



Northern Territory
Environment Protection Authority

TERMS OF REFERENCE FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT

AMMAROO PHOSPHATE PROJECT RUM JUNGLE RESOURCES LTD

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Acronym / Abbreviation	Description
4WD	Four wheel drive vehicle
AHD	Australian Height Datum
AMD	Acidic and/or Metalliferous Drainage
AMD/NMD/SD	AMD, NMD and/or SD, i.e. Acidic and/or Metalliferous Drainage, Neutral Mine Drainage, and/or Saline Drainage
BMP	Biodiversity Management Plan
CHMP	Cultural Heritage Management Plan
EA Act	<i>Environmental Assessment Act</i> (NT)
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
ESIA	Economic and Social Impact Assessment
ESIMP	Economic and Social Impact Management Plan
JORC	Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia
km	Kilometre
km ²	Square kilometre(s)
kt/year	Kiloton per year = one thousand metric tons per year
m ³	Cubic metres = 1x10 ³ litres
Mt/year	Million tons per year
P ₂ O ₅	Phosphorus pentoxide. Grade of the mined rock phosphate (ore) is reported as a percentage of phosphorus pentoxide (P ₂ O ₅).
MCP	Mine Closure Plan
NMD	Neutral Mine Drainage
NORM	Naturally Occurring Radioactive Material
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
The Project	Ammaroo Phosphate Project, by Rum Jungle Resources Ltd
QA/QC	Quality Assurance / Quality Control
SD	Saline Drainage
Territory	Northern Territory
TPWC Act	<i>Territory Parks and Wildlife Conservation Act 2000</i> (NT)
WMP	Water Management Plan

1 Introduction

Rum Jungle Resources Ltd (the Proponent), proposes to develop and operate the Ammaroo Phosphate Project (the Project), approximately 200km south-east of Tennant Creek and 300km north-east of Alice Springs, in the Northern Territory.

The Project would involve open-cut mining of shallow phosphate deposits at Mineral Lease 29463 and 29854, ore beneficiation / processing, tailings disposal and product transport to East Arm Wharf for export. The Proponent proposed three options for the Project of increasing Project scope, degree of processing, and infrastructure requirements, including pipelines and a sulfuric acid plant. The presented options represent potential sequential Project stages, being:

- Option 1: Open pit mining of high grade ore ($>24\%$ P_2O_5) with dry, simple crushing and screening (i.e. mechanically beneficiation of ore), prior to export to the railhead by road, conveyor or rail spur, then by rail to East Arm Wharf, and direct shipping. Resource would last 4-5 years, then be followed by Option 2.
- Option 2: Mining, crushing and screening of ore is followed by beneficiation through flotation, ramping up to 2 Mt/year of 30% - 32% P_2O_5 rock. Construction of a service road, gas pipeline and slurry pipeline or rail spur in a common transport corridor. Beneficiated rock transported 90km by slurry pipeline or rail to the railhead on the Central Australian Railway.
- Option 3: Construction of a Phosphoric Acid Plant at the mine-site, utilising a wet process, and 90 km rail spur to the railhead. A sulfuric acid plant would be constructed at the mine-site, and require input of approximately 450 Mt/year of elemental sulphur imported from Asia, or sulfuric acid could be imported via tanker train to the site. Option 3 would produce up to 500 kt/year of 100% Phosphoric Acid (P_2O_5).

The total Ammaroo Phosphate Resource is estimated at 1.135 billion tonnes P_2O_5 at an average grade of 14% P_2O_5 using a 10% cut-off or 338 million tonnes at 18% P_2O_5 using a 15% P_2O_5 cut-off.

Mine life is expected to be more than 25 years. Project footprint would be at least 17.5 km².

Infrastructure and components to be constructed for the Project vary with processing options, but include:

- open-cut mine based on strip-mining methods
- mine area disturbance (and rehabilitation) footprint of at least 10 km² for a 25 year mine life, or more than 20 km² for a 50+ year mine life
- infrastructure corridor of approximately 90 km length and 100 m width, containing power-lines, haul road, and potentially a slurry pipeline (option within stage 2) or rail spur
- phosphoric acid plant and sulfuric acid plant at the mine-site
- tailings storage facility
- access and haul roads
- gas supply pipeline (~125 km) for option 2

- power station (~10-24 MW) at the mine site for options 1 and 2 and facilities (option 3 would not require a power station, as excess heat and steam generated from the sulfuric acid production process could be utilised to generate 30 Mw of power)
- bore field, to supply at least 1,266 m³/day (option 1) to 25,000 m³/day (option 3) and reverse osmosis plant
- accommodation village (100-250 person)
- waste water treatment and disposal
- airstrip access or build
- rail siding including rail spur, storage and train loading facilities
- fuel supply and storage facilities
- port stockpile and export facilities at East Arm.

It is estimated that the workforce would peak at approximately 110 staff during full production open cut operations, and would operate on a combined drive in and fly-in fly-out basis depending on how much of the workforce can be accessed from the regional communities, Tennant Creek and Alice Springs.

The Notice of Intent (NOI) for the Project was referred from the Department of Mines and Energy to the Northern Territory Environment Protection Authority (NT EPA) on 29 April 2014 for consideration under the *Environmental Assessment Act* (EA Act). On 12 June 2014, the NT EPA decided that the Project required assessment under the EA Act at the level of an Environmental Impact Statement (EIS).

The NT EPA decision to require an EIS for the Project was based on risks detailed in the *Statement of Reasons*¹ for the decision. These included risks to:

- water resources
- terrestrial biodiversity
- human health and safety
- social, cultural and/or economic wellbeing
- existing services and infrastructure
- sacred sites, and places / objects of cultural /archaeological heritage value
- air quality.

