of approximately 200 m x 200 m (4 ha) and approximately 1 m depth is planned for early 2011. The representative bulk sample from this test pit will be used to further refine ilmenite grade estimates and plan open pit mining operations. It will also be used to test the processing plant to determine specifications and practically test the planned water usage requirements.



Figure 2-1: Ilmenite-rich regolith (weathered dolerite sill) outcropping at surface in MLA 27422.



**Figure 2-2: Mapped ilmenite-rich regolith within MLA 27422 and the wider SILL80 Project.**

Further ore body definition and characterisation will continue within MLA 27422 and SEL 29291 and future mining will follow the most economic mineralisation. Any mining that extends beyond MLA 27422 however, is beyond the scope of this NOI and would be submitted as a separate application.

## 2.2 Project Components

Table 2-1 outlines the project components and their approximate footprints. Initially, it is planned to recover 100,000 tonnes of ilmenite concentrate per annum. At a grade of between 10% to 25% ilmenite ( $\text{FeTiO}_3$ ), this requires the excavation and processing of between 400 000 tonnes (for grade of 25%) and 1 million tonnes (for grade of 10%) of regolith per year and equates to a surface area of between 13 and 33 ha per year (Table 2-2). Note that this is a maximum surface area calculated based on an excavation depth of 1 m and the surface area will be less where the ore extends deeper than 1 m (up to 3 m).

The area required for the processing plant and associated infrastructure will have a total footprint of 3000m<sup>2</sup> and include wash / trommels / separation spirals, concrete drying pad, power generation shed, and water pumps (layout within the mining area shown in Figure 2-4).

Stockpiled material will be located within the disturbed footprint of the mine and areas next earmarked for mining. Stockpiles will include:

- (1) excavated regolith awaiting processing (<10 ha);
- (2) post-processed ilmenite product in 2 tonne bulka bags awaiting shipment (<2 ha);
- (3) the remaining regolith after ilmenite extraction (about 75 – 90 % of original material) that is dewatered and then returned to the pit for subsequent rehabilitation (<2 ha); and
- (4) top soil (however this is unlikely available as the ilmenite ore is exposed at the surface with next to no overburden)



Other components within the disturbed footprint of the mine include an office / ablutions located near the entrance, a vehicle wash down bay, a bunded fuel storage area for safe storage of fuels used for machinery, water pumps, and power generation.

Workers will be accommodated offsite nearby at Numul Numul Station Homestead; however there will need to be a small on-site office with ablutions.

Ore processing will be the largest water requirement (estimated 3 tonne of water to produce 1 tonne ilmenite). Other water requirements include dust suppression during excavations and along roads, ablutions, laundering, the vehicle wash down bay, and for revegetation of mined areas (together requiring approximately 2 tonne of water per day). Water will be supplied via a pipeline (approx 12 km long), pumping water from the Roper River (extraction point shown in Figure 1-3). This will be parallel to the existing pump and pipeline supplying Flying Fox and Numul Numul stations (Figure 2-2). Water storage tanks (3 x 25 000 gallon tanks) on high ground near to the proposed mine and next to existing Numul Numul station water tanks will store water during times of high river flows for use during the late dry season when river flows are low. Water will be gravity fed from these tanks to the processing plant.

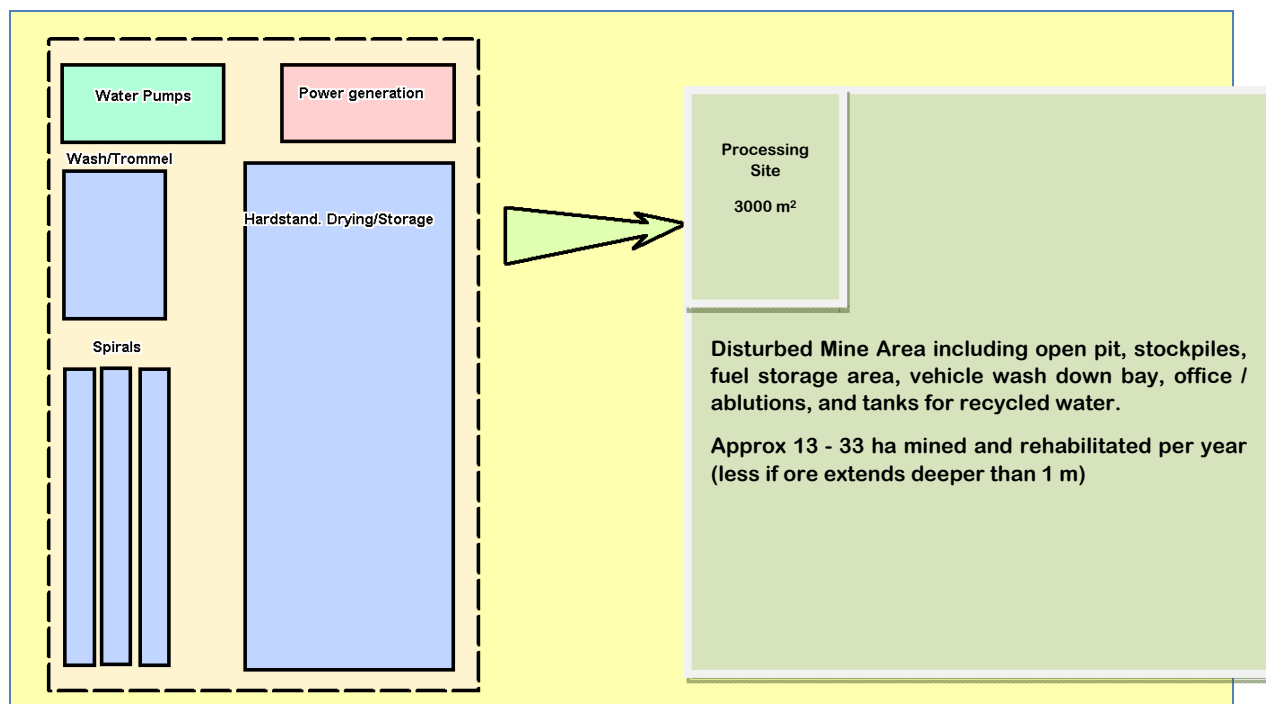
Water will also be recovered from ore processing and stored in 2 x 10 000 gallon tanks adjacent to the mine site. This water will be reused and further reduce the amount extracted from the Roper River.

**Table 2-1: Project components and approximate footprints**

Components		Approx Footprint
<b>Excavations / Open Pit:</b>	<i>Area strip mined and rehabilitated per year</i>	13 – 33 ha
<b>Temporary Stockpiles:</b>	<i>Located within disturbed footprint of mined area</i>	
<b>Stockpile Types</b>	Excavated regolith awaiting processing	<10ha
	Post-processed / pre-transport ilmenite concentrate	<2ha
	Remaining regolith (to be returned to open pit)	<2ha
	Topsoil (if available)	<2ha
<b>Processing Site Combined Footprint:</b>		3000 m <sup>2</sup>
<b>Processing Site Components</b>	Wash / Trommels / Spirals	1000 m <sup>2</sup>
	Covered concrete pad to dry ilmenite concentrate	700 m <sup>2</sup>
	Water Pumps	70 m <sup>2</sup>
	Power generation shed	70 m <sup>2</sup>
<b>Office Module / Ablutions:</b>		150 m <sup>2</sup>
<b>Fuel Storage Area:</b>		100 m <sup>2</sup>
<b>Vehicle Wash Down Bay</b>		100 m <sup>2</sup>
<b>Access Roads:</b>	<i>Existing station roads will be maintained and used for access between Roper Hwy and the mine site</i>	8 km
<b>Water Supply:</b>	<i>Water sourced from Roper River using pump and pipeline parallel to existing Numul Numul Station pump and pipeline and stored in tanks built next to existing station tanks. Water also recycled from processing plant and stored in tanks at the mine site.</i>	
	Water pipeline between Roper River and mine site	12 km
	Water pump on Roper River	
	Water storage tanks for water from Roper River	3 x 25 000 gallon
	Water storage tanks for water recovered from processing plant	2 x 10 000 gallon

**Table 2-2: Extent of mining activity required to produce 100 000 tonnes of ilmenite concentrate**

Extent of Mining	Grade	
	10%	25%
For 100 000 tonnes ilmenite concentrate produced:		
Regolith Excavated (tonnes)	1 000 000	400 000
Regolith Excavated (cubic metres)	333 333	133 333
Area Mined (ha) for excavation depth of 1 m	33	13
Water required for processing (ML)	300	300
Residual regolith returned to pit (tonnes)	900 000	300 000



**Figure 2-3: Layout of processing site and mine components.**

## 2.3 Mining and Ore Processing

The mine and processing plant will operate for 10 hours a day, for over 200 days a year; stopping if required during the wet season, if the site becomes too wet. The site may also be required to temporarily cease activities late in the dry season if water becomes scarce or unavailable.

The targeted ilmenite mineralisation occurs at the surface and extends down to between 1 and 3 m depth. As such, ilmenite recovery will require strip mining using excavators to remove the regolith to an average depth of 1.2 m (maximum 3 m). In order to recover 100 000 tonnes of ilmenite concentrate per annum, at a grade of between 10% and 25%, between 400 000 and 1 million tonnes of regolith will be excavated per year (Table 2-2).

Excavations will progress along 50 - 100 m wide strips. After the initial strip is mined, the ore is processed and the residual material (about 75 – 90% of the original material) is stockpiled, dewatered, and placed back into the pit as excavations move to the next strip. This allows for immediate rehabilitation of mined areas, involving contouring and facilitating natural revegetation of local species through watering and fire exclusion. Note that top soil where available will be stockpiled for later use in spreading over filled pit areas. However, very little top soil is expected, as the ilmenite mineralisation extends to the surface with very little overburden (Figure 2-1). The proposed mine area is currently used for cattle grazing and is sparsely vegetated (Figure 2-1). Prior to excavations, the vegetation will



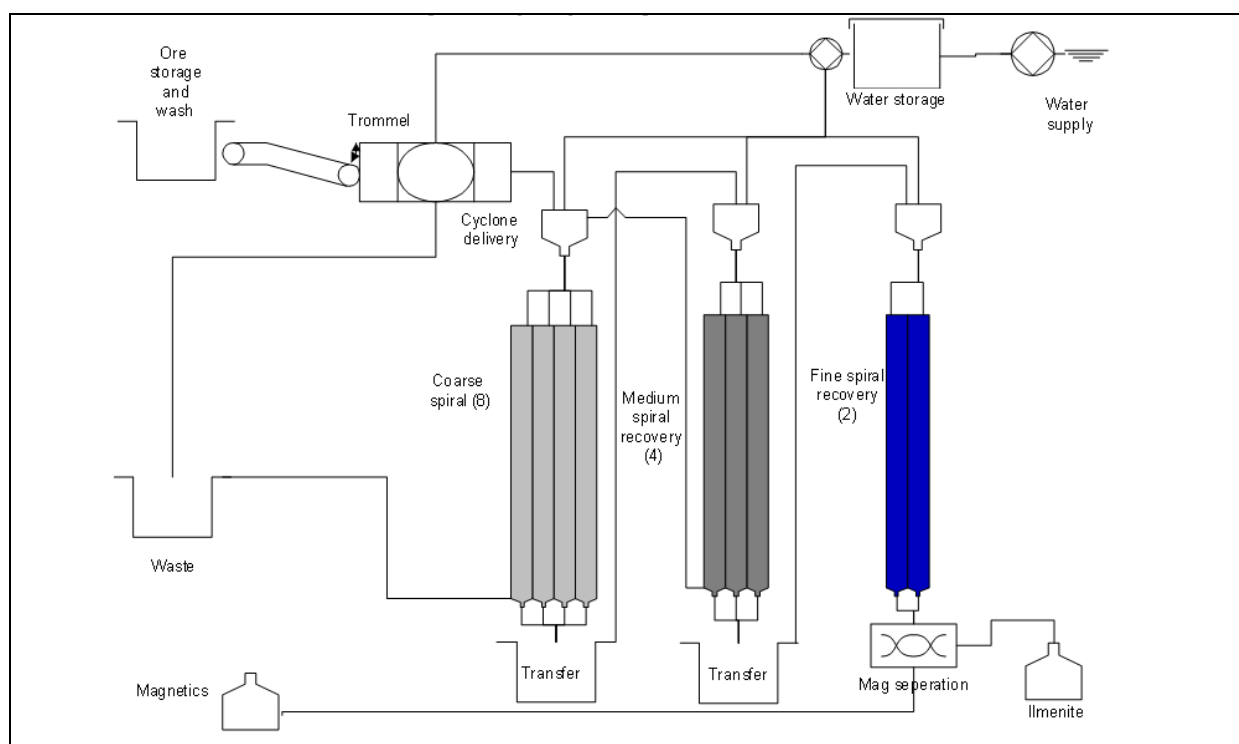
be cleared and soil ripped to a depth of approximately 1 m for ease of ore removal by a single CAT325DL Excavator or similar. The excavated material will be loaded onto a CAT725 dump truck or similar for transport to either a stockpile during non-processing periods or direct to the processing plant during operations.

