

Guidelines for the Preparation of a Public Environmental Report

SILL80 Project

Roper River area, NT

**Australian Ilmenite Resources
Pty Ltd**

April 2011

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1 Introduction

Australian Ilmenite Resources Pty Ltd (AIR) proposes to strip-mine ilmenite at SILL80 (Mining Lease Application 27422), 105 km east of Mataranka and 12 km south of the Roper River. The resource is expected to be 120 million tonnes at 10% to 25% ilmenite (FeTiO_3), and is expected to produce approximately 200 000 tonnes of concentrate per annum. The mine is expected to have a life of 20 years. Ore would be separated on site using gravity and water, dried, and exported as ilmenite concentrate. Water is proposed to be sourced from the Roper River during the Dry season and from rainfall during the Wet season.

The three main components of the project are:

1. Strip mining of between 13 and 33 hectares per year (up to 660 ha over 20 years).
2. Progressive rehabilitation of 13 to 33 ha per year.
3. Water extraction from the Roper River.

The Northern Territory Minister for Natural Resources, Environment and Heritage (the Minister) has determined that this proposal requires formal assessment, under the NT *Environmental Assessment Act 1982* (EA Act), at the level of a Public Environmental Report (PER). Issues of concern contributing to this decision include:

- Impacts to water flow in the Roper River caused by extraction for processing ilmenite;
- Rehabilitation efficacy over large areas;
- Impacts to flora and fauna; and
- Management of soil.

Information about the proposal and its relevant impacts, as outlined in this document, is to be provided in the PER. This information must be sufficient to allow the Minister to make informed recommendations to the Responsible Minister / relevant consent authority in accordance with the EA Act.

2 General advice on PER

2.1 General content

The PER should be a stand-alone document. It should contain sufficient information to avoid the need to search out previous or additional, unattached reports.

The PER should enable interested stakeholders and the Minister to understand the environmental consequences of the proposed development. Information provided in the PER should be objective, clear, succinct and, where appropriate, be supported by maps, plans, diagrams or other descriptive detail. The body of the PER is to be written in a clear and concise style that is easily understood by the general reader. Technical jargon should be avoided wherever possible. Cross-referencing should be used to avoid unnecessary duplication of text.

Detailed technical information, studies or investigations necessary to support the main text should be included as appendices to the PER.

The level of analysis and detail in the PER should reflect the level of significance of the expected and potential impacts on the environment, as determined through adequate technical studies. Any and all unknown variables or assumptions made in the assessment must be clearly stated and discussed. The extent to which the limitation, if any, of available information may influence the conclusions of the environmental assessment should also be discussed.

The PER is to be prepared and submitted within three years of the date final Guidelines are issued. The Minister should be notified in advance should AIR be unable to submit the PER within this timeframe.

2.2 Format and style

The PER should comprise three elements, namely:

- The Executive Summary;
- The main text of the document; and
- Appendices containing detailed technical information and other information that can be made publicly available.

The structure of these Guidelines may be adopted as the format for the PER. This format need not be followed if the required information can be presented alternatively for better effect. However, each of the elements in these Guidelines must be addressed to meet NT Government regulatory requirements.

The Executive Summary must include a brief outline of the project and each chapter of the PER, allowing the reader to obtain a clear understanding of the proposed project, its environmental implications and management objectives. It must be written as a stand-alone document, able to be reproduced on request by interested parties who may not wish to read the PER as a whole.

The main text of the PER should include a glossary to define abbreviations, technical terms, acronyms and colloquialisms.

The appendices must include:

- A copy of these Guidelines;
- A list of persons and agencies consulted during the PER;

- Contact details for the proponent;
- The names of, and work done by, the persons involved in preparing the PER; and
- The expertise of the people involved in work contributing to the PER.

The PER must be written so that any conclusions reached can be independently assessed. To this end, all sources must be appropriately referenced using the Harvard Standard. The reference list should include the address of any internet pages used as data sources. All referenced supporting documentation must be available upon request.

The PER should be produced on A4 size paper capable of being photocopied, with any maps and diagrams on A4 or A3 size and in colour if possible.