Identified risks were associated with factors including potential:

- drawdown of shared groundwater aquifers affecting other users and groundwater dependent ecosystems
- contamination of surface waters, aquifers and soils, such as from:
 - acidic and/or metalliferous drainage (AMD), neutral mine drainage (NMD) and/or saline drainage (SD) from and waste gypsum stockpiles
 - hazardous process outputs and contaminated discharges
 - storage, transport and spills of hazardous materials

¹ NT EPA *Statement of Reasons – Rum Jungle Resources - Ammaroo Phosphate Mine*, issued to the Proponent on 12 June 2014. at: <http://www.ntepa.nt.gov.au/environmental-assessments/assessment/register/ammaroo-phosphate-mine>

- biodiversity impacts including on listed threatened species, such as from land clearing, loss of habitat / connectivity, weed and feral animal outbreaks, dust, erosion and sedimentation, failed mine rehabilitation and road strikes
- traffic impacts on communities traversed by Project vehicles
- social/economic impacts on communities affected by the Project components.

These Terms of Reference have been developed to assist the Proponent in preparing an EIS for the Project, in accordance with Clause 8 of the Environmental Assessment Administrative Procedures (EAAP). The following sections describe information requirements, to be presented in the EIS.

Where uncertainties remain with regard to which of the three Project options will be implemented in future, the EIS must consider all options and associated risks to their full potential extent.

It is recognised however that a preferred option may emerge, and other options may be discounted before submission of the Draft EIS. If an option that was described in the NOI is no longer considered viable, the submitted draft EIS should address this Terms of Reference to the full extent it is relevant to the remaining development option(s), and risks presented by the remaining option(s). Significant change to Project scope should be notified to the NT EPA, under section 14A of the EAAP.

2 Regulatory Context

2.1 Approvals and Conditions

The EIS should provide information on requirements for approval or conditions that apply, or that the Proponent reasonably believes are likely to apply to the Project, including but not limited to:

- approvals required by State, Territory or Commonwealth agencies or authorities
- summary of current agreements between the Proponent and the Northern Territory Government, and/or the Australian Government, and/or other stakeholders, including Traditional Owners and/or land managers
- any additional approvals required
- description of the regulatory monitoring, enforcement and review procedures that apply, or are proposed to apply, to the Project.

When identifying the individual approvals, certificates, permits etc. the Proponent should include details of the approvals, certificates, permits etc., including any conditions imposed. Consideration should be given, but not limited to, the following legislation:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Heritage Act*
- *Mining Management Act and Regulations*
- *Mineral Titles Act and Regulations*
- *Northern Territory Aboriginal Sacred Sites Act*
- *Public and Environmental Health Act & Regulations.*
- *Territory Parks and Wildlife Conservation Act*
- *Waste Management and Pollution Control Act*
- *Water Act*

Identify National, State and/or Territory standards, codes of practice and guidelines relevant to the Project.

2.2 Environmental History

The EIS should include details of the environmental record of the Proponent, including:

- details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Proponent, and details of the Proponent's environmental management systems and processes subsequently upgraded as a result of those proceedings
- obligations, non-compliances or incidents under the *Mining Management Act*, which includes the history in relation to environmental matters, compliance or non-compliance with the requirements of the Mining Management Plan and other relevant management plan
- any international or national accreditations (e.g. ISO 14001 etc.), environmental awards or other recognition for environmental performance.

2.3 Ecologically Sustainable Development

When considering the matters to be addressed in the EIS, the NT EPA are required under the *Northern Territory Environment Protection Authority Act 2012* to:

- (a) Promote ecologically sustainable development (ESD)
- (b) Protect the environment, having regard to the need to enable ESD.

Accordingly, the assessment of the Project, its potential impacts (positive and negative) and the management measures used to enhance positive and reduce negative impacts will be taken in the context of ESD principles, consistent with the *National Strategy for Ecologically Sustainable Development*.² Therefore, it is essential that the Proponent demonstrate how it complies with and contributes to the principles and objectives of ESD in the relevant section(s) of the EIS.

3 Project Description

3.1 Project Details

3.1.1 Proponent Details

Provide details of the Proponent, including:

- full name, contact details and postal address
- details of the Proponent's company portfolio (e.g. a single entity or in joint venture, ownership being domestic or international, major commodities, position in the market and countries where key business dealings are undertaken).

3.1.2 Development Context

Provide details of the development context of the Project, including:

- title of the current Project
- current status of the Project

² Ecologically Sustainable Development Steering Committee, 1992. *National Strategy for Ecologically Sustainable Development*. Department of the Environment and Water Resources, Canberra, Australia. Available at: <http://www.environment.gov.au/resource/national-strategy-ecologically-sustainable-development>

- background to the development of the Project, including discussion of previous environmental impact assessment and overview of historic mining, exploration and rehabilitation activities
- exploration activities, areas that may be mined in future, or any other potential future activities being planned
- explanation of 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.

3.1.3 Project Components

Effective scoping of the Project will assist with the preparation of the EIS as well as clearly defining the footprint and operational details of the proposed action. The EIS should identify all the processes and activities intended for the Project and associated ancillary activities, for each Project stage. Similar examination should occur for each proposed Project option.

3.1.4 Location and Infrastructure

Describe the location of the Project in the region and its proximity to:

- major roads, railways, airstrips, rivers and landmark features
- towns and regional community centres
- underlying and/ surrounding tenure and land use (e.g. pastoral, national park, town boundary etc.)
- sites of cultural or social significance
- significant natural or ecological features, such as areas on the National Reserve System, conservation reserves, major watercourses or significant groundwater resources.

Delineate the Project footprint using detailed maps and diagrams to show:

- Project disturbance footprint development through Project stages
- location of the mineral resources to be mined/developed, ore reserves and areas to be explored
- variation across tenements of target-ore grades, non-target metal contaminant levels, depth to the resource, resource thickness / strip-ratio and topsoil depth
- precise locations (including maps) of existing and new road infrastructure
- locations of proposed infrastructure and other mine components, such as water resources
- layout of the construction camp and accommodation village with respect to the work sites and mining and processing operations
- location / extent of any other works to be undertaken, such as rehabilitation / closure activities.

