

ASSESSMENT REPORT 71

# **SILL80 ILMENITE PROJECT**

**AUSTRALIAN ILMENITE RESOURCES**

ENVIRONMENTAL ASSESSMENT REPORT  
AND  
RECOMMENDATIONS

By the

Environment Protection Agency

September 2012

# Table of Contents

Glossary.....	4
Executive Summary .....	5
List of Recommendations.....	7
1 Introduction and Background.....	11
1.1 Environmental Impact Assessment Process .....	11
1.2 Regulatory Framework.....	12
1.3 Environmental Impact Assessment History .....	13
1.4 Ecologically Sustainable Development.....	14
2 The Proposal.....	16
2.1 The Proponent .....	16
2.2 Project objective .....	16
2.3 Project location and description .....	16
3 Regional Setting .....	20
3.1 Physical.....	20
3.2 Hydrological Setting.....	20
3.3 Biological .....	22
3.3.1 Flora.....	22
3.3.2 Fauna.....	22
3.4 Socio-economic.....	22
3.5 Cultural/Historical.....	23
4 Environmental Impact Assessment.....	24
4.1 Introduction.....	24
4.2 Water Management.....	25
4.2.1 Surface Water Extraction from the Roper River .....	25
4.2.2 Water conservation.....	29
4.2.3 Water Re-Use and Minimisation.....	30
4.2.4 Water Quality.....	31
4.2.5 Flocculent Use .....	32
4.2.6 Water Management Plan.....	32
4.3 Rehabilitation of Disturbed Areas .....	33
4.3.1 Rehabilitation Monitoring.....	35
4.3.2 Erosion and Sediment Control.....	36
4.3.3 Weed Management.....	37
4.4 Flora and fauna surveys.....	38

<b>4.5 Road and Traffic Impacts .....</b>	<b>40</b>
<b>4.6 Current Land Use.....</b>	<b>41</b>
<b>4.7 Environmental Management Plan.....</b>	<b>42</b>
<b>5 Conclusion .....</b>	<b>43</b>
<b>6 References .....</b>	<b>44</b>
<b>Appendix 1 – Submissions on exhibited PER, February 2012.....</b>	<b>45</b>
<b>Appendix 2 – Commitments Register (from updated PER – August 2012, Appendix M).....</b>	<b>58</b>

## Glossary

AIR	Australian Ilmenite Resources Pty Ltd (the Proponent)
DoR	Former Department of Resources
EA Act	<i>Environmental Assessment Act</i>
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
ML	Mega Litres (100 000 litres)
MLA	Mineral Lease Application
MMP	Mining Management Plan
NOI	Notice of Intent
NRETAS	Former Department of Natural Resources, Environment, the Arts and Sport
NT	Northern Territory of Australia
NTG	Northern Territory Government
PER	Public Environmental Report
SILL80	the name of the ore body proposed for mining
TPWC Act	<i>Territory Parks and Wildlife Conservation Act</i>
WMP	Water Management Plan

## Units and Symbols

>	greater than
%	percent
ha	hectares
m	metres
m <sup>3</sup>	cubic metres (1000 L)
L/day	litres/day
L/s	litres per second
ML/day	megalitres (1 000 000 L) per day
ML/annum	megalitres (1 000 000 L) per year

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## Executive Summary

Environmental impact assessment (EIA) is the process of defining those elements of the environment that may be affected by a development proposal and analysing the risks associated with the identified potential impacts. This Assessment Report (the Report) assesses the environmental impact of the SILL80 Ilmenite Project, proposed by Australian Ilmenite Resources Pty Ltd (AIR) (the Proponent).

The SILL80 Ilmenite Project intends to mine ilmenite ( $\text{FeTiO}_3$ ), a black iron-titanium oxide mineral. Ilmenite is most commonly used to produce titanium dioxide ( $\text{TiO}_2$ ), which is an important base pigment in paint, paper, and plastics. The Project estimates ilmenite resources of 4.5 million tonnes, which would sustain the mine in excess of 20 years, with a permanent employment of up to 12 staff.

The Project comprises:

- Strip mining 400 000 – 1 000 000 tonnes of regolith to excavate ilmenite rich soils up to a maximum depth of four metres (from pits 300 m long x 200 m wide);
- Processing of regolith through wash trommels to produce up to 300 000 tonnes of ilmenite concentrate per annum;
- Extraction of up to 1649 ML/annum of water sourced from the Roper River and transferred via an above ground 225 mm pipeline 12 km south to the processing site;
- Returning remaining waste material generated (75 – 90% of original material) to the mining pit;
- Fencing and revegetating backfilled pits with improved pasture grasses and progressively grazed under the management of Numul Numul Station; and
- Transporting ilmenite concentrate by truck to Darwin to be stored in a warehouse for shipment to China through East Arm Port.

This Assessment Report forms the basis of advice to the NT Minister for Lands, Planning and the Environment on the environmental issues associated with the Project. The Minister is required to make comment and/or recommendations with regard to the proposal to the Minister for Mines and Energy (the responsible Minister).

The Report is based on a review of the Public Environmental Report, comments from the public and NT government agencies, and further information request.

### Major Issues

The major issues associated with the Project are:

- Extraction of water from the Roper River that could reduce flows and impact on water quality and ecological values;
- Effectiveness of the proposed rehabilitation over large areas;
- Risks of impacts on local threatened species in the area of proposed land clearing and disturbance cannot be assessed as the flora and fauna surveys conducted for the PER were insufficient to determine whether threatened species are present in the area; and

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- The mineral lease is on a currently operating pastoral lease and mining activities are required to be closely monitored to ensure the pastoral lease can continue its activities.

## Conclusions

The SILL80 Project can proceed without unacceptable impacts providing the recommendations in this Assessment Report are followed and any outstanding information is provided.

The SILL80 Project is proposed to support and meet future demand for raw ilmenite and ilmenite products. It would include strip mining 15 - 25 ha of land per year over a 20 year lifespan, extraction of up to 1649 ML/annum of water from the Roper River, processing plant and associated infrastructure and transport of 300 000 tonnes of ilmenite concentrate by truck 550 km to the Port of Darwin. It would provide permanent employment for up to 12 people over a period of 20 years, with a commitment to employ three local Indigenous persons (Section 5.6.1, PER).

The Project involves the land clearing of a total of 800 ha with a progressive rehabilitation program that focuses on instating improved pasture species post mining works. The PER analysed the impact of the project by considering its impact on water flows and quality, aquatic and threatened fauna species, terrestrial flora and fauna and erosion and sedimentation. These impacts are discussed in this report and additional recommendations have been made in the Assessment Report to ensure impacts are avoided where possible and/or minimised to the greatest extent possible. Given the cumulative impacts of this Project with other projects in the Roper Shire and the value the community places on the Roper River, it is essential that the Proponent demonstrates good corporate stewardship and makes the water management plan incorporating the water extraction limits and compliance available in the public domain.

The lack of information presented in the PER has hindered comprehensive assessment of the risks and increases the risk setting of this Project. In order for the project to proceed in an environmentally acceptable manner, the Proponent needs to address all information gaps identified in this Assessment Report prior to submitting a Mining Management Plan. Key areas that must be addressed prior to the commencement of any mining activity under the *Mining Management Act* for the SILL80 project include:

- An updated Water Management Plan that complies with all the requirements of the Department of Mines and Energy Advisory Note Water Management Plan;
- Quantitative rehabilitation monitoring program that will determine success or otherwise of the proposed rehabilitation methods that propose intensive grazing as an end use;
- Submission of a number of Environmental Management Plans including Erosion and Sediment Control Plan, Mine Closure and Rehabilitation Plan and Traffic Management Plan; and
- Weed Management Map of the existing mineral lease following Department of Resources Advisory Note *Weed Management on Mine Sites* and complying with the draft Invasive Species Policy.

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## List of Recommendations

### 1. Recommendation

The Proponent will ensure that the Project is implemented in accordance with the environmental commitments and safeguards:

- Identified in the SILL80 Ilmenite Project Public Environmental Report; and
- Recommended in this Assessment Report.

All safeguards and mitigation measures outlined in the Public Environmental Report are considered commitments by the Proponent and are to be incorporated into the Mining Management Plan for approval by the Department of Mines and Energy as per Appendix 2 of this Assessment Report. All recommendations in this Assessment Report are to be included in the Mining Management Plan.

### 2. Recommendation

The Proponent will advise the Minister of changes to the proposal in accordance with clause 14A of the Environmental Assessment Administrative Procedures, for determination of whether or not further assessment is required.

### 3. Recommendation

The following provisions are to be incorporated into a Water Management Plan under the Mining Management Plan to ensure that mitigation measures are implemented and to minimise any potential negative impacts to downstream users including wildlife:

- In the absence of detailed impact assessment studies being undertaken to demonstrate a sustainable trigger, pumping will cease at the water extraction site when flow rates at Judy Crossing trigger a threshold equal to or less than 0.9 m<sup>3</sup>/sec (or 900 L/s);
- Failure to comply with this cease to pump provision must be reported as an environmental incident under section 29 of the *Mining Management Act*;
- An extraction regime must be provided indicating total monthly water usage; and
- The Proponent must report annual water extraction rates from the Roper River and provide reasons if extractions are in excess of 1649 ML/annum in the Water Management Plan.

### 4. Recommendation

The following provisions are to be incorporated into a Water Management Plan under the Mining Management Plan to ensure extraction of water from the Roper River does not impact other users or environmental values:

- Water extraction by the Proponent should also consider water extraction by users at the water extraction site;
- Statistically rigorous monitoring programs should be established as soon as practicable that aim to establish baseline information, in particular on Dry season conditions, at the water extraction site;

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- **Monitoring programs should include terrestrial and aquatic fauna surveys at the extraction point on the Roper River to ensure impacts to any threatened species can be assessed and mitigated; and**
  - **The Proponent should consider alternative water supply or Wet season storage if monitoring indicates the cease-to-pump threshold is insufficient to maintain environmental values of the water extraction site.**

#### **5. Recommendation**

**The following provisions are to be incorporated into a Water Management Plan under the Mining Management Plan to ensure equipment used by the Proponent is adequately installed:**

- **A hydrologist should be engaged to select a suitable gauging location at the abstraction point on the Roper River to ensure flow rates are accurately measured and to ensure pumping ceases when flow thresholds are triggered; and**
- **The Proponent is to provide justification in the Mining Management Plan of the location and height of pumping equipment and fuel storage tanks at the Roper River to ensure that infrastructure is adequately designed and placed to prevent environmental harm.**

#### **6. Recommendation**

**The following provisions are to be incorporated into a Water Management Plan under the Mining Management Plan to ensure water conservation objectives are met and river flows are not unnecessarily impacted:**

- **Flow meters are to be installed at both the supply and delivery end of the 12 km pipeline to ensure leaks or breaks in the line are detected and water consumption is accurately recorded;**
- **A flow meter is to be installed at the processing plant (within proposed Mineral Lease 29042) to monitor water extraction from the shared 50 ML dam that is used for ilmenite processing. This should have minimum of monthly reporting to Department of Mines and Energy and to managers of the pastoral operation to enable adequate stock water requirements at peak dry periods. The proponent should also report pastoral station extraction from the 50 ML dam;**
- **If the Proponent ceases water extraction from the Roper River the use of water from the Numul Numul Station 50 ML dam should cease in accordance with pastoral station managers' requirements; and**
- **Commitment to supply pumping data on extraction rates and determination of yearly extraction totals to the Department of Land Resource Management.**

#### **7. Recommendation**

**Water efficiencies must be considered in the design of the final processing plant and in ongoing operations. Following a bulk test sample targets should be developed for maximising water re-use and minimising raw water consumption. Information on how raw water consumption will be minimised and re-use maximised, including details on the proposed screen dams and quantitative water recovery estimates, should be provided in subsequent Water Management Plans.**

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## **8. Recommendation**

To protect surface water quality values in the Roper River the Proponent should provide additional information in an updated Water Management Plan prior to operation. These include:

- Any historical water quality data and targeted surveys to describe existing baseline conditions and natural variations in the Roper River;
- A surface water quality monitoring program that follows the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000);
- In consultation with the Department of Mines and Energy and Power and Water Corporation identify alternative water supply for the Ngukurr community in the event impacts to water quality are detected.

## **9. Recommendation**

An updated Water Management Plan should be provided in the Mining Management Plan submitted to Department of Mines and Energy, that includes the following information:

- Surface water catchment areas, runoff and relevant watershed information – plans and images showing all contours, drainage lines and significant features, including a baseline study of surface water flows on and off the mineral lease; and
- Auditing of monitoring data proposed by the Proponent should be done by a qualified and independent auditor and be conducted monthly (for data audits) and quarterly on-site (audits on equipment, procedures and processes) and include the above cease to pump threshold. These Audit Reports, detailing pumping and extraction rates are to be publicly available.

## **10. Recommendation**

A Mine Closure and Decommissioning Plan must be developed prior to commencement of mining and submitted with the Mining Management Plan to the Department of Mines and Energy for assessment. The closure plan should address:

- Capability of the land to support the proposed end land use of improved pastures for grazing;
- Potential of improved pasture species spreading and impacting native flora and fauna species in adjacent areas;
- The necessity to disturb non-mining areas within the mineral lease to source additional topsoil; and
- Consultation with local stakeholders on the final land use objectives.

The Department of Primary Industry and Fisheries should be consulted regarding technical issues of establishing improved pastures prior to employing final rehabilitation methods.

## **11. Recommendation**

A rehabilitation monitoring manual detailing methods to conduct a scientifically and statistically rigorous monitoring program of the soil and

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vegetation attributes of rehabilitation must be included in the Rehabilitation Management Plan to be submitted as part of the Mining Management Plan.

**12. Recommendation**

The Proponent must develop a final Erosion and Sediment Control Plan (ESCP) in the Mining Management Plan submitted to the Department of Mines and Energy. The updated ESCP must include additional detail on the following:

- interception of runoff from disturbed areas into sediment control structures;
- location, size, capacity and designs required for sediment basins, silt fences, mulch bunds and catchment drains;
- proposed maintenance schedule and management of erosion and sediment controls; and
- proposed erosion and sediment control of haul roads, pipelines and other structures that may change surface water patterns.

**13. Recommendation**

To reduce impacts of weeds it is recommended that the following are included in an updated Weed Management Plan:

- A Weed Distribution Map be produced to define weed species on the mineral lease; and
- Weed control is implemented for the mineral lease prior to commencement of mining activities.

**14. Recommendation**

Road transport and traffic issues will need to be managed through a Traffic Management Plan that will form part of the Environmental Management Plan. This plan should be prepared in consultation with the Department of Transport.

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# 1 Introduction and Background

This Report assesses the environmental impact of the SILL80 Ilmenite Project (the Project).

Australian Ilmenite Resources Pty Ltd (AIR) (the Proponent) proposes to construct and operate its SILL80 Ilmenite Project on Mineral Lease 27422 in the Roper River region over a projected period of 20 years. The lease is 105 km east of Mataranka and 12 km south of the Roper River. The lease is within Perpetual Pastoral Lease 1161 (NT Portion 4970) Chatterhoochee (Numul Numul) Station. The nearest community is the Kewulyi Aboriginal Community Outstation (Old Roper Valley Homestead) four kilometres to the north west. The proposed Project includes:

- Strip mining to excavate ilmenite rich soils to a maximum depth of four metres (multiple strips 300 m long and 200 m wide) over a projected period of 20 years;
- Start up production of 100 000 tonnes of ilmenite concentrate per annum (grade between 10-25%), increasing to 300 000 tonnes in subsequent years;
- Extraction of 1649 ML/annum of water from Roper River, for use in concentrating ilmenite on site and transported by a 12 km water pipeline; and
- Rehabilitation of backfilled pits with a mix of pasture and native grass species.

This Environmental Assessment Report (the Report) is based on a review of the Public Environmental Report (PER), comments from the public and Government agencies on the PER, and a further information request (addressed by a complete update of the PER in August 2012). Submissions received on the PER are summarised in Appendix 1.

The PER and further information request can be viewed on the Environmental Assessment register at:

[www.nretas.nt.gov.au/environment-protection/assessment/register/sill80](http://www.nretas.nt.gov.au/environment-protection/assessment/register/sill80)

## 1.1 Environmental Impact Assessment Process

Environmental impact assessment (EIA) should:

- identify potential impacts on the environment (where environment is defined broadly according to the *Environmental Assessment Act*); and
- evaluate the risks of those impacts occurring.

Through its assessment of the Project risks, the Proponent must demonstrate:

- that these risks can be satisfactorily managed within acceptable levels e.g. impacts would not result in long term environmental detriment; and
- the effectiveness/feasibility of management measures in a precautionary/risk management framework.