The proponent should consider the format and style of the document appropriate for publication on the internet. The capacity of the website to store data and display the material may have some bearing on how the document is constructed.

2.3 Administration

Ten bound copies of the PER should be lodged with the Minister, care of the Environment and Heritage Division (EHD) of the Department of Natural Resources, Environment, the Arts and Sport (NRETAS) for distribution to NT Government advisory bodies.

The PER should be provided in Adobe PDF format for placement on the NRETAS internet site (for documents with large file size the Executive Summary, Chapters and Appendices separately). Additionally, two Microsoft Word copies of the PER should be provided to facilitate production of the Assessment Report and Recommendations.

The PER is to be advertised for review and comment in the *NT News* and *Katherine Times*.

The PER should be made available with additional bound copies for public review at:

- Environment and Heritage Division, NRETAS, 2nd Floor, Darwin Plaza, 41 Smith Street Mall, Darwin;
- NRETAS Katherine – 32 Giles Street, Katherine;
- Katherine Town Council Public Library (8972 5500).
- Katherine Government Centre, First Street, Katherine;
- Roper Gulf Shire offices at Mataranka (Roper Tce; 8975 4576) and Ngukurr (Balamurra St; 8975 4606);

- Northern Territory Library (NTL), Parliament House, Darwin; and
- The Environment Centre NT, Unit 3, 98 Woods St, Darwin;

The action officer is Bryan Baker from the EHD of NRETAS, phone (08) 8924 4047, facsimile (08) 8924 4053 or email: eia.nretas@nt.gov.au.

3 General Information

The PER should have a chapter that provides general information on the background and context of the action including:

- The title of the action or proposal;
- The full name and postal address of the designated proponent;
- A description of the proposal's location in the region and its proximity to landmark features, regional community centres, and sensitive environments such as major waterways, significant groundwater resources and conservation reserves;
- A description of the vegetation and the land resources;
- A clear outline of the objective of the action;
- Legislative background for the proposal, including the relevant NT and Commonwealth legislation that applies to the project;
- The background to the development of the action;
- How the action relates to any other proposals or actions (of which the proponent should reasonably be aware) that have been or are being taken, or that have been approved in the region affected by the action, including the proponent's long-term plan for exploration and mining in the area;
- The current status of the action; and
- The consequences of not proceeding with the action.

4 Description of the proposal

To assist in determining the environmental impacts associated with the proposal, a section should be provided that describes the project in sufficient detail to allow an understanding of all stages of the proposal, including infrastructure design and engineering, construction, operation and management. Emphasis should be given to those components with the most

potential for significant short and long term environmental impacts. Also describe the existing operations in relation to the proposed development.

4.1 General aspects

Aspects to be covered in the project description include:

- An explanation of the objectives, benefits and justification for the action;
- An overall layout of the proposed action;
- Schedule or timeline for all relevant aspects of the proposal;
- Tenure/s under which the proposal would be held and any Native Title issues;
- Relevant National and Northern Territory legislation, standards, codes of practice and guidelines;
- Employment and business opportunities (direct and indirect), including sources of workforce, skill levels required and opportunities for local people, Indigenous employment and businesses;
- The sources of greenhouse gas emissions caused by the project and any offsets or actions to mitigate emissions (see Appendix A);
- Methods for storage, handling, containment and emergency management of chemicals and other hazardous substances (including fuel); and
- Rehabilitation objectives for the site beyond the intended use.
- Provide additional details on ore characterisation, radiation levels, and the chemical and physical fate of any flocculants used in production. (If the concentration of radionuclide is higher than the exemption level specified in Schedule 4 of the National Directory for Radiation Protection, the mine will come under the *Radiation Protection Act*, and would require a Radiation Protection Plan.)
- Provide additional information on transport impacts (with reference to Appendix 2).

4.2 Social and cultural aspects

The Roper River region has several large new mining proposals and other developments that would be a significant change in land use from the region's tourism and pastoral activities. Although sparsely populated, there are likely impacts to people living in communities across the region from the establishment of these proposals, both positive and negative.