Figure 2-4 shows the treatment process for separating the ilmenite from the regolith. The excavated material is first loaded into the 1st stage trommels by a CAT950H Loader or similar. It is then washed through the trommels (Figure 2-5), which comprise a rotating cylindrical screen that separates the material based on particle size. The smaller particle fraction then goes through a series of ilmenite specific gravity designed spirals (Figure 2-6 and Figure 2-7). This process uses only water and relies on the particular specific gravity of ilmenite to separate it from the regolith.

There are 3 returns from the processing plant. The first is a slurry of washed regolith, the second is a magnetic mineral concentrate (titanomagnetite, magnetite, haematite), and the third is the ilmenite concentrate. The regolith soils and magnetic mineral concentrate are dewatered and returned to the pit (see Section 2.10 below for rehabilitation process) and the recovered water is stored on-site in two 10 000 gallon tanks for later recycling.

A flocculent may be trialled to increase the rate at which water drains from the residual regolith and magnetic concentrate. This flocculent is not classified as hazardous by the Commonwealth National Occupational Health and Safety Commission and the proportion added is small compared to the volume of residual regolith material.

The ilmenite concentrate is placed onto a covered concrete slab for drying to a depth of 150mm. It is then bagged into 2 ton “bulka” bags and stored for transport to Port of Darwin by owner operated Road-Train or local contractors.



**Figure 2-4: Schematic diagram of processing plant**



**Figure 2-5: Trommel and wash**



**Figure 2-6: Trommel and wash to spirals**





**Figure 2-7: Spirals and ilmenite concentrate**

## 2.4 Water Management

AIR will develop a comprehensive Water Management Plan that includes commitments to water extraction limits, water recovery and recycling, and water use minimisation. It will also outline how environmental issues associated with surface and groundwater at the mine site will be managed along with monitoring, setting performance measures, and reporting.

AIR consider water use and management to be the major environmental issue associated with this proposal and are instigating many engineering, process, design and simple storage methods in an attempt to reduce water consumption to as low as possible.

### 2.4.1 Water Use

Ore processing will be the largest water requirement. It is estimated that 3 tonne (which equals 3m<sup>3</sup> or 3000 litres) of water will be required to produce 1 tonne ilmenite. For an annual production of 100 000 tonnes of ilmenite, this equates to an annual water use of 300 ML [300 000 m<sup>3</sup> or as an indicative measure, 120 x 50 m swimming pools] (Table 2-2 and Table 2-3) or 1.5 ML per day based on a 200 day working year. Other water requirements include dust suppression during excavations, ablutions, laundering, the vehicle wash down bay, and for revegetating mined areas, which together will require approximately 2000 L of water per day. Based on a 10 hour working day, the rate of water supply required for both ore processing and other mining requirements would be 42 L/s (0.042 m<sup>3</sup>/s). AIR plans to increase production to 200 000 tonnes of ilmenite in 2012. This would increase the daily water usage to 3 ML per day, or 84 L/s (0.084 m<sup>3</sup>/s).

**Table 2-3: Water consumption of mine operations and threshold for extraction from Roper River.**

Year	Ilmenite Production	Annual Water Consumption (200 day working year)		Daily Water Consumption (10 hr working day)		Daily rate of water extraction	River Flow when water extraction equals 20%
		Production Plant	Other	Production Plant	Other		
2011	100 000 t	300 ML	0.4 ML	1.5 ML	0.002 ML	42 L/s (0.042 m <sup>3</sup> /s)	210 L/s (0.21 m <sup>3</sup> /s)
2012	200 000 t	600 ML	0.4 ML	3 ML	0.002 ML	84 L/s (0.084 m <sup>3</sup> /s)	420 L/s (0.42 m <sup>3</sup> /s)

Potable water supplied to the office / ablutions will be treated if necessary and be sourced from either an existing nearby bore, from rainwater tanks or from the river if suitable and available, whereas water extraction from the Roper River is the only viable water supply for all other mine operations. Nearby streams are ephemeral and only flow during the wet season, and the local groundwater aquifer is unreliable and supplies less than 1 L/s (see Gulf Water Study, Zaar 2009). As such, Numul Numul station draws all its water for human consumption and stock needs from the Roper River via a pump and pipeline despite the presence of several stock and domestic bores on the property. The community at the old Roper Valley Homestead draws its water from a nearby spring, however, water extraction from here would be inappropriate given it is an Aboriginal Sacred Site (AAPA site in Figure 2-8) and discharge from the spring is small, less than 1 L/s (Gulf Water Study, Zaar 2009, pg 50).

As such, it is proposed that water be supplied via a pipeline (approx 12 km long), pumping water from the Roper River (extraction point shown in Figure 1-3). This will be parallel to the existing pump and pipeline supplying Flying Fox and Numul Numul stations (Figure 2-2). Water storage and water recycling will enable flexibility in quantity and timing of water extraction. Three 25 000 gallon tanks will be built on high ground near to the proposed mine and next to existing Numul Numul station water tanks. These will store water during times of high river flows for use during the late dry season when river flows are low. Water will be gravity fed from these tanks to the processing plant.

Water will also be recovered from ore processing and stored in 2 x 10 000 gallon tanks adjacent to the mine site. This water will be preferentially reused further reducing the amount extracted from the Roper River.

The NT Water Allocation Planning Framework nominates that at least 80% of flow at any one time in any part of a river is allocated as water for environmental and other public beneficial water provision. It also nominates that extraction for consumptive uses will not exceed the threshold level of 20% of flow at any time in any part of the river (NT Government 2006).

**Given a rate of water extraction of 0.042 m<sup>3</sup>/s (for 100 000 t/yr production) and 0.084 m<sup>3</sup>/s (for 200 000 t/yr production), the mine would breach the 20% limit when Roper River flows at the extraction point were to fall below 0.21 m<sup>3</sup>/s and 0.42 m<sup>3</sup>/s respectively (Table 2-3).**

Flow gauge records for the Roper River show that during relatively dry periods, such as in the 1950s and 60s, by the end of the dry season the Roper River can cease to flow at Roper Bar and up to 65 km kilometres upstream at Judy Crossing, which is closer to AIR's water extraction point. In contrast, the last decade has been a relatively wet period with high rainfall, and flows at Roper Bar have hardly dropped below 1 m<sup>3</sup>/s. It is highly likely, however, that dry periods will return and a cease to flow situation at Judy Crossing reoccur. Modelling of integrated surface and groundwater flows and their response to rainfall (Knapton 2009) show that cease to flow conditions at Red Rock (located 8 km upstream of Roper Bar) are relatively common; occurring in 48 of 107 years since 1900. The model also showed that no flow occurred for approximately 5% of the time, equating to 18 days of no flow in an average year.

Current operating flow gauges along the Roper River include G9030176, located near Mataranka Homestead, approximately 80 km upstream of the proposed water extraction point, and G9030250 located at Red Rock (just upstream of Roper Bar), about 60 km downstream of the water extraction point. Long term flow records for these gauges indicate that water ceases to flow at Red Rock when flows are generally less than 1 m<sup>3</sup>/s at Mataranka and less than 0.8 m<sup>3</sup>/s at Judy Crossing (this flow gauge is no longer operating). Selected flow gauge records are shown in Table 2-4.

AIR will cease all water extraction well before cease-to-flow conditions occur at Roper Bar, which, based on flow gauge records, occurs when flows at the extraction point (near Judy Crossing) are less than approximately 0.8 m<sup>3</sup>/s. This would commit AIR to a more conservative threshold than when water extraction reaches 20% of river flows, that is when river flows are less than 0.21 m<sup>3</sup>/s (for 100 000 t/yr production) and 0.42 m<sup>3</sup>/s (200 000 t/yr production). Given this 0.8 m<sup>3</sup>/s threshold and the modelling results of Knapton 2009, on average AIR will not be able to extract water to supply the mine for 5% of the year. During this period, stored water may be utilised until exhausted and then production will cease until flow rates recover to a point that will allow extraction to recommence. The existing pumps

are removed from the Roper River during the wet season so as to avoid being washed away during a flood and stored water is supplemented by rainwater for the existing users of that supply. AIR will also utilise rainwater harvested from sheds and facilities to supplement its supply during these periods that flood may impact the pumping activities. The general wet conditions of the ground and the potential to harvest water from the mining pit will also reduce the need to access river water during these periods.

There are currently no flow gauges near to AIR's water extraction point. As such, AIR will monitor flow rates at the Mataranka flow gauge, which are available on the NRETAS telemetered flow gauge website (<http://www.nt.gov.au/nreta/naturalresources/water/surfacewater/telemeteredsites/index.shtml>) on a daily basis to determine when Roper River flows are approaching levels less than 1 m<sup>3</sup>/s, which are equivalent to 0.8 m<sup>3</sup>/s at Judy Crossing.

**Table 2-4: Recorded Flows (m<sup>3</sup>/s) at selected flow gauges along the Roper River taken in the late dry season between August and December.**

Data from the Gulf Water Study (Zaar 2009). Note that flows at Judy Crossing only recorded between 1969 and 1991.

Date	Gauging Station		
	Mataranka G9030176	Judy Crossing G9030010	Red Rock G9030250
1963	0.99	0	0
1966	0.963	n/a	0
1967	1.09	n/a	0
1968	0.985	n/a	0.13
1969	1.08	0.462	0.04
1970	0.8	0.263	0
1971	0.977	0.759	0

#### 2.4.2 Surface Water and Groundwater Management

The Roper River region has a tropical savanna climate with marked wet and dry seasons; where over 90% of the mean average rainfall (800 – 1000 mm) falls in the wet season (November to March). During the wet season, the mine area can be subject to flooding. However prior to construction, a comprehensive environmental baseline study covering surface and groundwater flows, occurrences and quality will be undertaken with professional support, and mine infrastructure located to minimise deviation of natural surface water flow paths resulting in inundation of the open pits. Erosion and siltation will be prevented and adverse impacts on water quality downstream of the Mineral Lease minimised. Site surface water management will be based on the principle of diverting clean surface water runoff away from disturbed areas, and intercepting runoff from disturbed areas and either capturing it for use or directing it through sediment control structures prior to discharge to the downstream environment.

Use of groundwater is expected to be minimal and at most for potable consumption for the 2 to maximum 5 staff. The mining operation is not expected to have any interaction or negative influence on the groundwater resources of the region. An awareness of the fact that the nearest Indigenous community extracts water from a spring exists and AIR's aim is to avoid any potential impact on this spring and therefore do not propose to undertake any specific groundwater studies.

Surface water, groundwater, climate, and rainfall characteristics of the Roper River catchment are further discussed in Section 4.1 *Climate and Greenhouse Gas* and Section 4.4 *Surface Water and Groundwater* below.

