Northern Territory Environment Protection Authority

TERMS OF REFERENCE FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT

MOUNT PEAKE PROJECT
TNG LIMITED

March 2014

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Acronymns and Abbreviations Used in this Document

AAPA	Aboriginal Areas Protection Authority
AMD	Acidic and/or Metalliferous Drainage
AS/NZS	Standards Australia / Standards New Zealand
CO	Carbon Monoxide
DoH	NT Department of Health
EA Act	NT *Environmental Assessment Act*
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Comm)
ESCP	Erosion and Sediment Control Plan
Fe_2O_3	Hematite
GIS	Geographic Information System
ha	hectares
JORC	Joint Ore Reserves Committee
JORC Code.	The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves
km	kilometres
km^2	square kilometres
m	metres
MCP	Mine Closure Plan
NES	National Environmental Significance
NOI	Notice of Intent
NO_X	Nitrogen oxide
NT EPA	Northern Territory Environment Protection Authority
NT	Northern Territory
NNW	North-North-West
PAF	Potentially Acid Forming
PASS	Potential Acid Sulfate Soils
ROM	Run of mine
SO_2	Sulfur dioxide
SOX	Sulfur oxides
TDS	Total Dissolved Solids
the Project	The Mount Peake Vanadium-Iron-Titanium Project
the Proponent	TNG Limited
TiO_2	titanium dioxide
TIVAN	Proposed new processing technology trademarked by TNG
TPWC Act	*Territory Parks and Wildlife Conservation Act 2000* (NT)
TSF	Tailings Storage Facility
V_2O_5	Vanadium pentoxide
WRD	Waste Rock Dump

1 Introduction

TNG Limited (the Proponent) proposes to develop and operate the Mount Peake Vanadium-Iron-Titanium Project (the Project) at Mount Peake, 280km NNW of Alice Springs and 60km west of the Stuart Highway. The Project includes open-cut mining of a polymetallic ore body, followed by ore beneficiation to produce a magnetite concentrate and / or hydrometallurgical processing to extract vanadium pentoxide flake (V_2O_5), titanium dioxide (TiO_2) and hematite powder (Fe_2O_3). The Joint Ore Resource Committee (JORC) Mineral Resource is estimated at 160 Million tonnes providing for an initial mine-life of 20 years. Workforce would peak at around 350 workers. The configuration is yet to be finalised with regard to the hydrometallurgical plant location, waste rock/tailing storage type, and whether the 90km product transport to the Alice Springs to Darwin Railway would be via road-train or pipeline, before transport by rail to East Arm Wharf. New infrastructure requirements include:

Mount Peake Mine Area

- 150m-deep pit
- beneficiation plant
- hydrometallurgical plant including acid plant and oxygen generation facility (onsite or offsite, yet to be determined)
- dry stacked tailings cell, or conventional Tailings storage facility
- waste rock dump
- concentrate stockpile
- product stockpiles for titanium dioxide and hematite (or magnetite)
- leach and salt residue storage cells
- run of mine (ROM) pad
- gas-fired power station
- water and waste water treatment plants
- water treatment ponds or tanks
- explosives and detonator magazines
- bulk fuels storage area and water storage tanks
- mine access road
- gas and water pipelines
- construction camp and accommodation village
- administrative, control, laboratory, workshop and storage buildings
- air strip
- gatehouse and weighbridge
- workshops and offices.

Rail Siding

- product rail load-out facility at Adnera including hard stand storage shed for containerised vanadium and product stockpiles for titanium dioxide and hematite (or magnetite concentrate); and
- If transport via slurry pipeline is selected, additional new facilities required could include: filtration area with:
    - thickeners;
    - pressure filters;
    - control room; and
    - buffer tanks.
- transfer pond or tank;
- slurry pipeline from the Project Mining Area to Adnera Rail Siding; and
- return water line.

Corridors

- infrastructure pipeline corridor (gas, +/- slurry, +/- return water, <90km / 100.8 ha);
- road transport corridor (90km, 310 ha);

East Arm Wharf

- stockpiles for Fe_2O_3, TiO_2 and / or magnetite concentrate.
- laydown area for containerised V_2O_5; and
- reclaim hopper.

The Proponent submitted a Notice of Intent (NOI) for the Project to the Northern Territory Environment Protection Authority (NT EPA) on 4 July 2013 for consideration under the NT *Environmental Assessment Act* (EA Act). On 13 November 2013 the NT EPA decided that the Project required assessment under the Act at the level of an Environmental Impact Statement (EIS).

A review of the NOI identified that the project will potentially have a significant impact on the environment. The following environmental risks have been identified:

Environmental risks:

- waste rock dump (WRD) and dry stacked tailings cell, or conventional Tailings Storage Facility (TSF);
- potential for Acidic and/or Metalliferous Drainage from the WRD, TSF and other mine infrastructure;
- handling, storage and transport of mineral products: hematite powder (Fe_2O_3), vanadium pentoxide flake (V_2O_5), titanium dioxide (TiO_2) and magnetic concentrate;
- product transport alternatives to the railhead, i.e. slurry pipeline vs. road train transport;

- potential for product concentrate spills, such as from ruptured pipelines, traffic and rail transport accidents, and wind and water erosion of product stockpiles;
- alternative hydrometallurgical plant locations;
- handling, storage and transport of reagents and/or hazardous materials, including: hydrochloric acid, organic solvent, sulphuric acid, sulphur, sodium hydroxide, sodium chloride, calcium carbonate, oxygen, sodium hypochlorite; flocculent; and fuels;
- storm surge (East Arm Wharf infrastructure); and
- closure and rehabilitation.

Potential impacts to:

- sites of biological conservation significance, including Mud Hut Swamp and Anmatyerr North, downstream of the Project Area;
- sites of Aboriginal heritage significance;
- sites of cultural heritage (Indigenous and non-Indigenous);
- flora and fauna species of conservation significance for the NT and nationally;
- local communities;
- workers, such as from inhalation of product dust; and
- livestock at neighbouring pastoral properties.

Uncertainties:

- whether sufficient water will be available for the Project;
- whether ground and surface water resources will be protected from contamination;
- whether sensitive receptors to mine impacts have been identified. Impacts might include:
    i. groundwater drawdown (cone of depression) associated with pit dewatering, potentially affecting groundwater dependent ecosystems, livestock, nearby communities or other users of shared potable aquifers;
    ii. dust (including product dust) at all Project locations;
    iii. power station emissions;
    iv. erosion and sedimentation; and
    v. groundwater and surface water contamination.
- whether negative social and economic impacts will be avoided, and benefits optimised;
- whether breeding sites for biting insects will be created; and
- whether clearing of native vegetation will be minimised where possible.

The NT EPA decision that the project requires assessment at the level of an EIS was based upon the above potential environmental impacts and risks. Further studies and a

more comprehensive assessment were considered to be required to ensure environmental impacts from the proposal would be minimised.

The Project was referred by the Proponent to the Australian Department of the Environment for consideration under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). On 13 November the Project was determined to be a controlled action under the EPBC Act due to the potential for significant impacts to listed threatened species and communities (Sections 18 & 18A). On the same day, a delegate for the Minister for the Environment agreed to accredit the Northern Territory's assessment process under the EA Act for the purposes of assessing the Project.

2 General Advice on EIS

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.

The EIS should enable interested stakeholders and the NT EPA to understand the environmental consequences of the proposed development. Information provided in the EIS should be objective, clear, succinct, and easily understood by the general reader. Maps (using an appropriate scale, resolution and clarity), plans, diagrams and other descriptive detail should be included. Technical jargon should be avoided wherever possible. Cross-referencing should be used to avoid unnecessary duplication of text.

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 a limitation, if any, of available information may influence the conclusions of the environmental assessment should also be discussed.

Information materials summarising and highlighting risks of the Project should be provided in a culturally appropriate format and language, where relevant.

2.2 Format and Style

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

The EIS should comprise of three elements:

- Executive summary

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.

- Main text of the document

The main text of the EIS should include a list of abbreviations, a glossary to define technical terms, acronyms and abbreviations, and colloquialisms. The document should consist of a series of chapters detailing the level of significance of the expected and potential impacts on the environment from the Project.