To ascertain any impacts to social or cultural values, the PER should contain the following:

- An archaeological survey of areas proposed for disturbance.
- A demonstration that sacred sites in a current Aboriginal Areas Protection Authority Certificate will be protected from disturbance by the SILL80 Project. This should include the proposed pump site and pipeline despite any existing infrastructure or disturbance in these corridors.
- A social impact assessment, that takes into account cumulative impacts, identifying likely social impacts on the wider community caused by the establishment of the SILL80 Project. Cumulative impacts are the successive, incremental and combined impacts of an activity on society, the economy and the environment. Consideration should be given to:
 - the life of the project;
 - changes in access to land for commercial, traditional or recreational purposes, including recreational fishing;
 - environmental impacts that may cause permanent or temporary loss of culturally important natural resources, such as significant flora and fauna (e.g. medicinal plants), or fisheries (commercial and recreational);
 - any cultural importance placed on the Roper River itself, or by people that may be affected by the extraction of water from the river;
 - impacts on the community at Kewulyi; and
 - increases in transport in the region including the potential for changes in transport options that would see exports through the proposed Port Roper.

5 Alternatives

Alternatives to the proposal must be discussed in sufficient detail to enable an understanding of the reasons for preferring certain options and rejecting others.

Alternatives to be discussed must include:

- Not proceeding with the proposal;
- Site selection;
- Rehabilitation methods;
- Other sources of water; and

- Environmental management techniques.

6 Risk Assessment

6.1 Risk assessment approach

Understanding environmental risk and uncertainty is a major element of the National Strategy for Ecologically Sustainable Development. This PER should be undertaken with specific emphasis on identification, analysis and treatment of risks through a whole-of-project risk assessment. Through this process, the PER will:

- Acknowledge and discuss the full range of risks presented by the proposed action including those of special concern to the public;
- Quantify (where possible) and rank risks so that the reasons for proposed management responses are clear;
- Acknowledge levels of uncertainty about estimates of risk and the effectiveness of risk controls;
- Risk assessment should include the potential scenario where benefits of the project for the wider community may not eventuate; and
- Explicitly identify those members of the community expected to accept residual risks and their consequences, providing better understanding of equity issues.

Statements about levels of uncertainty should accompany all aspects of the risk assessment. Steps taken to reduce uncertainty or precautions taken to compensate for uncertainty should also be identified and their effect/s demonstrated.

Information provided should permit the reader to understand the likelihood of the risk, its potential severity, and any uncertainty about the effectiveness of controls. If levels of uncertainty do not permit robust quantification of risk, then this should be clearly acknowledged.

The risk assessment should be based on international best practice. Processes for risk management are formalised in Standards Australia / Standards New Zealand (e.g. AS/NZS ISO 31000:2009; HB 436:2004; HB 158:2010).

7 Key risks

The major risks below have been identified through analysis by the Northern Territory Government of the Notice of Intent for the SILL80 Project. It is

possible that further risks will be identified in the environmental impact assessment process. The three major risks identified are:

1. Extraction of water from the Roper River used for processing ore:
 - Average cease to flow occurrences in the Roper River may increase with significant amounts of extraction;
 - Impacts may be caused downstream from the extraction point to water quality and supply for other users and wildlife.
2. Effectiveness of the proposed rehabilitation over large areas:
 - Identification of suitable revegetation species;
 - Supply and sources of an adequate seed bank or seedlings;
 - Soil erosion and weed management over large areas;
 - Timing of establishment and water requirements.
3. Potential impacts to threatened species:
 - Annual clearing and strip mining of 13 to 33 ha of native vegetation could impact on local threatened species;
 - Identifying any listed threatened species, particularly flora, will provide better information for management and rehabilitation.

7.1 Water management including extraction from the Roper River

Outcome

The proponent will demonstrate that water extraction from the Roper River will not significantly impact the aquatic environment or affect water supply to other downstream users.

Context

Water flowing in the Roper River at the proposed point of extraction is fed by groundwater flows from the Tindal Limestone aquifer at Mataranka during the Dry season and from combined rainfall and groundwater during the Wet season.