## 2.5 Waste Management

The only waste generated from ore processing is washed regolith which will be returned to the mining pit. Other wastes associated with mining operations, such as standard wastes associated with the operation of machinery (oils and replacement parts etc), will be minimised and all waste materials collected, contained and removed from the site and disposed of into an approved waste disposal facility. No waste other than washed regolith will be placed into the open pit.

Wherever practically and economically viable all waste materials will be recycled. Metals such as steel wear parts, copper wire, etc. will be collected in designated areas prior to removal from site for recycling. Plastic pipe including HDPE, PVC, ABS, will be reused wherever possible. Used tyres will be collected and periodically dispatched to off-site recyclers or a retread facility.

On site ablutions will require a septic system.

Greenhouse gasses will be produced by diesel engines. This subject is outlined in Section 4.1 *Climate and Greenhouse Gases*.

## 2.6 Power Plant

A power plant generating approximately 75KVA will supply power to the water pumps, processing plant and office. It will be diesel fuelled with fuel storage located in a designated bunded fuel storage area. A buffer zone of approximately 50 m surrounding the power plant will be selectively cleared to prevent fire risk and to allow access for refilling of fuel storage vessels and for heavy vehicle access for refuelling and for the removal and replacement of the power generating units. The power plant will be designed to prevent the emission of sparks from the engine exhausts by fitting each with spark arrestors.

## 2.7 Transport

During the construction phase of the project, materials required for construction and operation will be transported to the site from Darwin by truck. During operations, it is intended to transport the dried ilmenite concentrate in 2 ton 'bulka' bags by owner operated road train to the Port of Darwin to be stored and await shipment to Chinese markets for further processing into Synthetic Rutile or Titanium Sponge. There would be a requirement for 2 road trains a week from the mine to the Port of Darwin along the Roper and Stuart Highways. Return trips would be largely empty unless freight to Katherine, Mataranka or surrounds could be arranged. The Roper Highway may need to be upgraded for this traffic load of 90 tonne per trip. The NT Roads Division will be consulted about this.

Mine access from the Roper Highway (approx 8 km north) will use the existing unsealed Numul Numul Station tracks (shown in Figure 1-3). These provide good dry access and average wet season access which will be improved and upgraded and continually maintained to handle B Class trucks and small road trains. Water will be sprayed on roads using a water cart to minimise dust if required.

Improved transport options may be developed at a later stage after undergoing feasibility assessment. These include linking to the existing railway line near Mataranka for transporting the ilmenite concentrate to Darwin, or preferably, transport through Port Roper utilising barges to take the product to a loading facility 14 km offshore on Maria Island, details of which, when determined will be submitted for assessment in a separate proposal.

This scenario would make mining in the region very attractive and the loading facility could also be used for two way freight for infrastructure development and cattle export. The neighbouring iron ore leases of Sherwin Iron and Western Desert Resources are also investigating this option.

## 2.8 Mining Schedule

Testing of the processing plant using a representative bulk sample excavated from the site is scheduled for early 2011 and production is scheduled to commence in late 2011 dependant on gaining the appropriate environmental, legislative, and traditional owner approvals. Mining will initially aim to produce 100 000 tonnes per annum of ilmenite concentrate, increasing to 200 000 tonnes per annum in 2012.



## 2.9 Workforce

During the initial phase of mining the project will require between 2 and 5 staff. These numbers will slightly increase when the project scales up to 200 000 tonnes per annum.

## 2.10 Rehabilitation and Mine Closure

Rehabilitation and mine closure planning will be a continuous process throughout the life of the mine. Closure plans will be progressively refined and adapted as further site information becomes available during operations and in response to changes in regulations, stakeholder expectations, technological knowledge and mine planning.

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 the following objectives developed from the NT Department of Resources *Mine Close Out Objectives* (DoR 2008):

- Protect human health and safety.
- Reduce the need for long term monitoring and maintenance through design of and construction of landforms that are geotechnically and geochemically stable.
- Develop landforms that are consistent with the surrounding landscape.
- Develop an environmental monitoring and reporting program which is focused towards demonstrating the achievement of closure outcomes.
- Undertake progressive rehabilitation of the site during operations.
- Ensure that the full cost of decommissioning and rehabilitation is understood and that a mechanism for funding exists.
- Ensure that residual risks and liabilities are identified and controlled to an acceptable level.

A key aspect of mine closure will be the progressive rehabilitation of the site during operations, where this will enable rehabilitation techniques to be trialled and refined prior to closure. While rehabilitation and mine closure will continue to be refined during the life of the mine, generally the Mineral Lease will be rehabilitated as follows:

- Excavations will be progressively backfilled with the residual material left over from ore processing (about 75 – 90% of the original material).
- Residual material will be dewatered prior to being placed back into the pit.
- Excavations will be mostly re-filled to their original level and contoured to blend with the surrounding landscape. This will mean, however, there will not be enough remaining regolith material to fill the final open pit, as the ilmenite concentrations are generally between 10 and 25%.
- Top soil where available will be stockpiled for later use in spreading over filled pit areas. However, very little top soil is expected, as the ilmenite mineralisation extends to the surface with very little overburden.
- It is anticipated that natural revegetation will occur through the germination of local provenance seed and will be facilitated through watering and fire exclusion.
- Access roads not wanted by the landowner will be ripped and allowed to revegetate naturally
- At the completion of mining operations, all mining infrastructure, including the processing plant, concrete pad, sheds, office, and any other infrastructure not wanted by the landowner will be removed.
- A security calculation will be submitted in the Mining Management Plan.

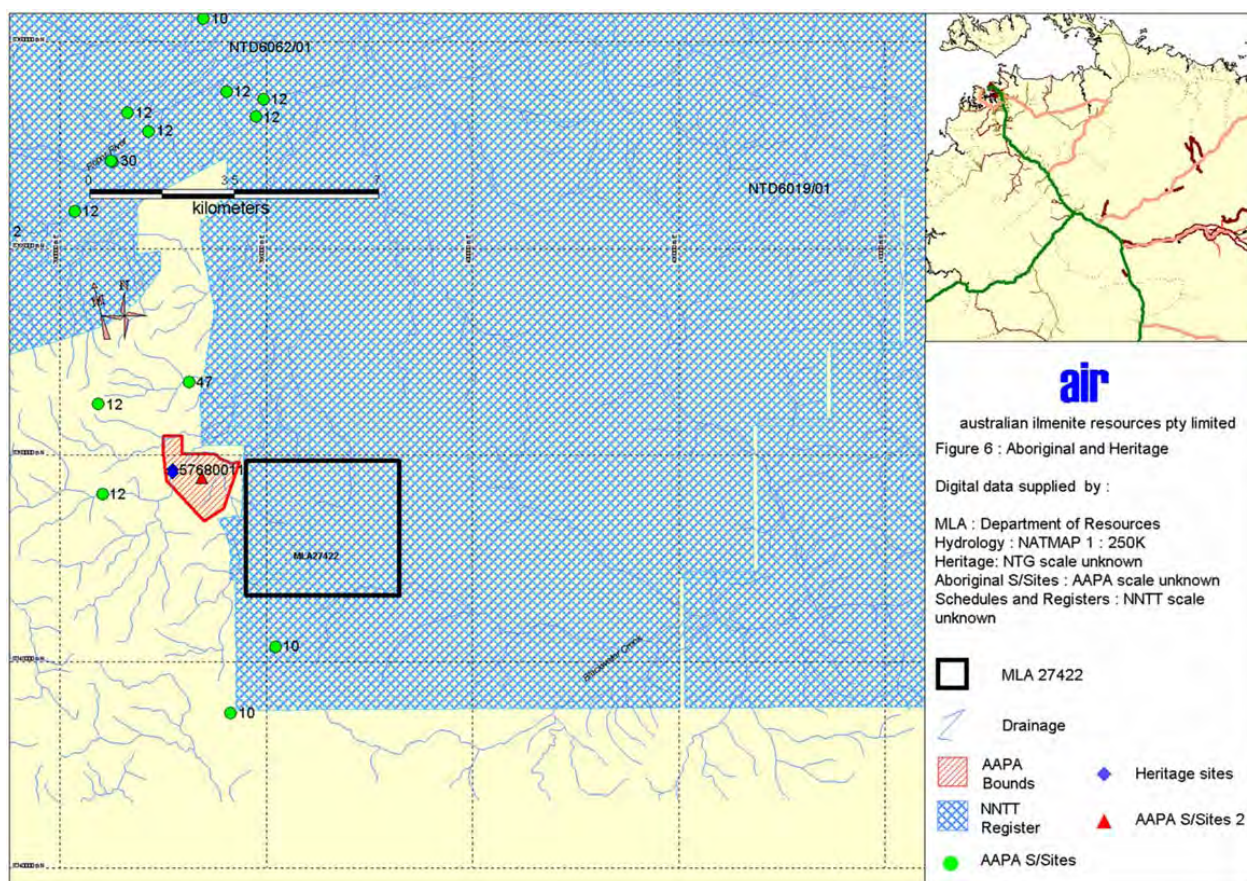


## 2.11 Aboriginal Sacred Site and Heritage Site Clearance

Figure 2-8 shows MLA 27422 in relation to aboriginal sacred sites registered with the Aboriginal Areas Protection Authority (AAPA). None fall within the mining lease area and the closest registered AAPA site is the Kewulyi site located at the Roper Valley Homestead. AIR is currently in consultation with the traditional owners of this area regarding all aspects of planned mining activities.

A formal AAPA Sacred Sites Survey is to be completed over the MLA 27422 in the near future. AIR has commissioned both Heritage and AAPA sacred site surveys as per the terms and conditions of obtaining an exploration license in all its areas of current exploration.

Heritage site locations obtained from the NT Government database have also been mapped in relation to MLA 27422 (Figure 2-8) and none fall within the proposed mining area.



**Figure 2-8: Aboriginal Sacred Sites listed on the Aboriginal Areas Protection Authority (AAPA), Native Title claims registered with the National Native Title Tribunal (NNTT), and Heritage sites listed .**

### 3. LEGISLATIVE AND LICENCING REQUIREMENTS

#### 3.1 Commonwealth Legislation

##### 3.1.1 *Environment Protection and Biodiversity Conservation Act*

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 (DSEWPC) administers the Act and has established a formal referral and assessment process. If DSEWPC 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 1-3) 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 mineral sands or rare earths as a nuclear action. Therefore, the Project is not considered a nuclear action.

The Project is however, in the vicinity of recorded habitats for 12 nationally listed threatened species and 14 nationally listed migratory species and marine species (discussed in Section 4.6). Potential impacts on the overall status of these species is considered minimal, however AIR will lodge a referral to DSEWPC at a later stage if further investigations result in it being considered necessary.

##### 3.1.2 *Native Title Act*

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 principals 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 (ILUA's) 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. MLA 27422 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.

Australian Ilmenite Resources Pty Limited has instigated a community consultation strategy based on open sharing of information with all stakeholders and communities including the Northern Land Council (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 on a two-way street with AIR respecting the connections of Aboriginal people with their land and any 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.

MLA 27422 is wholly within pastoral lease land and 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 (i.e. this document) to the Northern Territory Government through the Minerals and Energy Referral Assessment branch of the 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 the DNRETAS for determination of the appropriate level of assessment.

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

### **3.2.1 Mining Act and Mining Management Act**

The *Mining Act* 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 Mining Act 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 (SEL 28291, which is an amalgamation of EL23048, EL24655, and EL24986) and is currently applying for MLA 27422.

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 Mine Management Plan (MMP). A 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**

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 NOI is informing the administrators of the Environmental Assessment Act of the proposed activity so that a determination as to the level of assessment required to properly assess the potential impacts of the project can be addressed and therefore the project can be appropriately assessed.