- Appendices

The appendices must include detailed technical information, studies or investigations necessary to support the main text that can be made publicly available, including:

- a table listing how these Terms of Reference have been addressed in the EIS, cross-referenced to chapters, page numbers and/or appendices;
- an outline of the relevant legislation, codes, standards and guidelines applicable to the Project;
- a list of persons and agencies consulted during the Environmental Assessment process;
- the names of, and work done by, the persons involved in preparing the EIS; and
- the qualifications and experience of the people involved in work contributing to the EIS.

The EIS must be written so that any conclusions reached can be independently assessed. 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.

2.3 Administration

The Proponent should lodge ten bound, hard copies and an electronic (Adobe PDF format) copy of the EIS with the NT EPA and two bound hardcopies with the Australian Government Department of the Environment (DoE). The electronic copies should be provided both as a single file of the entire document and separate files of the document components. Additionally, a Microsoft Word copy of the EIS should be provided to facilitate the production of the Environmental Assessment Report. The proponent should consider the file size, the number of files, format and style of the document appropriate for publication on the NT EPA website. The capacity of the website to store data and display the material may have some bearing on how the document(s) are constructed.

Hard copies of the EIS document should be offered to all neighbours of the Project, and other significant stakeholders.

At a minimum, the Proponent is to advertise when the EIS will be available for review and comment in *The Centralian Advocate, Tennant and District Times* and *NT News*.

To ensure sufficient time to review the advertisement and upload the documentation, the NT EPA requires that an electronic copy of the draft EIS and the draft advertisement is submitted to the NT EPA at least one week prior to advertising the draft EIS.

2.4 Public Involvement and Consultation

The draft EIS has an important role in informing the public about the risks associated with the Project. It is essential that the Proponent demonstrate how any public concerns were identified, and how those concerns will influence the design and delivery of the Project. 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 Project as a result of consultation.

To ensure that the draft EIS is publicly available to interested members of the public or stakeholders, the NT EPA requires that it be made available for a period of at least six weeks, at the following locations:

- NT Environment Protection Authority, 2nd Floor, Darwin Plaza, 41 Smith Street Mall, Darwin;
- Mines and Energy Information Centre, Department of Mines and Energy, 3rd Floor, Paspalis Centrepoint, 48 Smith Street Mall, Darwin;
- Department of Lands, Planning and the Environment, Floor 1, Alice Plaza Building, Todd Street Mall, Alice Springs;
- Central Land Council, 27 Stuart Hwy, Alice Springs;
- Northern Territory Library, Parliament House, Darwin;
- Alice Springs Public Library, Gregory Terrace, Alice Springs (telephone 8950 0555 Email: library@astc.nt.gov.au);
- Tennant Creek Public Library (telephone: 8962 2657 Email: library@tennantcreek.nt.gov.au); and
- Arid Lands Environment Centre, Alice Springs. Office cnr Warburton St and Lindsay Ave, Alice Springs NT 0870. (telephone: 8952 2497, email: info@alec.org.au)

The EIS exhibition period should not occur in late December or January in any year to ensure optimal opportunity for public and Government viewing of the EIS document. Additional time will be added to the EIS exhibition period if the EIS exhibition overlaps any Christmas and January periods.

3 Description of the Proposed Development

3.1 General Information

The EIS should provide a brief background and context to the Project, including:

- the title of the Project;
- the full name and postal address of the Proponent;
- an explanation of the objectives, benefits and justification for the Project;
- the Project's location in the region and its proximity to landmark features, sites of cultural/social significance, regional community centres, and sensitive environments such as major waterways, significant groundwater resources, significant natural features, conservation reserves and any areas on the National Reserve System;
- details of the Proponent's environmental record, including details of any proceedings against the Proponent under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources;
- climate and atmospheric characteristics relevant to the Project (e.g. air quality, wind speed and direction, seasonal temperatures, humidity, wind, evaporation, extreme events and rainfall);
- agreements between the Northern Territory Government, Traditional Owners, land manager(s) and the Proponent;

- the background to the development of the Project including discussion of previous environmental impact assessment and overview of historic mining activities;
- identification of areas under exploration which may be mined in future, or any other potential future activities being planned;
- how the Project 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;
- National and Northern Territory standards, codes of practice and guidelines which may be relevant to the Project;
- an overview of the schedule for the whole Project; and
- the current status of the Project.

3.2 Description of the Proposal

The EIS should identify all the processes and activities intended for the Project, and any associated ancillary activities, during the life of the Project. As background to discussion of specific components, the following should be included:

- an outline of the geology of the area including:
  - a summary of the results of studies and surveys undertaken to identify the extent of the resource within the Project area;
  - geological properties of the Project site including the results of studies to identify sulphidic ores;
  - characterisation of classes of ore and waste rock; and
  - the results of geotechnical studies undertaken for the purposes of designing open pit(s), waste rock dump(s), tailing storage facilities and water storage facilities.
- delineation of the Project footprint using detailed maps and diagrams, including:
  - location of the resource/s to be explored, developed or mined;
  - all areas to be cleared or disturbed (including mine, haul roads, pipeline corridors, product stockpiles and other infrastructure), both for the life of the Project and temporarily, prior to rehabilitation;
  - the location of any works to be undertaken, structures to be built or elements of the proposed Project. Where relevant this must include, but is not limited to, the location of the mine, water extraction points and storage facilities, roads, airfield, accommodation village or construction camp/s, hard stands, stockpiles (soil/ore/waste rock), haul roads, product rail load-out facility, beneficiation plant, hydrometallurgical plant, pipeline corridors, rail siding, and product export facilities;

Additionally, data should be provided to the NT EPA as importable GIS shape files with relevant features and areas marked as polygons, lines and points, and any relevant geospatially referenced underlays also included.

3.3 Project Components

3.3.1 Mine

Provide the following information (where relevant) with regard to mining activities for the Project:

- design details, dimensions and design concepts for the:
  - open-pit;
  - waste rock dump;
  - tailings storage facility;
  - run of mine (ROM) pad;
  - mine access road;
  - leach and salt residue storage cells;
  - explosives and detonator magazines;
  - product and other stockpiles; and
  - other significant mine infrastructure.
- timetable for construction, including staging of construction activities;
- native vegetation (community types, areas) to be cleared and disposal of consequent plant matter;
- methods of mine construction, including estimates of the volume of materials required for waste rock and tailings storages;
- sources and quantities of clay required, such as for construction of the TSF / WRD, drains, water dams and other mine infrastructure; and
- details of the plant and machinery required.

Provide specific details on the following aspects of operation:

- mining types and methods, including the major equipment to be used in the various components of the operation;
- handling/stockpiling of topsoil and waste materials;
- quantity of material to be mined, ore produced and waste rock generated annually, and any proposed ramping up of production or staging of development;
- describe methods for disposing of waste rock, tailings and any other residues;
- provide conceptual designs of the pit, WRD, TSF, processing facilities and power station to indicate their scale in relation to existing surrounding landscape; and
- timetable for operation of the mine including the targeting of each prospect or deposit.

3.3.2 Processing

Provide relevant information with respect to the beneficiation and processing plants, including but not limited to:

- conceptual designs and footprints of the Project beneficiation and processing plants;
- clearing and preparation of the site;
- final location of the sites;
- transport of materials to the site and assembly of the plants;
- ore beneficiation and processing methods, including flow diagrams, chemistry, quantities, variables, inputs and outputs;
- the recovery method proposed (including flow diagrams);
- history and explanation of the proposed TIVAN process, and evidence to demonstrate its levels of reliability to fulfil design specifications and mine processing objectives; and
- the physical and chemical characteristics of tailings and screenings.

3.3.3 Road Transport

Identify proposed routes for transport of construction materials, personnel, product and supplies for the Project, including use of existing transport infrastructure. Details of proposed road construction and/or upgrades should be provided, including:

- road designs, including methods of river crossings and intersection with other roads, including the Stuart Highway;
- maximum and average width of road corridors required for construction;
- plant and machinery required;
- road building material sources;
- vegetation clearing methods and disposal of plant matter following clearing;
- location of campsites for construction crews, if required;
- the results of surface water investigations in and around proposed road structures;
- sources of construction inputs and materials;
- methods including crossing techniques which will be used when bisecting creeks or linear infrastructure (provide cross section diagram/s);
- timeframes for transport infrastructure construction/upgrade;
- design requirements, Legislative approvals and/or requirements which will be applicable to the construction of the road; and
- ongoing provisions for transport infrastructure maintenance, including source and extraction of maintenance inputs and materials.

