Northern Territory Government

DEPARTMENT OF
NATURAL RESOURCES, ENVIRONMENT, THE ARTS AND SPORT

# Guidelines for the Preparation of an Environmental Impact Statement

## McArthur River Mine Phase 3 Development Project

## Borroloola, NT

## McArthur River Mining Pty Ltd

**August 2011**

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## ABBREVIATIONS AND GLOSSARY

| | |
|---|---|
| AMD | Acid and / or metalliferous drainage |
| Long term | Post mine closure and extending to >1000 years. Where long term modelling is required, this should consider a time frame >1000 years, but be conducted for a time period that produces results within a reasonable degree of uncertainty |
| MRM | McArthur River Mining Pty Ltd |
| Mtpa | million tonnes per annum |
| OEF | Overburden Emplacement Facility |
| Short term | During mine operations |
| TSF | Tailings Storage Facility |

# 1 Introduction

McArthur River Mining Pty Ltd (MRM) proposes to expand existing operations at the McArthur River Mine site 60 km south of Borroloola. The Phase 3 Development Project will result in a doubling of the mining rate, from 2.5 million tonnes per annum (Mtpa) of ore to 5 Mtpa, and an increase in zinc concentrate from 360 000 dry metric tonnes to 800 000 dry metric tonnes. The total volume of waste rock will increase from an approved 185 Mt facility to 685 Mt facility.

To accommodate for the proposed expansion the following existing onsite infrastructure will need to be enlarged:

1. The open cut pit is anticipated to nearly double in size, increasing from 210 to 410 m in depth, from 800 to 1500 m in width and from 103 to 203 ha in the overall footprint;

2. The tailings storage facility (TSF) is expected to be extended or increased in height to create additional tailings storage capacity;

3. The overburden emplacement facility (OEF) will increase from a 185 Mt to 685 Mt facility; and

4. The gas fired power station is expected to double in output, from 20 Mw to 40 Mw.

It is anticipated that there will be no change in the methods used to transport the ore. However, the volume of concentrate to be trucked to the Bing Bong Port facility (located approximately 40 km north of the McArthur River Mine) for shipment is expected to double. The ore processing operation will be expanded to handle the increased ore production. The mine life is also expected to increase by six years, to 2033. Further details are provided in the MRM Notice of Intent.

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 an Environmental Impact Statement (EIS). Potential environmental risks contributing to this decision include:

- Risks relating to construction and management of the TSF extension to ensure long term stability from seepage of contaminants through acid and metalliferous drainage;

- Risks relating to construction and management of the OEF and characterisation of waste entering the facility to ensure long term stability from seepage of contaminants;

- Natural disasters and an extreme climate that may degrade the integrity of infrastructure in the long term; and

- Risks relating to on-going management and rehabilitation of the McArthur River Mine.

# 2 General advice on the EIS

Information about the Phase 3 Development Project proposal and its relevant impacts, as outlined in this document, is to be provided in the EIS. 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.

## 2.1 General content

The EIS should be a stand-alone document. It should contain sufficient information to avoid the need to search out previous or additional, unattached reports. It should include aspects of the existing operation that are affected by the proposal expansion, even if minor.

The EIS should enable interested stakeholders and the Minister to understand the environmental consequences of the proposed development. Information provided in the EIS should be objective, clear, succinct and, where appropriate, be supported by maps, plans, diagrams or other descriptive detail. The body of the EIS 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 EIS.

The level of analysis and detail in the EIS 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.

MRM should demonstrate its commitment in the EIS to best practice environmental management. Best practice can be explained as "the best way of doing things" (RET 2011). For it to be successful it requires careful planning and commitment from all levels and groups within a mining company and through all phases of a resource project from the initial exploration to construction, operation and closure. It is based on a comprehensive and integrated approach to recognising, and avoiding or minimising, environmental impacts (RET 2011).

## 2.2 Format and style

The EIS 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 EIS. 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 EIS, 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 EIS as a whole.

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

The EIS 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 EIS 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 EIS exhibition

To ensure optimal opportunity for public and Government scrutiny of the submitted EIS document, EIS exhibition should not occur in late December or

January in any year. If EIS public exhibition overlaps any December – January period, additional time will be added to the EIS exhibition period. The EIS public exhibition period will be a minimum period of six weeks.

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

The EIS is to be advertised for review and comment in the *NT News*. The EIS should be made available with additional bound copies for public review at:

- Environment and Heritage Division (EHD), NRETAS, 2nd Floor, Darwin Plaza, 41 Smith Street Mall, Darwin;
- Minerals and Energy Information Centre, Department of Resources, 3rd Floor, Paspalis Centrepoint, 48 Smith Street Mall, Darwin;
- Borroloola Community Government Council Building (ph. 8975 8618);
- Roper Gulf Shire office at Katherine (29 Crawford St; ph. 8972 9000);
- 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 EIS should have a chapter that provides general information on the background and context of the action including:

- The title of the action;
- 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 clear outline of the objective of the action;

- Legislative background for the proposal, including the relevant NT legislation that applies to the project;

- The background to the development of the action, including previous environmental impact assessment and reference to the Independent Monitor Audit reporting. An assessment of how MRM has met its commitments to the protection of environmental and social values that would provide confidence to the wider community that this and any future proposals could proceed without unacceptable impacts;

- 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. The infrastructure design and engineering for all phases of construction, operation and management of the project should be detailed and relevant plans, photos and maps should be included.