### **3.2.3 Water Act**

The *Water Act* is administered by the Water Resources Branch of the DNRETAS 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 MLA 27422. The Project will be exempt from requiring a water extraction licence, however in order to ensure sustainable use of the water resource, AIR will likely enter into a MoU with the Department. This will contain similar conditions to an extraction licence including water consumption metering and reporting and the setting of limits during dry periods such as that proposed above in Section 2.4 *Water Management*.

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 MLA 27422 but however, 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 Pastoral Land Act (NT)**

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 have been consulting with both the lease owners and the lease holders. Both stakeholder groups are pleased with the progress and plans.

### **3.2.5 Northern Territory Aboriginal Sacred Sites Act**

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 are in the process of seeking an AAPA Certificate for MLA 27422.

### 3.2.6 Other Relevant Legislation

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

- *Bushfires Act.*
- *Control of Roads Act.*
- *Dangerous Goods Act.*
- *Dangerous Goods (Road and Rail Transport) Act.*
- *Environmental Offences and Penalties Act.*
- *Heritage Conservation Act.*
- *Miscellaneous Acts Amendment (Aboriginal Community Living Areas) Act.*
- *Planning Act.*
- *Soil Conservation and Land Utilisation Act.*
- *Traffic Act.*
- *Waste Management and Pollution Control Act.*
- *Weeds Management Act.*
- *Workplace Health and Safety Act.*

## 4. EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND MANAGEMENT

This chapter outlines the existing environments potentially impacted by the Project, and AIR's proposed management and mitigation measures for minimising any potential impacts.

### 4.1 Climate and Greenhouse Gas

#### 4.1.1 Existing Environment

##### *Climate*

The Roper River region lies in the Wet/Dry tropics, where almost no rain falls between May to September, and over 90% of mean annual rainfall occurs between November and March; mainly falling as intermittent high intensity tropical showers that can cause flooding (from BOM web site [www.bom.gov.au/climate/averages](http://www.bom.gov.au/climate/averages)).

Important to note is that annual rainfall is highly variable; the long term average annual rainfall is between 800 and 1000 mm however, any given year could range between 300 and 1 400 mm. Rainfall records show that there are wet periods and dry periods. The last decade has been the wettest for the last 118 years since records have been kept; whereas the 1950s and 1960s were relatively dry (Zaar 2009). The significance of these wet and dry periods in relation to Roper River flows and water allocation planning are further discussed below in Section 4.4. *Surface Water and Groundwater*.

Mean monthly minimum temperatures range between 15 and 26°C and maximum temperatures between 30 and 39°C. Average annual evaporation is about 2400 mm for the region, greatly exceeding annual rainfall even in the wettest years.

The prevailing wind direction in the region is southeast.

##### *Greenhouse Gases*

According to information presented in the State and Territories Greenhouse Gas Inventories 2007 (DCC 2009) greenhouse gas emissions for the Northern Territory (excluding emissions and removals from land use, land use change and forestry) were 15.0 Mt. When emissions and removals from land use, land use change and forestry are included the total becomes 17.2 Mt. The principal source of emissions in the Northern Territory is the burning of savanna woodlands.

Greenhouse gas emissions, other than those associated with bushfires within close vicinity of the project are limited. The largest source of anthropogenic greenhouse gas emissions in close vicinity to the project is likely to be methane emitted from pastoral activities.

#### 4.1.2 Potential Impacts

The construction and operation of the project will increase the greenhouse gas emissions for the region. Of the main greenhouse gases, carbon dioxide (CO<sub>2</sub>) and nitrous oxide (NO<sub>2</sub>) are the most significant in relation to the project since they are the main products that result from the combustion of diesel when powering earthmoving equipment. Vegetation clearance in preparation for strip mining during construction will also cause emissions, however will be offset by revegetation during rehabilitation works.

#### 4.1.3 Management and Mitigation

Best practice environmental measures for reducing greenhouse gas emissions will be employed during the construction and operations phases and include:

- Developing and applying policies and procedures for energy efficient mine operation.
- Minimising haul distances to minimise diesel consumption.
- Monitoring energy consumption (e.g. diesel and electricity) and calculating greenhouse gas emissions.



- Where practicable, establishing measurable improvement targets for greenhouse gas emissions.
- Reporting greenhouse gas emissions in accordance with the Territory Greenhouse Gas Inventory.

## **4.2 Air Quality, Noise, and Vibration**

### **4.2.1 Existing Environment**

The project area is remote and far from pollution sources and anthropogenic-related noise and vibration. The only air pollutant likely present at significant concentrations is particulate matter from wind-blown dust and bushfire smoke during the dry season.

### **4.2.2 Potential Impacts**

The main sources of potential air quality issues with consequent adverse impacts on human health, vegetation and amenity resulting from construction and operation of the project include dust from:

- Excavations
- Loading and unloading of ore and waste rock
- Truck and vehicle movements over unsealed roads and within the mine area
- Wind erosion from exposed surfaces (e.g. stockpiles)

Vehicle and power plant emissions of fuel combustion products such as carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>) and particulate matter will occur and also have the potential for minor adverse impacts to local air quality.

Sources of potential noise and vibration with consequent disturbance and nuisance impacts on local residents include excavations, ore processing machinery, power generation, and heavy vehicle traffic.

Potential air quality, noise and vibration impacts on flora and fauna are discussed below in Sections 4.5 and 4.6 respectively.

### **4.2.3 Management and Mitigation**

The only settlements in the vicinity of the proposed mine are the Kewulyi Aboriginal Community Outstation (old Roper Valley Homestead), located approximately 4 km north-west, and Numul Numul homestead, located 3 km north. People living in these settlements will be regularly consulted throughout the life of the mine as part of AIR's planned comprehensive community and stakeholder consultation plan. This will include opportunities for residents to complain and their issues be addressed in regards to any impacts from mining operations including particularly, dust and noise.

The following mitigation strategies will be adopted, and also refined and strengthened in response to any community or other stakeholder concerns:

- Access to and from the mine from the Roper Highway will use existing station tracks that do not go near Kewulyi or the Numul Numul homestead
- Water will be used to suppress dust on unsealed roads and around excavations
- Speed limits on roads used by mine traffic will be upheld
- Signage and markings to ensure traffic is kept to designated roadways will be installed
- Ilmenite concentrate will be transported to Darwin in 'bulka bags'
- The extent of exposed areas susceptible to wind erosion will be minimised
- Progressive rehabilitation of disturbed areas once they are no longer required for mining
- Where practical, high dust-generating activities will be limited during adverse wind conditions
- Installing standard noise abatement devices (e.g. mufflers) on machinery and vehicles and servicing machinery and vehicles regularly

- Construction and mining activities will be limited to daylight hours between 6 am to 7 pm.
- Dust, noise and vibration will be monitored as part of AIR's ongoing environmental monitoring program.

The abovementioned mitigation measures in relation to greenhouse gas emissions (Section 4.1) will also serve to reduce and minimise vehicle and power plant emissions on air quality in the area.

### 4.3 Land Resources and Land Use

#### 4.3.1 Existing Environment

##### *Landform*

The Project Area lies principally within the physiographic province of the Gulf Fall, which is the second largest in the NT stretching from the Arnhem Plateau into western Queensland (Aldrick and Wilson 1992). It is a dissected terrain from which almost all of the old Tertiary land surfaces have been eroded. This terrain is characterized by broad alluvial valleys between low rubbly hills and prominent strike ridges of resistant Roper Group strata. The flat-floored ridges form part of the vast Roper River floodplain and its associated tributaries (Wilton, Maiwok, Flying Fox and Jalboi Rivers) and are largely developed on incompetent shales, fine-grained sediments, volcanics and carbonate rocks. Local relief is variable ranging from 20 to 120 metres. The target dolerite sills are prominent in their deep red soil colour and rounded boulder-strewn outcrops (Figure 2-1).

The general area of interest comprises flat to undulating terrain with scattered low, steep hills and rugged dissected plateau on Proterozoic and Palaeozoic sedimentary rocks, often overlain by lateralized Tertiary material (Baker *et al.* 2005). The SILL80 Ilmenite Project is situated on a relatively flat to low lying area surrounded by cattle grazing paddocks with cattle yards 3 km to the north of this section of the overall large deposit and the entire area appearing to have been subject to heavy grazing pressure.

Technical Report No. 52 of the Conservation Commission of the Northern Territory (Aldrick and Wilson 1992) nominate most of the area as the Clifffdale land system of gently undulating to hilly terrain on basalt, dolerite, agglomerate and other volcanic and sometimes non-volcanic rocks. Lithosols with rock outcrop, euchrozems, red and black earths and red clays. Highly erodible, especially the sloping red soils. The MLA also contains the Nutwood Land System with a generalized description of "Plains and low rises on basalt and associated igneous rocks. Brown, grey and red clays, euchrozems, and brown and red earths. MHOW (Medium High Open Woodland) of *Lysiphyllum cunninghamii* and *Eucalyptus terminalis* with some *Eucalyptus patellaris*.

Figure 4-1 below shows the land systems.

##### *Geology and Soils*

The Roper Heavy Minerals Project including the SILL80 Project is confined to the Roper Group, specifically targeting the ilmenite-bearing dolerite sill horizons and their possible erosional transport trails. The strata are generally flat lying to undulating although secondary folding and reactivation of older faults results in steepening of dips and stratigraphic dislocation in places (WNW trending Urapunga Tectonic Ridge in the central area and N-S trending Strangeways Fault in the southwest).

The MLA has an absence of Cambrian flood basalts and only remnant outliers of Cretaceous sandstones, both of which are extensive to the south, west and north of the Project, suggesting a significant exposure to uplift and erosion within the area permitting exposure of the underlying Proterozoic sediments and dolerite sills. Extensive deposits of Quaternary to Recent sediments comprising alluvium, colluvium, unconsolidated gravel and sand overlain by mud-rich soils are mapped in the project area and reflect material derived from prolonged weathering and erosion during the Tertiary.

Sills of the Derim Derim Dolerite were emplaced at various stratigraphic horizons from a primary magma source at depth. Extensive lateritised outcrops, sub-crops and regolithic soils of the dolerite have been mapped throughout AIR tenements. The dolerite outcrops as low-relief medium to coarse grained, variably altered and weathered ('onion-skin' weathering) rounded boulders. Composition is dominated by plagioclase (40%), clinopyroxene (40%), amphibole (7%), opaques (ilmenite & magnetite 5%) and clay (7%). The associated regolith soils are deep red-purple-brown, clay-rich and contain abundant liberated ilmenite and locally with accessory titanomagnetite, magnetite and haematite grains. In some areas these dolerite sills have only been recently exhumed (higher elevations) and in other instances, larger areas of dolerite sills have been exposed for a longer geological time resulting in pisolitic laterite formation and attendant erosion (lower elevations). These latter areas are considered to have the best potential for higher in situ ilmenite grades in both eluvial and alluvial terrain. Figure 4-2 identifies the geology and the dominant dolerite outcrops mapped within the SILL80 environment.