Assessment gives weighted consideration to:

- values and risks;

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- estimation of the likelihood of success of preventative and remedial measures; and
  - the validity and comprehensiveness of monitoring programs established to provide ongoing measures of the environmental effects of the proposed Project.

The assessment of risks can be more reliably evaluated where there is good baseline information. Where this information is limited or not available, risk assessment is constrained and it is appropriate to use the precautionary principle in the evaluation of potential impacts. If potential impacts are understood with a reasonable level of certainty, monitoring programs can be better informed to detect impacts, and management measures can be more effectively targeted to address those impacts.

This Report evaluates the adequacy of baseline information, commitments and environmental safeguards proposed by the Proponent to avoid or mitigate the risks of potential impacts identified in the assessment process. The safeguards may be implemented at various levels within the planning framework of a project and include (among other approaches):

- Design and layout of components and other infrastructure on the site;
- Management of construction activities; and
- Management of processes used in operations of the facility (e.g. inputs and outputs).

Appendix 2 lists the commitments made by the Proponent. Additional safeguards are recommended in this Assessment Report where appropriate. The contents of this Report form the basis of advice to the NT Minister for Lands, Planning and the Environment (the Minister) on the acceptability of environmental impacts, the adequacy of mitigation measures and the residual risks to the environment that are to be borne by the current and future community.

## 1.2 Regulatory Framework

Environmental assessment was undertaken in accordance with the requirements of the Northern Territory *Environmental Assessment Act* 1982 (EA Act).

This Report forms the basis of advice to the Minister on the environmental issues associated with the Project and informs the decision as to whether or not the Project should proceed. The Minister is required to make comment and/or recommendations with regard to the proposal to the Minister for Mines and Energy (the Responsible Minister).

The responsible Minister, taking into consideration this Report, will then make a determination as to whether or not an 'Authorisation to Operate' will be issued to the Proponent to operate the SILL80 Ilmenite Project under the *Mining Management Act* 1990. Preceding authorisation under this Act, the proponent must submit a Mining Management Plan (MMP), which is the principal administrative document for the management of mine sites and can incorporate environmental conditions created through the environmental approval process. A number of environmental management plans (EMPs) prepared by the proponent will be included as part of the MMP.

A more complete list of Government approvals and relevant legislation for the regulation of the proposal is provided in Chapters 1.4 and 1.5 of the PER. The

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following legislation also applies to the SILL80 Project and details are available at the NT Work Safe website ([www.worksafe.nt.gov.au](http://www.worksafe.nt.gov.au)):

- *Work Health and Safety (National Uniform Legislation) Act 2011* and Regulations;
- *Workers Rehabilitation and Compensation Act* and Regulations;
- *Dangerous Goods Act* and Regulations;
- *Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act* and Regulations; incorporating the Australian Dangerous Goods Code 7th Edition;
- *Radioactive Ores and Concentrates (Packaging and Transport) Act* and Regulations;
- *Electricity Reform Act* and Regulations; and
- *Work Health and Administration Act 2011*

The Proponent must consult with NT WorkSafe on safety components of the operations and provide commitment to developing appropriate strategies and control measures for safety and waste and hazardous substance management to ensure design and planning is appropriate for the activity proposed.

### **1.3 Environmental Impact Assessment History**

On 20 May 2010, a Notice of Intent (NOI) outlining the proposed SILL80 Ilmenite Project was submitted to the former NT Minister for Natural Resources, Environment and Heritage (the former Minister). On 31 May 2010 a further information request was provided to the Proponent to address information gaps in the NOI.

On 28 October 2010 a revised and updated Notice of Intent (NOI) was submitted in response to the further information request and circulated for comment.

On 30 December 2010, the former Minister determined that the proposal required formal assessment under the EA Act, at the level of a PER. Final PER Guidelines were issued to the Proponent on 8 April 2011.

On 28 January 2012, the PER was made available for public comment for a period of 28 days; seven government agency and four public submissions on the PER raised the following issues:

- The PER lacked detail on baseline water quality, water quality monitoring program, total quantities of proposed water extraction, and management of water on site;
- The potential impacts of water extraction that could lead to a reduction in flow and water quality deterioration downstream at Roper Bar was not adequately addressed in the PER;
- The flora and fauna survey did not meet the recommended number of survey sites for the area of proposed disturbance, and is likely to under represent species presence, distribution and abundance of plant and animals species;
- The rehabilitation methods and the proposed end land use for maintenance of long term environmental integrity of the landscape was not adequately addressed;

- Cumulative impacts of the project in relation to other development in the region, including impacts on surface water flows, water quality and groundwater resources; the combined impacts of large areas of clearing of native vegetation; and impacts caused by transport of large quantities of bulk minerals was not adequately addressed.

A more detailed list of issues raised during public exhibition is included in Appendix 1 of this Report.

On 6 March 2012 a further information request was provided to the proponent to address gaps in the PER. This was addressed by resubmission of a full and updated PER on 31 August 2012, including changes to the project outside the information request. This PER was not publicly exhibited, but is available at the project website.

Through this Assessment Report, the Minister issued final advice and recommendations on the Project to the Responsible Minister.

## 1.4 Ecologically Sustainable Development

The Australian Government affirmed its commitment to sustainable development at United Nations conferences on environment and development, notably via the Rio Declaration and Agenda 21 in 1992 and the Johannesburg Declaration at the United Nations 2002 World Summit. Australia reaffirmed its commitment at the Summit to promote the integration of the three components of sustainable development—economic development, social development and environmental protection—as interdependent and mutually reinforcing pillars.

Australia developed the National Strategy for Ecologically Sustainable Development (ESD) identifying four national principles (Box 1). The Strategy identified ways to apply the principles to a range of industry sectors and issues such as climate change, biodiversity conservation, urban development, employment, economic activity, and economic diversity and resilience.

Box 1 - The principles of ESD and their definitions in the National Strategy for ESD

ESD Principle	Definition
Precautionary principle	Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
Inter- and intra-generational equity	The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of present and future generations.
Conservation of biological diversity and ecological integrity	The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making
Improved valuation, pricing and incentive mechanisms	Should be promoted to ensure that the costs of environmental externalities are internalised and that the polluter bears the costs associated with environmental pollution.

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In December 1992 the NT Government endorsed the National Strategy and agreed, along with all other States and Territories, to the Intergovernmental Agreement on the Environment. The Strategy defines ESD as: *'Using, conserving and enhancing the communities' resources so that ecological processes, on which life depends, are maintained and the total quality of life now and in the future can be increased. ESD is development that aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations.'*

To achieve the objective of ESD, the Project needs to continually be informed and guided by the ESD principles. Accordingly, the assessment of this proposal, its potential impacts (positive and negative) and the management measures used to enhance positive and reduce negative impacts was undertaken in the context of ESD principles.

Subsequent decision-making processes by approval bodies must be guided by ESD principles and the continued project design and development, as well as the development and implementation of management and monitoring programs by the Proponent, should all aim to meet the objective of ESD.

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## 2 The Proposal

### 2.1 The Proponent

The Proponent of the SILL80 Ilmenite Project is Australian Ilmenite Resources (AIR) Pty Limited - an Australian registered Proprietary Company with significant assets of ilmenite and magnetite and holds a number of mineral lease applications and exploration leases in the Northern Territory.

### 2.2 Project objective

The project is important to support a rapidly growing demand for ilmenite and ilmenite-containing products (e.g. base pigments in paint, paper and plastics). The SILL80 Ilmenite Project aims to:

- Develop a profitable business venture;
- Support and meet future demand for raw ilmenite and ilmenite products;
- Operate in an environmentally sustainable manner; and
- Increase and support socio-economic opportunities for local communities.

### 2.3 Project location and description

The SILL80 Ilmenite Project is located 105 km west of Mataranka, 80 km east of Ngukurr, and eight kilometres south of the Roper Highway (Figure 1).

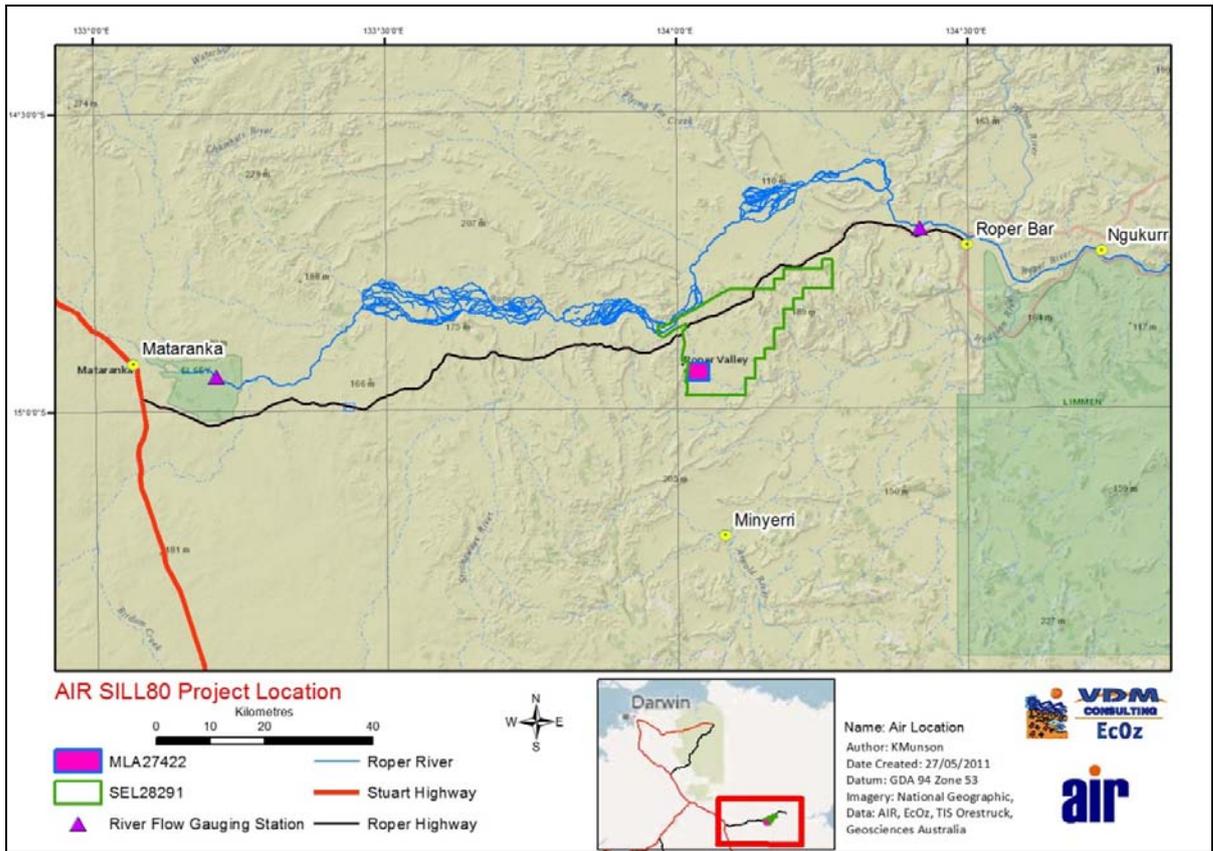
Mineral Lease 27422 is located within Numul Numul Station (Perpetual Pastoral Lease 1161 and NT Portion 4970). The Project is approximately 12 km south of the Roper River, four kilometres south-east of the Kewulyi Aboriginal Community Outstation, and one kilometre south-west of Numul Numul Station homestead (Figure 2). A smaller adjacent mineral lease (MLA 29042) is proposed for the construction of the processing plant and associated facilities.

The project description has been modified throughout the assessment process, informed by completed studies and modelling. The PER exhibited publicly in February 2012 was lacking in detail that was requested in the PER Guidelines (issued in February 2011). Further information was requested in March 2012 to enable a thorough assessment of the project.

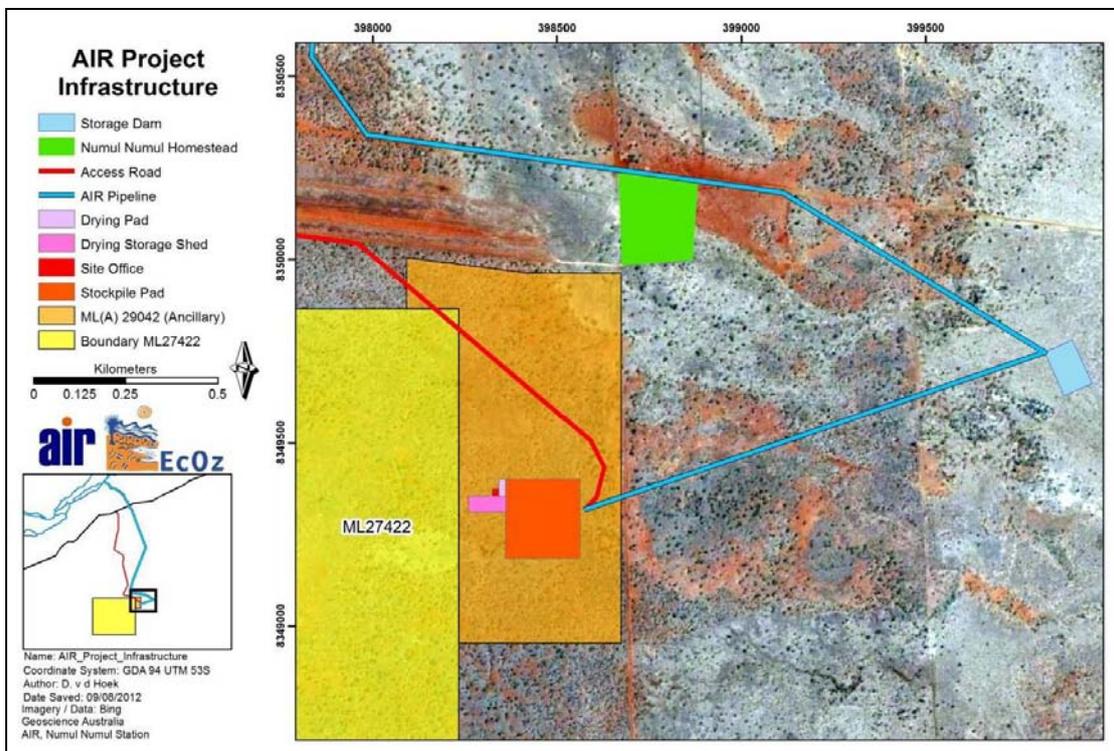
An updated PER was submitted in August 2012 to address the further information request. Various details of the project description outside the scope of the further information request were modified without explanation, notably a 50% increase in the full capacity of the concentration plant (from processing 200 000 tonnes of ilmenite to 300 000 tonnes of ilmenite per annum). A detailed table of changes between the February and August PERs was requested to complete the further information request.

The Project infrastructure and disturbance footprints are presented in Table 1. The Project involves:

- Strip mining 400 000 – 1 000 000 tonnes of regolith to excavate ilmenite rich soils up to a maximum depth of four metres (from pits 300m long x 200m wide);



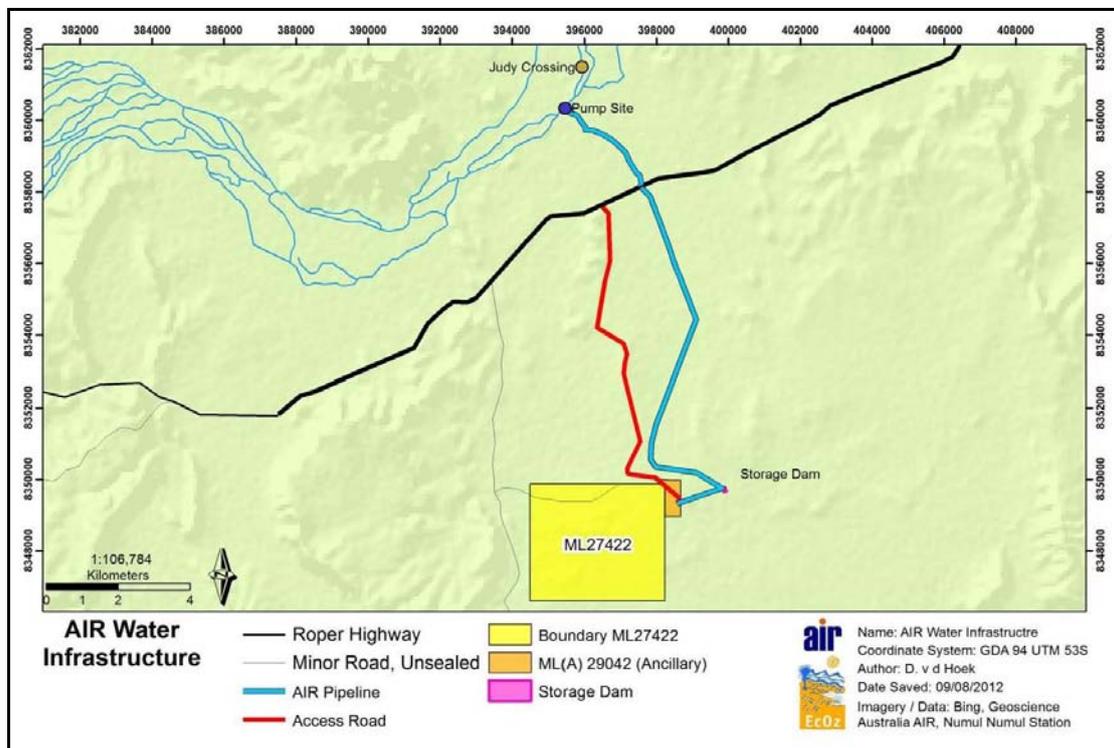
**Figure 1** Location of SILL80 Ilmenite Project (from Figure 2-1, PER – February 2012)



**Figure 2** General Layout the Proposed SILL80 Ilmenite Project, excluding strip mining areas (From Figure 5-1 updated PER – August 2012).