Describe in detail Project infrastructure requirements through Project stages, including:

- proposed new infrastructure
- existing infrastructure to be utilised, and/or upgraded for use
- ancillary infrastructure requirements, such as for telecommunications, transport, accommodation, airstrip, waste management and water supplies.

For the linear infrastructure corridor(s), describe:

- corridor elements, such as haul road, pipeline(s)
- periodic elements, such as pumping stations, lay-down / turning areas, gravel pits and construction bores
- maximum width of corridors required for construction and operation
- plant and machinery required
- timeframes for corridor / haul road construction and upgrade, if relevant
- vegetation clearing methods and disposal of plant matter following clearing
- results of surface water investigations in and around corridor(s)
- corridor intersections with potentially significant habitats, geology, watercourses, roads, linear infrastructure, places of cultural / heritage significance, etc.
- methods for crossing sensitive areas, such as waterways and/or land units with poor soil recovery potential
- corridor vulnerabilities and risks, and designs to address these
- construction methods and timing, including of:
 - survey / design / selection of the pipeline route
 - provision of access tracks and temporary facilities
 - clear and grade of the right of way
 - pipe stringing and bending
 - pipe welding
 - hydro-testing
 - rehabilitation of right of way.
- corridor operational, maintenance and safety procedures
- proposed environmental management, including erosion and sediment control, flood protection, and maintenance of fauna / livestock access pathways to water, etc.
- type and sources of rock, gravel, fill and other construction materials
- legislation, standards and Guidelines applicable to corridor elements.

3.1.5 Mine Operation

Describe proposed mine construction and operation, including, but not limited to:

- types / categories, quantities and characterisation of materials to be mined annually (e.g. ore classes, top soil, waste rock classes, etc.).
- processing, storage and management methods applicable to each category of mined material
- proposed mining methods
- equipment requirements
- proposed staging of the Project
- projected quantities of ore to be shipped each year
- target ore grades, such as for markets and proposed processing circuits, and how target grades will be achieved from a resource containing variable grades of P_2O_5 and contaminants

- presence and management of Naturally Occurring Radioactive Materials (NORM) in ore, waste streams and processing streams for each of the Project options
- sources and volumes of materials required to support construction of mine infrastructure, such as fill, clays and consumables
- proposed design and methods of construction of the open pits, including:
 - proposed location
 - sequencing
 - design and
 - construction of the open pits.
- product handling requirements
- run of mine stockpile.

3.1.6 Processing

Provide relevant information with respect to each processing circuit to be utilised for the Project, including but not limited to:

- production of mechanically beneficiated ore
- ore beneficiation through floatation
- sulfuric acid production
- phosphoric acid production (wet process or thermal process? – provide information for all proposed options)
- potable water production
- other processing methods
- major components and equipment of each processing operation
- processing circuit inputs, outputs, volumes / feed grades of materials / consumables required, product recovery grades
- demonstrate and compare performance of similar processing plants
- transport of materials to / from the processing circuits.

3.1.7 Energy

Provide relevant information with respect to energy, including but not limited to:

- information on the Project's energy requirements, including mining fleet fuels and electricity demand for mine operations
- details of energy infrastructure requirements, for all components of the Project, including fuel storage
- describe any initiatives proposed to improve energy efficiency and/or reduce emissions to air.

3.1.8 Tailings Management

Provide detailed information with respect to tailings management, within each Project option/stage, including but not limited to:

- Methods for managing tailings, process outputs and associated process water, including volumes

- proposed recycling / further processing, management and fate/destination of tailings components, including process waters, gangue materials and gypsum
- proposed final removal or rehabilitation/closure of the tailings storage facility
- anticipated quantities of tailings that would be produced and managed by the Project
- geochemical characterisation of the tailings, indicating its potential to generate seepage/ stormwater runoff of a poor quality with respect to the *National Water Quality Management Strategy*¹
- analysis of physicochemical mobility of contaminants under expected environmental conditions
- design details, specifications, capacity and integrity of the proposed tailings storage facilities, including details of the location, layout, expected design life, material geotechnical specifications used in construction and permeability of walls/floors/underlying strata.

3.1.9 Water Management

Provide information on proposed Project groundwater and/or surface water use, in terms of parameters such as extraction rates, quantities, qualities, sources, storage, treatments and infrastructure requirements. Details should include:

- all phases and areas of the Project
- processing circuit(s)
- process / tailings water
- slurry water for product transport
- dust suppression
- drinking water
- water treatments, and management of any reverse osmosis plant - hypersaline waste stream
- waste water and sewage treatment, and disposal
- reuse / recycling / disposal options
- need for waste discharge of waters
- any other uses.

A water balance should be provided for the proposed Project, considering all Project areas and phases/options. Specific methods for dewatering should be provided where relevant. The water balance should predict Project-related changes to baseline surface and ground water conditions (volumes, flows and quality) locally and regionally, at Project component sites.

The reporting of the Project water balance in the EIS should be consistent with the *Water Accounting Framework for the Minerals Industry*³.

The EIS should detail design, construction methods and proposed construction materials for:

- water drainage management works

³ Mineral Council of Australia, 2014. *Water Accounting Framework for the Minerals Industry*. Available at: http://www.minerals.org.au/focus/sustainable_development/water_accounting

- waterway diversion works
- watercourse crossings, such as for roads and pipelines.

3.1.10 Air

Provide relevant information with respect to air quality, including but not limited to:

- inventory (name, composition and quantities) of Project generated air emissions, including from land disturbance, all processing circuit options, vehicles, plants and machinery
- proposed monitoring regime and equipment
- reporting requirements and compliance with relevant health and/or environmental standards
- air quality target thresholds with reference to regulatory industry-standard, health-related safe-limits, or aspirational parameter levels.
- proposed emission control methods.