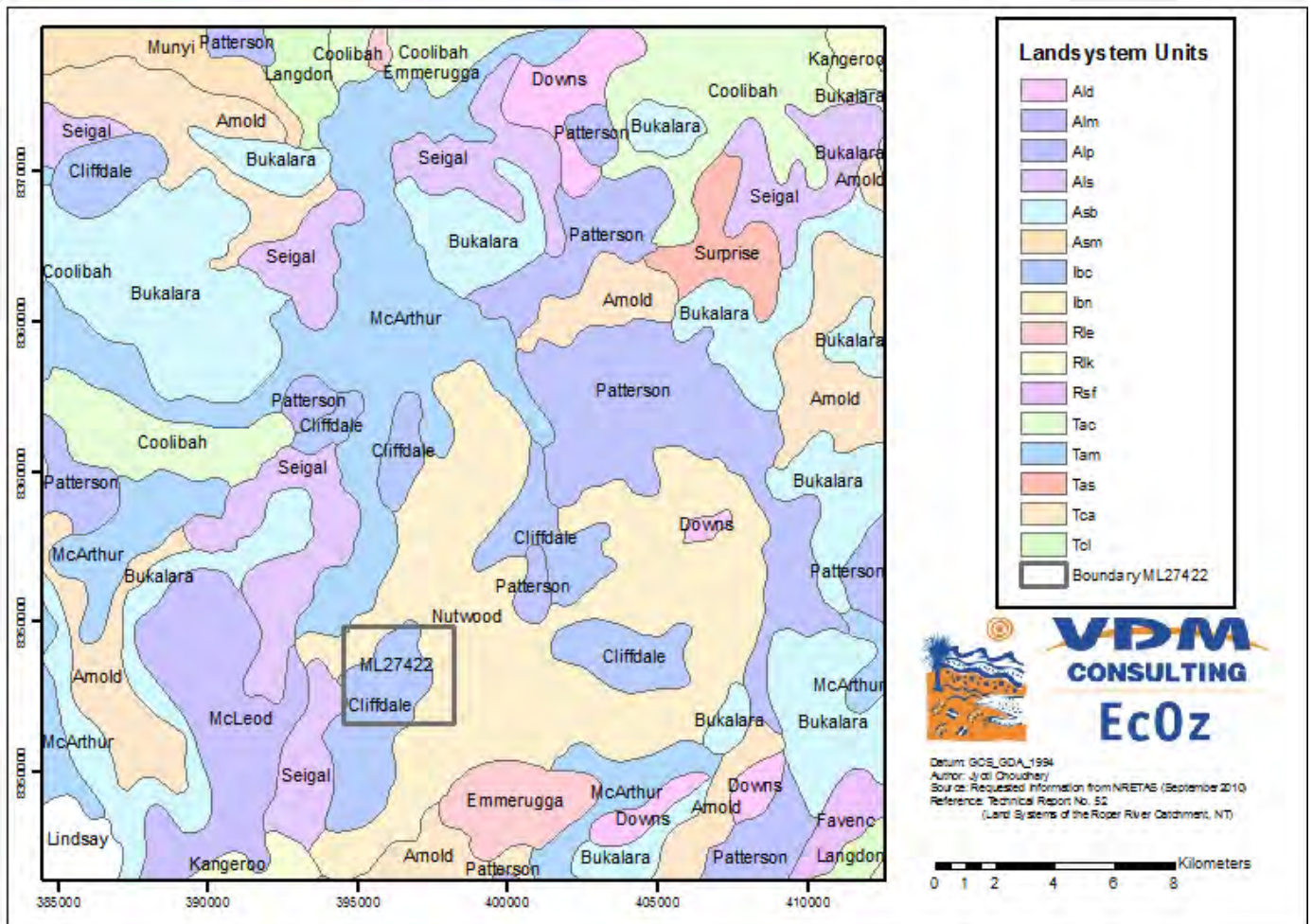
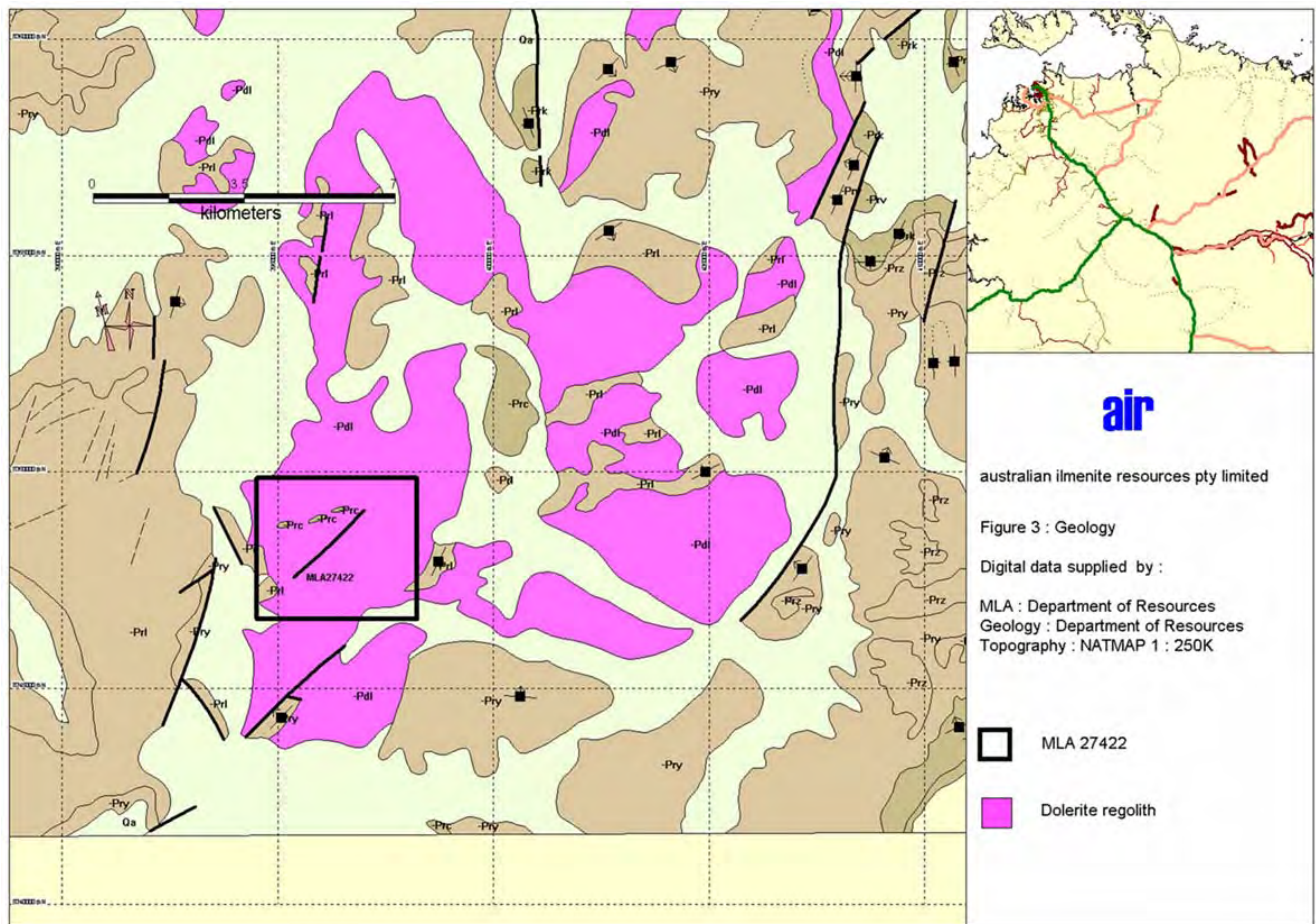


Figure 4-1: Landsystem Units of the area of MLA 27422 (from Aldrik and Wilson 1992).





**Figure 4-2: Geology of the SILL80 Project**

#### *Land Use*

The Sill80 lies entirely within an area of pastoral lease that is currently utilised for extensive grazing. The pastoral lease operators have not expressed concern about the very small scale and temporary loss of grazing areas amongst the vast property. The only other land use that may be impacted by AIR's proposal (on and off lease) is traditional hunting and other practices. Such activities do not currently occur in the vicinity of the lease and only ad hoc activities occur along roads that AIR may use as part of this project. Local Indigenous stakeholders have not raised this as an issue and therefore it has not been investigated further.

#### **4.3.2 Potential Impacts**

The mining proposal is to take place on flat lying topography, and it will be left as flat lying topography. The soils will be impacted via the removal of the ilmenite, and the placement of the soil back into the mining pit. Soil erosion potential exists with any ground disturbing activity. The area is very flat lying so the potential impact is associated with the alteration of drainage via the creation of channels or windrows etc.

#### **4.3.3 Management and Mitigation**

Soil erosion potential will be monitored and mitigation actions implemented prior to it becoming a problem. The viability of the soil returned to the pit, and its ability to support revegetation will also be monitored within the first month of the project to determine if it requires supplementation or further management.

## 4.4 Surface Water and Groundwater

The recently completed Gulf Water Study (Zaar 2009), co-funded by the Australian Government and NRETAS, provides details of the Roper River catchment's surface and groundwater resources in a series of reports, maps, and GIS available through the NRETAS website (<http://www.nt.gov.au/nreta/water/gws/index.html>). This study, and the associated integrated surface water / groundwater computer model (Knapton 2009) were referred to above in Section 2.4 *Water Management* in relation to determining appropriate Roper River water extraction limits for the Project. Information from the Gulf Water Study relevant to the SILL80 Ilmenite Mine proposal has been summarised in the following sections, along with other studies such as the *Top End Waterways Project* (Faulks 2001) and other water-related information gained through consultation with landholders and while conducting exploration in the area.

### 4.4.1 Existing Environment

The Roper River catchment is one of the largest in the Northern Territory with an area of 81 794 km<sup>2</sup> (Faulks 2001). It is fed by nine rivers (Phelp, Hodgson, Arnold, Wilton, Mainoru, Jalboi, Strangways, Chambers and Waterhouse), and three major creeks (Maiwok, Flying Fox and Elsey). These tributaries provide large wet season surface water flows to the Roper with the highest mean monthly discharge occurring in March ranging from 83 m<sup>3</sup>/s near Mataranka, to 509 m<sup>3</sup>/s at Red Rock. However, most of these tributaries dry up in the Dry season. Importantly, during the Dry season, baseflows in the Roper are maintained mainly by the Tindall Limestone aquifer, located in the River's headwaters near Mataranka, and also secondly, the Dook Creek dolomitic aquifer supplying flows via the Wilton and Flying Fox Creeks, and other smaller carbonate aquifers (Zaar 2009). These aquifers are responsible for maintaining river flows over the Dry season, and as such, their water dependant ecosystems. The lowest mean monthly discharge occurs in September and October; ranging from 1.5 m<sup>3</sup>/s near Mataranka, to 1 m<sup>3</sup>/s at Red Rock.

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 (see Gulf Water Study, Water Resources Map 2009). Groundwater resources in the area of the SILL80 Project are typical for the catchment, comprising fractured and weathered rocks with bores yielding less than 1 L/s.

The extremely high evaporation rate (mean annual rate about 2400 mm), greatly exceeds annual rainfall, even in the wettest years. As such, only the upper reaches of the Roper River maintains flows greater than 100 L/s by the end of the Dry season. The middle and lower reaches of the river usually have flows less than 100 L/s by the end of the Dry season, and flow records show that cease to flow conditions can often occur at Roper Bar and in some very dry periods such as the 1950s and 1960s can occur up to 65 km upstream at Judy Crossing near to where AIR proposes to extract water.

In these drier times, the freshwater/saltwater interface in the estuary can move more than 70 km upstream, causing the usually fresh reaches of the estuary to turn salty. This can effect Ngukurr's water supply, which is mainly water pumped from the Roper River.

In contrast, during the Wet Season, flooding in the lower lying areas of the Roper catchment can be extensive, and flooding can occur in the area of the proposed mine.

#### *Current Water Usage*

The current level of water usage in the Roper River catchment is low. The main water usage is on cattle stations for both domestic and stock watering, and for domestic use in communities and the small population centres in the region.

Given the generally poor and limited groundwater prospects, water supplies are often sought from surface water sources; from rivers, waterholes, springs, and dams. Groundwater is used for domestic supplies wherever possible, and the major population centres of Minyerri, Urupunga, and Ngukurr all use groundwater. However, Ngukurr, the largest community in the region, supplements its supply with Roper River water. Outstations use bores, springs, river water or lagoons for their domestic water supply. The Kewulyi Community, located 4 km north-west of the proposed mine site at the old Roper Valley Homestead, use a nearby spring.



The cattle stations use bores, rainwater tanks, or river water for their domestic supply and the cattle are watered using bores, dams, river water and natural water holes. Cattle stations have reported dams drying up late in the Dry season due to months of no rain and high evaporation rates. A number of cattle stations (including Numul Numul and Flying Fox) as well as Ngukurr draw supplies from the Roper River.