- Processing of regolith through wash tromeels to produce up to 300 000 tonnes of ilmenite concentrate per annum during 300 operating days;
- Extraction of up to 1649 ML/annum of water sourced from the Roper River and transferred via an above ground 225 mm pipeline 12 km south to the processing site;
- Returning remaining waste material generated (75 – 90% of original material) to the mining pit;
- Fencing and revegetating backfilled pits with improved pasture and progressively grazed under the management of Numul Numul Station; and
- Transporting ilmenite concentrate by truck to Darwin to be stored in a warehouse for shipment to China through East Arm Port.

The proposed above ground pipeline would be parallel to the existing Numul Numul Station pipeline that supplies Flying Fox and Numul Numul Stations (Figure 3).



**Figure 3** Water pipeline, pump and access road locations. (from Fig 5.3, updated PER – August 2012)

Water would be pumped into an existing 50 ML dam used by Numul Numul Station before being transferred to the processing plant. Verbal agreement from the property managers has been given for the use of this dam and a more formal agreement is being developed with Numul Numul Station to ensure these water storage structures remain accessible to maintain an operating pastoral lease (Section 6.5 updated PER August 2012).

**Table 1:** Project infrastructure and disturbance footprints for the SILL80 Project

<b>Infrastructure</b>	<b>Purpose</b>	<b>Area</b>
Process and refinement plant	Adjacent to storage shed will be a two level structure housing 120 nylon wash spirals, associated pipe work, and storage tanks	520 m <sup>2</sup>
On-site drying pad	Concrete pad for spiral separators for the removal of water from processed ilmenite and spoil.	800 m <sup>2</sup>
Storage and packing shed	Pack and store dried ilmenite concentrate prior to transport to Darwin	2000 m <sup>2</sup>
On-site office	Fabricated office building for daily operation purposes	20 m <sup>2</sup>
Worker's camp	Camp will be located adjacent to processing plant and will comprise 5 relocatable buildings	Not provided
Power generation shed	Supply power to processing plant, water pumps, and office	70 m <sup>2</sup>
Self banded fuel storage station	To store approximately 61 000 litres diesel fuels for machinery, power generation, and for water pumps	Not provided
Vehicle wash down bay	Ensure machinery hygiene and reduce spread of weeds	400 m <sup>2</sup>
Water pump and pipeline	150mm diameter poly pipe approximately 12 km long to pump water from Roper River to the Project.	Not provided
Water Storage	Existing Numul Numul Station 50 ML dam will be used to store water from Roper River for processing needs	Not provided
Private access road	From Roper Highway (approx. 8km) through Numul Numul Station (15 m wide corridor).	12 ha
Open cut mine	Excavation to strip mine ilmenite rich soils for refinement (maximum depth 4m, 300m long to 200m wide). Progressive backfilling of pits and rehabilitation would occur throughout life of mining. To produce 100 000 tonnes of ilmenite concentrate per annum (10 – 25%) would require excavation and processing of 400 000 to 1 million tonnes of regolith per year equating to a surface area 13 – 40 ha per year.	15-25 ha per annum – total area up to 800 ha

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## 3 Regional Setting

### 3.1 Physical

The SILL80 Ilmenite Project is situated on a relatively flat to low lying area surrounded by cattle grazing paddocks. The mineral lease is on an area predominately nominated as the Cliffdale land system of gently undulating to hilly terrain on basalt, dolerite, agglomerate and other volcanic and sometimes non-volcanic rocks (Aldrick and Wilson, 1992). The other predominant land system is the Nutwood Land System consisting of plains and low rises on basalt and associated igneous rocks (Table 1, Appendix B, PER).

### 3.2 Hydrological Setting

There are no major water courses located on the mineral lease. The major water source for processing ilmenite will be the Roper River, 12 km to the north of the mineral lease.

The Roper River region has a tropical savannah 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). The mean rainfall at Roper Bar store (60 km east of the Project) is 787.7 mm/year and mean evaporation of 2400 mm/year.

The Roper River catchment is the largest sea-flowing catchment in the Northern Territory and covers an area of approximately 82 000 km<sup>2</sup>. The tidal influence of the Roper River reaches the Roper Bar, a natural rock bar extending across the river. The saltwater/freshwater interface occurs further downstream, and depends on the stream flow. The township of Ngukurr, about 30 km downstream of Roper Bar, relies on the Roper River for part of its drinking water supply.

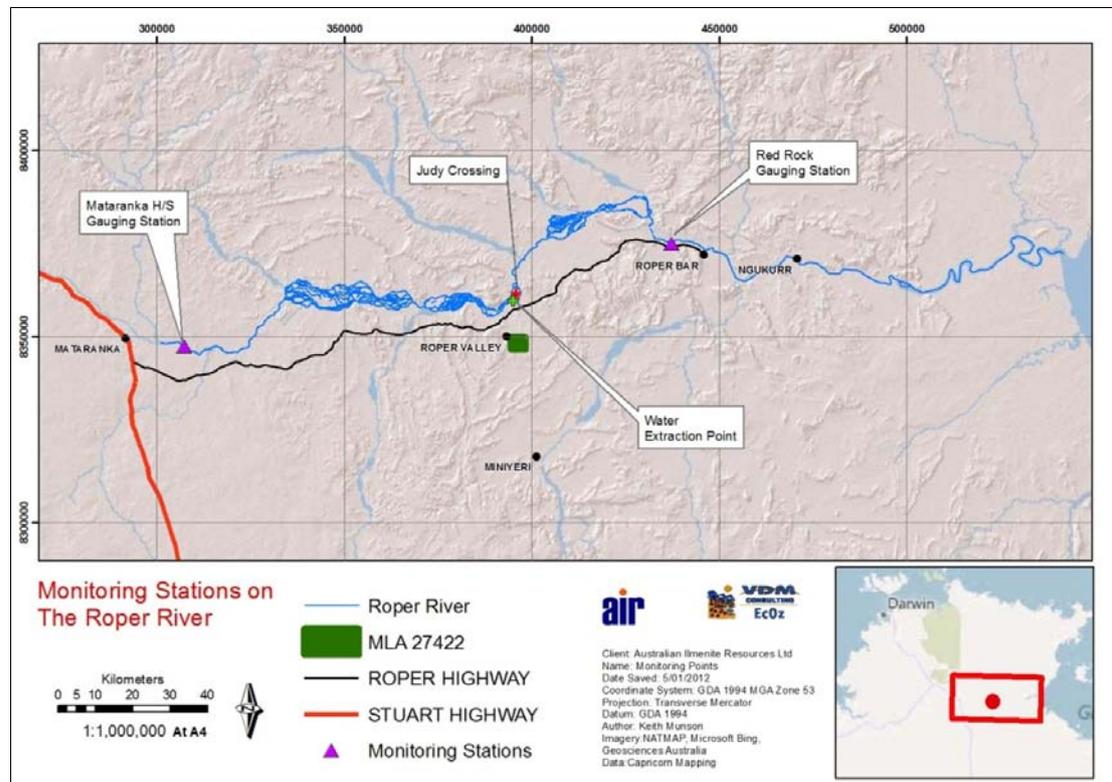
The Limmen Bight (Port Roper) Tidal Wetlands System is situated around the mouth of the Roper River covering an area of 185 000 ha and is the only wetland in the region listed in the Directory of Important Wetlands in Australia (Environment Australia, 2001).

Groundwater discharges provide an important contribution to the base flow of the Roper River. This occurs from the Tindall Limestone Aquifer (near Mataranka – see Figure 1 above) providing substantial Dry season flow. Groundwater resources in the mineral lease area of the SILL80 Project are typical for the catchment, comprising fractured and weathered rocks with bores yielding less than 1 L/s. 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 Project.

The water extraction point is situated near the central section of the Roper River, about 1 km upstream of Judy Crossing and 65 km upstream of Roper Bar. The proposed water extraction point is a naturally occurring permanent pool on the main channel of the Roper River. The river immediately above and below this pool is shallow and braided. Water is currently extracted from this site by Flying Fox Station for domestic and stock supply and historically by Numul Numul Station during particularly dry years (Appendix C, PER) via an existing pipeline.

Two telemetered gauging stations currently operate on the Roper River measuring river height and rainfall and managed by the Department of Land Resource Management. The Mataranka Homestead gauge is located approximately 80 km upstream of the proposed water extraction point, and the Red Rock gauge is located

approximately 60 km downstream of the water extraction point (Figure 4). Judy Crossing is a proposed gauging station to be established and monitored by the Proponent.



**Figure 4** Flow monitoring locations on the Roper River (Fig 3.1, PER Appendix G).

Downstream of Mataranka Homestead, the Roper River obtains no further contribution from groundwater and any additional input is from surface water, although this diminishes throughout the Dry season. A key finding in the Gulf Water Study (Knapton, 2009) showed that cease-to-flow events at Red Rock gauging station are relatively common, with no flow occurring for approximately 18 days in an average year. However when full allocations from the Tindall Limestone Aquifer are reached (up to 29 400 ML/yr<sup>a</sup>), the predicted cease-to-flow occurrences are expected to increase to 73 days per year at Red Rock (Knapton, 2009).

Surface water extraction for stock and domestic purposes is exempt from licensing under the NT *Water Act*.

The NT Water Allocation Planning Framework (NRETA, 2006) nominates that at least 80% of flow at any one time (instantaneous flow) in any part of a river is allocated as water for environmental non-consumptive uses. The remaining 20% of natural flow is for consumptive uses (including agriculture and industry).

Units used to describe water flow and pumping were used interchangeably in the PER. Flow is typically measured in cubic metres per second (m<sup>3</sup>/s), sometimes referred to as cumecs, and pumping in litres per second (L/s). To convert figures the relationship is 1 m<sup>3</sup>/s equals 1000 L/s.

<sup>a</sup> This quantity is approximately the total valid and pending groundwater and surface water licensed amounts in the Mataranka Water Allocation Planning Area (MWAP), in June 2009.

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### 3.3 Biological

#### 3.3.1 Flora

The flora survey recorded 92 species which represented 37% of the recorded plant diversity of the local area, although more flora surveys in similar areas are required to be sampled at comparable intensities to validate that percentage figure. There were a large number of introduced plants identified but no conservation significant species were recorded. Three main vegetation communities were identified: Low *Eucalyptus pruinosa* open woodland over tall closed tussock grass; Medium height *Corymbia terminalis*, *Eucalyptus tectifica* open woodland, over tall mid-dense tussock grass; and Low *Corymbia terminalis*, *Eucalyptus tectifica* Woodland over medium height / mid-dense closed tussock grass.

#### 3.3.2 Fauna

The fauna trapping program conducted during May 2011 had a total of 526 trap nights resulting in 52 captures of 13 species over a total number of six sites. An additional 27 species were recorded as incidental records (i.e. species that were recorded within the survey area but not as part of the systematic trapping and sampling program).

Forty-seven records from the fauna sampling program are new records for the area, reflecting a general paucity of biological surveys conducted across the habitat occurring within the lease. Four introduced species were recorded: Cane Toad (*Rhinella marinus*), Cattle (*Bos indicus*), Feral Pig (*Sus scrofa*) and the House Mouse (*Mus musculus*). Two recorded species are considered threatened under the *Territory Parks and Wildlife Conservation Act* (TPWC Act): the Australian Bustard (*Ardeotis australis*) and Mertens' Water Monitor (*Varanus mertensi*).

Fauna survey methods followed the Guidelines of the Northern Territory Terrestrial Fauna Survey. These Guidelines suggest that for a project area of 100 – 1000 ha in size should sample fauna at between 8 to 16 sites. The proposed disturbance area for SILL80 is 800 ha over 20 years with pits progressively rehabilitated to improved pasture.

### 3.4 Socio-economic

The Project is located within the sparsely populated Roper Gulf Shire. Only 3500 people live in the shire, of which 70% are Indigenous and English is usually the second language. The largest population centres are Ngukurr (1589), Mataranka (600) and Minyerri (340).

Pastoral activities, agriculture and fishing are currently the only major industries in the region. In the last decade mining exploration activities have occurred in the region. Fishing within the Roper River is a common activity and much of the region's tourism is based on aesthetics concerning the Roper River. There is a significant limestone quarry at Mataranka and the nearest operating mines are the McArthur River Mine and Frances Creek Mine. Potential mines include the Western Desert Resources Iron Ore Mine located approximately 100 km east of SILL80.

Other users of water from the Roper River include Badawarrka outstation, Big River cattle station, Flying Fox cattle station, Lonesome Dove cattle station, Mt McMinn cattle station, Ngukurr community, Nulawan outstation, and Wongalara cattle station (Zaar, 2009).

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### **3.5 Cultural/Historical**

An archaeological field survey was conducted to locate and record any archaeological objects or places with no material identified in the survey areas.

The Proponent has made an application to the Aboriginal Areas Protection Authority (AAPA) for an authority certificate to perform works in relation to the SILL80 Project. An initial map of restricted works areas was shown in Figure 3-2 of the PER although the pipeline and access road has since been relocated to prevent passage through restricted works areas (see Figure 3 above).

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## 4 Environmental Impact Assessment

### 4.1 Introduction

The purpose of this Report is to evaluate the Project and to determine whether it can proceed with acceptable environmental impacts. This is achieved by identifying the risk of an environmental impact occurring as a result of Project components and activities, and evaluating the Proponent's corresponding safeguards or prevention measures to remove or mitigate the risks. Where the proposed safeguards are considered insufficient, or where a safeguard is deemed particularly important, recommendations are made in this Report to add to or emphasise those commitments made by the Proponent.

The environmental acceptability of this project is based on analysis of the following from the PER:

- Adequacy of information outlining the proposal (particularly which components or activities are likely to impact the environment);
- Adequacy of information on the existing environment (particularly environmental sensitivities);
- Adequacy of information on the range and extent of potential impacts and the risks of those impacts occurring within the Project context; and
- Adequacy of the proposed safeguards to avoid or mitigate potential impacts.

Conclusions and recommendations are then based on comments from the review of the PER by relevant government agencies and the public.

In this Report, the recommendations (in **bold**) are preceded by text that identifies concerns, suggestions and undertakings associated with the project. For this reason, the recommendations should **not** be considered in isolation.

As changes are expected in the design and specifications of the proposal following the conclusion of the PER process, it is necessary for approval mechanisms to accommodate subsequent changes to the environmental safeguards described in the PER and the recommendations in this Report. If the Proponent can demonstrate that changes are not likely to significantly increase the risks of an impact on the environment, an adequate level of environmental protection may still be achieved by modifying the conditions attached to relevant statutory approvals governing this project. Otherwise, further environmental assessment may be required.

Therefore, subject to decisions that authorise / permit the Project to proceed, the primary recommendations of this assessment are:

#### 1. **Recommendation**

**The Proponent will ensure that the Project is implemented in accordance with the environmental commitments and safeguards:**

- **Identified in the SILL80 Ilmenite Project Public Environmental Report; and**
- **Recommended in this Assessment Report.**

**All safeguards and mitigation measures outlined in the Public Environmental Report are considered commitments by the Proponent and are to be**

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incorporated into the Mining Management Plan for approval by the Department of Mines and Energy as per Appendix 2 of this Assessment Report. All recommendations in this Assessment Report are to be included in the Mining Management Plan.