3.1.11 Wastes and Hazardous Materials

Provide relevant information with respect to other waste management, including but not limited to:

- descriptions of predicted waste streams, both industrial and domestic, including solid and liquid wastes at/from the mine site, railhead, port, accommodation facilities and other relevant locations
- descriptions of proposed waste management strategies, including reduction, reuse, recycling, storage, transport and disposal of waste
- potentially hazardous materials to be used or produced and methods for storage, transport, handling, containment, disposal and emergency management of these materials
- garbage disposal and management
- management of any reverse osmosis plant - brine waste streams
- the proposed size and construction details for landfill, and a list of wastes likely to be deposited in landfill
- legislation, guidelines, and standards applicable to any Project landfill, waste disposal facility, and how such requirements will be fulfilled.

3.1.12 Workforce and Accommodation

Provide details of the predicted workforce requirements during all phases of the Project, including:

- the number of people to be employed, skills base required, and likely sources (local, regional, overseas)
- personnel handling requirements
- the number of people that may be employed to manage or undertake environmental duties on the site, including the specific qualifications and the level of experience with mining or other related activities
- Discuss arrangements for transport of workers to and from Project areas, including air services required.

For the mine camp that will be used to accommodate staff, provide brief information on aspects of the facility such as:

- accommodation arrangements proposed for workers
- proximity to the nearest town, work sites and mining operations
- whether the premises will be licensed to serve alcohol
- compliance with licensing requirements associated with food preparation and storage for catering premises proposed at Project sites
- compliance with *Environmental Health Fact Sheet No. 700. Requirements for Mining and Construction Projects*⁴.

3.1.13 Transport

Provide details of road, rail, air and sea transport requirements during all phases of the Project, including:

- methods to convey all site traffic (including materials, workers and product) to and from the Project
- road, rail and port networks to be utilised by the Project
- type, size and number of vehicles / aircraft / vessels required, hours of operation and peak times
- types and quantities of materials to be transported to/from the Project (e.g. heavy machinery, equipment, fuel, hazardous materials)
- estimated frequency of Project vehicles / aircraft use on public infrastructure.

Describe the proposed methods and areas for transporting and exporting product, including:

- road, rail, air and port networks to be utilised by the Project
- product handling requirements
- storage / laydown areas and loading facilities
- methods of truck/train/vessel loading, load constraint, product containment and spillage prevention
- safety management
- additional transport infrastructure works required, including site access and signage
- discussion of the Project transport facilities purposes and capability (e.g. East Arm Wharf, Alice Springs to Darwin Railway Terminal, etc.) to meet the transporting and exporting requirements of the Project.

Describe the intended use and capacity of the airfield to service the Project. Detail any upgrades, area of disturbance and commitments to meet aviation legislative obligations (e.g. Civil Aviation Safety Authority).

⁴ Reference should be made to *Environmental Health Fact Sheet No. 700. Requirements For Mining And Construction Projects*. Department of Health, Northern Territory Government July 2013 via http://www.health.nt.gov.au/environmental_health/health_risk_assessment/index.aspx. Consultation should occur directly with the Department of Health to ensure compliance with requirements of the *Public and Environmental Health Act & Regulations*, and with mandatory requirements described in *Environmental Health Fact Sheet No. 700*.

3.2 Alternatives

The EIS should describe any feasible alternatives to carrying out the Project. 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
- site selection for all Project components
- mining and processing methods
- management of clean, dirty or contaminated water
- management of site water surpluses
- prevention and remediation of acid and/or metalliferous drainage, neutral mine drainage and/or saline drainage (AMD/NMD/SD)
- management of wastes and overburden
- rehabilitation methods
- methods of product treatment, storage, transport and export
- energy sources for power generation, including renewable energy sources
- alternative life-of-mine schedule
- designs and construction methods of infrastructure
- consideration of alternative environmental management measures for key risks.

Discussion should include:

- sufficient detail to make clear why a particular alternative is preferred to another
- adverse and beneficial effects (direct and indirect) of alternatives at national, Territory, regional and local levels
- the comparison of short (whilst operational), medium (post closure) and relevant long term advantages and disadvantages of the options.

3.3 Cumulative Impacts

Cumulative impacts can arise from compounding activities of a single operation or multiple mining and processing operations, as well as the aggregation and interaction of mining impacts with other past, current and future activities that may not be related to mining. Considerations include:

- Landscape change originates not only from single projects and management actions, but also from complex and dynamic interactions of multiple past, present and future management actions.
- Biophysical, social and economic change accumulates through additive or interactive (or synergistic) processes. The aggregate impact of multiple actions on the environment can be complex and may result in impacts that are more significant because of interactive processes.
- Any given action does not operate in isolation. The most significant changes are often not the result of the direct effects of an individual action, but from the combination of multiple minor effects over the accumulation of time.

An assessment of cumulative environmental impacts should be undertaken that considers the potential impact of the Project in the context of previous, existing and reasonably foreseeable future developments, to ensure that any potential environmental impacts are not considered in isolation. The extent of cumulative impacts to be considered depends on the nature of the environmental issue. The risk assessment should consider and discuss cumulative assessment, where relevant, and account for impacts on an appropriate scale.

Impacts on the general environment, ecosystems and matters of national environmental significance could be permanent. If the impacts are not permanent, describe how long recovery from any impacts is anticipated to take, and identify how soon restoration of habitat could be achieved to reinstate ecosystem function.

4 Existing Environment

The EIS should outline the environmental context of the Project area. Description should include:

- climate and atmospheric characteristics relevant to the Project, such as temperatures; rainfall / evaporation; flood / drought / fire regime, winds, extreme weather events
- regional landscape characteristics / features
- proximity / downstream connection to sites of ecological, social or cultural significance or sensitivity, surface / groundwater resources, conservation reserves.

The EIS is required to describe baseline (i.e. current) environmental conditions, to the extent of potential environmental impacts from the Project in a worst case scenario. Detailed investigation of baseline conditions allows for better understanding of potential impacts from mining in the future.