#### 4.4.2 Potential Impacts

Ore processing will be the largest water requirement. Initially, annual water use is estimated at 300 ML (Table 2-2 and Table 2-3) or 1.5 ML per day based on a 200 day working year. Other water requirements include dust suppression during excavations, ablutions, laundering, the vehicle wash down bay, and for revegetating mined areas, which together will require approximately 2000 L of water per day. Based on a 10 hour working day, the rate of water supply required for both ore processing and other mining requirements would be 42 L/s (0.042 m<sup>3</sup>/s). AIR plans to increase annual production from 100 000 to 200 000 tonnes of ilmenite in 2012. This would increase the daily water usage to 3 ML per day, or 84 L/s (0.084 m<sup>3</sup>/s).

The Project plans to source its water requirements from the Roper River and as such this has the potential to reduce flows and impact on water users, such as the Ngukurr community and other cattle stations, and water-dependant ecosystems downstream.

During the wet season and early to mid dry season when Roper River flows are high, water extraction rates of 0.042 m<sup>3</sup>/s and 0.084 m<sup>3</sup>/s would be insignificant and represent less than 1% of flows. However, during the late dry season, especially during dry periods when cease to flow conditions can occur upstream of Roper Bar, the Project's water extraction may cause increased stress to already stressed ecosystems and limited water supplies.

#### 4.4.3 Management and Mitigation

AIR recognises that such high variability in annual rainfall and its influence on Roper River flows requires flexibility and careful planning in water allocation. Water recycling and large-scale water storage at the mine as outlined above in Section 2.4 *Water Management* will allow operations to adjust according to the availability of Roper River flows on a year-to-year basis. Additionally, setting thresholds for when water extraction will cease, such as those outlined above in Section 2.4 *Water Management* or those set out by DNRETAS in an MoU will be adhered to.

AIR will develop a comprehensive Water Management Plan that includes commitments to water extraction limits, water recovery and recycling, and water use minimisation. It will also outline how environmental issues associated with surface and groundwater at the mine site will be managed along with monitoring, setting performance measures, and reporting.

### 4.5 Flora

#### 4.5.1 Existing Environment

The vegetation of the Project region is mapped at 1:1 000 000 scale by Wilson *et al.* 1990 (Figure 4-3). The mining lease application area is wholly within mapping unit 16 which comprises, *Eucalyptus tectifica* (Northern Box), *Eucalyptus terminalis* (Bloodwood) woodland with *Sehima nervosum* (White Grass), *Chrysopogon fallax* (Golden Beard Grass) grassland understory. Wilson *et al.* (1990) report that the distribution of this habitat is widespread occurring extensively in the Gulf and Victoria River regions. It is generally found on flat to undulating plains with mainly loam to clay loam soils.

During exploration fieldwork it has been observed that the presence and dominance of *Heteropogon contortus* (Black Spear Grass) and *Triodia bitextura* (Soft spinifex) perpetuates early, low intensity fires. Pastoral activities also include an annual burn-off during the dry season to reduce any large scale fire risk and promote active pasture regrowth during the Wet. The area does contain weed species typical of the region in areas subject to cattle grazing.

No threatened flora species have been recorded in the area of MLA 27422 and a 10 km wide surrounding buffer (based on reports generated using the NT NRM Infonet database search tool (<http://www.infonet.cdu.edu.au/nrm/>) and the EPBC Act Protected Matters Search Tool (<http://www.environment.gov.au/erin/ert/epbc/index.html>)).

## 4.5.2 Potential Impacts

The Project will involve the clearance of between 13 and 33 ha of vegetation annually confined to within the bounds of MLA27422. This clearance rate is not expected to impact on the viability of the vegetation type covering the area, which is widespread throughout the region.

## 4.5.3 Management and Mitigation

Disturbance to vegetation outside the strip mined area and processing plant footprint will be minimal. Stockpiles, vehicle movements, and machinery will be located within the disturbed area of the mine or areas earmarked for future mining.

Rehabilitation will be progressive throughout the life of the mine and involve the re-establishment of local provenance species through promotion of natural growth with watering and protection from fires following filling and contouring of the open pit as per the methods outlined in Section 2.10 *Rehabilitation and Mine Closure*.

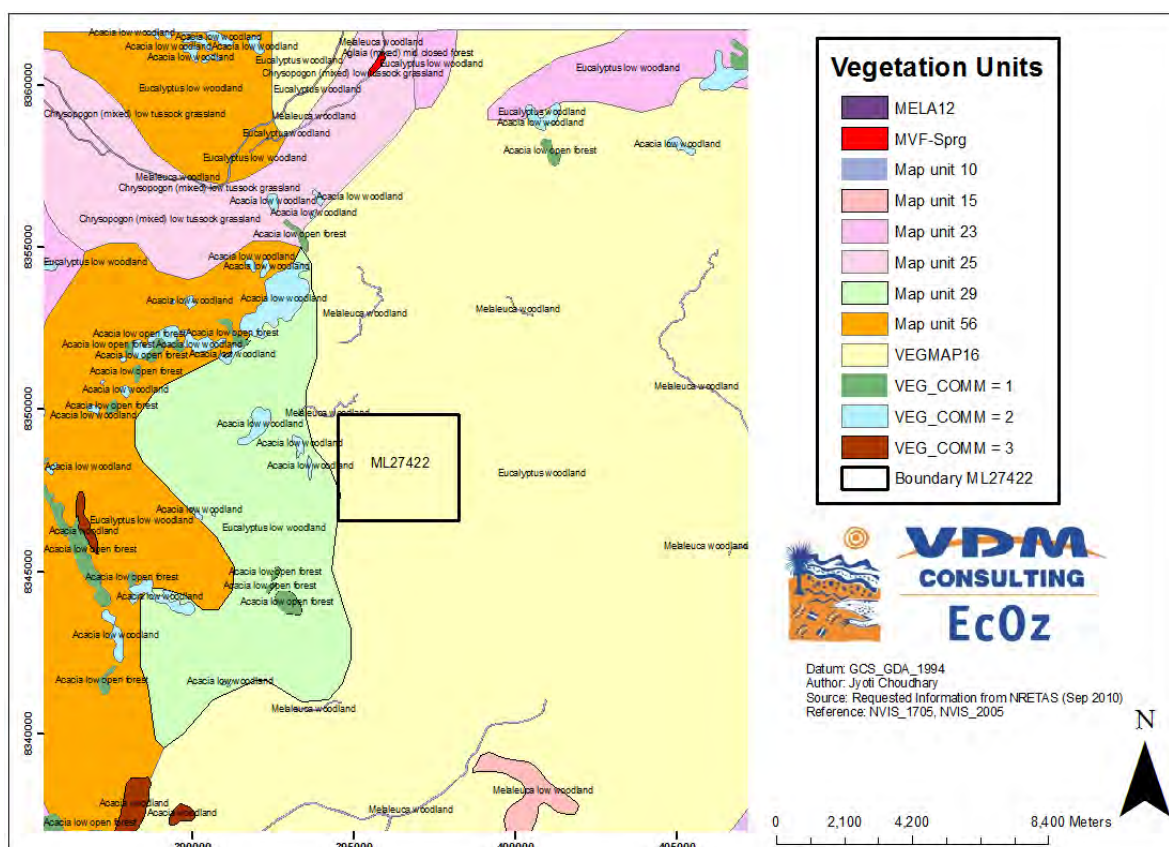


Figure 4-3: Vegetation Units in the area of MLA27422 (from Wilson et al. 1990).

## 4.6 Fauna

### 4.6.1 Existing Environment

The proposed mining operation is located within an area of high use within the Numul Numul Pastoral Lease. The area is sparsely vegetated with significant areas of exposed surface. There are few large trees in the area, and no watercourses or natural water holding bodies.

The site of water extraction is also assessed as a place of potential impact to fauna.

The tables below presents threatened species with potential habitat within and adjacent to MLA 27422 and the water extraction point on the Roper River:

### Ferals

Apart from the abundant cattle on the pastoral lease, significant numbers of feral donkeys, buffalo, brumbies and pigs share waterholes and surrounding areas with native wildlife in the Project Area.

**Table 4-1: Threatened species with potential habitat within and adjacent to MLA 27422 and the water extraction point on the Roper River.**

Table compiled from reports generated on 5<sup>th</sup> October 2010 using the NT NRM Infonet database search tool (<http://www.infonet.cdu.edu.au/nrm/>) and the EPBC Act Protected Matters Search Tool (<http://www.environment.gov.au/erin/ert/epbc/index.html>) for the area of MLA 27422 and a 10 km wide surrounding buffer.

Species	NT Status	Nat. Status	Habitat Value of Project Area and likelihood of presence.
<b>Fish</b>			
Freshwater Sawfish <i>Pristis microdon</i>	VU	VU	The Roper River supports a population of Sawfish.
<b>Reptiles</b>			
Mertens` Water Monitor <i>Varanus mertensi</i>	VU		The Roper River extraction point is within an area of likely habitat for this species
<b>Birds</b>			
Emu <i>Dromaius novaehollandiae</i>	VU		Poor Habitat value and Minimal potential of presence
Partridge Pigeon <i>Geophaps smithii</i>	VU	VU	Poor Habitat value and Minimal potential of presence
Red Goshawk <i>Erythrotriorchis radiatus</i>	VU	VU	The Roper River extraction point is within an area of likely habitat for this species.
Australian Bustard <i>Ardeotis australis</i>	VU		Poor Habitat value and Minimal potential of presence.
Masked Owl <i>Tyto novaehollandiae</i>	EN/VU	EN/VU	Poor Habitat value and Very Low potential of presence
Masked Owl (northern mainland) <i>Tyto novaehollandiae kimberli</i>	VU	VU	Poor Habitat value and Very Low potential of presence
Crested Shrike-tit <i>Falcunculus frontatus whitei</i>	VU	VU	Poor Habitat value and Very Low potential of presence
Hooded Robin <i>Melanodryas cucullata</i>	EN/-	EN/-	Poor Habitat value and Very Low potential of presence
Gouldian Finch <i>Erythrura gouldiae</i>	EN	EN	Poor Habitat value and Very Low potential of presence
Australian Painted Snipe <i>Rostratula australis</i>		VU	Poor Habitat value and Very Low potential of presence
<b>Mammals</b>			
Northern Quoll <i>Dasyurus hallucatus</i>	CR	EN	Poor Habitat value and Very Low potential of presence
Golden Bandicoot <i>Isoodon auratus</i>	EN	VU	Poor Habitat value and Minimal potential of presence
Brush-tailed Rabbit-rat <i>Conilurus penicillatus</i>	VU	VU	Poor Habitat value and Minimal potential of presence

CR=Critically Endangered; EN=Endangered; VU=Vulnerable; EN/VU=One Endangered subspecies/One Vulnerable subspecies; VU/-=One or more subspecies vulnerable; EN/-=One or more subspecies endangered

**Table 4-2: Migratory species with potential habitat within and adjacent to MLA 27422 and the water extraction point on the Roper River.**

Table compiled from report generated using the EPBC Act Protected Matters Search Tool ). 5<sup>th</sup> October 2010 (<http://www.environment.gov.au/erin/ert/epbc/index.html>) for the area of MLA 27422 and a 10 km wide surrounding buffer.