Water in the Tindal Limestone aquifer will be allocated under the Mataranka Water Allocation Plan to approximately 19,365 ML/year. When fully allocated, cease to flow conditions downstream of the aquifer will be more common.

Extraction from the Roper River for consumptive uses should not exceed the threshold level of 20% of flow at any time in any part of the river (Northern Territory Water Allocation Planning Framework 2006).

Daily water requirements proposed for processing ilmenite are 1.5 ML per day in the first year, doubling to 3 ML per day thereafter (42 L/s and 84 L/s respectively).

Proposed sources of water for the SILL80 Project are from the Roper River during the Dry season (pumped via a pipeline 12 km south to the processing site) and from collected rainwater during the Wet season.

Current data indicates that the Roper River, on average, ceases to flow at Red Rock gauging station (60 km downstream of the proposed extraction point) approximately 18 days of the year, and with full allocation of water entitlements from the Tindal Limestone this would increase to 73 days per year at Red Rock. At the upstream extraction point these figures would be higher.

During the Wet season river-side pumps would be removed due to potentially damaging floods, and production of ilmenite would then rely on stored water and collected rainfall.

Information requirements

- Provide a water management plan outlining water consumption, anticipated water extraction limits, water recovery and recycling, fate of used water, and proposed water use minimisation measures.
- Provide details on how water flow will be monitored at the extraction site to demonstrate that no more than 20% of river flow is extracted.
- Assess how salinity will be impacted at downstream sites, particularly for human consumption quality, that may be caused by increased extraction by the SILL80 Project.
- Estimate the average annual duration of cease to flow in the Roper River and assess how this may impact operations at the SILL80 site.
- Determine, using best available information, the timing and duration that river-side pumps would need to be removed due to flooding of the Roper River.
- Provide details and methods of rainfall collection for production of ilmenite, such as volume of pits or tanks, the feasibility of rainfall recovery and filtering, with regard to local climatic conditions.
- Provide an indication of whether and how water supply for nearby communities, that also extract water from the Roper River, will be affected by increased extraction for production by AIR.
- Provide an assessment of the fate of any flocculants proposed and if they could be detrimental to surface water quality through runoff from backfilled pits.
- Provide a biting insect management plan demonstrating that excavations for the SILL80 Project will not provide breeding sites for human pest species during works and following rehabilitation¹.

¹ The mining development should also conform to applicable sections of the Medical Entomology guideline 'Guidelines for preventing biting insect problems associated with mining sites in the Northern Territory'

7.2 Rehabilitation of disturbed areas

Outcome

The proponent will demonstrate that impact caused by strip mining and disturbance to riparian habitats can be mitigated through effective and timely rehabilitation with appropriate species, erosion and sediment control, and weed management.

Context

The proposed annual area of disturbance at the SILL80 project is 13 to 33 ha, with progressive annual rehabilitation, and will vary with ore depth and production output. Excavations will be dug along 50 to 100 m wide strips to an average depth of 1.2 m (maximum 3 m) where ilmenite-bearing soils occur. Drill holes are also present, used to define the extent of ore bodies.

Very little top soil is present on the surface that can be used to provide a seed bank of local species, and the vegetation is sparse providing little brush cover available for protection of seedlings and soil. Although existing vegetation is sparse, effective rehabilitation may require a higher density of plantings to ensure long-term survival of individual plants and effective soil erosion prevention. Rehabilitation should replicate strata and growth form of existing vegetation.

The returned regolith is processed and washed soil. Soils are known to be clay-rich in the areas where they are ilmenite-bearing. Disturbed soils without vegetation cover are less resilient to forces of wind and water erosion.

Mapping of vegetation, soils and landforms should be considered at scales that provide a useful resource for the intended outcome.