## **2. Recommendation**

The Proponent will advise the Minister of changes to the proposal in accordance with clause 14A of the Environmental Assessment Administrative Procedures, for determination of whether or not further assessment is required.

## **4.2 Water Management**

Water management is an integral part of mine operations (DRET, 2008) and leading practice management of water is required for this Project to proceed in an environmentally acceptable manner.

Water management was identified in the PER Guidelines (February 2011) as a key risk due to risk of impacts to aquatic ecology and water quality caused by water extraction reducing flows in the Roper River. In addition water consumption by other users, particularly groundwater extraction at Mataranka, could increase the risk setting in the future.

### **4.2.1 *Surface Water Extraction from the Roper River***

The Project proposes to extract water from the Roper River for ore processing and other water requirements. Water extraction is dependant on adequate flows in the Roper River and determining when extraction may impact on environmental values associated with water flows is critical. It is essential that the consequences of negative environmental impacts are properly taken into account in the decision to cease water extraction (which will have a direct financial impact for the Proponent due to lost opportunities for production).

Potential impacts of extracting water from Roper River include:

- Decrease in volume of water flowing downstream of the extraction site leading to a decrease in water quality, impacting communities such as Ngukurr and other users;
- Reduced flows may also allow migration of the sea water interface further upstream which could impact on freshwater water quality and aquatic ecology;
- Increased occurrence of cease-to-flow events along the Roper River when full groundwater entitlements from the Mataranka Water Allocation Planning are reached, impacting further on environmental values and operational activities of other users; and
- Detrimental impacts to threatened species as a consequence of reduced flows due to water extraction.

The following mitigation measures and controls to reduce the risks of extracting surface water from the Roper River were provided by the Proponent in the PER:

- 
- A Water Management Plan and associated monitoring and auditing;
  - A cease-to-pump regime when low flow thresholds are reached (flow rate at Judy Crossing less than or equal to  $0.9 \text{ m}^3/\text{s}$ );
  - An aquatic fauna survey to inform Water Management Plan objectives and outcomes;
  - Should extraction be required when flows are  $0.9 \text{ m}^3/\text{s}$  or lower, the Proponent will initiate a water quality monitoring program at Ngukurr to ascertain the impact of abstracting water and permanently cease abstraction if any deterioration in water quality is observed; and
  - Future Water Management Plans that would need to consider changing water regimes (e.g. when full groundwater allocations for Tindall Aquifer are granted).

The processing of ilmenite requires approximately 64 L/s. Due to a proposed 300 day operating year and variation in operating hours, an estimate of the total annual surface water extraction from the Roper River required for processing has been calculated in the revised PER (August 2012) to 1649 ML/annum. This excludes potable water for mine staff (300 L/day) as this will be taken from bottled water and tank water.

One important aspect of maintaining water quality and ecological values is the minimum flow rate and the number of days the river will cease-to-flow. Modelling based on average rainfall and undertaken by the Department of Land Resource Management for the consultant estimated that the minimum flow at Judy Crossing is  $1.0 \text{ m}^3/\text{s}$  (or 1000 L/s). Further, modelling by the Department of Land Resource Management also indicated that 133 L/s could be extracted from the Roper River by the Proponent without increasing cease-to-flow events at Red Rock gauging station.

The Proponent has committed to cease extraction should river flow at Judy Crossing drop to  $0.9 \text{ m}^3/\text{s}$  (or 900 L/s) or less and to utilise a pump with a maximum extraction rate of  $0.1 \text{ m}^3/\text{s}$  (100 L/s) (Appendix G, updated PER). When the NT Water Allocation Planning Framework (NRETA, 2006) policy of no more than 20% of instantaneous flow to be extracted is applied at Judy Crossing, when flows are at their predicted minimum, the extraction rate would be  $0.2 \text{ m}^3/\text{s}$  (or 200 L/s). The Proponent has estimated that it will require, on average, 133 L/s for a 12 hour working schedule (or 66.5 L/s over 24 hours).

The Proponent has indicated that pumping may continue when flows are below  $0.9 \text{ m}^3/\text{s}$  at Judy Crossing and that if this occurs water quality monitoring at Ngukurr would commence. No circumstances were provided in the PER when this may occur and why other alternatives such as utilising water storages would be used. This appears to contradict the commitment to cease pumping when flows drop below  $0.9 \text{ m}^3/\text{s}$ .

### **3. Recommendation**

**The following provisions are to be incorporated into a Water Management Plan under the Mining Management Plan to ensure that mitigation measures are implemented and to minimise any potential negative impacts to downstream users including wildlife:**

- **In the absence of detailed impact assessment studies being undertaken to demonstrate a sustainable trigger, pumping will cease at**

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**the water extraction site when flow rates at Judy Crossing trigger a threshold equal to or less than 0.9 m<sup>3</sup>/sec (or 900 L/s);**

- **Failure to comply with this cease to pump provision must be reported as an environmental incident under section 29 of the *Mining Management Act*;**
- **An extraction regime must be provided indicating total monthly water usage; and**
- **The Proponent must report annual water extraction rates from the Roper River and provide reasons if extractions are in excess of 1649 ML/annum in the Water Management Plan.**

While it is recognised that ceasing to pump at the nominated flow rate is in keeping with the NT Water Allocation Planning Framework (NRETA, 2006) of 20% of instantaneous flow for water consumption, the Proponents' threshold does not take into account all other extractions from the Roper River. The 20% extraction threshold is a default position used when no historic data are available. In consultation with Water Resources Division of the Department of Land Resource Management, consideration should be given to other users of the catchment.

The current Roper River surface water license entitlements have a combined entitlement of only 88.2 ML/annum, indicating that the 1649 ML/annum required for this Project is a significant volume of surface water extraction in the region. Provisions of the Water Management Plan require that the daily and annual surface water extraction volumes and yearly allocations are provided based on rainfall, recharge and water use allocation. Annual water extraction will have to include consideration of the capacity of the resources (surface flow), timing of mining activities, environmental and cultural requirements, and quantities taken by other users.

Despite a commitment to cease-to-pump when flows at Judy Crossing reduce below 0.9 m<sup>3</sup>/s, monitoring will be required to confirm this extraction rate is adequate to achieve the goal that water extraction from the Roper River will not significantly impact the aquatic environment or affect water supply to other downstream users (as required at Section 7.1, PER Guidelines, 2011).

The Surface Water Monitoring Plan (Section 6.1.1 PER) has an objective to ensure that abstraction from the Roper River does not negatively impact downstream users, including wildlife, and that there is no increase in cease to flow events downstream of the abstraction point. The plan will target riffle habitats as they are vulnerable to reduced flows. The plan should also aim to provide information on whether the Proponent's cease-to-flow threshold of 0.9 m<sup>3</sup>/s is an appropriate threshold for environmental values of the Roper River.

The proposed water extraction point for SILL80 is a perennial water hole in the main channel of the Roper River and may be of importance as a Dry season refuge for a number of aquatic and terrestrial species, particularly when freshwater flows cease along this stretch. The size and estimated volume of this pool at certain times of the year was not provided in the PER and it is difficult to assess its habitat significance in the Roper River system. Water extraction should include the environmental values of this pool. Aquatic fauna surveys are required to identify fauna species, particularly threatened species that may be resident or migrate through the area, so that management strategies to minimise potential impacts on these species can be developed where required.

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#### **4. Recommendation**

The following provisions are to be incorporated into a Water Management Plan under the Mining Management Plan to ensure extraction of water from the Roper River does not impact other users or environmental values:

- Water extraction by the Proponent should also consider water extraction by users at the water extraction site;
- Statistically rigorous monitoring programs should be established as soon as practicable that aim to establish baseline information, in particular on Dry season conditions, at the water extraction site;
- Monitoring programs should include terrestrial and aquatic fauna surveys at the extraction point on the Roper River to ensure impacts to any threatened species can be assessed and mitigated; and
- The Proponent should consider alternative water supply or Wet season storage if monitoring indicates the cease-to-pump threshold is insufficient to maintain environmental values of the water extraction site.

In the absence of a gauging station at the proposed extraction point on Roper River, flow monitoring would be conducted via a combination of the existing Red Rock gauge (via telemeter) as well as manually gauging Judy Crossing downstream from the extraction point. When flow reaches 3 m<sup>3</sup>/s or less at Red Rock, daily manual gaugings would be conducted at Judy Crossing. When flows at Judy Crossing are 0.9 m<sup>3</sup>/s or less water extraction would cease. The Proponent commits to install a measuring plate at the abstraction point, calibrated against flows at upstream and downstream gauging stations. The Proponent should also commit to engaging a qualified hydrologist to select a suitable gauging location and develop a ratings table for the monitoring location. Given that the thresholds and levels can only be properly adhered to if there is some method of determining water flow at the site, flow monitoring equipment at the extraction site is required to maximise accuracy and reduce error margins compared with manual monitoring at Judy Crossing, or relying on equipment maintained by other agencies.

Concern was raised regarding whether the Roper River extraction pump would need removal during flooding events. In the PER, the Proponent detailed that the pump would be located 40 m from the river on a four metre high rock armoured island to mitigate flooding. The island would have a concrete pad on which the pump, drive engine, and a 10 000 litre self-bunded diesel storage would be mounted. The site of the pump and fuel tank was not provided in the PER. Concerns were raised on whether flooding could damage the infrastructure and cause fuel spills. An explanation on how the location was chosen was provided in email correspondence to the Environmental Protection Agency in February 2012, but this was not included in the updated PER in August 2012.

#### **5. Recommendation**

The following provisions are to be incorporated into a Water Management Plan under the Mining Management Plan to ensure equipment used by the Proponent is adequately installed:

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- **A hydrologist should be engaged to select a suitable gauging location at the abstraction point on the Roper River to ensure flow rates are accurately measured and to ensure pumping ceases when flow thresholds are triggered; and**
  - **The Proponent is to provide justification in the Mining Management Plan of the location and height of pumping equipment and fuel storage tanks at the Roper River to ensure that infrastructure is adequately designed and placed to prevent environmental harm.**

#### **4.2.2 Water conservation**

When the cease-to-pump extraction threshold of 0.9 m<sup>3</sup>/s of instantaneous flow is triggered the Proponent would use stored water from existing water storages that have capacity up to 50 ML (sufficient for 22 days), or cease operations until flow rates at Judy Crossing are greater than 0.9 m<sup>3</sup>/s. The Proponent also indicated that a synthetically lined and covered dam could potentially be explored post mine development. The locations, dimensions and capacity of these existing and future water storages were not provided in the PER.

The Water Management Plan states that pump meter reading (volume) and conversion to an average volume/second (m<sup>3</sup>/s) would be recorded daily by the mine Environmental Officer (Appendix G, PER). Flow meters should be installed at both supply and delivery end of the 12 km pipeline to detect leaks and prevent under estimation of water consumption. These results would be submitted as part of the quarterly water monitoring reporting requirement for Water Management Plans under the *Mining Management Act*.

Given the existing users of the Roper River, projected regional mining development and future demands on the Tindall Limestone Aquifer, it is recommended these pumpage results on extraction rates and yearly totals are also made available to the relevant administrative agency (Water Resources, Department of Land Resource Management) for common purpose of ensuring that water resources are used within environmentally, economically and socially sustainable limits.

Water extraction for stock and domestic use is not required to be monitored or reported, even when flow rates in the Roper River drop below environmental flow thresholds. This creates a problem in water use accounting for the Proponent as the shared 50 ML dam will be able to remain full all year (via the pastoralists own pumping regime), and potentially accessible to the Proponent for production. A water flow meter installed within the proposed mineral lease (MLA 29042) that records consumption (or extraction from the holding dam) on a regular basis and that can be reported with river flow monitoring will provide the Proponent with the knowledge when river extraction should cease and when dam extraction should cease, ensuring pastoral managers have sufficient water for their use and are not subsidising water demand of the mine through increased Roper River extraction at times of low flow.

## **6. Recommendation**

**The following provisions are to be incorporated into a Water Management Plan under the Mining Management Plan to ensure water conservation objectives are met and river flows are not unnecessarily impacted:**

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- **Flow meters are to be installed at both the supply and delivery end of the 12 km pipeline to ensure leaks or breaks in the line are detected and water consumption is accurately recorded;**
  - **A flow meter is to be installed at the processing plant (within proposed Mineral Lease 29042) to monitor water extraction from the shared 50 ML dam that is used for ilmenite processing. This should have minimum of monthly reporting to Department of Mines and Energy and to managers of the pastoral operation to enable adequate stock water requirements at peak dry periods. The proponent should also report pastoral station extraction from the 50 ML dam;**
  - **If the Proponent ceases water extraction from the Roper River the use of water from the Numul Numul Station 50 ML dam should cease in accordance with pastoral station managers' requirements; and**
  - **Commitment to supply pumping data on extraction rates and determination of yearly extraction totals to the Department of Land Resource Management.**

#### **4.2.3 Water Re-Use and Minimisation**

The Proponent recognises that the high variability of annual rainfall and its influence on Roper River flows requires flexibility and careful planning in water allocation. Water minimisation, recycling and large-scale water storage at the mine would be essential components for operations to refine according to the availability of Roper River flows on a year-to-year basis. To reduce reliance on natural river flows the proponent has committed to water re-use from processing and rainfall collection from any open pits during the Wet season.

Scant detail was provided in the PER on minimising raw water consumption and maximising water re-use. This was reliant on a bulk sample test to be conducted to determine water processing needs and water reclamation capacity. The Proponent indicated in the PER that a bulk sample would be performed in March/April 2012. The further information request also asked the proponent to provide additional details, but no details have been provided in the updated PER (August 2012).

The proposed water re-use provided in the PER included:

- Separated refined ilmenite concentrate would be transferred to a covered concrete pad to drain to collect all water seepage; and
- Wet tailings (remaining regolith) would be sent to a series of partitioned screen dams - the first dam would allow seepage into the lower dam from where water will be pumped back into the process.

The tailings would be backfilled into a non-working pit in preparation for rehabilitation. The proponent did not indicate the location or capacity of these screened dams or concrete pad.

The Proponent has indicated that up to 40% of water used in processing would be lost by retention in the tailings. The remaining 60% would be reused in processing. The Proponent has committed to a program of continued improvement which includes investigations into dewatering of the tailings prior to pit backfilling to improve water efficiencies (Section 3.3 Appendix G – updated PER). This would reduce reliance on surface water extraction from the Roper River.

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The Proponent acknowledges there is a subsequent future risk to environmental values and the Project if groundwater entitlements at Mataranka are fully allocated (Section 6.3.1, PER). For this reason, as well as the project having a lifespan of up to 20 years, during which these groundwater entitlements could become allocated, more focus is required on minimising surface water extraction from the Roper River and maximising water recycling.

The Proponent has not provided any detail on water re-use other than the statement “AIR will pump excess water from holding sumps between wash trommel cycles back into water stores to reclaim as much of the processing water as possible” (Section 5.5.4, PER). More accurate figures for water recycling cannot be provided until a bulk sample test is taken and testing of the processing plant’s water recovery systems is conducted. This lack of fundamental project design information increases the risk setting for this Project. The Proponent needs to provide an informed estimate (based on bulk sample test) of the plant’s water use and recycling and how the plant design and operations has maximised water re-use, as part of the Water Management Plan approval.

## **7. Recommendation**

**Water efficiencies must be considered in the design of the final processing plant and in ongoing operations. Following a bulk test sample targets should be developed for maximising water re-use and minimising raw water consumption. Information on how raw water consumption will be minimised and re-use maximised, including details on the proposed screen dams and quantitative water recovery estimates, should be provided in subsequent Water Management Plans.**

### ***4.2.4 Water Quality***

Water quality parameters measured at the proposed water extraction point (Flying Fox Station pump waterhole) were presented from a single sample taken on 19 May 2011 (Table 5-1, Appendix C, PER). This does not represent a comprehensive baseline prior to operations commencing.

The Proponent has assumed that water quality would not be affected unless greater than 20% of inflows are extracted. Given that there is no scientific data presented in the PER that supports the assertion that extracting up to 20% of inflows will not impact water quality, the risk setting for this Project is increased and monitoring will be relied on to confirm the threshold is adequate.

The level of uncertainty for water quality impacts downstream of the site can be addressed by continuing to develop knowledge of the existing aquatic environment. Collection of baseline information and monitoring will inform whether the proposed cease-to-pump threshold is sufficient to prevent impact from river flows and water quality for adequate protection of environmental assets and downstream users at Ngukurr. Carefully scoped surveys would provide a known baseline to compare with future water quality monitoring to ensure mine operations are not impacting water quality (from either water extraction or land clearing activities).