Details of road use should be provided including:

- type, size and number of vehicles required during all phases of the Project;
- estimated frequency of Project vehicle use on public roads;
- identification of sites of increased road traffic density, and potential traffic accident hotspots, such as around construction camps;
- requirements for new restricted speed limits due to roadworks;
- methods to convey all site traffic (including materials, workers and product) to and from the site;
- routes for transport, including details of proposed routes for over-dimension or very heavy loads, and when/where oversize escorts would be required,
- details of the method of truck loading and load constraint;
- peak user times for vehicular movements by staff/contractors;
- hazardous or dangerous material which may be transported (type, hazard, quantity, frequency, routes);
- additional transport infrastructure works required, including site access and signage; and
- hours of operation.

Describe proposed methods of product transport and export.

3.3.4 Infrastructure Corridor

Identify proposed route(s) for infrastructure corridor(s), such as for gas, concentrate slurry and water pipelines. Details of proposed corridor construction and maintenance should be provided, including:

- land tenure, and status of landholder agreements;
- design details of the corridor(s) and contained infrastructure;
- locations of non-linear items within corridors, such as pumping stations;
- maximum and average widths of infrastructure corridors required for construction;
- plant and machinery required;
- vegetation clearing methods and disposal of plant matter following clearing;
- location of campsites for construction crews, if required;
- the results of surface water investigations in and around proposed structures;
- sources of construction inputs and materials;
- designs and construction methods which will be used when bisecting creeks or linear infrastructure (provide cross section diagram/s); and
- design requirements, Legislative approvals and/or requirements which will be applicable to the construction of infrastructure corridors.

3.3.5 East Arm Wharf

Identify all infrastructure relating to the storage and shipping of material, in particular:

- stockpiles for material such as Fe_2O_3, TiO_2 and / or magnetite concentrate;
- laydown area for containerised V_2O_5; and
- reclaim hopper.

3.3.6 Water

Describe water-related infrastructure for the Project including location, footprint, design details and objectives for each of the following:

- water treatment systems, including sediment ponds;
- storage ponds (describe contents);
- pumps, pipelines, etc.;
- effluent disposal systems.

In addition:

- estimate water requirements (rates / quality) for (components of) the Project.
- estimate pit dewatering rates, de-water quality and describe proposed management of extracted waters.

3.3.7 Energy

Determine Project electricity and fuel requirements including proposed alternative fuels if a gas pipeline is not viable. Provide:

- description and map the proposed electricity, fuel and gas supply and storage infrastructure;
- conceptual designs and objectives of proposed power plants; and
- description of gas source(s) and any constraints to availability.

3.3.8 Waste management

Describe waste streams, and their management, storage, treatment and disposal;

- through construction and operational phases;
- at each Project component location;
- including industrial and domestic waste streams; and
- waste stream phases (solid, liquid, gas), environmental residency, environmental or human hazards, and proposed treatment and management.

In addition:

- provide an inventory of any hazardous wastes requiring management during the Project;
- describe proposed management of each hazardous waste type;
- define Legislation, standards and/or Guidelines applicable to handling of each type of hazardous waste.

3.3.9 Workforce and accommodation

- describe the number of people to be employed, skill-sets required, and likely sources (local, regional, overseas) of workforce during construction and operational phases;
- discuss arrangements for transport of workers to and from project areas, including air services required;
- specify the number of people to be employed to manage or undertake environmental duties on the site, and minimum requirements for qualifications and experience.

For the proposed construction camp / accommodation village, provide brief information on aspects of the facility such as:

- conceptual designs of:
  - construction camp;
  - accommodation village; and
  - administrative, control, laboratory, workshop and storage buildings.
- layout of the camp / village with respect to work sites and mining and processing operations;
- requirements for food preparation and storage; and
- whether the premises will be licensed and include alcohol storage facilities.

3.3.10 Adnera Rail load-out facility

- describe the facility's purpose and capabilities;
- describe facility components, footprints, configuration, product handling and processing;
- where relevant, include conceptual details of the:
  - filtration area with:
    - thickeners;
    - pressure filters;
    - control room; and
    - buffer tanks.
  - transfer pond or tank;

  - slurry pipeline; and
  - return water line.
- describe construction requirements and timing;
- describe proposed load out facility operations, workforce, raw material and energy requirements, clearing footprint, and local environmental and community context.

3.3.11 Ancillary infrastructure

Provide construction and operational information regarding ancillary infrastructure, including, but not limited to:

- telecommunications;
- information on potentially hazardous materials to be used or produced and methods for storage, transport, handling, containment, disposal and emergency management of these materials (including fuel);
- airstrip; and
- any existing ancillary infrastructure that could be used by the Project.

3.3.12 Closure and rehabilitation

Discuss the various aspects of proposed progressive and final rehabilitation of disturbed areas, including:

- proposed staging/timing;
- soil profile reconstruction;
- final landform design and any voids or landscape depressions to be left at cessation of mining;
- rehabilitation techniques to be used and the final topographic and drainage morphology;
- the proposed revegetation program, with selection and collection of local native species (e.g. native grasses and other vegetation);
- other preparations required for successful rehabilitation (seed harvesting, seedling generation, etc.); and
- closure plans for individual Project components including the WRD, TSF, Pit(s), pipelines, corridors, roads, etc.

Describe mine closure plans including:

- plans for unexpected or forced closure;
- removal of plant, equipment, structures, hardstand and concrete footings, buildings, water storages, and methods proposed for stabilisation of affected areas;
- reinstatement of creeks where diversion of creeks is proposed during operations; and
- future land tenure arrangements.

4 Alternatives

The EIS should describe any feasible alternatives to carrying out the proposed activity. The choice of the preferred option(s) should be clearly explained, including how it complies with the principles and objectives of ecologically sustainable development. Alternatives should include:

- not proceeding with the Project;
- options for concentrate transport and export;
- site selection for Project components;
- mining methods;
- management of waste rock and tailings streams, and waste facility designs;
- rehabilitation methods;
- methods of product treatment, storage, transport and export;
- energy sources for power generation; and
- consideration of alternative environmental management measures for key risks/impacts.

Discussion should include:

- adverse and beneficial effects of alternatives at national, territory, regional and local levels;
- the comparison of short (whilst operational), medium (post closure) and long term advantages and disadvantages of the alternatives;
- detailed alternative Project infrastructure configurations being considered in equivalent terms as in the preceding sections (above);
- the EIS should include an analysis of potential alternatives that will reduce net water use for the Project and contamination of water resources by the Project; and
- a comparative description of the impacts of each alternative on the matters of National Environmental Significance (NES) protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) controlling provisions applicable to the Project (Sections 18 & 18A - Listed Threatened Species and Communities).

5 Risk Assessment

5.1 Risk Assessment Approach

The EIS should be undertaken with specific emphasis on the 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 Project, including those of special concern to the public;

- quantify 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; 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 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. Levels of uncertainty that preclude robust quantification of risk should be clearly acknowledged.

Risk rankings assigned should be fully justified. Where a risk score associated with the likelihood or consequence of an impact is reduced as a result of proposed mitigation measures, clear justification should be provided for the reduction in score. The adequacy and feasibility of mitigation measures must be demonstrable.

Sufficient quantitative analysis should be provided to indicate whether risks are likely to be acceptable or tolerable. A comparison can be made with similar ventures in Australia and internationally. Assumptions used in the analyses should be explained. Relevant standards, codes and best practice methodologies that minimise risks should be discussed.

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; HB 203:2012).

A number of key Project risks have been identified through a preliminary assessment of the Project. Each of the risks defined in this Terms of Reference (Sections 1 and 5.2-5.8) should be addressed by the Proponent in the risk assessment and management process.

Additionally, it is expected that further risks will be identified through the comprehensive risk assessment process required for the EIS. These should also be addressed and appropriate management initiatives developed.