Group	Species	Migratory Status				LMS	Habitat Value of Project Area and likelihood of presence
		MTS	MWS	MMB	MMS		
Reptiles							
Freshwater Crocodile <i>Crocodylus johnstoni</i>						√	The Roper River extraction point is within an area of likely habitat for this species
Salt-water / Estuarine Crocodile <i>Crocodylus porosus</i>					√	√	The Roper River extraction point is within an area of likely habitat for this species
Birds							
Gouldian Finch <i>Erythrura gouldiae</i>	√						Poor Habitat value and Minimal potential of presence
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>	√					√	The Roper River extraction point is within an area of likely habitat for this species
Rainbow Bee-eater <i>Merops ornatus</i>	√					√	Widespread species
Rufous Fantail <i>Rhipidura rufifrons</i>	√					√	Poor Habitat value and Minimal potential of presence
Great Egret, White Egret <i>Ardea alba</i>			√	√		√	The Roper River extraction point is within an area of likely habitat for this species
Cattle Egret <i>Ardea ibis</i>			√	√		√	The Roper River extraction point is within an area of likely habitat for this species
Oriental Plover, Oriental Dotterel <i>Charadrius veredus</i>			√			√	Poor Habitat value and Minimal potential of presence
Oriental Pratincole <i>Glareola maldivarum</i>			√			√	Poor Habitat value and Minimal potential of presence
Painted Snipe <i>Rostratula benghalensis s. lat.</i>			√			√	Poor Habitat value and Minimal potential of presence
Fork-tailed Swift <i>Apus pacificus</i>				√		√	Poor Habitat value and Minimal potential of presence
Magpie Goose <i>Anseranas semipalmata</i>						√	Poor Habitat value and Minimal potential of presence

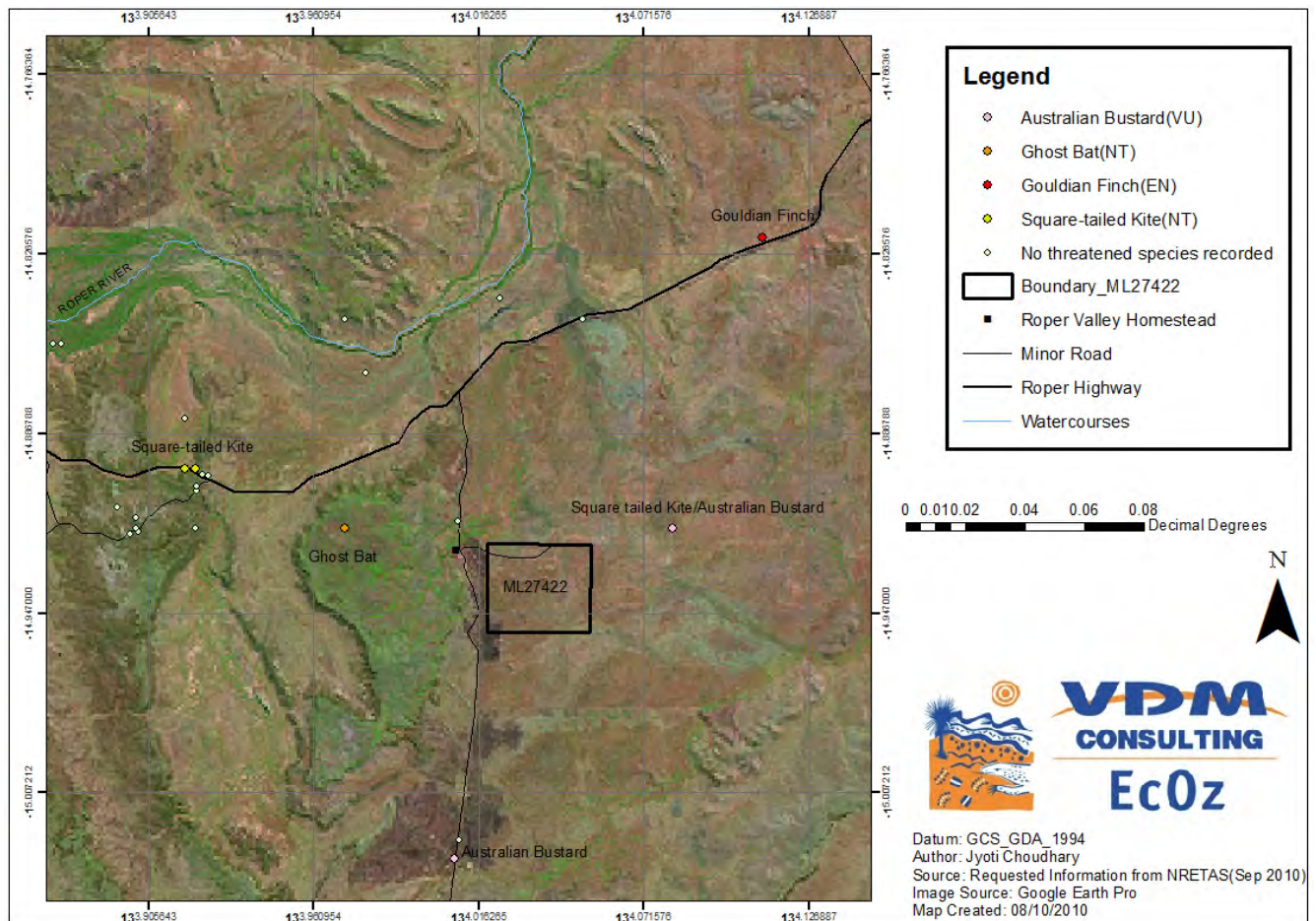
MTS=Migratory Terrestrial Species; MWS=Migratory Wetland Species; MMB=Migratory Marine Birds; MMS=Migratory Marine Species; LMS=Listed Marine Species



#### 4.6.2 Potential Impacts

The mining operation may impact species by either scaring them away or discouraging them from entering the area. Off site impacts are expected to be limited to those associated with transport.

The operation of a pump at the river will create noise and disturbance associated with regular staff access to the pump. The pump will utilise a water resource that is important to fauna and it may present a threat to species due to water being drawn into a pipe for transport.



**Figure 4-4: Actual threatened species recordings obtained from NT Government Data Request**

#### 4.6.3 Management and Mitigation

The pump site will be located adjacent to existing pumps and the intake will be designed so that it cannot trap or inhale fauna. It will be monitored and inspected on a regular basis.

The use of water will be limited according to a water extraction licence and self imposed restrictions so that impacts on species via water use will be avoided.

The mine site will undergo specific fauna surveys prior to disturbance and if required, avoidance measures will be established. All staff will be inducted and made aware of fauna issues that may arise on the site and how to manage such issues.



## **4.7 Socio-Economic Environment**

### **4.7.1 Existing Environment**

The Roper River region is sparsely populated. Only 3 500 people live in the catchment, of which 70% are Indigenous. The largest population centres are Mataranka (~600), Ngukurr (1589), and Minyerri (340) (Bushtel 2007), respectively located about 105 km east, 80 km west, and 65 km south of the Project area. People of the Jawoyn, Mangarayi, Ngalakan, Ngandi, Nunggubuyu, Mara, Alawa and Yangman language groups live in the region (AIATIS 2000). English is not the first language for the majority of the Indigenous population and Kriol is commonly spoken.

The remoteness of the region means that service provision is expensive and limited.

Pastoral activities, agriculture and fishing are currently the only major industries in the region. In the last decade, there has been much exploration but as yet no mines developed. There is a significant extractive operation in the form of a limestone quarry at Mataranka and the nearest major mine is the McArthur River mine (Zn, Pb, Ag).

### **4.7.2 Potential Impacts**

Small scale mining operations such as the mining that may result from this proposal is unlikely to have any detrimental impacts on the social environment of the region. Mining is likely to provide employment and other potential benefits to the region. The activities will also increase the amount of local purchasing of suitable locally supplied goods.

### **4.7.3 Management and Mitigation**

Australian Ilmenite Resources Pty Limited has instigated a community consultation strategy based on open sharing of information with all stakeholders and communities including the Northern Land Council 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 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 on a two-way street with AIR respecting the connections of Aboriginal people with their land and any sites of significance and the Aboriginal people and their Councils respecting the staff and the work carried out by AIR.

AIR already provide benefits to the station holders in the form of accessing accommodation, services and access to local machinery and paying for these services. This relationship is planned to expand once the project gains approvals.

## **4.8 Infrastructure and Transport**

### **4.8.1 Existing Environment**

The proposed mine site is located on a pastoral lease approximately 105 km east of the township of Mataranka. Access to the property boundary is via the sealed Roper Highway. The Roper Highway joins the Stuart Highway.

The roads proposed to be used on the station are gravel and the main access road is used by the local Indigenous Community as well as the pastoral lease operators.

### **4.8.2 Potential Impacts**

The mining activities will result in an increase in traffic during the construction and operation stages. During construction, plant, materials and workers will be accessing the site. During operations there will be daily small vehicle movements around the site as well as on average 2 road trains per week transporting product from site. There will be occasional deliveries to site, especially fuel.

Increased traffic results in increased impacts to gravel roads and these 2 factors increase the potential for road accidents and incidents. The station roads and the Roper Highway are utilised for the transport

of cattle on road trains, so the roads are generally suitable from a safety perspective. The gross weight of road trains transporting ilmenite is likely to be significantly higher than that of a stock transport vehicle so there are potential impacts to the road associated with weight.

#### **4.8.3 Management and Mitigation**

AIR will be required to maintain and if necessary upgrade gravel and station roads. Dust suppression will be used where available and required. AIR will liaise with the other station road users to determine if there is any safety or other concerns that AIR should be aware of and AIR will restrict heavy vehicle use of the road if required.

The weight capacity of the Roper Highway will need to be investigated with the Roads Department so as to ensure that it is capable of carrying heavily laden road trains. AIR will monitor the road conditions to ensure that they are not seriously impacting other users.

All vehicles that are to travel on public roads will be registered and pay their appropriate registration and road construction and maintenance levies. AIR believe that none of their small vehicle activities or their heavy vehicle activities on the Stuart Highway require any specific mitigation or management plans.

### **4.9 Visual Amenity**

#### **4.9.1 Existing Environment**

The proposed mine area is flat, sparsely vegetated and currently subject to cattle grazing. The site is not visible from any populated areas or public roads.

#### **4.9.2 Potential Impacts**

The Project has the potential to decrease visual amenity in the area as it involves vegetation clearance, excavations, dust creation, earthmoving, and the presence of additional vehicles and project machinery and plant.

#### **4.9.3 Management and Mitigation**

The region is sparsely populated and the impact to visual amenity is not anticipated to be significant. Mitigation and management measures will include:

- Consideration of the colours of the surrounding landscape when selecting exterior paint colours for buildings.
- Maintaining a high standard of housekeeping at the site.
- Progressive rehabilitation of areas.
- Rehabilitation and decommissioning of site at mine closure (see Section 2.10 *Rehabilitation and Mine Closure*).

### **4.10 Radiation**

#### **4.10.1 Existing Environment**

Sedimentary heavy mineral deposits are often associated with the accumulation of radioactive materials such as Monazite, as radioactive minerals are also heavy and enduring. No other heavy minerals have been discovered associated with the ilmenite in this deposit.

#### **4.10.2 Potential Impacts**

Radiation and the disturbing and concentration of radioactive materials can result in elevated radiation levels and an increased level of radon gas emission. Radiation can cause health issues.

#### **4.10.3 Management and Mitigation**

AIR holds a large number of samples of ilmenite from the deposit here in Darwin and they will be tested for radioactivity. If levels above acceptable health levels are detected then appropriate actions and further investigations will take place.

## **4.11 Cultural Heritage**

### **4.11.1 Existing Environment**

Initial investigations have not identified any issues associated with Cultural Heritage and the potential areas of interest. Traditional Owners have been introduced to the project on site and have not raised any concerns. An AAPA register check has identified sites nearby and impacts to these areas will be avoided and access by staff will not be allowed and a condition of employment.

The dominant means of investigating and assessing cultural and historical values for potential mine site will include:

- A desktop search of nearby significant places, values or objects (nominated or listed under the EPBC Act, NT Heritage and Conservation Act and NT Sacred Sites Act);
- An assessment of significant places and potential impact according to the Sacred Sites Act through obtaining an Aboriginal Areas Protection Authority clearance Certificate;
- An archaeological and cultural heritage survey (which will aim to identify sites or objects of historical or archaeological significance requiring consideration under the NT Heritage and Conservation Act) ; and
- A preliminary assessment of cultural values and concerns gathered from consulting prospective native title holders.