Details of the water quality monitoring program must be provided as part of the Water Management Plan. Baseline conditions at the water extraction site and Ngukurr as part of a surface water quality monitoring program must be established prior to operations commencing rather than when abstractions are required at a flow of 0.9 m<sup>3</sup>/s or less.

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## **8. Recommendation**

To protect surface water quality values in the Roper River the Proponent should provide additional information in an updated Water Management Plan prior to operation. These include:

- Any historical water quality data and targeted surveys to describe existing baseline conditions and natural variations in the Roper River;
- A surface water quality monitoring program that follows the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000);
- In consultation with the Department of Mines and Energy and Power and Water Corporation identify alternative water supply for the Ngukurr community in the event impacts to water quality are detected.

### **4.2.5 Flocculent Use**

Flocculants are additives used to assist separation of water and solids. It is noted that the Project does not require flocculants for processing operations (section 6.7.3, updated PER). It is expected that if flocculants are required after a bulk sample is tested, an assessment of their potential environmental impacts is required, in accordance with Recommendation 2 of this Report, rather than as an amendment to a future MMP.

### **4.2.6 Water Management Plan**

A Water Management Plan was provided as part of this assessment to address the above identified risks of surface water extraction from the Roper River with the aims to:

- Develop water extraction practices to mitigate any potential negative impacts to downstream communities and wildlife; and
- Provide a framework for reporting and auditing of water extraction by the Proponent to the Northern Territory Government.

An updated Water Management Plan was provided in the updated PER (August 2012) in response to a further information request in March 2012 (see Appendix 1A of the updated PER). Although the majority of these issues have been addressed, the Proponent will need to address all the requirements of a Water Management Plan as provided in the Template for the Preparation of a Mining Management Plan by the Department of Mines and Energy at: [www.nt.gov.au/d/Minerals\\_Energy/index.cfm?header=Mining%20Documentation](http://www.nt.gov.au/d/Minerals_Energy/index.cfm?header=Mining%20Documentation).

A map of surface water catchment areas, runoff and relevant watershed information of the mineral lease was required in the further information request (March 2012). A map was provided of local hydrology (Figure 2.4 Appendix G – Water Management Plan), but this did not describe catchment boundaries adequately.

A baseline study covering surface water flows on and off the mineral lease is required to ensure clean water is diverted away from operating pits. Details are required on how surplus water would be managed. It is expected that mine

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infrastructure would be located to minimise deviation of natural surface water flow paths, reduce/prevent erosion and siltation and restrict inundation of open pits. This information is required prior to any disturbance to the site.

It is essential that the Project is designed to handle and control the required inflows and outflows as well as any unpredictable fluctuations (e.g. high rainfall events) so that a water balance can be established during the design stage, which is important to prevent water management problems occurring during operation and closure.

The Proponent has committed to appoint an independent auditor to audit water management, particularly extraction rates and compliance to the proposed cease to pump threshold. The auditing should ensure:

- Data of inflows to the extraction pool and extraction rates has been collected, regularly recorded and appropriately reported;
- Any cease-to-pump events have been recorded;
- Inflows since last reporting period are recorded; and
- Extraction since last reporting period are recorded.

The above information gaps must be addressed for adequate assessment of water management by the Department of Mines and Energy.

#### **9. Recommendation**

**An updated Water Management Plan should be provided in the Mining Management Plan submitted to Department of Mines and Energy, that includes the following information:**

- **Surface water catchment areas, runoff and relevant watershed information – plans and images showing all contours, drainage lines and significant features, including a baseline study of surface water flows on and off the mineral lease; and**
- **Auditing of monitoring data proposed by the Proponent should be done by a qualified and independent auditor and be conducted monthly (for data audits) and quarterly on-site (audits on equipment, procedures and processes) and include the above cease to pump threshold. These Audit Reports, detailing pumping and extraction rates are to be publicly available.**

#### **4.3 Rehabilitation of Disturbed Areas**

The proposed annual area of land clearing and disturbance for strip mining at the Project is 15 – 25 ha progressively rehabilitated over an expected 20 year mining life span. The updated PER of August 2012 states that total clearing of vegetation in the mineral lease remains at 800 ha but does not show how this figure is calculated. Impacts that may occur due to strip mining identified in the PER include:

- Large areas of exposed earth prone to weed infestation, erosion and sedimentation;
- Spread of existing weed infestations due to disturbance and vehicle traffic;
- Unstable landscape post mining;

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- Reduce quality of surrounding water resources;
  - Gradual decline in landscape function;
  - Altered drainage and hydrology; and
  - Impact on potential future pastoral land if contaminants (e.g. heavy metals) and other potential hazards are not properly identified or managed.

Successful rehabilitation includes well managed soil erosion, weed control, ground cover establishment and monitoring. The Rehabilitation Management Plan provided at Appendix K of the PER details the objectives, methods and management of rehabilitation at the Project. Traditional Owners and Pastoral Lease owners were also consulted on rehabilitation outcomes.

The Rehabilitation Management Plan is subject to regular review, detailed monitoring and reporting and modification as required. The Rehabilitation Management Plan details the following rehabilitation methods that would occur after completion of the first year of mining:

- Excavations would be progressively backfilled with the residual material left over from ore processing (about 75 – 90% of the original material);
- Residual material would be dewatered prior to being placed back into the pit;
- Top soil (where available) would be stockpiled for later use (for spreading over filled pit areas);
- Additional soil may be sourced from other areas within the mineral lease, as required;
- A mixture of desirable native pasture grass seeds and introduced improved pasture species suitable for intensive grazing in tropical and subtropical regions of the NT (Sabi grass, Verano, Seca) would be broadcast over rehabilitation areas;
- Hay or silage would be introduced to the rehabilitation area to provide additional fodder and mulch, along with mulch sourced from stockpiled cleared material;
- Cattle would be selectively introduced to the rehabilitation area for a short periods of time (possibly only 6 to 12 hours) every six or more months, as determined by a Grazing Plan (as prepared by Pastoral Lease owners). The cattle would mix the mulch through hoof action and add natural fertiliser in the form of faeces and urine. This aims to create “new” topsoil;
- If enough native residual seed does not germinate in the area a cross-selection of perennial grass species would be introduced at a later date;
- Re-introduction of cattle would be carried out at various times (for short periods and of varying density), carefully managed to promote growth of pasture without negatively impacting the environment and to promote the desired future landscape;
- Regular monitoring (photo monitoring) would occur to determine if the rehabilitation activities are achieving the desired result or if methodologies need to be modified;
- Access roads not wanted by landowners would be ripped and allowed to revegetate naturally; and

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- Prior to the completion of mining operations, consultation with landowners would be undertaken to determine the fate of all mining infrastructure, including the processing plant, concrete pad, sheds, office, roads and any other infrastructure in place.

Improved pastures generally need more intensive management and higher inputs to remain productive. The higher inputs include fertiliser at establishment and then approximately every three years. The proposed rehabilitation methods will be done on processed and washed regolith that is lacking in soil structure and may have different drainage properties to the original soil. Advice provided by the then Department of Resources (Primary Industry Division) indicated that the suggested pasture species Sabi grass may take 2-3 years to establish to a useful density and it is unlikely the proposed native grasses (Bull Mitchell or Flinders) would establish as they are better suited to cracking clays and lower rainfall.

The success or otherwise of rehabilitation must be reported in the Annual Environmental Review as required as part of the MMP. Any changes to rehabilitation methods or final land use objectives should be done with further consultation with Traditional Owners and Pastoral Lease owners.

## **10. Recommendation**

**A Mine Closure and Decommissioning Plan must be developed prior to commencement of mining and submitted with the Mining Management Plan to the Department of Mines and Energy for assessment. The closure plan should address:**

- **Capability of the land to support the proposed end land use of improved pastures for grazing;**
- **Potential of improved pasture species spreading and impacting native flora and fauna species in adjacent areas;**
- **The necessity to disturb non-mining areas within the mineral lease to source additional topsoil; and**
- **Consultation with local stakeholders on the final land use objectives.**

**The Department of Primary Industry and Fisheries should be consulted regarding technical issues of establishing improved pastures prior to employing final rehabilitation methods.**

### **4.3.1 *Rehabilitation Monitoring***

In the Rehabilitation Management Plan, the Proponent provides sample grid or point data that would be used annually to determine ground cover and plant composition compared to a nominated “control” area. Photo monitoring was proposed to monitor rehabilitated areas with reference points set up and photos taken quarterly over the same area of rehabilitation to determine success.

A wide range of quantitative methods are available for monitoring rehabilitation success with the selection of methods dependent on the precise rehabilitation target. The rehabilitation target (or proposed end land use) for this Project is to increase economic viability of the land by establishing a healthy and productive state of vegetation to support intensive grazing. The Proponent has not indicated whether:

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- the proposed rehabilitation objective (intensive grazing) is suitable with existing soil types or with post-mined processed and washed soil; and
  - rehabilitation monitoring would indicate the ability of the site to support the post mining land use (DOR, 2008).

Rehabilitation monitoring techniques, other than quarterly photo monitoring, need to be specified to indicate that rehabilitated areas are trending towards a stable and sustainable ecosystem, consistent with the defined end land use. Best Practice mine rehabilitation monitoring should follow the Department of Industry, Tourism and Resources mine rehabilitation techniques (DITR, 2006).

While it is recognised that the Grazing Plan (used as part of rehabilitation techniques) would be prepared by Numul Numul Station Managers, the Proponent needs to commit to providing sufficient resources to conduct quantitative rehabilitation monitoring to determine early success or otherwise of rehabilitation methods. A record of the history of an area of rehabilitation can link current performance with rehabilitation practice, such that the best approaches can be identified and problems remedied. Annual reporting on rehabilitation methods and monitoring would be presented in the Annual Environmental Report as required as part of the Mining Management Plan and report to Department of Mines and Energy.

## **11. Recommendation**

**A rehabilitation monitoring manual detailing methods to conduct a scientifically and statistically rigorous monitoring program of the soil and vegetation attributes of rehabilitation must be included in the Rehabilitation Management Plan to be submitted as part of the Mining Management Plan.**

### ***4.3.2 Erosion and Sediment Control***

The Project area is mainly within the Cliffdale land system, which has sloping red soils that have a high erosion risk and subject to flooding during the Wet season. The following potential impacts are associated with strip mining:

- Land clearing followed by strip mining creating large areas of bare ground susceptible to increased erosion;
- Increased erosion and loss of topsoil may impact rehabilitation success; and
- Increased erosion resulting in sedimentation impacts to waterways.

It is proposed that an eight metre wide, gravel based haul road would be developed through Numul Numul Station from the Roper Highway. No details were provided on any land clearing and sediment control requirements to construct and maintain the haul road.

An Erosion and Sediment Control Plan (ESCP) was provided in the PER with the following objectives:

- Control soil erosion and sediment generation from areas disturbed by construction and mining activities; and
- Minimise potential project related activities resulting in decreased water quality (particularly suspended solids) in downstream local watercourses (Appendix H, PER 2012).

The following mitigation measures were detailed in the ESCP:

- 
- Construct entry/exit shake down to prevent tracking of sediment from vehicle tyres to public roads;
  - Construct catch drains to convey flow within disturbed areas to sediment basins and divert clean water around disturbed areas;
  - Use of diversion banks to convey clean water flows toward a level spreader for discharge into intact vegetation;
  - Construct sediment basins to retain storm water for a 1 in 10 year storm event;
  - Install silt fences around stockpiles and sediment basins; and
  - Mulch bunds to temporarily reduce the velocity of contaminated sheet flow and induce gravitational settlement of sediment.

The above mitigation measures are supported but more details are required to be submitted in an updated ESCP as part of the Mining Management Plan. It is recommended the development of the ESCP consider the International Erosion Control Association Best Practice Erosion and Sediment Control Guidelines 2008 or the Sunshine Coast Regional Council November 2008 – Manual For Erosion Control Version 1.2 as a guide to the type of information, detail and data that should be included in an ESCP.

## **12. Recommendation**

**The Proponent must develop a final Erosion and Sediment Control Plan (ESCP) in the Mining Management Plan submitted to the Department of Mines and Energy. The updated ESCP must include additional detail on the following:**

- **interception of runoff from disturbed areas into sediment control structures;**
- **location, size, capacity and designs required for sediment basins, silt fences, mulch bunds and catchment drains;**
- **proposed maintenance schedule and management of erosion and sediment controls; and**
- **proposed erosion and sediment control of haul roads, pipelines and other structures that may change surface water patterns.**

### **4.3.3 Weed Management**

An objective of mine rehabilitation is to reduce the incidence of weed infestation and spread. A Weed Management Plan was provided in the PER (Appendix I) that identified the following potential negative impacts that may occur from Project activities:

- Large areas of exposed earth available for weed colonisation;
- Spread of existing weed infestations due to disturbance and vehicle traffic;
- Untidy and bare infrastructure areas; and
- Dead or weed infested revegetated areas.

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The Weed Management Plan objective is to minimise the risk of mine operations facilitating the spread and establishment of weeds into the lease and surrounding Numul Numul Station area. The following mitigation measures were proposed and, if implemented, should mitigate the potential impacts of mining activities on weed infestations:

- Minimising disturbance to areas with, or vulnerable to weed infestation;
- Inspecting vehicles and machinery for soil and seeds upon entering the site and washing them in purpose built wash-bays as required;
- Inspecting disturbed and rehabilitated areas for weed presence and consulting with appropriate advisory agencies for treatment;
- Raising awareness of weed control within the workforce; and
- Progressive rehabilitation of disturbed areas to discourage weed establishment.

The proponent notes that the commencement of weed monitoring would coincide with the commencement of clearing within the mineral lease. As weeds may already be present on the lease, it is recommended manual or chemical control programs are implemented prior to any clearing. It is advised the Proponent follow the Department of Mines and Energy Advisory Note – Weed Management on Mine Sites ([www.nt.gov.au/d/Minerals\\_Energy/Content/File/Forms\\_Guidelines/AA7-017\\_Weed\\_Management\\_Advisory\\_Note.pdf](http://www.nt.gov.au/d/Minerals_Energy/Content/File/Forms_Guidelines/AA7-017_Weed_Management_Advisory_Note.pdf)). The Advisory Note states that the first step in managing weeds is to assess the current situation with weed mapping. A field survey to accurately record the locations of weed species present, density (percentage cover) and area of infestation is required. This was not provided as part of this assessment and will be required as part of the Mine Management Plan submitted to Department of Mines and Energy for approval.

### **13. Recommendation**

**To reduce impacts of weeds it is recommended that the following are included in an updated Weed Management Plan:**

- **A Weed Distribution Map be produced to define weed species on the mineral lease; and**
- **Weed control is implemented for the mineral lease prior to commencement of mining activities.**

#### **4.4 Flora and fauna surveys**

A desktop and field flora and fauna survey was conducted by the Proponent to gain an understanding of the species and ecological communities. The survey focussed on species of conservation significance within and near the mine site and the impact mining activity could have on those species.

Fauna survey results were combined from the desktop and field surveys for species of conservation significance. A total of 14 threatened species (listed under NT or Commonwealth legislation) possibly occur in the development area. A further 12 species listed as migratory (11 birds, one reptile) under the EPBC Act were also identified. The study concluded that no threatened or migratory species would be affected by this development for the following reasons:

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- No critical habitat would be affected by the Project;
  - Flora and fauna mapping showed none of the vegetation communities (habitats) were special or of restricted distribution;
  - All species were wide ranging to the extent that the range of these species is wider than the development impact; and
  - Species also have existing threatening processes affecting them (e.g. introduced species).

The PER Guidelines (2011) requested a description of existing vegetation within the lease at a scale finer than the existing 1:1000 000 vegetation mapping of Wilson *et al.* (1990), to characterise vegetation of the lease and identify significant vegetation communities. The vegetation mapping provided in the PER was based on Wilson *et al.* (1990) and was not at sufficient scale to be useful to assess vegetation on a 1225 ha lease of which 800 ha are proposed to be disturbed (Figure 6, Appendix B).

The flora inventory compiled was taken from only five survey sites and is not a complete inventory for the mineral lease (Section 3.2.10, Appendix B). The 92 species of plants recorded represented 37% of the recorded plant diversity of the local area but this should not be implied to mean there is low regional plant diversity until comparable surveys are conducted in similar areas. The flora surveys provided in the PER are inadequate to provide an assessment of species diversity.

The presence, distribution and abundance of plant and animal species present in the project area is likely to be under-represented in this PER. The total number of sites at which fauna and flora surveys were conducted for this project was six. The likelihood of detecting threatened species that may occur in the project area is considered low with this level of survey effort.