Environmental objectives, or overarching goals, and environmental values to be protected have been identified for each key risk.

5.2 Risks to Ground and Surface Water Resources

Key Risks

- potential for Acidic and/or Metalliferous Drainage (AMD) from the waste rock dump, tailings storage facility and other mine infrastructure, to contaminate shared water resources;
- surface water quality may be impacted by spills to surface water and runoff containing hazardous substances or elevated sediment concentrations;
- contamination of groundwater could occur through leaks from storages or pipelines and spills during handling of contaminants, chemicals and toxicants; and

- practically available water sources will not be sufficient to supply the needs of the proposed Project configuration; or will not be sufficient without causing environmental or social impacts.

Environmental Objectives

- demonstrate that available water supplies will be sufficient to fulfil the Project needs over the predicted life-of-mine, without causing environmental or social impacts.
- demonstrate that project configuration will optimise reduction of net water use for the Project and minimise contamination of water resources.
- ensure that surface water and groundwater resources and quality are protected both now and in the future, such that ecological health and land uses, and the health, welfare and amenity of people are maintained.

Information Requirements

- define water sources that may be used to fulfil the requirements of the Project, including:
  - target bore fields (existing / proposed) and surface waters;
  - predicted extraction rates;
  - seasonal requirements for additional clean water;
  - sources of water for construction of roads and infrastructure corridors; and
  - sources and requirements of potable water.
- describe the existing mine-site and regional hydrogeology in terms that will provide a comprehensive baseline of pre-disturbance conditions. The baseline should be adequate to identify any changes that may have occurred as a result of the Project. Emphasis should be given to factors that are likely to be affected by Project activities, such as, levels of aluminium that may be affected by tailings slurry, water-table depth and pit dewatering.

The EIS should include information on the current groundwater resources. In particular, the draft EIS should:

- map, describe and model site and regional groundwater resources for the mining leases, ore-processing and water extraction points.
- discuss significance and sensitivity of site and regional groundwater resources from ecological, public/social and economic perspectives. Include description of:
  - existing groundwater users;
  - location of groundwater bores for the Project with respect to any groundwater dependent natural features and community uses;
  - groundwater depths;
  - directions and rates of groundwater flow;
  - groundwater quality, with particular emphasis on contaminants likely to be elevated from mining activities, such as values for yield, fluoride, nitrate, sulfate and Total Dissolved Solids (TDS);

- connectivity between aquifers and with surface waters;
- points of recharge / discharge;
- whether proposed bores or the Project footprint are within a declared Water Allocation Planning area. If so, describe how the proposed extraction can be accounted for in the relevant Water Allocation Plan; and
- estimate total reserves and annual recharge.

Provide a description of site and regional surface water resources in the vicinity of the proposed mining areas.

- describe surface water resources - water quality and significance;
- discuss sensitivity and significance of site and regional surface water resources from ecological, public/social and economic perspectives. Include description of water quality, flow rates, existing surface water users;
- define baseline surface water quality (acidity, metals, sulfate, salinity, nutrients, major ions etc.) for Murray Creek and Bloodwood Creek, Mud Hut Swamp and Anmatyerr North if data is available.
- the nature of Murray Creek, including when it flows, flow rates, catchment size, width, and where it flows to; and
- whether Murray Creek presents a seasonal flooding/erosion risk to the pit, plant or proposed bridges/crossings.

Designs of river crossings, stormwater drainage flows, flood flows should be based on the recently released changes in rainfall intensities by the Bureau of Meteorology.

Provide a water balance model for the Project, detailing

- each Project site;
- construction and operational phases;
- water sources (extraction rates / quality);
- water uses;
- water treatments (such as of supplies, stormwater, waste water discharges); and
- recycling.

Describe AMD potential, including potential for circum-neutral drainage, with respect to the WRD, TSF, ROM and other Project infrastructure. Include:

- characterisation of AMD potential of ore (high and low grade), tailings, and waste rock types to be exposed by the Project, using representative samples for geochemical test work;
- description of planning, testing, ongoing identification, segregation and management of Potentially Acid Forming (PAF) material to minimise AMD risk;
- incorporate the findings of various investigations into AMD potential for Project waste rock into the block model and mine-sequencing plan for the mine, to minimise AMD risk; and

- detail the findings of testing carried out in accordance with recommendations of the NT EPA Environmental Assessment Guidelines for Acid and Metalliferous Drainage.

Define applicable Legislation, standards, and/or Guidelines, and proposed containment, handling, and spill management of product at the Adnera and East Arm load-out facilities.

Assessment of risk

Provide a groundwater and surface water model for the mine and processing site(s), to predict groundwater drawdown and contaminant transport dynamics over time, and in response to alternative management actions and infrastructure configurations.

Predict potential impacts of the proposal on downstream flora and fauna and communities, including drawdown cones and pollution pathways.

Where identified discharge risks to water quality and related sensitive receptors occur for the Project, interactions should be illustrated in a Conceptual Site Model for the Project. The Conceptual Site Model should include relevant impacts to human health and safety as well as air quality for the project. Model design and information content should be in accordance with the NT EPA Guidelines on Conceptual Site Models. (Available online at: http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0005/349943/guideline_pollution_conceptual_site_models.pdf)

The draft EIS should include an assessment of the Project's risks to the surface and groundwater resources in the vicinity of the site and Project components, as well as regionally. In particular, the draft EIS should identify and assess the risks associated with:

- disturbance, storage, and management of PAF material and contingency management of AMD;
- groundwater drawdown (cone of depression) and its impacts on other groundwater users, existing springs and groundwater dependent ecosystems.
    - identify sensitive receptors and risks to sensitive receptors from the predicted cone of depression as a result of dewatering activities;
- the construction of any infrastructure that crosses, is adjacent to, or situated within waterways. The draft EIS should include an discussion of the risks associated with the new infrastructure altering the hydrology and rates of erosion, and sedimentation;
- uncontrolled or unplanned releases of environmental contaminants such as AMD, leaking storage facilities or pipelines, accidental spills of hazardous materials or hydrocarbons;
- disturbance of soils, allowing mobilisation of sediments, erosion, and sedimentation of waterways;
- impacts to local livestock, such as through the exposure to salt or other contaminants associated with mining or waste storage activities; and
- land degradation from disposal of brine, sulfates, wastewater or other contaminants.

Identify areas of the Project presenting risks of spills, or need for discharge of environmentally hazardous substances.

- describe any proposed application for a waste discharge licence, from the NT EPA.

Identify environmental toxicity and hazardous risk to personnel or other sensitive receptors from potential escape of:

- vanadium compounds / magnetite concentrate;
- processing tailings / by-products;
- hydrochloric acid;
- organic solvent;
- sulphur, sulphuric acid;
- sodium hydroxide, sodium chloride, sodium hypochlorite;
- flocculent; or
- fuels.

Identify risks associated with stockpile areas and rail load-out facilities; including at Adnera, the mine site, and at the site of the processing plants.

Identify risks to marine water quality associated with Project load-out facilities, stockpiles and lay-down areas at East Arm Wharf. Consideration should be given to risks associated with:

- potential for escape of Product concentrates, with:
    - stormwater runoff;
    - groundwater infiltration;
    - dust mobilisation; and/or
    - storm surge affecting Project areas at East Arm Wharf. Estimates of storm surge extents are available from the Department of Land Resource Management. Design of Infrastructure at East Arm Wharf should consider potential primary and secondary extent / height of storm surge.
- disturbance of Potential Acid Sulfate Soils (PASS). Characterisation and management of PASS should be undertaken in consultation with the NT Department of Land Resource Management.

Mitigation

Describe contingency environmental management against risk of:

- AMD or other hazardous substances escaping to local creeks and/or aquifers;
- spills or need for discharge of environmentally hazardous substances or hazardous to human health;
- offsite impacts of spills, such as to water resources, ecosystems, workers, the public or sacred sites;

- spills of processing inputs/outputs such as: vanadium compounds, processing tailings / by-products, hydrochloric acid, organic solvent, sulphuric acid, sulphur, sodium hydroxide, sodium chloride, sodium hypochlorite, flocculent, and fuels.
- spill of magnetite concentrate from the slurry pipeline;
- offsite impacts, such as to water resources, ecosystems, workers, the public or sacred sites; and
- spills as a result of storm surge at East Arm Wharf.