## 4.1 General aspects

- 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;

- All components of the project should be described in detail, including construction through to mine closure/rehabilitation, and care and maintenance;

- 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;

- Areas at the mine site that will require expansion including the mine pit, OEF, TSF, accommodation facilities, stockpiles, processing facilities, and transport;

- Upgrades to water management structures;

- 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.

### 4.2 Upgrade to the gas fired power station

The gas fired power station is proposed to be doubled in power output (20 Mw to 40 Mw) to accommodate an increase in production.

- Describe where the proposed power station expansion will be located and any environmental impact associated with its placement;

- Demonstrate that sufficient gas is available for the life of the mine for additional processing that is required for the expansion;

- Provide an estimate of the greenhouse gases that will be produced over the life of the mine from power production; and

- Discuss whether alternate sources of energy will be used for power production for the mine or camp facilities.

## 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. The choice of the preferred option(s) should be explained, including a comparison of the adverse and beneficial effects (direct and indirect) used as the basis for selection, and compliance with the principles and objectives of ecologically sustainable development.

Alternatives to be discussed must include:

- Not proceeding with the proposal;
- Site selection;
- Rehabilitation methods;
- Other sources of water;
- Environmental management techniques;
- The comparison of short, medium and long term advantages and disadvantages of the options; and
- The criteria and their relative importance in comparing options.

# 6 Existing environment

## 6.1 Hydrogeology and groundwater

To determine the impacts to the environment and public health, particularly where key risks have been identified, provide a description, including detailed maps or diagrams where appropriate describing:

- Local and underlying geology and depths of geological strata;
- Seasonal groundwater depth(s), surface connections, via springs or recharge zones, extent and degree of connectivity or confinement, proximity and connectivity to local and regional aquifers, and flow velocities and directions;
- Regional aquifers underlying the mine pit, TSF, OEF, water management network, and surrounding areas to the outer extent of the underlying aquifers;
- Information pertaining to any recent hydrogeological assessments;
- Sensitive receptors to impacts upon groundwater systems, including consideration of ecosystems;
- The current groundwater monitoring program, any proposed modifications to the program, and how it will be implemented in order to include monitoring of impacts from the mine site on the local and regional hydrogeological conditions;
- Provide a comprehensive Groundwater Report summarising groundwater levels, quality and trends over time. Identify any issues (e.g. degrading water quality, significant drawdown) and potential causes or issues and details of actions taken to address those issues; and

- Present and interpret water quality monitoring data for groundwater in the area of the project.

### 6.2 Surface water

For surface water systems within the project area identify and discuss, using detailed maps or diagrams where appropriate:

- Catchments, their significance (Ramsar etc), boundaries, area and topography, including location of mine infrastructure and the mining lease boundary;
- Areas of inundation, drainage lines, surface-water flow directions, creeks and receiving waterways. Existing surface drainage patterns, flows (including flood level contours) and discharge rates;
- Size and seasonal flow rates of drainage lines, creeks and waterways;
- Beneficial uses;
- Sensitive receptors to impacts upon surface water systems, including consideration of riparian and aquatic ecosystems, flora and fauna;
- The current surface water monitoring program, any proposed modifications to the program, and how it will be implemented in order to include monitoring of impacts from the project on the local and regional hydrological conditions; and
- Present and interpret water quality monitoring data for surface water in the area of the project.

### 6.3 Biodiversity

Sufficient information is required regarding the current biodiversity of the project area to assess and monitor expansion impacts. With reference to the NRETAS biodiversity and natural resource guidelines (see section 12.3) the following information should be provided:

- Present flora and fauna surveys of the project area. Identify flora and fauna species of conservation significance present, or potentially present within the project area, and which may be affected by the project. Targeted fauna and flora surveys for listed species should primarily be in areas of uncleared vegetation that will be directly affected by the proposed development, i.e. the tailings storage facility, the overburden emplacement facility, and the pit expansion area;
- Provide a map of the vegetation communities within the project and surrounding areas at an appropriate scale. Identify areas containing significant vegetation communities, including creek lines with associated riparian vegetation or rainforest;
- Describe in detail aquatic fauna present in local creeks and rivers in and downstream of the project area;

- Identify and discuss species of traditional Aboriginal cultural significance (particularly aquatic and terrestrial fauna species), based upon consultation with traditional owners and surveys of the project area;
- Identify areas requiring clearing of native vegetation for the project, including potential for edge (degradation) effects. Present alternative configurations where available to minimise clearing requirements. Detail habitat types within areas to be cleared, with focus on significant habitats and habitats supporting species of conservation significance;
- Identify habitats and species of conservation significance and species listed under the *Environment Protection and Biodiversity Conservation Act*; and
- Identify presence and potential presence within the project area of weeds and feral animals.

### 6.4 Climate

- Describe the existing regional climate, including extremes in weather or climate (such as highest rainfall records, evaporation, longest period of wet and dry spells, cyclonic activity, etc.). Provide sufficient information that would allow an understanding of the potential impacts climate will have on infrastructure longevity and maintenance; and
- Describe what variations to the known climate that may occur under various climate change scenarios.