This section should identify and reference any relevant studies undertaken in the area that will assist in describing patterns and trends in the environment.

4.1 Topography and Geology

The EIS should describe and map geology, topography, soils and significant landscape features of the project area and surrounding areas.

Discuss geological factors relevant to the Project construction, operation, rehabilitation, closure and/or the stability of any final landforms or infrastructure. Where relevant, discuss: resource geology, hydrogeology, geological faults, dust / erosion potential, topsoil / overburden depths, strata, and AMD/NMD/SD potential.

4.2 Water

The EIS should describe surface and ground water resources locally, regionally and seasonally, including their extent, connectivity, catchments, flow-paths, volumes/capacities, depths, types, chemistry, biological characteristics, areas of recharge / expression, environmental values, uses and third party users of the surface waterways and groundwater aquifers potentially affected by the Project. Consideration should be made of areas/waters within and around all Project elements, upstream and downstream, within identified hydrolithological units, and in waterways (ephemeral and permanent) to be crossed by any infrastructure utilised for the Project (i.e. haul roads, pipeline, rail loading facility, etc.).

The EIS should include a detailed, comprehensive, pre-mining hydrological model for the proposed main Project sites, at an appropriate scale to enable identification of any future

impacts, including regional/off site impacts. The model should to be prepared by an appropriately qualified person.

4.3 Biodiversity

Describe fauna, flora and vegetation communities of the Project area and local region. Surveys should be in accordance with the NT EPA *Guidelines for Assessment of Impacts on Terrestrial Biodiversity*⁵ and/or Australian Government Guidelines for the surveying of threatened species⁶. Describe survey/program timing, locations and methodology, to demonstrate appropriate and statistically sufficient survey designs.

Where indicated, describe and map:

- any areas that have already been subject to clearing activities or disturbance previously
- any significant or sensitive vegetation types
- habitat within and adjacent to the Project area suitable for species of conservation significance potentially present, including consideration of habitat suitable for breeding, foraging, aggregation or roosting
- *the presence or likely presence of species listed under the Territory Parks and Wildlife Conservation Act (TPWC Act) and/or the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), and other un-listed species of conservation significance*
- any riparian or aquatic ecosystems or groundwater dependent ecosystems
- the presence, or likely occurrence, of introduced and invasive species (both flora and fauna) within the Project area, and regionally, including weed species declared under the NT *Weeds Management Act*.

4.4 Indigenous and Cultural Heritage

The EIS should outline the cultural and heritage significance of any sites or objects located on the Project areas or that could be impacted by Project activities. The 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*
- *Northern Territory Aboriginal Sacred Sites Act.*

Describe ⁷:

- indigenous and non-Indigenous sites, places or objects of historic or cultural heritage significance

⁵ NT EPA *Guidelines for Assessment of Impacts on Terrestrial Biodiversity* at: http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0003/349941/guideline_assessment_terrestrial_biodiversity.pdf

⁶ <http://www.environment.gov.au/epbc/policy-statements>

⁷ Archaeological surveys for the Project that result in an archaeological survey report must be submitted to Heritage Branch of the Department of Lands, Planning and the Environment for inclusion into the NT Archaeological Sites Database.

- surveys used to identify sites or objects of historic or cultural heritage significance, with outline of survey location and effort
- areas nominated for listing or listed on Commonwealth and Northern Territory registers of Indigenous cultural heritage
- current status of any approvals, permits or clearances under the above legislation.

The EIS should outline consultations with Indigenous stakeholders and Traditional Owners for all areas potentially affected by the Project. Determination and details should be provided of any current Traditional Owner utilisation of Project areas, and spiritual/cultural significance of potentially affected areas.

4.5 Air

Provide information with respect to existing air quality across seasons, including:

- ambient levels of Project generated air emissions
- locations of nearest sensitive receptors to Project generated emissions, considering as a minimum, sites of human habitation and use, and flora and fauna and their habitats.

5 Risk Assessment

5.1 Risk Assessment Approach

The EIS should be undertaken with specific emphasis on the identification, analysis and mitigation of risks through a whole-of-project risk assessment. Through this process, the EIS will:

- identify and discuss the full range of risks presented by the Project
- identify relevant direct and indirect impacts
- quantify and rank risks so that the reasons for proposed management responses are clear
- identify levels of any uncertainty about estimates of risk and the effectiveness of risk controls in mitigating risk
- explicitly identify those members of the community expected to accept residual risks and their consequences, providing better understanding of equity issues
- demonstrate that the Project represents best practicable technology.

A number of key risks have been identified through a preliminary assessment of the Project. Each of the identified risks should be addressed by the Proponent in the risk assessment and management process. It is expected that further risks will be identified through the comprehensive risk assessment process required for the EIS. These should be addressed and appropriate management initiatives developed to demonstrate that:

- the Proponent is fully aware of risks associated with all predictable aspects of the Project
- the prevention and mitigation of risks are properly addressed in the design specifications
- the risks can and will be managed effectively during the construction, operation, decommissioning, closure and post-closure phase of the Project.

Information provided should permit the general reader to understand the likelihood and potential severity of each risk presented by the Project, and any uncertainty around

these risks, as well as 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.

5.2 Information Requirements

The NT EPA has prepared a series of Environmental Assessment Guidelines to assist in the preparation of EIS documents. Environmental Assessment Guidelines are developed and updated periodically, and should be referenced and referred to when addressing the information requirements detailed in this Terms of Reference document. Environmental Assessment Guidelines, current at the time of publication of these Terms of Reference, include:

- *Environmental Assessment Guidelines on Acid and Metalliferous Drainage*
- *Guidelines on Conceptual Site Models**
- *Guidelines for Assessment of Impacts on Terrestrial Biodiversity*
- *Guidelines for the Preparation of an Economic and Social Impact Assessment*
- *Guidelines on Environmental Offsets and Associated Approval*

The above Guidelines are available from the NT EPA website at:

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

* <http://www.ntepa.nt.gov.au/waste-pollution/guidelines/guidelines>

5.3 Water

5.3.1 Environmental Objectives

Proposed extraction of water will be within the sustainable limit of the aquifer or water supply to fulfil the Project needs over the predicted life-of-mine, without causing environmental or social impacts.