Information requirements

- Provide a Rehabilitation Management Plan outlining proposed rehabilitation methods, and include adaptive management details that would demonstrate successful rehabilitation prior to on-going mining. Include details about rehabilitation of access roads.
- Provide a description of the existing vegetation within MLA 27422 (at an improved scale than existing 1:1 000 000 mapping) to facilitate identification of any sensitive vegetation or likely habitats for threatened species.
- Any vegetation survey and mapping should be conducted at a scale that will allow for the identification of homogeneous vegetation associations and unique functional habitat types across the proposed project site. This will allow for effective appraisal of risks associated with operations and planning for rehabilitation to be undertaken on a

- Provide a list of species to be used for rehabilitation, identifying those occurring naturally in the area, with details of their strata and growth form.
- Provide a description of the landforms within MLA 27422 indicating drainage and slope where rehabilitation will take place.
- Provide details or mapping of soil types within MLA 27422 and what constraints they pose for rehabilitation.
- Discuss rehabilitation methodologies and the benefits and disadvantages of each with reference to local climatic and geological conditions, and indicate which method/s will be proposed for rehabilitation.
- Detail any water or fertiliser requirements for successful rehabilitation. Also provide detail on what protective measures against erosion and disturbance from large herbivores will be employed.
- Indicate whether rehabilitation activities could provide local employment opportunities.
- Provide an Erosion and Sediment Control Plan (ESCP) with reference to ESCP Guidelines published by NRETAS, for all disturbed areas including roads and tracks managed by AIR.
- Provide a weed management plan covering the broader site as well as rehabilitation areas, including rehabilitated access roads and tracks.
- Discuss any proposed review or monitoring of rehabilitated areas to determine effectiveness, including flora and fauna surveys.
- If threatened species are identified within areas of proposed disturbance, detail how proposed flora surveys will inform rehabilitation.
- Identify sources of top soil to be used to re-establish vegetation in the event insufficient soil is available from pre-mined areas.

Note: Reference should be made to *The Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping* (Lewis *et al.* 2007), *Guidelines for Surveying Soil and Land Resources* (McKenzie *et al.* 2008 (eds.)) and *The Australian Soil and Land Survey Handbook* (NCST, 2009) for further discussion of the techniques and requirements associated with particular scales of mapping for vegetation survey purposes.

7.3 Potential impacts to threatened species

Outcome

Impacts to threatened species are avoided or mitigated with effective rehabilitation.

Context

The NT Government 2030 Strategy provides generic targets for biodiversity protection, stating that there shall be no deterioration in the health of biodiversity in the Northern Territory.

Threatened species may occur in areas proposed to be disturbed both at the mine site and at the Roper River. The NOI lists 12 species that could occur at the mine site and a further three at the Roper River pump site.

The proposed mine site and adjacent habitats have been poorly surveyed, and there is inadequate information to currently assess potential impacts to threatened species.

Vegetation, soil and landform mapping produced for Section 7.2 should be used to provide a spatial context to assess risks associated with impacts to threatened species.

Information requirements

- Provide results of formal flora and fauna surveys conducted on the lease and at the river-side water extraction point. It is preferable that the survey be undertaken during the 'Build Down' (late Wet season/early Dry season).
- Provide details on any listed threatened species identified through flora and fauna surveys and measures proposed to mitigate impacts of disturbance.
- Identify any significant vegetation communities, fauna aggregations or colonies and measures to mitigate impact of disturbance on these.
- An assessment should be provided of potential impacts to aquatic vertebrate species that may be impacted by decreased water flows during the Dry season.

Note: NRETAS has developed standardised methodologies for surveying terrestrial vertebrate fauna and flora in the Northern Territory (available upon request). Proponents should use these methodologies when conducting fauna and flora surveys or a suitable alternative such as <http://www.environment.gov.au/epbc/guidelines-policies.html>. There also standard survey methods for the crested shrike-tit available on the NRETAS website and should be followed: <http://www.nt.gov.au/nreta/wildlife/animals/threatened/specieslist.html>.

8 Environmental Management

Specific safeguards and controls, which are proposed to be employed to minimise or remedy environmental impacts identified in previous sections, are to be included in an Environmental Management Plan (EMP) or similar plan.

The EMP should be strategic, describing a framework for environmental management of the proposal and the property; however, as much detail as is practicable should be provided to enable adequate assessment of the proposed activity during the public exhibition phase. Where possible, specific management practices and procedures should be included in the EMP.