### 6.5 Historic and Cultural Environment

The 2011 Notice of Intent acknowledges that mining activities will be carried out in accordance with the *Aboriginal Sacred Sites Act*. MRM is also required to ensure protection of any heritage or archaeological sites. Information is required on these sites within or adjacent to the project footprint that may not be protected under the *Aboriginal Sacred Sites Act*.

- Identify areas of historic or archaeological significance likely to have or require consideration under the *Heritage Conservation Act*;
- Describe potential impacts to any heritage or archaeological places identified in baseline studies;
- Detail measures to mitigate impacts to any cultural heritage and archaeological sites at risk from the project. Information should include procedures to avoid significant areas and ongoing protection measures.

# 7 Risk assessment approach

Understanding environmental risk and uncertainty is a major element of the National Strategy for Ecologically Sustainable Development. This EIS should be undertaken with specific emphasis on identification, analysis and treatment of risks through a whole-of-project risk assessment. Through this process, the EIS 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
- Identify and discuss the residual risks and their impact on the wider community, particularly those that do not benefit directly from the proposal.

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 203:2006; HB 158:2010).

# 8 Key risks of the Phase 3 Development Project

The major risks below have been identified through analysis by the Northern Territory Government of the 2011 Notice of Intent for the MRM Phase 3 Development Project. It is possible that further risks will be identified in the environmental impact assessment process. The major risks identified are:

1. Seepage of contaminants and potential migration of tailings at the TSF from the expansion project. Construction and management of the TSF should:
    - Ensure long term stability;
    - Prevent unacceptable seepage and groundwater contamination;
    - Ensure correct characterisation of tailings entering the facility;
2. Seepage of contaminants from the OEF. The construction and management of the OEF should:
    - Ensure long term stability;
    - Prevent unacceptable seepage and groundwater contamination;
    - Ensure correct characterisation and management of waste rock material that may lead to an acid and metalliferous drainage legacy from the OEF;
3. Natural disasters and extreme weather or climate conditions that may degrade the integrity of infrastructure could lead to:
    - Impacts to the TSF and OEF by extreme weather events which could degrade essential structural components in the long term;
    - Additional costs for maintenance of the site in tropical conditions for the long term. An external auditing program to ensure integrity is maintained may be required.
4. On-going management and rehabilitation of the McArthur River Mine:
    - There are unknown risks with an enlarged pit during operation and post closure;
    - Legacy pit management;
    - Risks of covers on the OEF and TSF deteriorating over time;
    - How the site will be left after mining is complete and the final landform of the OEF and TSF;
    - Risks to groundwater and surface water.

## 8.1 Seepage of contaminants and potential migration of tailings at the TSF from the expansion project

### Outcome

The proponent will demonstrate that the construction and maintenance of the tailings storage facility (TSF) will be managed so that no environmental harm occurs in the long term.

Demonstrate that identified risks associated with TSF seepage aspects will be avoided, mitigated or otherwise minimised in the planning and design phases to achieve a risk rating of 'low', and that monitoring, reactive management and contingency actions will be in place to prevent development of residual risks.

Design, management, environmental outcomes and residual risks of the TSF are reviewed and assessed to evaluate the effectiveness of safeguards previously proposed and implemented, to inform whether similar designs and safeguards are appropriate for the proposed TSF expansion.

### Context

Seepage from tailings storage facilities is often difficult to predict prior to construction due to the complexity of factors in their setting (e.g. if over a water course or within a flood zone), type of construction material, design, location of ground and surface waters and climatic influence.

Modelling potential impacts to the environment requires a thorough investigation of variables affecting the stability of these facilities. Long term management will require acceptance that unknown risks can arise due to imprecise modelling. Mitigation measures will be required that may be beyond those identified through modelling. Sampling and testing will assist in the planning of the design and management measures.

### Information requirements

- To provide a basis on which to assess additional or upgraded TSF, describe the current facilities of the TSF and their performance to date; describe seepage quantity and quality from the current TSF;
- Provide details on the size and extent of facilities required for the Phase 3 Development Project, and whether new cells will be commissioned in stages;
- A comparison of TSF options should be provided, with justification for the design selected. The justification should take into account geotechnical stability, potential of increased seepage impacts, impacts of land clearing, visual amenity and any other matters identified by MRM through a risk assessment process;
- Provide a justification that the proposed site of the TSF extension ponds is an appropriate location with consideration of alternative sites;
- Provide a geotechnical assessment report of the selected tailings dam design;

- Provide information on the test works conducted on the tailings material. Indicate how these test works will be relayed in the tailings management design, operational and closure strategy;
- Identify where material for the tailings dam construction will be sourced, and indicate the location and size of any disturbance area;
- Provide a hydrogeological assessment of the location of the TSF and potential seepage zones using updated conceptual and numerical modelling based on the expanded facilities. Provide details on materials to be used as seepage prevention or limiting layers, the quantities required and where this will be sourced;
- Demonstrate that no threatened species of flora or fauna will be impacted within the footprint of the proposed TSF;
- Detail the rehabilitation trials on the existing TSF;
- Provide details on the preliminary design of the TSF, i.e. the height, footprint, batter angles, etc. that will be in place following rehabilitation. Also provide details on the following:
  - Conceptual design principles.
  - Capacity.
  - Surface configuration, size, height, landform, shape.
  - Cross sections.
  - Slopes, batters.
  - Containment principles.
  - Spillway design and location.
  - Armouring.
  - Cover design and vegetation.
  - Stormwater drains, seepage and runoff collection.
  - Erosion protection structures.
  - Sediment capture structures.
  - Applicable engineering standards and Guidelines.
  - Lining systems, including design depths and expected permeabilities of all liners and containment zones (walls, floors, lids).
  - Sub drainage, collection sumps and other seepage collection systems.
  - Consideration of AMD potential (including circum-neutral drainage) in selection of material for TSF construction.
  - Projected groundwater interactions with the TSF.
  - Extent of dewatering of tailings required to maintain dam wall stability.
  - Details of methods of tailings and waste transfer to the TSF.