Describe how AMD will be prevented in and from the WRD, TSF, ROM and other Project infrastructure.

- for designs of the WRD, TSF, Mine Pit, ROM and other Project structures to be built with waste rock, describe conceptually how designs will prevent AMD. Support discussion with relevant design details to demonstrate minimisation of AMD risk.
- detail proposed AMD management with reference to: *NT EPA Environmental Assessment Guidelines - Acid and Metalliferous Drainage*.
- describe any further proposed environmental management actions that will reduce the risk of AMD developing.

Define proposed management and erosion and sediment controls in an Erosion and Sediment Control Plan (ESCP) for the Project (components) for:

- construction and operational phases;
- mine infrastructure such as temporary haul roads, stockpiles, ore dumps, construction of tailings facilities and surface works relating to mine rehabilitation/closure;
- Off-mining lease construction works, vegetation clearance and/or infrastructure development such as airstrips, roads and pipeline corridors;
- transport, load-out facilities, associated stockpile areas; and lay-down / stockpile areas at East Arm Wharf; and
- sites of creek and river crossings by mine infrastructure, roads and infrastructure corridors.

The ESCP should be prepared by a suitably qualified professional and be consistent with ICEA's Best Practice Erosion and Sediment Control Guidelines 2008. The ESCP should include maps and diagrams which display where control measures are proposed to be installed. Further information about the composition and detail of an ESCP can be found at www.austieca.com.au and www.lrm.nt.gov.au/soil/management . Cross reference may be appropriate with the required Dust Management Plan for the Project, as defined in Section *5.8 (Air Emissions).*

To mitigate likely impacts of the action on groundwater and surface water resources, the EIS should contain a detailed Water Management Plan that outlines clear and concise mitigation measures. The purpose of the plan is to maintain and protect both the quality and quantity of ground and surface water resources. All mitigation and monitoring measures in the Water Management Plan should be consistent with best practice advice from relevant Northern Territory and Australian Government advisory agencies. The Water Management Plan must include but not be limited to measures that:

- avoid contamination of surface or groundwater resources;
- ensure the protection and resilience of water dependent ecosystems;
- protect and monitor water quality and levels for existing users of bores and/or surface waters;
- avoid the exposure of livestock to salt or other chemical substances which may be harmful; and
- treat and manage domestic wastewater and sewage.

Monitoring

To determine the effectiveness of the mitigation measures, the Water Management Plan and ESCP should outline details of monitoring programs that will be implemented throughout the life of the Project. The monitoring programs should identify clear thresholds and contingency measures should operational activities affect water quality on the site.

Describe programs monitoring for leaks /spills /escape of hazardous materials from pipelines, storage facilities (including TSF) and transport operations to ensure protection of local soils, aquifers, environments, workers and the public.

5.3 Risks to Biodiversity

Key Risks

- biodiversity values, conservation status, diversity, geographic distribution or productivity of local native flora or fauna species or ecosystems may be degraded by Project actions.
- the Project may result in one or more of the following significant impacts to species or communities listed as threatened under the EPBC Act and/or *Territory Parks and Wildlife Conservation Act* (TPWC Act):
    - long-term decrease in the size of an important population of a listed threatened species or community;
    - adverse effects on habitat critical to the survival of a species or community;
    - fragmentation of an existing important population into two or more populations;
    - reduced area of occupancy of an important population or community; and/or
    - modification, destruction, removal or isolation of the availability or quality of habitat, to the extent that a threatened species or community is likely to decline.
- degradation of the environment may occur through the introduction and spread of weeds and/or pest fauna species within and adjacent to the Project area;
- project inputs of environmental pollutants may result in reduced water quality (offsite) and impacts on sensitive ecosystems supporting higher biodiversity values, such as aquatic, riparian or wetland habitats; and
- wildlife may be exposed to metals and/or pollutants from the Project that will result in ongoing impacts, especially to long-lived species that accumulate toxicants and metals.

Environmental Objectives

- to maintain the conservation status, diversity, geographic distribution and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts.
- to minimise the risk of significant impacts to EPBC Act listed threatened species and communities during construction, operation and closure of the Project.

Information Requirements

Baseline flora and fauna surveys are to be undertaken or presented to represent the entire Project footprint and associated areas, including but not limited to the:

- mining leases;
- corridors – road and infrastructure;
- rail siding site;
- any offsite processing plant site;
- adjacent areas potentially indirectly affected by, or sensitive to Project impacts
- Mud Hut Swamp, Anmatyerr North and connecting waterways (including surveys of aquatic and riparian ecosystems).

Vegetation community and habitat mapping should be undertaken across the Project footprint. The mapping should be of a standard that sufficiently identifies any areas which have already been subject to clearing activities or disturbance previously (if any) and to identify areas of vegetation that are proposed to be cleared. Mapping should include identification of any significant or sensitive vegetation types, at a scale appropriate to the assessment of risk to their biodiversity values.

The draft EIS should include the results of targeted surveys for listed threatened species and communities undertaken on the site. The draft EIS should include details of the survey methodology, sampling effort and qualifications of the survey team. Information on the minimum standards required for listed threatened species is available online at:

http://www.environment.gov.au/topics/about-us/legislation/environment-protection-and-biodiversity-conservation-act-1999/policy

and,

http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0003/349941/guideline_assessment_terrestrial_biodiversity.pdf.

The draft EIS should identify and discuss the potential for the Project to impact on any sites which are of biological conservation significance, including: Mud Hut Swamp, Anmatyerr North and downstream of the Project Area.

Information provided in the draft EIS for Areas at East Arm Wharf that have already been subject to an environmental impact assessment may be described utilising findings from previous assessments and surveys.

Assessment of Risk

Provide a detailed risk assessment outlining the potential risks to listed threatened species and communities as a result of the action. When assessing the risk of impact, the draft EIS should include references to relevant research as well as relevant statutory

plans including: action plans, recovery plans and threat abatement plans. The draft EIS should include the following information:

- a detailed assessment of the presence and potential impacts upon native fauna, including consideration where relevant of vegetation clearance, habitat fragmentation, creation of barriers to fauna movement, altered hydrology, water quality impacts, erosion and sedimentation impacting on waterways, soil compaction, inappropriate/ineffective rehabilitation, groundwater contamination, impacts on surface and groundwater systems, waste material, risks associated with transport and traffic during construction and operation, weed and pest invasion, dust and noise impacts;
- discussion of the potential impact of the Project to vegetation at a local and regional scale, including the potential for ongoing indirect impacts as a result of edge effects, weed incursion or other processes exacerbated through construction or operation of the Project;
- a discussion of the potential risks associated with the accidental introduction or spread of weed species onto or throughout the site. The discussion should consider relevant weeds of national significance and those listed under the *Weed Management Act*. Information on the records of weeds can be sourced from the Weeds Branch of the Department of Lands and Resource Management.
- Identification of all situations where construction and/or operation activities could potentially interact with listed threatened species and/or communities. Where a risk has been identified, the draft EIS should include a discussion of the severity of those risks to individuals and regional populations;
- a detailed assessment of the presence and potential impacts upon native fauna including consideration of the impacts of vegetation clearance, habitat fragmentation, altered hydrology, water quality impacts, erosion and sedimentation impacting on waterways, soil compaction, inappropriate/ineffective rehabilitation, groundwater contamination, impacts on surface and groundwater systems, waste material, risks associated with transport and traffic during construction and operation, weed and pest invasion, dust and noise impacts. Species assessed must include, but not be limited to:
    - giant sweet potato (*Ipomoea polpha latzii*);
    - dwarf desert spike-rush (*Eleocharis papillosa*);
    - black-footed rock-wallaby (MacDonnell Ranges race) (*Petrogale lateralis);*
    - greater bilby (*Macrotis lagotis);*
    - red goshawk (*Erythrotriorchis radiatus*);
    - great desert skink (*Liopholis kintorei*);
    - southern marsupial Mole (*Notoryctes typhlops*);
    - princess parrot (*Polytelis alexandrae*); and
    - mulgara (*Dasycercus cristicauda* and *Dasycercus blythi*).
- Identification of any potential risks to habitat for listed threatened species or communities during construction and operation of the Project. Where a risk or risks are identified, the draft EIS should outline the extent of habitat potentially at

risk and discuss the severity of any potential impacts and discuss whether the impacts are irreversible.