### **4.11.2 Potential Impacts**

Potential impacts are difficult to determine without complete knowledge of the existing situation, but to date no areas of cultural significance have been identified within the proposed mining lease. An area of cultural significance has been identified nearby, that may be impacted by activities.

### **4.11.3 Management and Mitigation**

AIR will ensure protection of any sites, additional to those areas identified in the Aboriginal Areas Protection Area Authority Certificate

Due to the subjective nature and multiple interpretation of “cultural and historical value” AIR recognises that there is potential that some values may be overlooked. However, potential risks or emerging concerns will be minimised during the course of operations through AIR maintaining good working relationships with those who hold value to the area. In addition all personnel will be made aware the management actions which will uphold the identified values in the proposed development area and its surrounds.

Good working relations can be fostered through developing and maintaining open communication between AIR and the Native Title Holders. Redbank will seek input from these stakeholders regarding access to areas and where appropriate their involvement or employment in future activities.

## 5. ENVIRONMENTAL MANAGEMENT

To date, exploration activities that have generated more than simple disturbance have been fully rehabilitated in accordance with the legislation and company policies on Environmental Management, Field Practices, Safety and Rehabilitation.

AIR recognises that sound environmental practices and principles are critical to its short and long-term success. At all times the company will strive to minimise the environmental impact of its activities and develop an employee/contractor mindset aimed at environmental excellence.

To achieve this AIR shall:

- Ensure compliance with applicable Northern Territory and Federal laws, regulations, guidelines and procedures
- Establish procedures to ensure effective implementation of its policy
- Provide adequate environmental training and guidance to its employees
- Instil a culture of continuous improvement through setting and reviewing targets, auditing and reporting environmental performance
- Regular consultation with project stakeholders (both local and regulatory departments) to discuss any of their environmental concerns
- Regular audits of plans, procedures and on ground actions.

We expect AIR employees and contractors to:

- Comply with AIR environmental management policies and regulations
- Review and strive to improve environmental practice
- Report all environmental incidents to their immediate managers
- Identify and address environmental concerns through open and honest consultation with local community members and government departments

Responsibility:

- The responsible officer for the implementation of the Environmental Management Policy is the Field Operations Manager.
- The responsible officer for the Environmental Management Policy and Procedures is the Company Secretary.

This section of the document describes the framework in which AIR will manage its' activities to reduce the environmental impact. The framework is based on a Risk Management approach.

Adverse Environmental Impact - includes any impact that is detrimental to the environment. It is divided into four categories, including:

1. "Low Environmental Impact"- Low probability of event occurring with a low consequence of harm to people or potential only for localised environmental degradation;
2. "Moderate Environmental Impact" - High probability of event occurring with a low consequence of harm to people or environmental degradation. Low probability of event occurring with a high consequence of harm to people or environmental degradation.
3. "High Environmental Impact" - High probability of event occurring with potential for harm to people, operational integrity, or environment.
4. Critical Environmental Impact" - High probability of event occurring with potential for significant harm: to people; operational integrity; or environment. Loss of company credibility, with likelihood of prosecution.

AIR is a leading small Northern Territory exploration and mining company specialising in exploring and developing mineral resources.

In order to maintain this leadership we take on innovative and responsible approaches to exploring and developing ore bodies to meet our commitments. Wherever we operate, we aim to work as closely as possible with our hosts, respecting laws and customs, minimising adverse impacts and ensuring transfer of benefits and the enhancement of opportunities.

To assist to achieve this AIR has set high environmental and community standards with commitments to health, safety and to the enhancement of the skills and capabilities of our employees. This statement provides the necessary framework for the entire AIR organisation to meet these high standards and is completed by a compilation of policies by which those standards are established.

All operations within AIR are required to devote the time and effort at all levels to give effect to these policies, and to report on their implementation. In the case of associated companies, contractors and consultants these policies are to be enacted when directly employed by AIR. The policies are to be reviewed annually or when required by the organisations directors. Where possible all local charters, codes of practice and guidelines relevant to the operations of AIR are to be adhered to.

## **5.1 Health and Safety Policy**

Australian Ilmenite Resources Pty Limited (AIR) recognises that the health and safety of its employees are integral to both short and long term success in exploration and employee job security.

AIR is committed to providing a healthy and safe working environment for all its employees and contractors through adherence to both statutory and internal guidelines and best safety practices and an adoption of a safety orientated mindset.

To achieve this AIR:

- recognises that meeting legal requirements provides only a foundation from which to build effective safety systems
- will foster an environment in which employees freely and willingly comply with our safety systems and contribute to improving them
- will ensure that all employees understand that safety is integral to their roles
- will acknowledge individual and team efforts in promoting health and safety
- will continually identify and reduce risks to employee and contractor health and safety by controlling hazards in the work environment
- will ensure that this policy is supported by effective systems and procedures
- will provide resources to support the effective implementation of this policy

## **5.2 Environmental Policy**

Australian Ilmenite Resources Pty Limited (AIR) recognises that sound environmental practices and principles are critical to its short and long-term success. At all times the company will strive to minimise the environmental impact of its activities and develop an employee/contractor mindset aimed at environmental excellence.

To achieve this AIR shall:

- Ensure compliance with applicable Northern Territory and Federal laws, regulations, guidelines and procedures;
- Establish procedures to ensure effective implementation of its policy
- Provide adequate environmental training and guidance to its employees
- Instil a culture of continuous improvement through setting and reviewing targets, auditing and reporting environmental performance



- Regular consultation with project stakeholders (both local and regulatory departments) to discuss any of their environmental concerns

We expect our employees and contractors to:

- Comply with AIR's environmental management systems
- Review and strive to improve environmental practice
- Report all environmental incidents to their immediate managers
- Identify and address environmental concerns through open and honest consultation with local community members and government departments

### **5.3 Implementing the Health Safety and Environmental Policy's**

To implement the environmental and health, safety policy all operations must meet the following minimum requirements:

- Ensure that HS&E matters are an integral part of all strategy;
- Establish programmes and procedures to ensure proper and consistent implementation of their HSE policies;
- Assess in advance any potential HS&E implications of exploration and resource development activities and implement actions to minimise adverse environmental impacts;
- Cost and include all costs for HS&E in the budget process
- Ensure efficient use of all renewable and non renewable resources and the implementation of pollution prevention programmes;
- Evaluate HS&E risk associated with all operations and take appropriate action to minimise potential risk;
- Prepare and test emergency procedures in co-operation with local authorities if required;
- Prepare and maintain a closure plan for each operation including environmental impacts, closure and rehabilitation costs; and
- Ensure all employees are aware and abide by this policy and that all consultants and contractors implement practices consistent with this policy.

### **5.4 Access to Land and Social Responsibility Policy**

Sustainable development requires minerals and metals. They must be produced responsibly to benefit development. To accomplish this AIR operations require access to land for exploration and potentially smaller areas for mining. Any decision to proceed with exploration depends on a thorough evaluation of both the economic potential as well as any relevant environmental, heritage and community factors. In the case of environmental and/or heritage factors operations will be particularly rigorous in the assessment phase.

AIR accepts that in Australia there exists in addition to land rights enshrined in law other claims to land such as those based on ancestral or indigenous title. In such cases AIR seeks to establish the fullest possible understanding of the issues involved including the ways in which the wishes of the community claiming such rights are accommodated.

Australian States and Territories have established a legislative framework for land use and management with effective consultative procedures which enable interested groups such as the mining and exploration industry to express their views. AIR is committed to this system by using the appropriate land acts, rules and regulations for the Northern Territory.

AIR is committed to collaborating with all indigenous communities to identify and protect these areas. We actively consult with traditional landowners and relevant land councils about our operational intentions and ensure that we maintain the integrity and respect of our cultural heritage and that they in turn develop a trust and respect for AIR. To achieve this, we will:

- Respect the rights of traditional land-owners.
- Establish and maintain positive, effective and meaningful communication.
- Consult with the people whose country may be impacted by Arafura's activities.
- Engage with relevant indigenous groups on sustainable community projects.
- Carry out surveys at proposed exploration and operational areas to assess cultural heritage and
- Develop strategies to avoid impact on significant indigenous sites and cultural places.
- Develop and implement Incident Reporting Procedures

AIR's procedures, guidelines and accountabilities for all environmental related communication and reporting is identified here. Local communities unless otherwise stated generally refer to pastoralists and Aboriginal groups and their representatives.

The objectives of communicating environmental issues include:

- Provides access to information for AIR employees.
- Ensures that employees are aware of, and understand, their accountabilities for environmental management.
- Facilitates internal AIR reporting.
- Enables regulatory reporting.
- Encouraging employee involvement in continuously improving environmental systems and procedures
- Providing information on AIR environmental performance to the broader community.
- Addressing environmental concerns of local communities.

Communication on environmental issues can take on many forms with a variety of audiences. Methods of communication can include:

#### ***Internal***

- memoranda
- telephone
- bulletin boards
- e-mail
- newsletters
- meetings and meetings minutes
- workshops and training

#### ***External***

- annual reports
- one off or ongoing reports to Government and Government Departments
- one off or ongoing reports to the Northern Land Council and other NGO's
- reports required under specific licence conditions
- formal letters
- seeking advice or clarification from external agencies
- contact with communities
- media reports and advertising

- public meetings
- site tours/inspections
- presentations or papers to educational institutions or conferences

New employees will be briefed on AIR's environmental systems and procedures during their induction programme. The Field Operations Manager will be accountable for ensuring the appropriate induction takes place

Under Section 29 of the Mining Management Act an operator must report a "serious accident or critical incident "

(1) As soon as practicable after the operator for a mining site becomes aware of the occurrence of a serious accident or critical incident on the site, the operator must notify the Chief Executive Officer of the occurrence.

(2) If the operator gives oral notification under section (1), the operator must also give the Chief Executive Officer written confirmation of the occurrence as soon as practicable after the notification.

(3) An offence against this section is a regulatory offence.

AIR inducts its personnel to report all incidents and accidents immediately upon notice to the Field Operations manager or his delegate. If classified as serious or critical immediate notification is made to AIR Directors and the Chief Executive Officer of the Department in charge of the Mines Division and the Mining Management Act using the correct form.



## 6. STAKEHOLDER CONSULTATION

### 6.1 Stakeholders

Stakeholders are parties with an interest in the project who can potentially influence, or are influenced by its development. Stakeholders relevant to the project include:

- The 'local' community (people associated with the immediate area and who are directly affected by project-related activities),
- Roper Gulf Shire
- Peripheral communities (communities that are proximal to the project area and may or may not be affected by the project in some way,
- Mataranka Community
- Mining companies exploring in nearby ELs
- Other communities (communities that are distant from the project area and that may still be affected by the project in some way). These include Darwin.
- Territory and State government and agencies (e.g., NRETAS, DoR, NT Worksafe, NT Emergency Service, Darwin Port Corporation and relevant ministers and members of parliament).
- Australian Government, including DSEWPC (concerning EPBC Act matters).
- Special interest groups (e.g., Country Women Association, Roper Landcare).
- Media (regional, state and national).
- General public and road users (particularly within the Northern Territory).
- AIR (e.g., board, employees and shareholders).
- Contractors/suppliers (including infrastructure providers) to AIR
- Financiers (e.g., brokers, bankers and investors) and their advisors.
- Minerals Council of Australia NT Branch.

### 6.2 Consultation to Date

Australian Ilmenite Resources Pty Limited has instigated a community consultation strategy based on open sharing of information with all stakeholders and communities including the Northern Land Council 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 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 on a two-way street with AIR respecting the connections of Aboriginal people with their land and any sites of significance and the Aboriginal people and their Councils respecting the staff and the work carried out by AIR.

### 6.3 Proposed Stakeholder Consultation

Further and more formal consultations will be instigated once the level of assessment for this project is determined and announced.

## 7. REFERENCES

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