**Potential impacts**

*Seepage:*

- Predict TSF whole-of-dam seepage rates (progressive, until a long term equilibrium point / pattern is reached);
- Demonstrate that underlying geology and anomalies relevant to a TSF contaminant transport model have been appropriately defined for the entire footprint and local area of the TSF;
- Quantitatively estimate the capacity of the geology underlying the TSF to neutralise or contribute to any acid and/or metalliferous drainage outputs;
- Demonstrate how vertical and horizontal permeability characteristics of geological strata underlying the TSF will influence the design and construction:
    - Identify and describe expected hydraulic effects of any identified anomalies in geological strata under the footprint of the TSF;
    - Demonstrate that any identified anomalies in geology underlying TSF have been compensated for in design of the TSF;
- Tailings seepage quality is to be comprehensively predicted. Identify impacts to the environment, including to aquatic ecosystems, of any elevated metalliferous (or other) concentrations which could potentially occur in seepage, above background groundwater concentrations. Consider cumulative impacts with seepage from the existing TSF;
- Predict and demonstrate the permeability of all TSF constructed layers and calculate likely oxygen diffusion and water percolation rates through the layers;

*Long term stability:*

- Outline final rehabilitation and revegetation plans for the TSF;
- Demonstrate that the proposed TSF designs will be stable in the long term, including maintenance of:
    - Structural integrity against weathering elements, such as: extreme rainfall events, floods, long term erosion, desiccation, termite and tree root infestation, climate change and earthquakes; and
    - Design containment specifications to which the TSF was built;
- Describe how proposed TSF design and construction methods will minimise erosion and loss of sediment, topsoil, capping material and vegetation cover during extreme rainfall, heat and drought events;
- Describe contingency drainage and sediment interception arrangements; and how preferential flow paths over and through the TSF will be controlled;

- Describe how the conceptual cover design of the TSF will minimise AMD development, with reference to outcomes from existing, similar TSF cover configurations, in similar climatic settings;
- Demonstrate that proposed cover designs of TSF will:
    - Provide the foundation required to be able to create a self-sustaining, local providence, weed-free vegetation cover;
    - Be successful in the local climate, and able to withstand extreme rainfall, heat and drought;
    - Present low risk of damage from termite and root growth; and
    - Require minimal or no maintenance in the long term (post closure).

**Protection, management and monitoring**

- Provide details of proposed mitigation measures that would ensure that the surrounding environment is not impacted by seepage of contaminants from the TSF. Information in the EIS should indicate the amount of seepage produced, quality of seepage and any long term trends. Indicate the timeframe that recovery bores would be required following closure to demonstrate that no environmental impact has occurred;
- Discuss how the proposed TSF expansion could alter the effectiveness of existing mitigation measures for the current facilities;
- Provide information on the future management of the Water Management Dam and whether this will be used as a future TSF and if it has been designed and constructed for this purpose;
- Describe selective handling / placement / further processing proposed for any tailings identified as having potential to generate AMD or contain other potential environmental contaminates;
- Detail mitigation measures available / proposed to manage any poor quality seepage from TSF, both during operation and in the long term;
- Detail proposed contingency management and monitoring procedures which will reduce risk of impacts on local groundwater quality to a low level, for the short to long term;
    - Include consideration of aquifers accessed by bores from local properties and potentially impacting on health of the environment, aquatic ecosystems, livestock or local potable groundwater quality;
    - Include consideration of potential cumulative risks with seepage impacts on groundwater from the TSF;
- Demonstrate that identified risks associated with seepage, AMD generation or other water contamination will be avoided, mitigated or otherwise minimised to achieve a risk rating of ‘low’, in the planning and design phases, and that monitoring, reactive management and contingency actions will be in place;

- Indicate contingency arrangements including reporting protocols for dealing with both minor leakage and catastrophic failure of tailings dams;
- Demonstrate that identified risks associated with design and construction of the TSF cover will be avoided, mitigated or otherwise minimised to achieve a risk rating of 'low';
- Describe monitoring programs and infrastructure proposed to detect manifestation of identified potential impacts, including contamination of water resources, and dust, from the TSF;
- Describe proposed monitoring of the TSF cover performance (e.g. appropriately sized lysimeters, etc.), and reactive management measures which will ensure required outcomes will be met; and
- Describe ongoing monitoring, and (contingency) management plans for the TSF after mining ceases.

## 8.2 Seepage of contaminants from the OEF

### Outcome

The expansion of the overburden emplacement facility (OEF) will cause minimal impact to cultural or heritage values, and material entering the OEF should cause minimal acid or metalliferous drainage (AMD).

The design will aim to exclude or minimise any risk of contamination of underlying aquifers or surface water resources into the long term to a residual risk rating of 'Low'.

Risks to local waterways and aquifers will be thoroughly identified, characterised and avoided where possible, or otherwise minimised to the greatest possible extent.