Mitigation

The EIS should contain a detailed Biodiversity Management Plan which outlines clear and concise methods to mitigate likely impacts to biodiversity. All mitigation and monitoring measures should be in accordance with best practice advice from relevant Northern Territory and Australian Government advisory agencies and focus on:

- potential significant impacts to biodiversity as a whole;
- the proponent's weed control measures and hygiene protocols as required under the *Weed Management Act*;
- potential significant impacts to vegetation types, short-range endemic, rare or threatened flora or fauna; and
- any sites of conservation significance, including Mud Hut Swamp and Anmatyerr North.

The following information should be provided for EPBC Act and TPWC Act listed threatened species and communities:

- description of proposed safeguards and mitigation measures to deal with relevant impacts of the action; and
- any statutory or policy basis for the mitigation measures.

Monitoring

The Biodiversity Management Plan should include details of a Fauna and Flora Monitoring Program which is designed to monitor the effectiveness of the mitigation measures proposed. The Flora and Fauna Monitoring Program should identify the methodology for monitoring the impacts to biodiversity and identify clear thresholds and contingency measures which will be implemented in the event that the mitigation measures appear ineffective.

5.4 Risks to Historic or Cultural Heritage

Key Risks

- construction of the Project has the potential to damage areas or degrade values of sites or items which have historic and/or cultural heritage significance;
- operations associated with the life of the Project and increased human activities in the vicinity have the potential to disturb or damage areas of historic and/or cultural heritage; and
- the Project has potential to disturb sites of Aboriginal heritage significance.

Environmental Objective

To identify, understand and prevent, minimise or mitigate impacts of the Project on items or places which have historic and/or cultural heritage values and are protected under the *Heritage Act* and / or *Aboriginal Sacred Sites Act.*

Information Requirements

The draft EIS should outline the cultural and/or heritage significance of any sites located during archaeological investigations on or near the Mining Lease Area. The draft EIS should include the results of searches on the Northern Territory Government database and identify any sites or places protected or nominated for protection under the following legislations:

- *Aboriginal and Torres Strait Island Heritage Protection Act 1984*;
- *Environment Protection and Biodiversity Conservation Act 1999*.
- *Heritage Act*; and
- *Aboriginal Sacred Sites Act*;

The draft EIS should provide a summary outlining the survey effort and level of confidence that all items of heritage or cultural significance at risk have been identified. The results of any archaeological or ethnographic investigations should be provided in the EIS as an appendix. The draft EIS should provide a summary outlining the survey effort and level of confidence that all items of heritage or cultural significance at risk have been identified. The draft EIS should provide information on the current status of any approvals, permits or clearances in relation to the protection of heritage items or places.

The draft EIS must outline consultations with Indigenous stakeholders and traditional owners for all areas potentially affected by the Project. Determination and details should be provided of current traditional owner utilisation of Project areas, and spiritual/cultural significance of potentially affected areas.

Assessment of risk

The identification of any impacts to Indigenous cultural heritage is to take place in consultation with relevant Indigenous groups. Provide:

- details of any requirements to apply to, or applications already made to, the NT Minister for Lands, Planning and the Environment to disturb or destroy a prescribed archaeological place and/or object under the *Heritage Act*; and
- provision of evidence of an Aboriginal Areas Protection Authority (AAPA) certificate issued under the *Aboriginal Sacred Sites Act*.

Mitigation

The EIS should outline the prevention and mitigation of risks to sites or items of historic and cultural heritage in a Cultural Heritage Management Plan. The plan should include:

- procedures to avoid significant areas and sites;
- protection of key sites during construction, operation and decommissioning work;
- ongoing protection measures;
- procedures for the discovery of surface or sub-surface materials during the course of the Project;
- procedures that will ensure protection of known and unknown heritage sites, to the extent required under the *Heritage Act*; and
- measures to enable the Proponent to meet its duty of care to protect the cultural and heritage values of any places or items of significance.

The Environmental Management Plan for the Project should define risks to Indigenous-held values associated with the Project areas, and proposed management to minimise risks to identified values and uses.

When preparing the archaeological report and the Cultural Heritage Management Plan it is strongly recommended that the Proponent give consideration to, and refer to, the Burra Charter and guideline (available online at: http://australia.icomos.org/publications/charters/) to ensure that the investigations and mitigation measures proposed meet best practice standards for the management of cultural heritage in Australia.

Monitoring

To determine the effectiveness of mitigation measures, the Cultural Heritage Management Plan should include details of a monitoring and reporting program which is to be implemented throughout the life of the project. The monitoring and reporting program should identify when further action is required and outline contingency measures should the proposed mitigation measures result in ongoing degradation to the values of items with heritage or cultural significance.

5.5 Socio-economic risks

Key Risks

- operations associated with the life of the Project and increased human activities in the Project area have the potential to change the social demographic, culture and economies; and
- Potential economic and social benefits may not be optimised and costs may not be fully understood and taken into consideration.

Objectives

To analyse, monitor and manage the Project's intended and unintended social consequences, both positive and negative, such that outcomes are optimised.

Information Requirements

The EIS should include a balanced summary of the Project's economic value (positive and negative) to the regional, state and national economies, in terms of direct and indirect effects on employment, income and production.

Information requirements with regard to economic and social risk assessment and management are defined in the NT EPA Guideline: *Northern Territory Environment Protection Authority - Guidelines for the Preparation of an Economic and Social Impact Assessment*.

Assessment of risk

The draft EIS should include an economic and social impact assessment which gives consideration to the potential benefits and costs of the Project. The economic and social impact assessment should include consideration of the following:

- estimates of the quantity and value of production/exports relating to the mine, including expected reduction in revenue should the proposal not proceed;
- an estimate of the value of the Project to the local economy. In particular, the value associated with expenditure during the construction phase and the annual expenditure on regional goods and services as it relates to the mine and associated infrastructure;

- any benefits to local communities, during and beyond the life of the mine, such as development of new skills and facilities, economic development and opportunities for local and regional business and employment opportunities; and
- any negative impacts to local communities during and beyond the life of the mine.

Mitigation and Monitoring

A Social Impact Management Plan (SIMP) should be prepared and included in the draft EIS which addresses any risks identified in the economic and social impact assessment. At a minimum, the SIMP should include:

- any stakeholder engagement strategies that have occurred and will continue throughout the life of the Project;
- prioritisation of potential economic and social impacts;
- mitigation and management strategies for the identified risks including a register of agreed activities and commitments;
- a mechanism for monitoring any identified potential socio-economic and cultural impacts. The mechanism should also have opportunities for review;
- mechanisms to resolve new and emerging issues as they transpire with consequential amendment of the SIMP; and
- outcome and threshold criteria that will give early warning that management and mitigation measures are failing.

5.6 Rehabilitation and Mine Closure

Key Risks

- following closure and rehabilitation, potential for the mine to negatively impact the environment and/or associated communities; and
- risk that the Project will create an ongoing environmental, social and/or economic legacy if operations are required to cease ahead of schedule due to unforeseen circumstances, prior to the planned closure and rehabilitation of the site.

Environmental Objectives

The EIS should include a detailed assessment to demonstrate that:

- as far as practicable, rehabilitation achieves a stable and functioning landform which is compatible with the surrounding landscape and other environmental values; and
- the prevention and mitigation of risks associated with closure and rehabilitation of the Project are adequately addressed.

Information Requirements

- outline final rehabilitation, revegetation and closure plans for all aspects of the Project on completion of mining on site;
- based upon consultation with Traditional Owners, detail how rehabilitation and closure plans incorporate recognition and consideration of traditional knowledge, cultural values, land management systems and significance of particular species and places;

- based upon landscape evolution modelling, demonstrate that legacy mine structures will be stable over a geologically relevant period; and
- describe standards, guidelines and legislation applicable to rehabilitation and closure of the Project, and describe how such requirements will be met.

Assessment of Risk

- identify and discuss risks associated with final rehabilitation, revegetation and closure of the Project; and
- demonstrate that identified risks associated with rehabilitation, revegetation and closure from the Project will be avoided, mitigated or otherwise minimised.