Where practicable, the EMP should include:

- The proposed management structure of the operation and its relationship to the environmental management of the site;
- Management targets and objectives for relevant environmental factors;
- The proposed measures to minimise adverse impacts and maximise opportunities, including environmental protection outcomes;
- Performance indicators by which all anticipated and potential impacts can be measured;
- Proposed monitoring programs to allow early detection of adverse impacts;
- Information on how the land will be managed if it is taken out of production;
- A summary table listing the undertakings and commitments made in the PER, including clear timelines for key commitments and performance indicators, with cross-references to the text of the PER; and
- Provision for the periodic review of the EMP itself.

Reference should be made to relevant legislation, guidelines and standards, and proposed arrangements for necessary approvals and permits should be noted. Proposed reporting procedures on the implementation of the plan, independent auditing or self-auditing and reporting of accidents and incidents should also be included. The agencies responsible for overseeing implementation of the EMP should be identified.

The EMP would continue to be developed and refined following the conclusion of the assessment process, taking into consideration the proposed timing of development activities, comments on the PER and incorporating the Assessment Report recommendations and conclusions.

9 Environmental Offsets

The Draft NT Environmental Offsets Policy provides guidance on when and how offsets should be incorporated into development proposals so that there is no net loss of environmental quality. Offsets are designed to compensate for significant residual damage that cannot be avoided, reduced or mitigated at reasonable cost at the development site. The draft NT Environmental Offsets Policy is available at http://www.greeningnt.nt.gov.au/climate/environmental_offsets.html. Consideration of proposed activities or projects that could be implemented to offset the residual detriment should be discussed with the NRETAS Offsets Group.

The PER should provide information on:

- Any identified impacts or detriments that cannot be avoided, reduced or mitigated at reasonable costs; and.
- Risks of failure of management actions (such as rehabilitation, weed control, etc.) and uncertainties of management efficacy should be identified.

10 Public involvement and consultation

The PER has an important role in informing the public about this proposal. It is essential that the proponent demonstrate how any public concerns were identified, and will influence the design and delivery of the proposal. Public involvement and the role of government organisations should be clearly identified. The outcomes of any surveys, public meetings and liaison with interested groups should be discussed including any changes made to the proposal as a result of consultation. Details of any ongoing liaison should also be discussed.

An outline of negotiations and discussions with local government and the Northern Territory Government should be provided.

APPENDIX 1: NT ENVIRONMENTAL IMPACT ASSESSMENT GUIDE GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE²

PURPOSE

The Northern Territory Government's objective for managing greenhouse gas emissions from new and expanding operations is to minimise emissions to a level that is as low as practicable. This will help fulfil the objective of minimising greenhouse gas emissions from the NT into the future.

The Northern Territory Government's objective for considering future climate change in the assessment process is to ensure projects and developments are planned taking climate change science and projections into account, to minimise future environmental, social and economic costs and take advantage of any opportunities.

This Guide aims to assist proponents in providing the information needed by the Department of Natural Resources, Environment, the Arts and Sport (NRETAS) to assess the impact of greenhouse gas emissions from proposed projects and assess other potential impacts from proposed projects under projected future climatic conditions under the *Northern Territory Environmental Assessment Act 1994*.

GUIDANCE

Emissions estimates

Note that the Australian Government is establishing a national greenhouse gas emissions trading system (the proposed Carbon Pollution Reduction Scheme – CPRS), which may have implications for some proponents. More information on the CPRS available at

<http://www.climatechange.gov.au/emissionstrading/index.html>

Proponents should detail the following in their environmental impact assessment documentation:

² Last updated 2 July 2009.

1. An estimate of the greenhouse gas emissions for the construction and operation phases:
 - (a) in absolute and carbon dioxide equivalent figures (refer to the Glossary in this Guide) for each year of the project;
 - (b) identified on a gas by gas basis; and
 - (c) by source (including on site and upstream sources such as emissions arising from land clearing and the production and supply of energy to the site).