### Context

Waste rock entering the OEF requires characterisation of its AMD potential that can impact the environment with contamination. The proposed expansion would create significantly more waste rock per unit of ore recovered than existing rates (widening and deepening of the pit would approximately double the resource but would almost quadruple the size of the waste rock facility). The size and location of the OEF can impact on floodplains and waterways through release of contaminants, but can also impact visually despite being in a remote location.

### Information requirements

- Describe the location, size and extent of the proposed OEF expansion;
- Demonstrate that potentially acid forming (PAF) material would be placed in the OEF in a manner that will not cause acid and metalliferous drainage issues impacting on the environment;

- Provide details regarding potential impacts to waterways from the OEF expansion and provide mitigation measures;
- Describe what mitigation measures or infrastructure would be used to prevent any seepage from causing impact to the environment;
- Indicate whether the existing clay liner is being tested and identify where the clay is being sourced from;
- Provide a hydrogeological assessment of the OEF and potential seepage zones;
- Demonstrate that no threatened species of flora or fauna will be impacted within the footprint of the proposed OEF;
- Provide details on rehabilitation of the OEF and how it will be managed to prevent contamination of surface or groundwaters.

**Potential impacts**

- Identify and discuss risks associated with OEF design / configurations;
- Identify and discuss risks associated with OEF site characteristics. Consider as a minimum, risks associated with:
    - Underlying geology, including strata anomalies, paleochannels, etc;
    - Proximity (or downstream connections to) waterways, communal or dolomitic aquifers, sensitive / significant habitats and corridors or sites of cultural or Indigenous heritage;
- Demonstrate that underlying geology and anomalies relevant to modelling of OEF seepage modelling have been appropriately defined for the entire footprint(s) of the OEF;
- Demonstrate that any identified anomalies in geology underlying the OEF have been compensated for in design of the OEF;

Closure and rehabilitation:

- Identify and discuss risks of AMD development with regard to design and construction of the OEF;
- Discuss potential for exacerbation of AMD potential due to seasonal groundwater mounding height differences;
- Identify and discuss risks with regard to design and construction of the rehabilitated OEF cover, including proposed vegetation-cover assemblages;
- Demonstrate that proposed cover designs of the OEF will:
    - Be successful in the local climate, and able to withstand extreme rainfall, heat and drought;
    - Resist erosion and exposure of underlying layers after extreme rainfall events;
    - Present low risk of damage from termite and root growth; and

- Require minimal or no maintenance in the long term;

- Demonstrate by example (where possible) how the conceptual cover design of the OEF will minimise AMD development, with reference to outcomes from existing, similar OEF cover configurations, in similar climatic settings.

**Protection, management and monitoring**

- Demonstrate that identified risks associated with OEF design or configurations will be avoided, mitigated or otherwise minimised to a low level;
- Demonstrate, with the support of detailed modelling, that the risk of contamination of groundwater or surface water resources, from the OEF, is low;
- Describe monitoring programs and infrastructure proposed to detect manifestation of identified potential impacts, including contamination of water resources and dust, from the OEF;
- Demonstrate that OEF designs would effectively:
    - Eliminate or reduce risk to a low level, by design, the possibility of the OEF contaminating communal groundwater or surface-water resources, particularly post mine-closure; and
    - Exclude or reduce to a low level, the risk of development of AMD (including circum-neutral drainage) from waste rock storage(s) over the long term.
- Demonstrate that identified environmental risks associated with groundwater mounding within the OEF will be avoided, mitigated or otherwise minimised to a low level;
- Demonstrate that identified risks associated with design and construction of the OEF cover will be avoided, mitigated or otherwise minimised to a low level;
- Describe proposed monitoring of OEF cover performance (e.g. appropriately sized lysimeters, etc), and reactive management measures aimed at ensuring required outcomes will be met;
- Describe proposed contingency management measures to intercept / treat AMD from the waste rock storage(s) should it develop:
    - While MRM is still actively mining in the area; and/or
    - In the long-term, after mining and processing has ceased (proposed contingency actions should in the long term be passive self-sustaining systems without requirement for ongoing maintenance, to allow for mine closure).

## 8.3 Natural disasters and extreme weather or climate conditions that may degrade the integrity of infrastructure in the long term

### Outcome

The mine site infrastructure will be maintained so that no environmental harm is caused during operation or closure due to degradation from natural disasters or extreme weather or climate events.

### Context

Increasing the size of infrastructure will require further studies to understand the potential impacts. The TSF and OEF will remain in situ indefinitely as well as other aspects of the mine site. The proposed expansion to the TSF and OEF would create large areas of potential sources of contamination. Natural disasters and extreme events, including significant rainfall events and flooding, could fill water storages causing overtopping, or damage rehabilitated areas.

TEAM NT (2004) acknowledge that “the monsoonal tropics of the Northern Territory, by virtue of their annual seasonal oscillation between flood and drought conditions, represent one of the most difficult of all regimes to produce a cover system that will function effectively for the long term”.

Water management is a critical issue in the wet-dry tropics, and over flow of ponds and embankment failure can occur with significant storm or seismic events.

Erosion can severely degrade batters in a single Wet season if inappropriately designed and built. Initiation of erosion is related to soil/rock material properties and the velocity of surface water flow.