Mitigation

Provide a conceptual, whole-of-site Mine Closure Plan (MCP) (refer to the Western Australian Environment Protection Authority and Department of Mines and Petroleum mine closure guidelines: http://edit.epa.wa.gov.au/EPADocLib/Guidelines-for-preparing-mine-closure-plans-21061.pdf). The MCP must provide an understanding of the issues that require management at closure and demonstrate that all relevant issues and appropriate management measures have been identified.

Demonstrate that closure will be achieved in line with the industry best practice, including:

- contingency procedures in the event of any unexpected or temporary closure, to facilitate the closure process ahead of schedule, including making landforms secure and non-polluting;
- revegetation of the disturbed sites using local native plant species similar in type, density and abundance to those existing in adjacent areas;
- stabilisation of erosion, as far as can reasonably be achieved, to a level similar to comparable landforms in surrounding undisturbed areas. Information on the use of bunding and drainage around pits should be included;
- measures required to prevent contamination of groundwater, including contamination of aquifers;
- weed management; and
- fire management.

The EIS should also include details of a Care and Maintenance Plan which is based on the Mine Closure Plan. This Care and Maintenance Plan must include measures which outline how the Proponent will maintain its environmental obligations should the Project be temporarily closed.

Monitoring

Describe the post-mining monitoring and reporting used to evaluate and report on the effectiveness of rehabilitation and closure methods. The MCP should outline contingency measures that will be implemented in the event that monitoring demonstrates that rehabilitation and/or mitigation measures have not been effective.

5.7 Risks to Human Health and Safety

Risks

Potential risks might include:

- risks of health impacts to workers from exposure to hazardous, toxic or radioactive substances, associated with the Project.
- traffic or rail accidents;
- contamination of a shared potable aquifer accessed by workers or a local community;
- spread of mosquito-borne disease due to creation of mosquito breeding sites;
- sunburn, environmental exposure, heat exhaustion etc.; or
- risks to workers from animal attacks / bites.

Information Requirements

The EIS should include an assessment of the risks to human health and safety associated with the construction, operation and maintenance of the various components of the proposal, and the storage and transport of materials to and from the complex. The aim of this assessment is to demonstrate that:

- the proponent is fully aware of the risks to human health and safety associated with all aspects of the development;
- all potential hazardous substances and exposure pathways have been appropriately identified and assessed for the Project;
- the prevention and mitigation of risks to human health and safety are properly addressed in the design specifications for the facilities; and
- the risks can and will be managed effectively during the construction, commissioning, operation, and decommissioning of the development.

Sufficient quantitative analysis should be provided to indicate whether risks are likely to be acceptable. The analysis should draw from the experiences of similar ventures in Australia and Internationally, citing examples where appropriate. Assumptions used in the analyses should be explained. Relevant standards, codes and best practice methodologies that minimise risks should be discussed.

Human Health risks and exposure pathways should be summarised using a Conceptual Site Model for the Project (see - *NT EPA Guidelines on Conceptual Site Models*).

Mitigation

The hazard and risk analysis will identify the critical areas that need to be addressed in management plans, monitoring programs, contingency and emergency plans.

Detailed emergency plans and response procedures will need to be developed as a contingency in the event of an emergency or accident, incorporating management of all emergencies that may impact on the facility, its surrounds, personnel or the public. Responsibilities and liabilities in such an event should be included, and the Emergency Management Plan provided in the final Environmental Management Plan.

5.8 Air Emissions

Air pollution may result from Project air emissions, including: chemicals, particulates, or biological materials that cause discomfort, disease, or death to humans; damage other living organisms, biodiversity values, or to the natural or built environment.

Key risks

Potential risks to air quality for sensitive receptors may result from any of the following activities:

- drilling, blasting and materials handling;
- crushing, beneficiation and processing plants;
- general site movements over unsealed surfaces;
- wind erosion mobilising dust from exposed surfaces, such as from waste dumps, laydown areas, stockpiles, and sites of vegetation clearing.

Project related air emissions include:

- stack emissions from the power station containing NO_X, CO, particulate matter and SO_X; and
- combustion emissions from equipment and vehicles.

Information Requirements

The following information should be included in the EIS to describe atmospheric emissions from the Project and identify risks to sensitive receptors.

- identify legislation, guidelines, and standards applicable to management of air emissions from the Project;
- describe expected Project generated odours and atmospheric emissions, such as from combustion, processing, vehicles, power plants, or other sources. Quantify expected emissions where possible, before and after proposed management.
- present a baseline characterisation study to define pre-mining and processing air-quality, identifying parameters which may potentially by affected by the Project, measuring at a scale meaningful to potential effects on identified sensitive receptors. Define existing variability in target parameters, such as seasonal variability, and ensure change will be clearly measurable if/when it occurs from the Project, but before impacts on sensitive receptors could occur.
- describe sources and projected quantities of greenhouse gases to be emitted by the Project, including from clearing of native vegetation.
- identify sensitive receptors (human, biological, infrastructure or other) to emissions from the Project, and risks to sensitive receptors.

Assessment of Risk

The draft EIS should identify the likely risks to sensitive receptors from changes to air quality (health, wellbeing, amenity, functionality) associated with construction and operation of the Project. The draft EIS should outline any legislative requirements, guidelines and industry standards that are likely to be applicable to the management of air quality associated with the Project. The draft EIS should also identify any sensitive

receptors and discuss the health/environmental risks associated with dust mobilised during mining activities. Consideration should be given to the methods of exposure, including: inhalation, ingestion, dermal contact, wind, stormwater and groundwater.

Mitigation and Monitoring

Where identified air quality risks and related sensitive receptors occur for the Project, illustrate potential interactions in the Conceptual Site Model for the Project. In particular, the draft EIS should include:

- a description of the proposed management of Project atmospheric emissions. Describe how identified risks to ambient air-quality or sensitive receptors will be prevented, minimised or mitigated;
- a description of proposed management to minimise emissions of greenhouse gases from the Project;
- define target thresholds with reference to regulatory industry-standard, health-related safe-limits, or aspirational parameter levels. Justify proposed target thresholds in terms of levels of risk to identified sensitive receptors;
- identification of any monitoring plans that include measuring target parameters, and proposed reactive management that are tied to monitoring thresholds; and
- inclusion of an Air Quality Management and Monitoring Plan that provides an overview of the risks, sources of emissions, monitoring programs and proposed management of identified risks.
- details of a management and monitoring plan which aims to remove or mitigate dust-related risks associated with the Project. The Dust Management and Monitoring Plan should include the results of baseline studies, mitigation measures and a monitoring program.

5.9 Other Risks

Where applicable, environmental risks should be identified and management strategies proposed for the following aspects:

5.9.1 Mosquito Breeding

The *Public and Environmental Health Act* should apply to the Project and as such it is appropriate that consideration be given to the risks of biting insects. Guidance on preventing the creation of mosquito breeding sites can be found in the Medical Entomology guideline: *Guidelines for preventing mosquito breeding sites associated with mining sites in the Northern Territory*. Reference to the Medical Entomology, Department of Health guidance documentation regarding biting insect management is located at: http://health.nt.gov.au/Medical_Entomology/Publications/Development_Guidelines/.

Despite the mine being in an arid area, there is potential for mine sites to create mosquito breeding sites. The Environmental Management Plan in the draft EIS should include a section on biting insect management and outline the appropriate mitigation and management measures. In particular the Environmental Management Plan should include:

- measures to ensure no residual shallow surface ponding is created by development activities;

- ensuring any water pond (i.e. sediment pond) is designed with minimal mosquito breeding potential (i.e. steep sides, deep open water);
- preventing mosquito breeding in receptacles such as rainwater tanks, drums, buckets, used tyres, machinery items, plastic sheeting etc.;
- preventing effluent dispersal areas from becoming mosquito breeding sites. See recommendations in *Mosquito breeding and sewage pond treatment in the Northern Territory*;
- preventing pit water discharge from creating new mosquito breeding sites;
- ensuring the ore storage site at East Arm Wharf is managed to be free from shallow wet season flooded depressions; and
- provide information on appropriate personal protection measures that could be utilised by workers during periods of elevated mosquito abundance.