The results of the flora survey indicated that the number of native species is relatively high compared to introduced species, and significantly, that the density of native species, in particular native grass species, greatly exceeds that of introduced species. Fallen logs and tree hollows were also reported at all sample sites. This data suggests that, although the sites may be impacted by grazing, the area supports a relatively mature native vegetation structure and composition that is relatively intact.

The Proponent indicated the following mitigation measures to reduce impacts on terrestrial and aquatic fauna within or near the mineral lease:

- Confine clearing of vegetation to the minimum required for construction and operation of the mine and associated infrastructure such as roads;
- Further surveys to be undertaken to determine the presence/absence of weeds, with particular focus on Weeds of National Significance;
- Clearly mark the areas to be cleared prior to land clearing;
- Parking areas and turning points for plant and equipment to be within site boundaries to minimise vegetation disturbance;
- Implement a weed and pest management program to prevent weeds and pests leaving or entering the site;
- Machines are to arrive on site 'clean' of weed seeds (including mud) and are to be inspected and recorded;
- Ensure machinery hygiene by establishing a wash down area;

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- Inspect vehicles for weeds, seeds and soil prior to leaving and entering the site;
  - Monitoring of weeds will be conducted during construction and treatment will take place if they become visible. Weed information to be reported within the Mining Management Plan;
  - Maintain clean and tidy work areas to ensure native fauna are not attracted to the site, including provision of covered bins, e.g., dispose of leftover food from construction workers appropriately;
  - Large trees with hollows and hollow logs on the ground should be left in situ where possible, to provide nesting opportunities for native species;
  - As part of inductions instruct personnel to only use existing tracks and avoid off-road driving;
  - In inductions educate personnel on the importance of protecting stands of native vegetation, and on measures to prevent the spread of weeds, and weed identification and reporting; and
  - Develop reporting and action framework for any weed invasions (Section 6.3.3., PER).

Conformance to the above mitigation measures would be monitored in the Environmental Management Plan and detailed in the Annual Environmental Report required as part of the Mining Management Plan.

#### **4.5 Road and Traffic Impacts**

The PER lacks detail about the social and economic impacts of the transport component of the Project. Ore is proposed to be transported to Darwin by truck, approximately 550 km by road, and travel time estimated to be 11 hours excluding loading and unloading. Since the exhibition of the PER in February 2012, the proposed rate of ilmenite production has increased by 50% from 200 000 tonnes per annum to 300 000 tonnes per annum. Although there is an increase in concentrate, the proponent claims that no additional truck movements are required. Transportation of the ilmenite concentrate would operate 300 days/year with operations consisting of:

- 20 x 107 tonne road trains per day; or
- 16 x 60 tonne B-double trucks per day; or
- Up to 20 road trains per day travelling on the Stuart and Roper Highways.

There is expected to be significant increase in maintenance requirements on the NT road network and the cumulative impact on the road network of heavy vehicles associated with a combination of proposals in the region is likely to be significant in terms of environmental, social and economic impacts.

Necessary transport details deficient in the PER were:

- safety awareness measures;
- driver fatigue management;
- management of potential spills during transportation;
- fauna road strike management;

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- hours of operation;
  - load restraint issues (Department of Transport requires all loaded trucks be constrained to prevent the dropping or tracking of materials onto the road. This includes ensuring all wheels, tracks and body surfaces are free of mud and other contaminants before entering onto the sealed road network);
  - intersection details - there may be potential issues regarding intersection design suitability and safety including the Numul Numul Station access to Roper Highway and the Roper Highway/Stuart Highway intersection. Both intersections need to have an appropriate level of treatment to ensure that the speed, safety and efficiency of the highways is maintained;
  - noise mitigation measures for haulage vehicles along the route; and
  - dust control from haulage vehicles on public roads.

While it is acknowledged that improved transport options may be developed at a later stage after undergoing feasibility assessment (section 5.6, PER), the Department of Transport requires such information to assess the potential of the Project to impact on NT road infrastructure integrity and safety and efficiency of all the affected roads. A Traffic Management Plan must be prepared in consultation with Government (Department of Transport) prior to submission as part of the EMP (as discussed in Section 4.7 below).

It should be noted that if upgrades to existing intersections and roads are required for safety/capacity reasons, they must be to the standards and approval of the Department of Transport, at the Proponents cost.

#### **14. Recommendation**

**Road transport and traffic issues will need to be managed through a Traffic Management Plan that will form part of the Environmental Management Plan. This plan should be prepared in consultation with the Department of Transport.**

#### **4.6 Current Land Use**

Mineral Lease 27422 overlies Perpetual Pastoral Lease 1161, which is sub-leased from Traditional Owners through the Namul Namul Aboriginal Corporation. There was little discussion in the PER on how mining activities would impact the current pastoral land use. The Numul Numul property has been sub-leased since 2001 and significant infrastructure and property improvement has been invested during that time. It is imperative that critical pastoral infrastructure is not disturbed by the proposed mining activity and access is maintained to enable an operating pastoral business.

A Social Cultural Aspects Report was provided in the PER (Appendix D) with commitments that included:

- Maintenance of landowner property access at all times, and where fences are breached temporary stock proof gates will be provided; and
- Endeavours to minimise disruption to landowners and third parties where possible;

The purpose of a Social Impact Assessment is to identify key issues from the perspective of those potentially impacted by the Project, predict and anticipate

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change and embed these understandings into strategies to proactively respond to the consequences of the development (Vanclay and Esteves, 2011). A SIA must identify, avoid, mitigate and enhance outcomes for communities and is most effective across the life cycle of the development rather than a one-off activity (e.g. one workshop held prior to project approval) (Franks, 2012). Effective communication will be required so that the landowner is aware of activities to enable a shared use of the land.

#### **4.7 Environmental Management Plan**

A number of environmental management plans (EMPs) have been proposed through the course of the assessment process for the SILL80 Ilmenite Project. All management plans and procedures proposed to be developed for the Project must be approved by, or developed to the satisfaction of, relevant government agencies and in consultation with key stakeholders in the timeframes specified. These approved plans and procedures will be one of the primary tools by which the Proponent will implement management and monitoring commitments made in the PER and the recommendations detailed in this Report.

Provisional Environmental Management Plans for key environmental issues developed in the PER included:

- Water Management Plan
- Erosion and Sediment Control Plan
- Weed Management Plan
- Biting Insect Management Plan
- Rehabilitation Management Plan

A Mine Closure and Decommissioning Plan and Traffic Management Plan also needs to be developed in consultation with relevant Government agencies prior to being submitted with the Mining Management Plan to Department of Mines and Energy for approval. The final EMP submitted with the MMP should include a formal Project environmental policy.

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## 5 Conclusion

The SILL80 Project is proposed to support and meet future demand for raw ilmenite and ilmenite products. It would include strip mining 15 - 25 ha of land per year over a 20 year lifespan, extraction of up to 1649 ML/annum of water from the Roper River, processing plant and associated infrastructure and transport of 300 000 tonnes of ilmenite concentrate by truck 550 km to the Port of Darwin. It would provide permanent employment for up to 12 people over a period of 20 years, with a commitment to employ three local Indigenous persons (Section 5.6.1, PER).

The Project involves the land clearing of a total of 800 ha with a progressive rehabilitation program that focuses on instating improved pasture species post mining works. The PER analysed the impact of the project by considering its impact on water flows and quality, aquatic and threatened fauna species, terrestrial flora and fauna and erosion and sedimentation. These impacts are discussed in this report and additional recommendations have been made in the Assessment Report to ensure impacts are avoided where possible and/or minimised to the greatest extent possible. Given the cumulative impacts of this Project with other projects in the Roper Shire and the value the community places on the Roper River, it is essential that the Proponent demonstrates good corporate stewardship and makes the water management plan incorporating the water extraction limits and compliance available in the public domain.

The lack of information presented in the PER has hindered comprehensive assessment of the risks and increases the risk setting of this Project. In order for the project to proceed in an environmentally acceptable manner, the Proponent needs to address all information gaps identified in this Assessment Report prior to submitting a Mining Management Plan. Key areas that must be addressed prior to the commencement of any mining activity under the *Mining Management Act* for the SILL80 project include:

- An updated Water Management Plan that complies with all the requirements of the Department of Mines and Energy Advisory Note Water Management Plan;
- Quantitative rehabilitation monitoring program that will determine success or otherwise of the proposed rehabilitation methods that propose intensive grazing as an end use;
- Submission of a number of Environmental Management Plans including Erosion and Sediment Control Plan, Mine Closure and Rehabilitation Plan and Traffic Management Plan; and
- Weed Management Map of the existing mineral lease following Department of Resources Advisory Note *Weed Management on Mine Sites* and complying with the draft Invasive Species Policy.

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## Appendix 1 – Submissions on exhibited PER, February 2012

A summarised list of comments raised from public review of the PER corresponding with the individuals / organisations responsible for raising those issues.

Comments	Raised By
<p><b>Surface Water Extraction</b></p> <ul style="list-style-type: none"> <li>• There are no details on water extraction from the Roper River to assess other than up to 20L/sec will be pumped;</li> <li>• Due to highly variable flow rates throughout the year (and year to year depending on rainfall), their dependence on limited groundwater inflows to maintain flows at various times, there is significant risk in permitting significant surface water extraction;</li> <li>• Correctly interpreted, the Northern Territory Water Allocation Planning Framework requires that natural river flows at all parts of the Roper River will not be reduced at any time by more than 20% by the combined effects of all extractions from the river and extractions from groundwater that discharges into the river. The Proponent should show how the extraction limits and monitoring at the extraction site will demonstrate that natural river flow is not reduced at any time by more than 20% at the extraction site and at all points downstream from the extraction site;</li> <li>• More studies are required to determine environmentally safe extraction/flow rates for the Roper River such as those done for the Ooloo aquifer and Daly River;</li> <li>• Alternative water sources or on-site water storage (including possible covered water storage to combat high evaporation rates) should be provided so that surface water would only be extracted at wet season high flow periods;</li> <li>• The quality of water in Roper River downstream of Roper Bar “is highly dependent on the upstream flows that are maintained in it”, but the PER provides no other information. An assessment and report on the impact on salinity downstream from the extraction point caused by increased extraction by the project is</li> </ul>	<p>Water Resources (Dept of Land Resource Management), Department of Mines and Energy, Power and Water Corporation AFANT Environment Centre NT</p>

<p>required;</p> <ul style="list-style-type: none"> <li>• Lack of information on impact of cease to flow in the Roper River on project operations;</li> <li>• Determine and report on the timing and duration that river-side pumps would need to be removed due to flooding;</li> <li>• Lack of information on the effects on nearby community water supplies caused by extractions from the river for the project; as required for compliance with the Guidelines. It is recommended that the proponent be directed to report on whether and how community water supplies will be affected by increase extraction from the Roper River by the project</li> <li>• The WMP advises that pumping will be restricted such that CTF (cease to flow) events will not increase. CTF events should not increase in frequency, duration or location. Will CTF events be reported and compared with AIR pumping and gauge monitoring data, as part of the water management procedures?</li> <li>• It is noted that the abstraction of all potential groundwater abstraction allocations for the Tindall Aquifer would have a noticeable impact on the number of cease to flow days per year at Roper Bar. To what extent will the dry season flow at Roper Bar reduce due to surface water abstractions upstream of Roper Bar?</li> <li>• What is the impact of reduction in flow due to the 0.02 m<sup>3</sup>/s abstraction on the flow and mean tide river level downstream of Roper Bar?</li> <li>• A decline in river base flow due to abstractions upstream may cause a lowering of the river downstream of Roper Bar, which may permit greater tidal saline intrusion. The proposed ilmenite mine abstraction rate (0.02 m<sup>3</sup>/s) is relatively small compared with the Dry season base flow at that point – somewhere between Elsey Station (2.5-3.5 m<sup>3</sup>/s) and Roper Bar (0.3-1.0 m<sup>3</sup>/s). Evaporation losses towards the end of the dry season between Elsey Station and Roper Bar are 70-90% (Jolly 2002), so only a small proportion of the 0.02 m<sup>3</sup>/s would have reached Roper Bar if it were not abstracted. Given that the Roper River storage downstream of Roper Bar is large (approx. 50km by 80m wide - Jolly, 2002), it is expected that the small reduction in flow would not cause a noticeable reduction in river levels such that saline intrusion will be</li> </ul>	
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<p>exacerbated.</p> <ul style="list-style-type: none"> <li>• Gauging equipment provided by the Proponent should better manage this surface water extraction and trigger extraction limits – there are errors associated with manual monitoring</li> <li>• PER does not specify the total daily and annual volumes to be abstracted from river and with a project life of 20 years, there is scope to impact on environmental values;</li> <li>• Proposed 0.1m<sup>3</sup>/s threshold may be too low a target for cease to pump and protection of low flow values;</li> <li>• Management Plan does not propose a level at which pumping resumes;</li> <li>• 80/20 guide is an arbitrary rule of thumb and is not based on local scientific detail regarding ecological requirements of the Roper River.</li> </ul>	
<p><b>Water Quality</b></p> <ul style="list-style-type: none"> <li>• The PER has identified the project poses a low risk to the quality of Ngukurr’s potable water supply. Ngukurr sources its drinking water from the Roper River, and from groundwater. The groundwater supply has elevated levels of barium, chloride, iron, total dissolved solids and hardness. In addition, salinity levels appear to be progressively increasing suggesting the sustainability of this source is limited.</li> <li>• There is a risk of saline intrusion at Ngukurr (approximately 50 km downstream of Roper Bar), when mean tidal level in the river drops. Decrease in river flow due to upstream abstractions may exacerbate cease to flow events at Roper Bar and upstream, and increase the risk of saline intrusion at Ngukurr;</li> <li>• The WMP outlines the means of identifying when river flow rate is too low to support the proposed abstraction rate (0.02 m<sup>3</sup>/s), as when the Roper River flow drops below 0.1 m<sup>3</sup>/s at Judy Crossing gauge. How will low flows at Judy Crossing be accurately measured and will the measured flow rate be representative of the flow rate across the width of the river?</li> <li>• What is the risk of fuel spill into the Roper River from the self-bunded diesel tank at the pump intake?</li> </ul>	<p>Power and Water Corporation</p>

<ul style="list-style-type: none"> <li>Based on "Ngukurr Review of Water Supply Source Options" (P Jolly, 2002) - EC, HCO<sub>3</sub>, Ca, Mg, Si are all greater upstream of Roper Bar than downstream (on the Ngukurr side). Jolly (2002) also identifies increased Fe, turbidity and suspended solids downstream of Roper Bar;</li> <li>A potential decrease in river base flow from upstream of Roper Bar may cause a reduction in salinity (although the enhanced risk of saline intrusion would offset this), but may decrease quality through increased Fe, turbidity and suspended solids through lack of dilution from upstream flow;</li> <li>How will water quality deterioration at Ngukurr be monitored through the Water Management Plan (as stated in Table 6-4 of main report, p.44)?</li> </ul> <p><b>Flocculent and hazardous chemical use</b></p> <ul style="list-style-type: none"> <li>The Proponent should report whether flocculants will be used on the project and, if so, report on the risk to surface water quality associated with their use;</li> <li>All chemicals should be listed and an assessment of their environmental impacts provided – it is unreasonable to have chemicals or flocculants inserted at a later date through an amendment of the MMP.</li> </ul>	<p>Water Resources (Dept of Land Resource Management), AFANT, Northern Land Council</p>
<p><b>Water Management</b></p> <ul style="list-style-type: none"> <li>Plans and images of an appropriate scale showing all contours, drainage lines and significant features should be provided. Plans and images of an appropriate scale showing all proposed water management infrastructure eg ponds, tanks, pipes including dimensions and construction details should be provided. There is essentially no detail on planned monitoring programmes e.g. timelines;</li> <li>The PER indicates that a “synthetically lined and covered dam could potentially be explored post mine development” and that, until then the project will use local pastoral water storages with an approximate capacity of 55 ML. The water management plan (Appendix G) provides no information on rainfall collection and storage;</li> <li>There should be meters installed at both the supply and delivery end of the 12 km water line to help detect leaks. The occurrence of leaks or breaks in line would lead to unnecessary water loss and an</li> </ul>	<p>Department of Mines and Energy Power and Water Corporation Environment Centre NT</p>