### Information requirements

- Demonstrate that the design and materials of the legacy TSF and OEF are climatically appropriate for the long term;
- Provide details of maintenance required for these structures post closure; and
- Provide an indication of the timeframe in which active management of the site would be required following closure to ensure mitigation of any seepage of contaminants.

## 8.4 Risks relating to on-going management and rehabilitation of the site

### Outcome

Rehabilitation of the site will be undertaken in a manner that requires minimal inputs of maintenance post closure but maximum protection of the environment from seepage of contaminants, erosion or other impacts.

## Context

The primary functions of rehabilitation of the TSF and OEF are to slow down the processes of oxidation/weathering and rates of erosion for waste storage structures to a point where the resulting products are produced in small enough quantities, or at low enough rates, that the receiving environment can absorb and assimilate them without adverse impacts, or with impacts that are minimised to the satisfaction of the community.

Closure planning is a complex process that takes time to develop the necessary detail for final closure. The monsoonal tropics provide a difficult setting for the design of cover systems that will minimise the ingress of oxygen and water over the long term. Standards planned for today may be substandard at the time of mine closure, so anticipation of future requirements should be incorporated where possible.

It is critical that rehabilitation planning is undertaken in a holistic manner; that is, when planning for rehabilitation of an individual aspect of a site, its relationship to other aspects of the site are taken into account. Rehabilitation planning is often neglected until well into the operational phase, and the real cost is not determined until far too late in the project timeline.

The expansion of the pit will also lead to post-closure issues with determining the fate of the void, and whether it should remain dry, partially or fully filled with water or backfilled. In particular increasing the depth of the mine pit and dewatering could cause significant drawdown effects affecting yield and water quality in regional groundwater and groundwater dependant ecosystems.

The Western Australian guidelines for preparing mine closure plans may provide useful guidance (see section 12.5). Sections 8.1 and 8.2 above require closure and rehabilitation information on the TSF and OEF respectively. Issues covered here are about the overall mine closure and rehabilitation and the pit closure.

## Information requirements

- Provide information on whether the estimated mine life extension to 2033 includes decommissioning and closure activities. Describe how the proposed expansion alters existing closure plans;
- Demonstrate that consultation between MRM and stakeholders, which should include acknowledging and responding to stakeholder's concerns, has taken place on the closure and rehabilitation of the site;
- Describe proposed post-mining land uses which have been identified and agreed upon through consultation with stakeholders;
- Provide details on the proposed state that the mining pit void will be left in following closure (i.e. whether it will remain dry or partially or totally filled with water, or backfilled), and discuss the benefits or detriments of each option and support these with studies or data;

- Detail what impact the expansion project will have on the hydrology, including paleochannels, and the long term impact of leaving the pit void (post mining) on the hydrology, hydrogeology and water quality;
- Provide an assessment of the effects of groundwater drawdown with the deepening of the pit during operation of the mine;
- Describe the impact of drawdown on surface water or groundwater dependant ecosystems;
- Provide a water balance model verified using data acquired through monitoring of the final pit void;
- Characterise rock units projected to be exposed in the final (legacy) pit walls and floor, in terms of:
    - Mineralogy, base metal content;
    - Potential for development of AMD (e.g. acid neutralising capacity, sulfide content and type, net acid production potential, circum-neutral drainage potential, likely time frame required for AMD production); and
- Identify which material will become finally (and seasonally) immersed under groundwater, if and when pit flooding occurs. Estimate time frames for partial and permanent immersion, in light of groundwater modelling predictions, and MRMs future plans for mining and dewatering in the area.

**Potential impacts**

- Provide an assessment of the impacts on the environment of the selected state that pit void is proposed to be left in;
- Identify and discuss environmental risks associated with characteristics of material to be exposed in the final (legacy) pit walls; and
- Demonstrate that identified environmental risks associated with characteristics of material to be exposed in the final pit walls will be avoided, mitigated or otherwise minimised to achieve a risk rating of 'low' for the short to very long term, both prior to pit flooding, and upon immersion by permanent groundwater.

**Protection, management and monitoring**

- Provide details on the end land use following rehabilitation, and provide details on the stages in which rehabilitation works will be undertaken;
- Provide information regarding the actual and predicted changes to the water management systems as a result of the proposal. Include contaminated water inventories to support the water management pressures arising from the pit expansion, such as dewatering requirements; and
- Provide information on how the pit will be managed post closure.

# 9 Other risks

## 9.1 Greenhouse emissions

- Describe the quantity and sources of greenhouse gas emissions caused by the project and any actions to mitigate or offset emissions (see sections 12.1 and 12.2).

## 9.2 Dust emissions

- Describe the sources of dust emissions and particulate matter caused by the mining, processing and transport from the McArthur River Mine;

- Demonstrate that zinc and lead laden dust mitigation measures at the mine site will ensure that an increase in production will not cause environmental contamination or health issues; and

- Demonstrate that monitoring of dust emissions at mine site and Bing Bong Port will measure effectiveness of mitigation measures.

## 9.3 Road maintenance and Bing Bong Port facility

The Phase 3 Development Project would double the amount of zinc concentrate produced that will be exported through the Bing Bong Port. This will require additional vehicle movements along public roads, loading of concentrate and shipping movements.