5.9.2 Wastewater

NT Department of Health will require a notification to install a waste water treatment system outside of a building control area if a new effluent treatment system is to be installed to treat effluent. 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 of Practice for Wastewater Management. Further information is available online at: www.health.nt.gov.au/Environmental_Health/Wastewater_Management.

Workforce and accommodation wastewater disposal shall be in accordance with the Code of Practice for Small On-Site Sewerage and Sullage Treatment Systems and the Disposal or Reuse of Sewerage Effluent; Refer to Environmental Health Fact Sheet 700: Requirements for Mining and Construction Projects. Further information is available online at:
http://www.health.nt.gov.au/Publications/Environmental_Health_Publications/index.aspx

Should the Project require the discharge of wastewater into groundwater or waterways there may be a requirement for a license under the *Water Act*. Guidance and application forms can be found at: http://www.ntepa.nt.gov.au/environmental-assessments/factsheets-and-guidelines.

5.9.3 Solid Waste Storage and Disposal

The disposal of waste should be conducted in such a way as to avoid potential public health nuisances and environmental pollution. The draft EIS should identify any legislation, guidelines, and standards applicable to the Project's landfill, sewage treatment, or waste disposal facility. The draft EIS should describe how applicable requirements will be met. Include discussion of:

- proposed wastewater treatment plant(s), sewage treatment plant(s) and waste disposal /landfill facilities. proposed locations, and land capability at the sites;
- nature of by-products;
- usage of treated water/waste;
- proximity and risks to sensitive receptors;
- describe projected final water quality and destination of waste water from beneficiation and ore processing phases;

- methods for the storage handling containment and emergency management of chemicals and other hazardous substances (including fuel);
- describe and discuss proposed waste management strategies, including reduction, reuse, recycling, storage, transport and disposal of waste; and
- identify and discuss risks associated with waste and sewage:
    - facilities;
    - storage;
    - treatment; and
    - transport and handling.

Proposed management of identified risks should be presented and discussed.

- describe proposed methods for the transport, storage, handling, containment and emergency management of chemicals, hydrocarbons, toxic inputs and outputs, acids and other hazardous substances associated with the Project; and
- identify legislation, guidelines, and standards applicable to management of hazardous substances for the Project. The draft EIS should describe how applicable requirements will be met.

5.9.4 Noise and Vibration

Risk assessment for the Project should occur with respect to noise and vibrations from Project components. Potential sensitive receptors, expected impacts and proposed management should be identified with regard to Project-generated noise and vibrations.

A Noise Management and Monitoring Plan should outline proposed management to mitigate identified risks from the Project with regard to noise and vibration emissions. Cross reference should be made with a Project Public Consultation Plan facilitating communication with, and reducing the impact on, residents and communities who may be affected by the Project.

5.9.5 Pastoral Uses

The project is located within the Stirling and Anningie Perpetual Pastoral Leases, with land use immediately surrounding the project area of pastoral use. Potential risks and impacts to that activity should be detailed.

The outcomes of any consultation with potentially affected pastoralists, any representative bodies and the NT Department of Primary Industry and Fisheries (DPIF) to identify any risks to pastoral activities, issues or stakeholder concerns with regard to the proposed Project.

Identify and discuss:

- affected vegetation types, their extent, and to how these are important to cattle production in terms of livestock carrying capacity per km^2 (information held by DPIF);
- risks associated with the exposure of livestock to chemical substances, including metal ions, in terms of potential animal health impacts. Alternative exposure pathways should be considered;
- potential risks and effects of high levels of salt in water accessible to stock; and
- risks to and from aquifers.

Proposed management of identified risks should be presented and discussed.

5.9.6 Bushfires

The Proponent should be aware of sections of the *Bushfires Act* and Regulations that apply to the Project and address risk and management of bushfires. The development of the Fire Management Plan should be in consultation with traditional owners, pastoralists and their representative organisations, including the Central Land Council (CLC), that have specialist knowledge in fire management.

5.9.7 Public Health Premises and Food Premises

The Department of Health (DoH) require detailed plans of any shops or accommodation facilities to be submitted prior to construction. Further information from the DoH, including proponent responsibilities are provided in Fact Sheet 700 - *Requirements for Mining and Construction Projects*, available online at: http://www.health.nt.gov.au/Environmental_Health/Health_Risk_Assessment/index.aspx

The proponent must not abrogate their responsibility with respect to the required DoH approvals and licensing applicable to this project. If the proponent is uncertain about the DoH approval process then they must contact DoH (ph. (08) 8955 6122) prior to the commencement of works.

It is the proponent's responsibility to provide DoH with the relevant Environmental Management Plans (EMP) that relate to the camp or project operations for comment.

5.9.8 Radiation

Identify any radiation risks expected to be encountered by the Project or associated with its construction or operation. If the operator has any material that is a radiation source, as defined under the *Radiation Protection Act*, the operator must apply for all relevant authorities under the Act. It is possible that at least one fixed radiation gauge will be required at this operation. A fixed radiation gauge is a radiation source. Further information is available at: www.nt.gov.au/health/radiationprotection.

6 Environmental Offsets

The Australian Government Environmental Offsets Policy, October 2012 requires residual (after avoidance and mitigation measures have been implemented) significant impacts to be offset, with a focus on direct offsets. The Offsets assessment guide, which accompanies this policy, has been developed to give effect to the policy's requirements, utilising a balance sheet approach to quantify impacts and offsets. It applies where the impacted protected matter is a threatened species or ecological community. These documents are available at: http://www.environment.gov.au/epbc/publications/environmental-offsets-policy.html.

The EIS should provide information on:

- any identified impacts or detriments that cannot be avoided, reduced or mitigated at reasonable costs and whether these impacts could be considered as 'significant' under the EPBC Act;
- risks of failure of management actions (such as rehabilitation, weed control, etc.) and uncertainties of management efficacy should be identified; and
- proposed offsets for residual significant impacts to listed threatened species and an explanation as to how these proposed offsets are consistent with the requirements of the Environmental Offsets Policy and Offsets assessment guide, where relevant.

7 Environmental Management

Specific safeguards and controls 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 for the Project and its components.

The EMP should be strategic, describing a framework for environmental management of the Project. However, as much detail as is practicable should be provided to enable adequate assessment of the proposal during the public exhibition phase. Specific management practices and procedures should be included in the EMP, where possible. 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, including stochastic events such as flooding and high rainfall events;
- mitigation and treatment strategies should any Potentially Acid Forming material be encountered, or any Acidic and/or Metalliferous Drainage be detected from mine infrastructure.
- the proposed measures to minimise adverse social, economic and environmental impacts and maximise opportunities;
- 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 areas of land will be managed should it be changed from existing land uses;
- hierarchical reactive management plans including defined quantitative triggers at each level, designed to avoid, mitigate and minimise identified high residual risks from the Project, to the greatest extent practicable.
- the EMP should address Project phases (construction, operation, decommissioning) separately. It must state the environmental objectives, performance criteria, monitoring, reporting, corrective action, responsibility and timing for each environmental issue;
- the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program;
- 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 and timing for periodic reviews of the EMP to incorporate improvements to standards and technology as they occur.

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 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 Environmental Assessment Report recommendations and conclusions.

8 Attachment A – NT EPA Assessment Guidelines

The following Guideline documents by the Northern Territory Environment Protection Authority have been referred to in this *Terms of Reference* document. These can be found on the NT EPA website at:

http://www.ntepa.nt.gov.au/environmental-assessments/factsheets-and-guidelines

i. *NT EPA - Guidelines On Environmental Offsets and Associated Approval Conditions*

ii. *NT EPA - Guidelines For Assessment of Impacts on Terrestrial Biodiversity*

iii. *NT EPA - Environmental Assessment Guidelines - Mining Exploration or Production Proposals Submitted under the Mining Management Act*

iv. *Guidelines for the Preparation of an Economic and Social Impact Assessment*

v. *NT EPA - Environmental Assessment Guidelines - Acid and Metalliferous Drainage*

vi. *Guidelines on Conceptual Site Models*

(available at: http://www.ntepa.nt.gov.au/waste-pollution/guidelines/guidelines *)*