Water resources will be protected both now and in the future, such that ecological health and land uses, and the health, welfare and amenity of people are maintained.

5.3.2 Assessment of Risks

The EIS should identify and assess risks presented by the Project to surface and/or groundwater resources, including:

- progressive water table drawdown from unsustainable groundwater extraction rates, particularly where aquifers are utilised by other users and/or groundwater dependent ecosystems. Where risks to sensitive receptors are identified, drawdown modelling should quantify potential impacts.
- discharge or seepage of contaminated waters from the Project into surface and/or groundwater resources, such as AMD/NMD/SD seepage from pit walls, process water/waste/tailings storage facilities or gypsum stockpiles
- erosion of Project component sites, infrastructure corridors and utilised roads, and associated sedimentation of waterways

- loss of control / containment of poor quality mine waters, such as associated with extreme weather events
- uncontrolled release, spills or passive discharge of hazardous materials, such as hydrocarbons, to surface and/or groundwater resources
- need for the Project to discharge surplus contaminated waters to local creeks or aquifers (particularly at times of low creek flow)
- increasing contaminant concentrations in evaporation ponds, reflecting in water quality in pond seepage and groundwater plumes
- 'first flush' surge of stored oxidation products (AMD/NMD/SD) generated in mine storage facilities over extended dry periods, discharging downstream with the first heavy rains
- major weather events (e.g. 5 to 100 year average recurrence interval [ARI]) and extreme weather events (e.g. 100 year ARI, or greater) on water management and infrastructure, including contingency management
- Project disturbance of surface-water catchments, groundwater recharge zones, flowpaths, riparian zones or aquatic ecosystems.

Influence of seasonality should be discussed where relevant. The risk assessment should consider the short (whilst operational), medium (post closure and under institutional control) and long term (post-institutional control) timeframes of the Project.

Risk exists of generation/concentration of environmental contaminants from Project processes and waste streams impacting water quality and dependent/downstream ecosystems. Minimum requirements to address Project risks of AMD/NMD/SD are detailed in the NT EPA *Environmental Assessment Guidelines, Acid and Metalliferous Drainage*⁸.

The EIS should also provide the following information:

- Provide results of characterisation of expected waste streams (for all Project options).
- Describe proposed methods to characterise future mine wastes, in terms of their potential to generate environmental contaminants.
- Identify risks of AMD/NMD/SD or other environmental contaminants being generated or concentrated by the Project.
- Detail proposed management (and contingency management) that identifies, systematically addresses, remedies and monitors any occurrence of environmental contaminants to prevent environmental impacts during mine operations and beyond mine closure.
- Site-wide management of environmental contaminants should be summarised in the environmental management plan (Section 6) for the Project.
- Provide a detailed conceptual site model⁹ describing potential sources, pathways, receptors, and fate of any contaminated waters, and products, from the Project, and

⁸ NT EPA *Environmental Assessment Guidelines, Acid and Metalliferous Drainage* at: http://www.ntepa.nt.gov.au/_data/assets/pdf_file/0005/349934/guideline_assessment_acid_metalliferous_drainage.pdf.

⁹ See: NT EPA *Guidelines on Conceptual Site Models* at: http://www.ntepa.nt.gov.au/_data/assets/pdf_file/0005/349943/guideline_pollution_conceptual_site_models.pdf, and *Global Acid Rock Drainage (GARD) Guide. International Network for Acid Prevention (INAP)*. at:

Project components. The model should be of sufficient detail for the general reader to understand the sources of potential contaminants, mechanisms of their release, pathways for transport, and potential for human and ecological exposure to these potential contaminants.

The minimum data required to support the model should include, but not be limited to:

- laboratory and field testing data required to characterise AMD/NMD/SD potential and acid neutralisation potential of mine products and infrastructure.
- permeability and depths of geological strata across the mine site and underlying mine waste/water storage facilities, with identification of preferential flow pathways/strata, such as paleochannels and faults
- groundwater modelling and from Section 4.2, and flow modelling where appropriate
- physicochemical mobility of contaminants
- baseline water quality of receiving waters (from section 4.2)
- contaminant transport modelling of seepage plumes where appropriate.
- biological receptors, vectors and their habitats
- other complementary technical studies, at appropriate temporal and spatial scales.

An appropriately qualified and experienced person should be involved with the supervision and interpretation of test results and the development of the conceptual site model. Appropriate statistical design details including the number of samples, sampling site selection procedures and QA/QC protocols to support the development of the model should be provided and justified.

Estimate the quality and quantities of seepage discharging to aquifers and creeks from proposed mine components through all mine phases, including post closure (long term).

Summarise how water quality and flows in local creeks and aquifers will potentially be impacted by the Project in the short and long term.

Describe and assess the significance of residual risks to sensitive receptors from mine-induced water quality impacts. Include consideration of downstream ecosystems and stakeholders, in the short and long terms.

5.3.3 Mitigation

The EIS should describe proposed management of water for the Project for all mine-life stages and seasons, according to its source, quality, volume, end use or other parameters, including:

- proposed management to contain contaminants onsite

<http://www.gardguide.com> ...Conceptual Site Models:

http://www.gardguide.com/index.php?title=Chapter_4#4.2.3_Conceptual_Site_Model_Development

Including Figure 4-4:- *Sources and Pathways of ARD, NMD, and SD in Underground Workings during Operation and Closure*)

- water quality thresholds triggering management actions
- description of site surplus water volumes, and proposed management
- management of stormwater, erosion and sediment loads during seasonal and extreme rainfall events.