Emissions estimates are to be calculated using the methodology developed and periodically updated by the National Greenhouse Gas Inventory Committee or another national or internationally agreed methodology. See <http://www.climatechange.gov.au/workbook/index.html> for access to the National Greenhouse Accounts Factors which may assist.

For emissions from clearing of vegetation, emissions estimates are to be calculated using the National Carbon Accounting System, or another nationally recognised methodology. For more information see <http://www.climatechange.gov.au/ncas/index.html>

2. Details of the project lifecycle greenhouse gas emissions and the greenhouse gas efficiency of the proposed project (per unit and/or other agreed performance indicators).

Lifecycle emissions and greenhouse gas efficiency should be compared with similar technologies producing similar products.

To provide an understanding of the broader impact of the proposal, proponents are encouraged to place the estimated greenhouse gas emissions from the proposal into a national and global context. Information on Australia's national emissions profile can be obtained from the Department of Climate Change at <http://www.climatechange.gov.au/inventory/2005/index.html>. International emissions can be seen at the United Nations Framework Convention on Climate Change (UNFCCC) website at http://unfccc.int/ghg_emissions_data/items/3800.php

Measures to minimise greenhouse gas emissions

Proponents must demonstrate consideration of a wide range of options and indicate the intended measures and efficient technologies to be adopted to minimise total greenhouse gas emissions from the proposed project, including:

- (a) identifying energy conservation measures, opportunities for improving energy efficiency and ways to reduce fugitive emissions where applicable;

- (b) indicating where potential savings in greenhouse gas emissions can be made through the use of renewable energy sources, taking into account fossil fuels used for supplementary power generation; and
- (c) whilst recognising the likely commencement of an emissions trading scheme, their commitment to offsetting greenhouse gas emissions.

The design measures to maximise efficiency and minimise emissions should represent best practice at the time of seeking project approval.

Offsets

Emission offsets include activities that remove carbon from the atmosphere or reduce the greenhouse gas intensity (output per unit product) from current or future activities. No Australian standards for offsets currently exist, although the Australian Government is developing a National Carbon Offset Standard (see: <http://www.climatechange.gov.au/carbonoffsetting/ncos/ncos.html>).

Measures that offset emissions within the NT are strongly encouraged, and NRETAS staff can discuss possible options with proponents. Proposed emissions offsets projects should include an estimate of greenhouse gas emissions savings that will be achieved through implementation.

Emissions monitoring and reporting

Consistent with the principles of continuous improvement, a program is to be outlined in the proponent's Environmental Management Plan which includes ongoing monitoring, investigation, review and reporting of greenhouse gas emissions and abatement measures.

The Australian Government is developing a nationally consistent framework for greenhouse and energy reporting by industry. Projects with significant emissions may be required to report their emissions under the *National Greenhouse and Energy Reporting Act 2007*. Data reported through the system will underpin the proposed CPRS. For more information see <http://www.climatechange.gov.au/reporting/index.html>

Impacts of climate change

Climate change is projected to result in changes to sea level, land and sea temperatures, cyclone intensity, frequency of fire weather, and frequency of extreme weather events including storms, drought and flood.

Proponents should discuss how projected climate change has been taken into account in planning the proposal, and how climate change is expected to affect the proposal over its stated lifetime. Proponents should discuss how climate change-related risks (for example, risk of failure of project infrastructure during potential extreme weather events) will be managed.

Potential impacts of climate change on the surrounding environment including water, land, biodiversity and ecosystems, coastal zones, and the social environment should also be taken into account in proposal planning.

In assessing climate change risk, proponents should be guided by recent projections published by organisations such as the CSIRO, the Bureau of Meteorology (BoM), and the Intergovernmental Panel on Climate Change. For the latest CSIRO and BoM projections for Australia, see:

<http://www.climatechangeinaustralia.gov.au>

GLOSSARY OF GREENHOUSE TERMS

Abatement: Limiting, abating, avoiding or sequestering greenhouse gas emissions through source reduction, fuel displacement or switching, carbon stabilising techniques or sink enhancement.