- Describe increases in traffic movements and required road upgrades to allow for additional vehicle movements on the route between the mine and the port (concentrate haulage) and to the mine site along the Carpentaria Highway (general goods and services). The EIS should detail and examine the adequacy of the MRM's current transport methods (i.e. the operation of innovative road train combinations utilising quad axle groups (under permit)) for the haulage task. Refer to section 12.6 for additional transport information requirements;

- Provide details on whether the port infrastructure will require upgrading to allow additional handling of concentrate;

- Provide an assessment of dust mitigation at the loading facilities of the port and offshore transfer zone and whether an increase in loading will cause environmental harm through escape of dust from loading concentrate; and

- Provide an assessment of the potential risk of boat strikes on marine mammals caused by an increase in shipping movements around and between the port and offshore loading facility.

## 9.4 Mosquito breeding sites

- Provide an assessment of the risk of health problems associated with mosquito breeding caused by expansion activities and any rectification works to breeding sites. Reference should be made to the Department of Health report *Mosquito Monitoring Program McArthur River Mine 2010/11* for potential issues arising from expansion works and also regulatory notes at Section 13.5.

## 9.5 Visual impacts

The expansion will add to existing infrastructure that is proposed to be placed near the Carpentaria Highway and potentially near culturally sensitive sites.

- Provide details on the expected visual impact of the proposed TSF, OEF, other facilities and components of the McArthur River Mine that may be visible from public areas;

- Identify any proposed measures to minimise visual impacts; and

- Demonstrate that stakeholders have been consulted on the location, size and visual impacts associated with the proposed expansion.

## 9.6 Social and economic impacts

- Describe the broader social impacts the project is expected to provide to the local community, including any positive and negative impacts that may arise from the expansion project and the additional time to the mine life;

- Provide information on impacts from additional road and sea transport that may impact on the community;

- Community liaison and consultation is to include identification of, and ongoing consultation with, stakeholder groups to ensure the full range of community viewpoints are sought and considered. MRM is to outline its current and proposed methods for community consultation, including how it will respond to community feedback, questions and concerns in a formal, publicly accessible communication plan for the project; and

- Identify and discuss expected regional, Territory or national benefits and costs (including those that cannot be adequately described in monetary or physical terms e.g. effects on cultural and aesthetic amenity), in the short and long term.
- Provide a detailed assessment of the anticipated economic and business impacts and benefits of the proposal;

- Provide information on the expected contribution of the project to the Northern Territory economy;

- Provide a description of employment and training opportunities arising from the project, particularly in relation to Indigenous employment and training Programs;

- Provide details of industry participation and engagement opportunities resulting from the proposal; and

- Provide details of planned community engagement activities including expected benefits to the local and wider Territory community

# 10 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;
- A summary table listing the undertakings and commitments made in the EIS, including clear timelines for key commitments and performance indicators, with cross-references to the text of the EIS; 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 EIS and incorporating the Assessment Report recommendations and conclusions.

# 11 Public involvement and consultation

The EIS has an important role in informing the public about this proposal. It is essential that the proponent demonstrates 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.

# 12 Policy and guidance notes

## 12.1 Greenhouse gas emissions and climate change guidelines

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.

The Environmental Impact Assessment Guide (http://www.nt.gov.au/nreta/environment/assessment/eiaguide/pdf/EA_Guide_Greenhouse_Clim.pdf) 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 associated with projected future climatic conditions under the Northern Territory *Environmental Assessment Act*.

## 12.2 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 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 EIS 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.

## 12.3 Biodiversity and natural resource guidelines

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 www.environment.gov.au/epbc/guidelines-policies.html.

For any vegetation surveys reference should be made to the *Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping* (Brocklehurst 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.

## 12.4 Erosion and sediment control guidelines

It is important that the proponent comprehensively addresses the need for erosion and sediment controls, sediment capture, runoff collection and storm water drainage, dust control, etc. as described in the NT Erosion and Sediment Control Guidelines to ensure best practice: www.nt.gov.au/nreta/natres/soil/management/index.html.

## 12.5 Mine closure guidelines

Mine closure is an important step of the mining process and should be done as early as possible in the preliminary stages of planning, even before a mine opens. This allows for the most options to be considered and can result in lower costs at the time of closure. Closure planning is a progressive process that requires review and improvement throughout the mine life. In many

instances closure will not occur for decades, however it is important to demonstrate that ecologically sustainable closure can be achieved prior to commencement. The West Australian Environment Protection Authority and Department of Mines and Petroleum have mine closure guidelines that could be used in the formulation of a closure plan at www.epa.wa.gov.au/Policies_guidelines/other/Pages/GuidelinesforPreparingMineClosurePlans.aspx.

## 12.6 Transport guidelines

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 (for mine proposals only);
4. Description of construction methods and timeframes for any proposed private and public haul roads (for mine proposals only);
5. Consultation undertaken with relevant regulatory agencies; and
6. Necessary approvals required.

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

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.

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 axle 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.

# 13 Regulatory Notes

In addition to the requirements outlined in the Guidelines above, the following advice must be considered.

## 13.1 Public health or food premises and accommodation facilities

If shops or accommodation facilities are to be provided on the project site, Northern Territory Department of Health (DOH) will require detailed plans submitted via a building certifier, prior to construction, for any future public health or food premises built on the proposed lots. This would include food businesses, public accommodation, swimming pools etc. The DOH Environmental Health Section requirements for such a development can be found in fact sheet 700 for Mining, Construction and Bush Camps, located at the following link www.health.nt.gov.au/environmental_health/health_risk_assessment/index.aspx

Mine site kitchens that are not self catering, should hold NT Food Act registration with the Department of Health. Construction and fit out of kitchen facilities should be consistent with standards contained in Australia and New Zealand Food Standards Code.