The EIS should provide a draft Water Management Plan (WMP) that outlines clear and concise measures to mitigate identified risks of the Project to water resources. All mitigation and monitoring measures in the WMP should be adequately detailed to demonstrate best practice management and that environmental values of receiving waters will be maintained. The WMP should include but not be limited to measures that:

- avoid and remedy Project contamination of surface or groundwater resources
- ensure the protection and resilience of water dependent ecosystems
- protect water quality and levels for existing users of bores and/or surface waterways
- avoid the exposure of sensitive biological receptors to contaminants or water of a poor quality that may be harmful
- prevent release of contaminated Project waters or hazardous materials to the environment, and ensure treatment / neutralisation occurs to identified safe levels before any controlled environmental release is considered
- treat and manage domestic wastewater and sewage.

The WMP should be related to, but separate from Management Plans for:

- Erosion and Sediment Control
- Management of Environmental Contaminants.

The Erosion and Sediment Control Plan (ESCP) should be undertaken by a suitably qualified and experienced professional in erosion and sediment control planning. The ESCP should be consistent with the International Erosion Control Association's Best Practice Publications.

The WMP should undergo a process of peer review by an independent, appropriately qualified expert. Feedback should be included as an attachment to the WMP.

5.3.4 Monitoring

The WMP and related management plans should outline details of monitoring programs to be implemented throughout the life of the Project to determine effectiveness of the mitigation measures (Section 5.3.3), and to monitor for risks to water resources from the Project.

Proposed monitoring should be described for leaks or spills of materials from pipelines, storage facilities (including tailings storage facilities) and transport operations to ensure protection of local soils, aquifers, environments, workers and the general public.

The monitoring programs should include relevant water quality target values based on appropriate guidelines and/or standards. The monitoring program should outline reporting procedures and contingencies that will be implemented in the event that monitoring activities identify that any performance indicators have been triggered, or other water related hazard or emergency.

The monitoring programs should consider:

- methods to monitor the impacts of the Project on surface and groundwater quality and quantity

- Provisions to notify and respond to environmental and human health risks associated with water quality, or other water related emergency.

5.4 Biodiversity

5.4.1 Environmental Objectives

The Project will maintain the conservation status, diversity, geographic distribution and productivity of flora and fauna species and ecosystem levels through the avoidance or management of adverse impacts.

5.4.2 Assessment of Risk

The EIS should assess identified risks to biodiversity values, particularly threatened species, as a result of the Project¹⁰. The EIS should include references to relevant research and statutory plans, such as action plans, recovery plans and threat abatement plans, when assessing the risks.

The EIS should include:

- analysis of the potential impact of the Project to ecosystems at a local and regional scale, including the potential for ongoing indirect impacts
- detailed assessment of any likely impact that the Project may facilitate on listed threatened species at the local, regional, state, and national scale
- analysis of the potential for Project impacts (direct, indirect and consequential) to other flora and fauna species of conservation significance. Where a risk has been identified, the EIS should include discussion of the severity of those risks to individuals and regional populations
- analysis 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.

Consideration, where relevant, should include potential for impacts from linear developments, road strikes, discharge or seepage of poor quality water, ground/surface water contamination, groundwater drawdown, vegetation clearance, habitat fragmentation, edge effects, erosion and sedimentation, soil compaction, inappropriate/ineffective rehabilitation, waste material, transport / storage of hazardous chemicals, noise / vibration, dust / air quality impacts or other processes exacerbated through construction or operation of the Project.

Detailed assessment is required of the potential of the Project to introduce and/or increase the presence of introduced and invasive species (both flora and fauna) in the region, and the potential impacts of such species. Show consideration of relevant Threat Abatement Plans¹¹, such as:

- *Threat Abatement Plan for Predation by Feral Cats*
- *Threat Abatement Plan for Predation by the European Red Fox*
- *Threat Abatement Plan to reduce the Impacts on Northern Australia's Biodiversity by the Five Listed Grasses.*

¹⁰ In accordance with: NT EPA *Guidelines for Assessment of Impacts on Terrestrial Biodiversity* at: http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0003/349941/guideline_assessment_terrestrial_biodiversity.pdf

¹¹ <http://www.environment.gov.au/biodiversity/threatened/tap-approved.html>

5.4.3 Mitigation

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

The BMP should detail preventative management and treatment measures in relation to:

- procedures to be adopted during vegetation clearing, including wildlife rescue procedures
- weed and feral animal management
- potentially significant impacts to the biodiversity on-site as a whole
- mitigating the impacts to vegetation
- rare or threatened species at risk of being adversely impacted
- weed control measures and hygiene protocols as required under the *Weeds Management Act*.

Management measures should be prepared by a suitably qualified expert that has demonstrated experience in the mitigation and monitoring of adverse impacts to biodiversity and threatened species.

Proposed mitigation measures must be incorporated in relevant sections of the Environmental Management Plan (EMP) (see Section 6).

5.4.4 Monitoring

The BMP should include details of monitoring that is proposed to be undertaken to monitor the effectiveness of the mitigation measures proposed, including the methodology for monitoring the impacts to biodiversity. Where relevant, outline contingency measures to be implemented in the event that monitoring indicates that mitigation measures are ineffective. Provide explicit thresholds / trigger-points for intervention.

5.5 Human Health and Safety

5.5.1 Environmental Objectives

Project design, management and monitoring will reduce residual risks to human health and safety to a low level.

5.5.2 Assessment of Risks

The EIS should identify and assess risks and hazards to human health and safety associated with all stages and components of the Project, including pathways for development of risks and hazards.

Sensitive receptors to risks and hazards should be identified, including their location and patterns of activity and occupation, with the potential for exposure to the risks and hazards as a consequence of the Project.