<p>underestimation of water consumption;</p> <ul style="list-style-type: none"> <li>Parameters measured need to be expanded to properly establish background conditions prior to operation. How will sediment from sedimentation ponds be managed?</li> <li>There is essentially no detail on how water will be managed, where it will go after use, what the trigger values will be, how raw water consumption will be minimised and reuse maximised? A water account for the proposed operation should be included, this should include modelled scenarios for periods of high and low rainfall. Details of surface water flows onto and out of the project area, surface and groundwater quality, groundwater occurrence locally, and location of bores should be provided. Will any surface water quality monitoring be conducted at the site? Details of a monitoring program should be included in the Water Management Plan.</li> <li>Section 5.5.4 of the PER simply states that: "AIR will pump excess water from holding sumps between wash trammel cycles back into water storages to reclaim as much of the processing water as possible". This is not considered adequate for compliance with the Guidelines. Section 4 in the water management plan provided as Appendix G to the PER provides information that complies with the outline of anticipated water extraction limits required by the Guidelines. The water management plan does not include any information regarding water consumption, water recovery and recycling, fate of used water or proposed water use minimisation measures. Revise the PER to include an outline of water consumption, water recovery and recycling, fate of used water, and proposed water use minimisation measures as required under part 7.1 of the Guidelines</li> </ul>	
<p><b>Erosion and Sediment Control</b></p> <ul style="list-style-type: none"> <li>The field information over the area is limited to two field sites recorded on the 26th March 1988. One of these recorded 80% active sheet erosion on an old cropping paddock. Appropriate provisions will need to address the susceptibility of these areas to erosion, where clearing and disturbance are involved. No graphical ESCP has been provided identifying location of controls;</li> <li>Any sediment basins used should be sized to the catchment and all disturbed areas. The basin design should employ correct inlet to outlet ratio and adequate protection works must be implemented with outlets designed to encourage level spread sheet flows into stable receiving environments. Mulch banks/bunds can</li> </ul>	<p>Land Resources (Dept of Land Resource Management), Department of Mines and Energy</p>

<p>be useful but should not be used in areas of concentrated flows;</p> <ul style="list-style-type: none"> <li>• Both ESCP and the Rehabilitation Management Plan identify “progressive rehabilitation” and “prompt stabilisation of land following reshaping” is to be undertaken. However, Page 5 of 23 and Section 3.7.2 states that rehabilitation will not commence until year 2. It is recommended that rehabilitation is progressive for each 300x200 pit and cover should be established as soon as is practicable and prior to wet season rains;</li> <li>• Information regarding erosion and sediment control and ESCP content is available on the NRETAS website: <a href="http://www.nretas.nt.gov.au/national-resource-management/soil/management">www.nretas.nt.gov.au/national-resource-management/soil/management</a> and the development of the ESCP consider the IECA Best Practice Erosion and Sediment Control Guidelines 2008 as a guide to the type of information, detail and data that should be included in an ESCP;</li> <li>• A contour map should be provided showing the location of drainage lines, diversion drains and other sediment control features such as silt fences and mulch bunds.</li> </ul>	
<p><b>Rehabilitation</b></p> <ul style="list-style-type: none"> <li>• Will waste material left over from processing be enough to completely fill the pits, or will additional fill and topsoil need to be sourced externally? How long will the pits remain open before being filled in?</li> <li>• A mine closure and decommissioning plan should be developed prior to commencement of mining and reviewed regularly as operations proceed to keep abreast of industry best practice for mine rehabilitation and closure;</li> <li>• The rehabilitation program focuses on instating introduced pasture species for cattle grazing rather than native plant species. Rehabilitation with introduced pasture species will significantly reduce the floral species diversity of the area, and discourage native fauna species, particularly threatened species, from re-colonising the area after the cessation of mining and rehabilitation operations;</li> <li>• The results show that the number of native species is relatively high compared to introduced species, and significantly, that the relative density of native species, in particular native grass species, greatly exceeds that of introduced species. Fallen logs and tree hollows were also reported at all sample sites. This data</li> </ul>	<p>Department of Mines and Energy, Department of Primary Industry and Fisheries, Biodiversity Conservation Division (Dept of Land Resource Management), Land Resources (Dept of Land Resource Management)</p>

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suggests that, although the sites may be impacted by grazing to varying degrees, the area supports a relatively mature native vegetation structure and composition that is relatively intact. Rehabilitation should therefore aim to return the project site back to a comparable state to maintain the long term environmental integrity of the landscape;

- Timing of rehabilitation and revegetation should be clarified and advice should be sought from the Department of Resources as to the potential viability of proposed species to provide adequate cover utilising the material returned to the pits;
- Doubts on rehabilitation methodology proposed would achieve a stable weed-free ground cover that would enhance the grazing potential of the area;
- Use of mulch and cattle to sow the pastures is unproven technology and may result in seed being buried too deep. More conventional sowing methods, such as using a seeder or spinning the seed on and covering and water ponding may be worth considering;
- The processed spoil will have no soil structure which may cause problems with drainage and lead to water logging and ponding, which may affect pasture establishment, growth and persistence. It will take time for the spoil to become a useful soil for plants;
- The processed spoil, and possibly the stockpiled topsoil will most probably be low in nutrients and restrict the growth of the pastures if they establish. Fertiliser, particularly P & S may be required to ensure establishment and early growth
- Of the species proposed - the stylos would be good for future grazing but they are neither fast to establish nor dense ground cover so they would have limited value for erosion. Sabi grass would be an asset once established but may take 2-3 years to achieve a useful density. It is unlikely that either Bull Mitchell or Flinders grass will establish as they are better suited to cracking clays and lower rainfall. Flinders is an annual and thus not particularly good for erosion control. Perennial sorghum is likely to be the most successful of the species they propose.
- The results of Sally Sullivan's trials on water-ponding in the VRD in the early 1990s are relevant. She

<p>planted a wide variety of improved species. Most established well and some persisted but the site was fairly rapidly taken over by native plants blown on the wind. If you visit now, there is little evidence that it was other than a native pasture.</p> <ul style="list-style-type: none"> <li>• Rapid establishment of ground cover is the most important thing to achieve and consider a wider mix of native and improved species or even a cover crop as an intermediate step.</li> </ul>	
<p><b>Heritage</b></p> <p>No archaeological sites or objects were identified during the survey of the proposed Ilmenite mine, access route and pipeline corridor, and so it is recommended that no further action is required for compliance with the provisions of the Northern Territory Heritage Conservation Act 1991.</p>	<p>Heritage Branch (Department of Lands, Planning and Environment)</p>
<p><b>Flora and Fauna</b></p> <ul style="list-style-type: none"> <li>• Limited field survey work and the presence, distribution and abundance of plant and animal species in the project area are likely to under-represent actual numbers;</li> <li>• Increased likelihood that threatened species were missed.</li> </ul>	<p>Biodiversity Conservation Division (Dept of Land Resource Management)</p>
<p><b>Transport Impacts</b></p> <ul style="list-style-type: none"> <li>• Concern regarding heavy vehicles using both the Roper and Stuart Highways and possible road conflicts.</li> <li>• Cumulative increase in heavy vehicles on public roads increasing safety risks/impacts for all road users;</li> <li>• Concern the Roper Highway is a single lane bitumen road prone to degrade quickly with unsealed road edges and may not have capacity to withstand constant heavy vehicle use;</li> <li>• A lot of traffic on the Roper Highway are travellers with boats, caravans or camper trailers in tow and measures have been provided to mitigate road accident risks;</li> <li>• Upgrade to Roper Highway would be welcomed;</li> <li>• Roper Highway is narrow, used by public, cattle trucks and road trains and may not have capacity to bear</li> </ul>	<p>Department of Transport NT Worksafe AFANT ECNT NLC Public submission</p>

<p>consistent heavy ore-bearing loads;</p> <ul style="list-style-type: none"> <li>• Lack of detail regarding safety measures to be used to reduce transport risks (including safety awareness measures and driver fatigue management);</li> <li>• Load restraint issues (Transport requires all trucks to be loaded and loads constrained in such a manner as to prevent the dropping or tracking of materials onto streets. This includes ensuring that all wheels, tracks and body surfaces are free of mud and other contaminants before entering onto the sealed road network);</li> <li>• Noise mitigation measures for haulage vehicles along the route;</li> <li>• Dust control from haulage vehicles on public roads – will trucks or bulka bags be sealed? What dust control measures are proposed to mitigate dust or particles emitted during transport?</li> <li>• Why has the alternative of transporting product from Mataranka to Darwin via the railway not been considered?</li> <li>• No details are given as to existing intersection adequacy or possible treatments. Possible issues regarding intersection design suitability and safety including the Numul Numul Station access to Roper Highway and the Roper Highway/Stuart Highway intersection. Both intersections need to have an appropriate level of treatment to ensure that the speed, safety and efficiency of the highways is maintained. If upgrades to existing intersections/roads are required for safety/capacity reasons as a result of this activity, they shall be to the standards and approval of RND, at the proponent's cost.</li> <li>• Hours of Operation not stated in the PER (except that generators and machinery are to operate 12hr/day;</li> <li>• Further to the above comments, the Transport Division of DLP is increasingly concerned at the cumulative effect that this and other proposals (i.e. a combination of proposals) will have on the NTG road network in terms of the need for increased road maintenance and upgrading and safety issues. Notably much of the road traffic from these proposals consists of heavy vehicles travelling to the Port of Darwin. The impact of heavy vehicles on the road network is likely to be significant in terms of environmental, social and economic impacts.</li> </ul>	
<p><b>Safety</b></p> <ul style="list-style-type: none"> <li>• Safety is no longer covered under the <i>Mining Management Act</i>. The operator needs to be aware of</li> </ul>	<p>NT WorkSafe (Department of Justice), Department of Mines and</p>

<p>requirements under the <i>Workplace Health and Safety Act</i> administered by NT WorkSafe, including the provision of a Risk Management Plan.</p> <ul style="list-style-type: none"> <li>• The Executive Summary neglects to mention relevant mining and safety legislation. Page 6 mentions management of other risks including transportation but neglects to identify risks such as fatigue resulting in spillages etc. Page 6 also mentions waste and other hazardous substance management but neglects to identify the actual risks and the proposed hazardous substances and therefore it is not clear to the reader what risks apply and what controls will be put in place to eliminate or mitigate these risks.</li> <li>• Does AIR have a formal environmental policy?</li> </ul>	<p>Energy, AFANT, ECNT</p>
<p><b>Regulatory Framework</b></p> <ul style="list-style-type: none"> <li>• The report neglects to mention the linkage between safety and potential environmental risks should safety fail. Safety is a key component of any operations and should this fail spillages etc could result and in some cases escalation of events such as fire etc. A commitment to developing appropriate strategies and control measures should be identified at this phase to ensure design and planning is appropriate for the activity proposed. The following legislation applies to their operations in the Northern Territory: <ul style="list-style-type: none"> <li>- <i>Workplace Health and Safety Act</i> (until 1 March 2012);</li> <li>- <i>Work Health and Safety (National Uniform Legislation) Act 2011 and its Regulations</i> (After 1 March 2012);</li> <li>- <i>Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act and its Regulations</i></li> <li>- <i>Electricity Reform Act and its Regulations</i></li> <li>- Details of these are available on web site at <a href="http://www.worksafe.nt.gov.au">www.worksafe.nt.gov.au</a>.</li> </ul> </li> <li>• The project schedule is ambitious and a more accurate schedule should be submitted. Titles will need to be granted before the project can be authorised. Once the PER process is complete, the operator will be required to apply for an Authorisation under the <i>Mining Management Act</i>. The Mining Management Plan must be approved before construction, mining and processing can commence. What time of the year will</li> </ul>	<p>NT WorkSafe (Department of Justice), Department of Mines and Energy, AFANT, ECNT, Environmental Health (Dept of Health)</p>

<p>mining occur? A map showing target mining areas would be beneficial. The map should also show the proposed haul road route and any other relevant features related to the proposal.</p> <ul style="list-style-type: none"> <li>• Mining operations should be subject to requirements of the <i>Water Act</i> and regulatory regime should be changed;</li> <li>• Unfortunate that this project is being assessed through PER process rather than EIS given sensitivity of the river and lifetime of the project.</li> <li>• Developer to ensure all development, operations and transport works do not result in public health risk to any food or water source that is used for human consumption.</li> </ul>	
<p><b>Socio-economics</b></p> <ul style="list-style-type: none"> <li>• The loss of royalties, employment, revenue and positive legacy from mining is not a true loss as technically they do not exist at this time so therefore cannot be lost. It would be more constructive to highlight the advantages of the project going ahead;</li> <li>• It would be advantageous if the PER was further strengthened by the inclusion of additional information of the anticipated economic value and benefits of the project in accordance with the <i>Environmental Assessment Act</i>;</li> <li>• Will the existing camp at Flying Fox Station be large enough to accommodate the extra people without upgrading infrastructure? What alternatives are available if the camp closes before the project is completed?</li> <li>• Current land use and disruption and disturbance to existing pastoral business and resulting economic, environmental and social considerations;</li> <li>• Impact of water extraction on Flying Fox Station and whether it would impact the viability of the station (during periods of ceased or low flow);</li> <li>• Location of current land use infrastructure with relation to proposed Project infrastructure;</li> </ul>	<p>Department of Mines and Energy, Department of Business and Employment, Northern Land Council (NLC)</p> <p>Public submission</p>

<p><b>Cumulative Impacts</b></p> <ul style="list-style-type: none"> <li>• The combined impacts of the water requirements of the likely projects in the area on flows, water quality and aquatic populations in the Roper River and its feeders;</li> <li>• The combined impacts of the water requirements of the likely projects on the groundwater resources and groundwater dependent ecosystems of the area;</li> <li>• Given the relationship between groundwater resources (including upstream of the mining area in the Tindall Limestone Aquifer) and surface water flows in the Roper River, there should be consideration of the impacts of the projects on these groundwater resources and on other users such as those licenced to extract water under the Mataranka Water Allocation Plan;</li> <li>• The combined impacts of the large areas of land clearing in the Roper River catchment that could result from the projects;</li> <li>• The significant combined impacts that may result from the transport of very large quantities of bulk minerals from this remote mining area and downstream impacts on highway, rail, ports and other transport infrastructure;</li> <li>• The combined impacts of the projects on the environment and amenity of Limmen National Park (Proposed)</li> <li>• Water targets do not consider or provide contingencies for future regional developments downstream of the project.</li> </ul>	<p>AFANT, NLC</p>
<p><b>Greenhouse</b></p> <ul style="list-style-type: none"> <li>• The proposed clearing application for SILL80 Project will result in significant greenhouse gas emissions;</li> <li>• Proposed clearing of 800 ha of native vegetation would result in net greenhouse gas emissions of approximately 101 848 tonnes of CO<sub>2</sub>-equivalent after five years from clearing which represents 0.58% of total annual greenhouse emissions from the Northern Territory;</li> <li>• The estimated emissions are valued at approximately \$2,342,503 based on the price of greenhouse gas emissions under the Australian Government's Clean Energy Future legislation and represents only the economic cost of proposed clearing;</li> <li>• The Department can advise on methods for site-specific estimates of above ground carbon that is most immediately affected by land clearing</li> <li>• Any approval for land clearing should recognise the greenhouse implications of the activity and aim to</li> </ul>	<p>Environment Protection Agency</p>

<p>minimise the impact – this was not provided in the PER;</p>	
<p><b>Offsets</b></p> <ul style="list-style-type: none"> <li>• The Draft Northern Territory Environmental Offsets Policy (2010) states that “Environmental offsets must deliver real conservation benefits that exceed the magnitude of the development impacts”. It is questionable that the removal of woody vegetation and its replacement with introduced pasture species will achieve the desired outcome. The proponents will need to consult closely with Government regulators in order to achieve satisfactory environmental offsets.</li> <li>• Recommend habitat offset to offset loss of native vegetation, habitat and biodiversity from the conversion of 800 ha of woodland into improved pasture after rehabilitation.</li> </ul>	<p>Biodiversity Conservation (Dept of Land Resource Management), ECNT</p>
<p><b>Biting Insects</b></p> <p>A Biting Insect Management Plan is provided as Appendix J to the PER. It is recommended that appropriate expertise in Department of Health &amp; Families review the Biting Insect Management Plan for compliance with the requirements specific in the Guidelines.</p>	<p>Water Resources (Dept of Land Resource Management)</p>