All proposed sleeping accommodation rooms should be designed and constructed in accordance with the Building Code of Australia (BCA) and NT Public Health Act and regulations and reference should be made to the proposed NT Standard for Prescribed Commercial Accommodation. All prescribed accommodation must be registered with the DoH, Environmental Health Unit within terms of the NT Public Health (Shops, Boarding Houses, Hostels and Hotels) Regulations.

## 13.2 Water supply

The provision of an adequate potable water supply needs to be provided for mine sites and work places. All water supplies collected from groundwater must be at least 100 metres from any effluent drainage system or other water bodies as described in the *NT Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent (The Code).*

## 13.3 Wastewater

If the existing effluent treatment system at the mine site is to be used to treat effluent, written certification will be required from a suitably qualified hydraulic consultant, stating that the existing effluent disposal system has the capacity to handle the extra load in accordance with the Code.

If a new effluent treatment system is to be installed to treat effluent, DOH requires a notification to install a waste water treatment system outside of a building control area. Any waste water treatment system(s) installed on-site shall be capable of collecting, treating and disposing of waste water on-site in accordance with the Code.

Details of the proposed wastewater treatment system will need to be provided to the DOH for comment and appropriate action and a Land Capability Assessment may be required. Fact Sheet 508 regarding Land Capability assessment can be found at www.health.nt.gov.au/environmental_health/wastewater_management/index.aspx.

It should be noted that if the daily waste water flow exceeds 22kL/day or a capacity of 150EP an application for recycled water systems will be required. All waste water from ablution facilities shall be directed to the waste water treatment system.

Any discharge of wastewater from the mining lease will require a Waste Discharge Licence under the *Water Act 1992*. Guidance and application forms can be found at the following site: www.nt.gov.au/nreta/environment/licences/guides.html#water.

### 13.4 Solid waste storage and disposal

An area of land should be set aside for the safe storage of waste in order to prevent illegal dumping taking place and the creation of a potential public health nuisance and environmental pollution. Any new waste disposal site should be developed in accordance with the NT Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites.

### 13.5 Mosquito breeding and mosquito borne disease protection

Management should conform to applicable sections of the following DOH Guidelines: Regular wet season inspections should be conducted to locate artificially created depressions caused by site disturbance, dredge storage activities, and road construction. Water ponding areas should be fixed the following dry season by filling or draining, or a combination of both.

- *Guidelines for Preventing Mosquito breeding associated with Construction Practice near Tidal Areas in the NT.* Available at: www.health.nt.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/32/37.pdf&siteID=1&str_title=Construction%20practice%20near%20tidal%20areas%20-%20guidelines%20to%20prevent%20mosquito%20 breeding.pdf.
- *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites*. Available at: www.health.nt.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/32/40.pdf&siteID=1&str_title=Guidlines%20for%20preventing%20mosquito%20breeding%20sites%20association%20with%20Mining%20Sites.pdf A desktop investigation should be conducted to determine mosquito breeding sites nearby in consultation with Medical Entomology of the NT Department of Health.
- *Personal Protection from Mosquitoes and Biting Midges*. Available at: *http://digitallibrary.health.nt.gov.au/dspace/handle/10137/264*. Mine staff should be made aware of the appropriate personal protection measures against biting insects for the prevention of mosquito born disease, which is outlined in the DOH guideline.

# 14 References

Brocklehurst, P., Lewis, D., Napier, D., Lynch, D. (2007) Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping. Technical Report No. 02/2007D. Department of Natural Resources, Environment and the Arts, Palmerston, Northern Territory.

McKenzie, NJ., Grundy MJ., Webster R., & Ringrose-Voase AJ. (2008) Guidelines for Surveying Soil and Land Resources 2nd Edition, CSIRO Publishing, Collingwood.

NCST (2009) Australian Soil and Land Survey Field Handbook (3rd ed.), The National Committee on Soil and Terrain, CSIRO Publishing.

RET (2011) *Best Practice Environmental Management in the Mining Industry* (Webpage). Australian Government Department of Resources Energy and Tourism (RET). Available at: www.ret.gov.au/resources/resources_programs/lpsdp/best_prac/Pages/default.aspx. Accessed: 12 July 2011.

TEAM NT (2004) Northern Territory Minerals Council (Inc.) and the Mines and Petroleum Management Division of the Northern Territory Government, TEAM NT: Technologies for Environmental Advancement of Mining in the Northern Territory: Toolkit, D.R. Jones and M. Fawcett, principal authors. Posted on the Northern Territory Minerals Council web page at: http://ntminerals.org.au/VisionEdit/files/TEAMNT.pdf.

Other resources

DITR (2007) *Managing Acid and Metalliferous Drainage*, Leading Practice Sustainable Development Program for the Mining Industry produced by the Department of Industry, Tourism and Resources, Canberra (available on DMP website www.dmp.wa.gov.au/documents/file_MAMD20070227104556.pdf) and other relevant handbooks from this series.

The International Network for Acid Prevention (INAP), 2009. Global Acid Rock Drainage Guide (GARD Guide). http://www.gardguide.com/.