Absolute emissions: Refers to the total emissions of greenhouse gases expressed in terms of the actual mass of each individual gas emitted over a specified time period.

Best Practice: A best practice is a process, technique, or use of technology, equipment or resource that has a proven record of success in minimising energy use and greenhouse gas emissions. A commitment to use best practice is a commitment to use all available knowledge and technology to ensure that greenhouse gas emissions are minimised.

Carbon Dioxide Equivalent: A unit of greenhouse gas emissions calculated by multiplying the actual mass of emissions by the appropriate Global Warming Potential. This enables emissions of different gases to be added together and compared with carbon dioxide (see Table 1 below).

Greenhouse Gases: Table 1 lists the greenhouse gases proponents are required to report on.

Global Warming Potential (GWP): The warming potential of a gas, compared to that for carbon dioxide. GWPs are revised from time to time as knowledge increases about the influences of different gases and processes on climate change. Refer Table 1.

Project Lifecycle Greenhouse Gas Emissions: Those greenhouse gas emissions measured cumulatively over a defined period. Typically this period is from the point of extraction of the raw materials to either the beginning of the consumer phase of a product or the final disposal or recycling stage of a product, depending on its nature. Proponents should justify their choice of the defined period.

National Greenhouse Gas Inventory Committee: A committee comprising representatives of the Commonwealth, State and Territory Governments that oversees the development of greenhouse gas inventory methods and compilation of inventories for Australia.

Sequestration: Removal of greenhouse gases from the atmosphere by vegetation or technological measures. Sequestration is not yet precisely defined for the purposes of recognised trading or offset schemes. Accordingly, NRETAS will take a common sense approach on a case by case basis in the interim. To assist proponents, NRETAS regards sequestration as a process that results in the isolation of carbon dioxide from the atmosphere for a period which is significant in terms of influencing the global warming effect.

Source: Any process or activity that releases a greenhouse gas into the atmosphere.

Table 1: Greenhouse gases and respective Global Warming Potential (GWP) factors

Greenhouse Gas	Global Warming Potential
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	21
Nitrous oxide (N ₂ O)	310
Perfluorocarbons (CF _x)	6,500 – 9,200
Hydrofluorocarbons (HFCs)	140 - 11,700
Sulphur hexafluoride (SF ₆)	23,900

Greenhouse gas emissions expressed in carbon dioxide equivalent (CO₂-e) are calculated by multiplying the actual mass of emissions for each greenhouse gas by its respective GWP factor. GWP factors listed are those published by the International Panel on Climate Change in its 4th Assessment Report, 2007, see http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch02.pdf

Appendix 2: Department of Lands and Planning – PER Guidelines for transport

The project description should consider, as a minimum, the following:

1. Description of transport systems and methods to convey all site traffic (including materials, workers and product) to and from the site (both during construction and operation) including:
 - Type, size and number of vehicles required during all phases of the proposal;
 - The estimated volumes, tonnage, composition, origin and destination of traffic generated by the proposal;
 - Estimated times of travel;
 - Additional road infrastructure works required including site access and signage;
2. Description of transport systems and methods to convey any product to proposed markets;
3. Description of any proposed haul roads, including length, location, land requirements, tenure and acquisition requirements*;
4. Description of construction methods and timeframes for any proposed private and public haul roads*;
5. Consultation undertaken with relevant regulatory agencies; and
6. Necessary approvals required.

Existing Environment

Provide details of the existing transport infrastructure at locations likely to be impacted by the proposal.

Impacts

Describe how the project will, or has the potential to, impact on transport infrastructure during construction and operational phases. In addition, describe possible transport impacts as a result of the proposal including issues such as dust and road traffic noise.

* for mine proposals only

Management

Describe proposed safeguards, management and monitoring strategies that will be implemented to minimise potential transport impacts during construction and operation including, but not limited to:

- Methods for complying with any relevant road vehicle axis limits;
- Methods for securing loads;
- Measures to reduce any road traffic noise impacts;
- Consultation with local communities affected by transport impacts;
- Traffic management;
- Management of driver fatigue.