## Appendix 2 – Commitments Register (from updated PER – August 2012, Appendix M)

Subject	Description	Commitment	Compliance	Section in PER
<b>Safety and Risk Management</b>	Continual Improvement	There will be an annual assessment of risks, including incidents and near misses that will be incorporated into the risk management strategy.	Incidents and near misses reported in annual MMP update	Section 6 and Appendix L
<b>Economic Contribution</b>	Employment Opportunities	AIR will employ at minimum 3 indigenous people from local communities equating to a 12% indigenous employment commitment	All staff numbers reported in annual MMP update	Section 5.6
	Local sourcing of goods and services	AIR will provide a list of local businesses and individuals with relevant skills and services to all contractors to promote local economic growth; list will also be displayed within the camp for employee use and updated annually.	Reviewed during internal and external audits.	Appendix L
<b>Protection of Flora and Fauna</b>	Management	AIR will undertake active weed control in accordance with the Weed Management Plan (Appendix I).	Declared weeds must be reported as per the <i>Weed Management Act 2001</i> (Section 9).	Appendix I
	Vegetation clearing	AIR will report area cleared each year in the annual update of the MMP.	Area cleared each year will be reported in the annual update of MMP.	Appendix L
		Annual clearing predictions will be proposed each year in the MMP update, should additional clearing be required, and an amendment to the MMP will be sought.	Reported in annual update of MMP.	Appendix L
		AIR will mulch all woody material cleared for use in mulch berms and rehabilitation practices as detailed in the Rehabilitation Management Plan (Appendix K)	Audit against commitments in the EMP and non-compliance reported in the MMP	Section 6.3, Appendix K
AIR will burn all non-woody material from clearing practices to prevent weed development and spread.	Audit against commitments in the EMP and non-compliance reported in the MMP	Section 6.3, Appendix K		

Subject	Description	Commitment	Compliance	Section in PER
	Exclusion of fauna species	AIR will erect fences to exclude stock and other large animals, from hazardous areas such as the processing area, mine pit and internal roads.	A description of areas fenced each year will be reported in the annual update of the MMP.	Section 6.3, Appendix K
	Weed Management	AIR will construct and use a wash down area for the cleaning of all vehicles and equipment arriving and leaving the site to prevent the possible spread of weeds onto site.	Maintenance of wash down log – reviewed during internal and external audits.	Appendix I
		Declared weeds (including WONS) will be managed according to the <i>Weeds Management Act</i> . Undesirable species will be managed at Land Manager and AIR discretion pending the development of improved pasture as per the Rehabilitation Management Plan.	Declared weeds must be reported as per the <i>Weed Management Act 2001</i> (Section 9).	Appendix I
<b>Protection of Water Resources</b>	Surface water monitoring	AIR will enter a Service Level Agreement with NRETAS to receive flow rate alarm from the Red Rock gauging station as per the Water Management Plan.	Reported in MMP	Appendix G
		AIR will install a measuring plate at the abstraction point, calibrated against flows at the upstream (Mataranka) and downstream (Red Rock) gauging stations.	Annual Water Report, Internal and External audits	Appendix G
		AIR will not exceed a diversion rate of 100L/s from the Roper River	Pump installed will not be capable of diverting more than 100L/s. Internal and External Audits	Section 6.2 and Appendix G
		AIR will install and maintain a water flow meter on their pump and at the abstraction point and from the 50ML storage dam and will maintain a record of abstraction	Annual Water Report	Section 6.2 and Appendix G
		AIR will not extract more than 1649ML/a from the Roper River	Total volume extracted per year included in the Annual Water Report	Section 6.2 and Appendix G
		AIR will cease abstraction from the Roper River when the flow reaches 900L/s, as detailed in the Water Management Plan, and will initiate detailed water quality surveys at Roper Bar should further abstraction be required.	Annual Water Report will detail all instances of periods when flows were not conducive to extraction.	Section 6.2 and Appendix G

Subject	Description	Commitment	Compliance	Section in PER
		AIR will monitor water extraction and Roper River flows at the extraction point as well as information obtained from Red Rock and Mataranka Gauging stations as detailed in the WMP.	Annual Water Report	Section 6.2 and Appendix G
		AIR will produce an annual Water Report detailing all water monitoring results from the procedures outlined in the WMP. This report will be submitted with the annual MMP update.	Annual Water Report submitted 3 months prior to MMP	Section 6.2 and Appendix G
		AIR will engage NRETAS to monitor ecological response to extraction of water from the Roper River	NRETAS summary to be included with annual water report	Section 6.2 and Appendix G
		AIR will obtain water quality monitoring data at Ngukurr from PowerWater's ongoing Water Quality monitoring program (Annual Drinking Water Quality Reports) and incorporate in the annual assessment of abstraction.	Summary included in annual water report	Section 6.2 and Appendix G
	Ground Water Monitoring	AIR will develop a groundwater monitoring program (as detailed in the WMP) to assess potential seepage of leachate from the open pits. Should these leachates migrate further and/or contain concentrations of heavy metals in excess of current predictions, further investigations and assessments will be undertaken to implement the most appropriate mitigation measure.	GW monitoring summary to be included with annual MMP update	Section 6.2 and Appendix G
<b>Rehabilitation</b>	Monitoring	AIR will undertake routine photo monitoring of rehabilitation areas in accordance with the Rehabilitation Management Plan.	A summary of rehabilitation results will be included in annual MMP update.	Section 6.3 and Appendix L
		AIR will fulfil all rehabilitation objectives as per the Rehabilitation Management Plan.	Audit against the EMP. Non-compliance to be reported within the MMP.	Appendix L and Appendix K
	Topsoil and plant mulch	Topsoil will be stockpiled for later use in spreading over filled pit areas and managed to prevent infestation with weeds. To assist in the development of top soil and reestablishment of plants, the timber cleared from the site will be mulched, stockpiled and distributed over the site post mining.	Incorporated into maintenance log –	Section 6.3 and Appendices L and K

Subject	Description	Commitment	Compliance	Section in PER
		Development of the Grazing Plan within specified timeframe and in conjunction with Numul Numul Station Managers	Rehabilitation progress to be reported within the MMP	Section 6.3 and Appendices L and K
	Fencing	Permanent fencing (3 barbwire) will be established and maintained post mining and prior to rehabilitation work.	Incorporated into maintenance log – Incidents of non-compliance reported through complaints register and presented in annual MMP update.	Section 6.3 and Appendix K
<b>Social Impact Management</b>	Stakeholder engagement	Bi-annual consultation with TO's and affected land holders.	AIR will include the minutes from the bi-annual stakeholder consultations as an attachment to the MMP.	Appendix D
		Relevant stakeholder input or concerns will be addressed within the annually updated Mining Management Plan (MMP).		
	Complaints Register	AIR will have a complaints register and a corrective actions procedure outlining the handling of complaints	Copy of complaints and corrective actions included in annual update of MMP	Appendices D and L
	Maintenance of Current Land Use	Maintain land-owner and land-manager property access at all times, and where fences are breached temporary stock proof gates will be provided;	Incidents of non-compliance reported through complaints register and presented in annual MMP update.	Land holder agreement
	Road Safety	AIR commits to developing a standard operating procedure (SOP) aimed at limiting accidents particularly on the Roper Highway.	Incidents of non-compliance reported through incidents and near misses register and presented in annual MMP update.	Section 6.7.1
	Staff Training	All staff and contractors will undergo an induction which includes details on social and cultural impacts and management, 'cease work' protocols and access limitations.	Induction register reviewed during internal and external audits.	Appendices L and D and Section 6.7.2

Subject	Description	Commitment	Compliance	Section in PER
<b>Erosion and Sediment Control</b>	Legislation	AIR will implement the site specific erosion and sediment control plan prior to mining development in accordance with Northern Territory Governments requirements. Erosion and sediment control structures will be maintained through the routine maintenance program.	Maintenance log reviewed in internal and external audits	Appendix H
	Sediment dams	Sediment dams will be constructed and maintained adjacent to stockpile area. Design will accommodate large rainfall events and will be monitored and maintained to ensure they remain effective.	Incorporated into maintenance log – reviewed during internal and external audits.	Appendix H
	Road development	All road design will follow the principles and procedures outlined in the ESCP.	Audit against EMP. Non-compliance reported within the MMP.	
		Erosion and sediment monitoring will be conducted over established roads in the project area in line with the Erosion and Sediment Control Plan.	Audit against EMP. Non-compliance reported within the MMP.	
<b>Waste and Hazardous Materials Management</b>	Waste management (putrescibles)	Putrescibles will be disposed of into an excavated pit and burnt periodically to discourage scavenging animal attraction. Pit will be constructed in accordance with Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NRETAS 2010) and operated in accordance with the Waste Management and Pollution Control Act 1998.	Incorporated into maintenance log – reviewed during internal and external audits.	Section 6.7.3 and Appendix L
	Waste management (non-putrescibles)	All non-putrescibles will appropriately stored on site prior to removal by a licensed contractor. Constructed septic waste systems will be periodically emptied as required. Hazardous wastes will be stored in appropriately banded storage areas and will be labelled to the relevant standards.	Incorporated into maintenance log – reviewed during internal and external audits.	
	Waste Water	All wastewater generated from the mine site and main camp will be treated to a high quality and recycled according to the Northern Territory Department of Health Guidelines for Management of Recycled Water Systems (2011).	Incorporated into maintenance log – reviewed during internal and external audits.	

Subject	Description	Commitment	Compliance	Section in PER
	Hazardous materials	All hazardous materials and dangerous goods will be purchased, transported, stored and used in accordance with the relevant Australian Standards, NOHSC guidelines, Work Health (Occupational Health and Safety) Regulations, Dangerous Goods Regulations and Northern Territory guidelines. Any relevant licences concerning hazardous substances will be obtained.	Incorporated into maintenance log – reviewed during internal and external audits.	Section 6.7.3 and Appendix L
	Training	Training on the use of hazardous substances will be provided to appropriate personnel. Only trained personnel will be allowed to use hazardous substances.	Training register maintained and reviewed during internal and external audits	
	Fuel storage	Hydrocarbons will be stored in appropriately bunded areas according to Australian standards AS/NZS 1940:1993 and AS/NZS 4452:1997. Bunding will be regularly inspected for damage and repaired as soon as is practicable if any damage is detected. Appropriate licences for storage will be obtained.	Incorporated into maintenance log – reviewed during internal and external audits.	
	MSDS	All Material Safety Data Sheets (MSDSs) of dangerous and hazardous substances will be stored at various locations on site and will be communicated and accessible to all staff.	Reviewed during internal and external audits	
	Spill Kits	Spill kits will be strategically placed around the site with particular attention to high risk areas i.e. fuel storage and transfer areas. All staff will be appropriately trained in spill response procedures and in the use of spill kits.	Incorporated into maintenance log – reviewed during internal and external audits. Incidents to be reported as per the <i>Waste Management and Pollution Control Act 1998</i> .	
	Radioactive Materials	Once mining and processing begins AIR will conduct a radiological survey over the stockpile and processing area (see Radiation Assessment Report Appendix F).	Radiation assessment of areas to be mined included in annual update of MMP	Appendix F
<b>Protection of and Cultural</b>	Restricted areas	Whilst on site, workers, contractors and visitors will be restricted from accessing culturally sensitive areas. Any inappropriate behaviour will be responded to promptly, and the induction revised if necessary.	Incidents of non-compliance recorded and assessed through external audit	Section 6.7 and Appendix L

Subject	Description	Commitment	Compliance	Section in PER
<b>Environment</b>	AAPA Approval	Possess an Aboriginal Areas Protection Authority Certificate to protect areas of cultural importance from disturbance by the SILL80 Project.	Field manager to ensure all work areas are covered by a current AAPA certificate	Section 3.2.6 and Appendix L
	Archaeological sites	Immediate cease of work and assessment of any new archaeological, historic or cultural discovered during works; Notification of relevant authorities in accordance with the Northern Territory <i>Heritage and Conservation Act</i> and the <i>Sacred Sites Act</i> .	Incidents to be recorded and presented during external audits and reported in annual MMP update	Appendix L
<b>Road and Transport Management</b>	Road maintenance	Roads will be maintained for use by the pastoral station as per the land use agreement. If complaints are made about this, it will be handled through the complaints register. All road maintenance, including erosion maintenance, will be conducted as per the relevant Australian Standards and guidelines.	Incorporated into maintenance log – reviewed during internal and external audits. Records of maintenance work held by field manager	Section 6.7
	Product Transport	Transport of Ilmenite to Port of Darwin will be in covered trailers.	Reviewed during internal and external audits	Section 5.3
	Signage	All roads will have appropriate signage indicating road conditions and speed limits. All staff will be made aware of the road rules on site through inductions. Any unexpected adverse road conditions will be communicated to staff through daily tool box meetings and rectified immediately. No AIR employees will be allowed to use roads other than approved mine access roads unless appropriate permission from mine and pastoral staff is given or in the event of an emergency.	Incidents of non-compliance recorded and assessed through external audit	Section 6.7 and Appendix L
	Road use	Vehicular traffic will be restricted to the proposed vehicle access road.	Incidents of non-compliance recorded and assessed through external audit	Section 5.5.1 and Appendix L
	Dust suppression	Dust suppression will be delivered via water trucks.	Incorporated into maintenance log – reviewed during internal and external audits.	Section 5.5.1 and Appendix L

Subject	Description	Commitment	Compliance	Section in PER
<b>Air Quality and Noise Management</b>	Noise and air pollution	Due to the remote location of the project area, noise mitigation activities will focus on the occupational health and safety of employees. Adherence to the relevant Australian Standards will be used when performing activities likely to create excessive noise or dust. Hearing protection offered to staff that requires it.	AIR's Occupational Health and Safety program.	Section 6.7 and Appendix L
<b>Greenhouse Gas Emissions</b>	Vehicle emissions	Vehicles will be regularly maintained to minimise the quantity of greenhouse gases being produced by vehicular movement around the mine.	Incorporated into maintenance log – reviewed during internal and external audits.	Appendix L
<b>Biting Insects Management</b>	Water storage	AIR will minimise mosquito breeding areas in line with Biting Insect Management Plan (BIMP)	Incorporated into maintenance log – reviewed during internal and external audits.	Appendix J
	Mine site buildings	AIR will implement measures to minimise contact between personnel and mosquitos as per BIMP. Including screens placed on doors and windows to prevent mosquitos from entering buildings. Yellow lighting used to deter mosquitos from camp and mine site.	Incorporated into maintenance log – reviewed during internal and external audits.	
	Monitoring	AIR will undertake a baseline mosquito monitoring program as detailed in the BIMP	Results of monitoring program to be included with the MMP update following first years mining. All incidents of mosquito related illnesses reported	
<b>Decommissioning and Rehabilitation Requirements</b>	Mine Closure Plan	AIR will develop a mine closure plan – two years prior to forecasted closure and submitted to DoR for approval – Plan will include consultation with landowners and land managers to determine the fate of all mining infrastructure, including the processing plant, concrete pad, sheds, office, roads and any other infrastructure in place	Mine Closure Plan.	Section 5.7 and Appendices L and K
	Revegetation	AIR will revegetate mined areas with the aim of the land going back to pastoral production as detailed in the Rehabilitation Management Plan and in close consultation with pastoral managers.	Annual rehabilitation areas and success rates reported in annual MMP update.	Section 5.7 and Appendix K

Subject	Description	Commitment	Compliance	Section in PER
	Weed management	Upon mine closure, AIR will engage a suitably qualified botanist to perform a weed survey of the mining area with recommendations on measures for any identified weeds prior to closure.	Findings and actions reported in Mine Closure Plan.	Appendix L
	Ongoing mosquito control	Upon mine closure, all disturbed areas will be rehabilitated to be free draining where practical, and septic tanks and other artificial receptacles will be removed.	Reported in Mine Closure Plan	Appendix J
<b>Environmental Management</b>	Management Plans	All management plans will be updated annually and incorporated into the MMP.	Reported in annual MMP update.	Appendix L
	Maintenance Log	AIR will develop and utilise a routine maintenance log – including but not limited to; monitoring and maintenance of sediment dams, daily vehicle pre-start inspections, maintenance of waste and hazardous substance storage and bunding, mosquito controls etc.	Issues identified placed in maintenance register and remedied in a timely manner. Reviewed during internal and external audits.	
	Onsite inductions	All employees, contractors and site visitors will undergo inductions which will include information on environmental, social, cultural impacts and management, 'cease work' protocols and access limitations. AIR will also maintain an induction register specifying persons and dates of inductees.	Induction records to be maintained and included in annual MMP update	
	Audits	Annual external audits of AIR's performance against the MMP and EMP, commitments stated in this PER, and all relevant and current legislative requirements will be conducted. Quarterly internal audit	Internal audit records to be presented for annual external audit	
<b>Legislation and Permits</b>	Implementation and compliance	All applicable legislation will be followed and all applicable licences and permits will be obtained before the relevant aspects of the project commence.	Detailed in MMP	Section 3, Section 6 and Appendix L