Include identification and assessment of:

- health and safety risks for the workforce and the general public for the duration of the Project including post-closure
- safety risks associated with fire, including combustible materials and bushfires
- risks relating to the environment and public health and safety from the transportation of personnel, ore, explosives (bulk emulsion), consumables and dangerous goods, on public roads

- hazardous materials exposure, and proposed management of hazardous process inputs and outputs
- potential risks associated with naturally occurring radiation materials
- risks associated with remote area construction, operations and transport, such as due to:
 - reduced access to communications and monitoring networks, and to emergency, health and vehicle breakdown services.
 - extreme climates,
 - fauna
 - long travel distances
- risks to the safety of transport network users and communities adjacent to haul routes
- capacities of current and proposed infrastructure and services to allow the Project to operate safely
- other direct and indirect health and safety risks for the workforce and the general public associated with Project components.

5.5.3 Mitigation and Monitoring

Detail preventative, management, treatment and monitoring strategies used to minimise the impacts of the Project on human health and safety. Outline environmental management strategies necessary for human health and safety, and describe how these strategies will be incorporated into the EMP (Section 6).

Describe the emergency plans and response procedures developed as a contingency in the event of an emergency or accident (e.g. chemical spillages, leaks, fire and explosions, traffic accident, plane crash, etc.), including 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.

5.6 Socio-economic

5.6.1 Environmental Objectives

To analyse, monitor and manage the intended and unintended social consequences, both positive and negative, of the Project and any social change processes.

5.6.2 Assessment of Risks

The Project has the potential to cause positive and/or negative impacts on the regional, Territory and national economies, and the social well-being of the population. Operations and activities associated with the life of the Project have the potential to change social demographic, cultural and economic elements. As a result potential economic and social benefits may not be optimised and costs may not be fully understood and taken into consideration.

An Economic and Social Impact Assessment (ESIA) should be conducted in accordance with the NT EPA *Guidelines for the Preparation of an Economic and Social Impact Assessment*¹² considering social and economic risks from operation of the Project.

¹² Available at:
http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0007/349936/guideline_assessment_economic_social_impact.pdf

The following may assist with highlighting the economic value of the Project and are not intended to result in the inappropriate disclosure of confidential information:

- summary of the Project's economic feasibility
- details of the financial capacity to implement the Project, the significance of potential risks to project implementation and associated proposed mitigation measures, including the capacity to cost for mine closure and care and maintenance activities
- opportunities available to regional centres based on the activity generated by the Project (construction, rehabilitation and operation)
- current and projected availability of goods and services.

The ESIA should include analysis of the current and projected financial capacity of the Proponent to allocate sufficient resources to:

- implement the Project, mitigation measures, and contingency management measures
- maintain its environmental obligations should the Project be temporarily closed or suspended
- meet all stabilisation, rehabilitation and closure requirements, once operations have ceased.

5.6.3 Mitigation and Monitoring

An Economic and Social Impact Management Plan (ESIMP) should be prepared to address any risks identified in the ESIA. The ESIMP should:

- describe how the Proponent proposes to manage any identified economic, social, cultural or tourism risks from the Project, or its associated workforce
- describe how potential local and regional business and employment opportunities related to the Project will be identified and managed
- include a mechanism for monitoring and reporting any identified potential socio-economic and cultural impacts
- include measures to mitigate negative economic and social impacts on the locality and region
- provide outcome and assessment criteria that will give early warning that management and mitigation measures are not achieving the outcomes and benefits expected and identified by the Proponent
- provide a stakeholder communications strategy including identification of, and ongoing consultation and negotiations with, all relevant stakeholders, ensuring the full range of community viewpoints are sought and included in the EIS.

5.7 Transport

5.7.1 Environmental Objectives

Key transport risks will be effectively identified and avoided / mitigated / minimised to the greatest practicable extent.

5.7.2 Assessment of Risks

The EIS should identify and analyse direct and indirect risks, hazards, costs and benefits associated with Transport components of the Project.

Sensitive receptors to risks, hazards, costs and benefits should be identified, including their location and the potential for exposure.

Aspects to be discussed include:

- support services and infrastructure to be provided by the Proponent for transport components of the Project
- risks to regional community access to emergency and breakdown services, fuel supplies and accommodation from increased demands due to the Project
- risks to marine waters and ecosystems associated with loading/unloading of vessels, and stockpiles of product and materials
- risks from Project heavy vehicles to the condition and usability of public roads, including the Sandover Highway (tourist 4WD route), and consideration of seasonal variability of road surface conditions
- risks to other users and available capacities of shared railway resources
- risks associated with other transport components of the Project, including personnel and air transport, rail and sea haulage.

5.7.3 Mitigation and Monitoring

Detail preventative, management, treatment and monitoring strategies used to minimise the impacts of Transport components of the Project. Describe how these strategies will be incorporated into the EMP (Section 8).

Description should be included of safeguards, management and monitoring strategies to be implemented to minimise potential transport (air, road rail, sea) health, safety and environmental risks, such as:

- measures to reduce any road traffic nuisance impacts (e.g. noise, dust, light)
- road / airstrip maintenance and upgrades where relevant to human safety and continued access
- methods for complying with any relevant road vehicle axle limits
- methods for securing loads
- consultation with local communities affected by transport impacts
- spill prevention and management during ship loading/unloading operations, transport of product, and stockpiles of product and materials
- management of driver fatigue.

5.8 Historic and Cultural Heritage

5.8.1 Environmental Objectives

Places and items with historic and/or cultural heritage values protected under the *Heritage Act* and/or *Northern Territory Aboriginal Sacred Sites Act* will be identified and those values protected.

5.8.2 Assessment of Risks

The EIS should:

- identify and assess risks of the Project to impact on sites / objects of sacred, heritage, cultural or indigenous cultural significance
- detail any requirements to disturb or destroy a prescribed archaeological place and/or object under the *Heritage Act*
- identify and assess any risks to significant cultural sites from Project generated vibration and dust.

5.8.3 Mitigation

The EIS should describe the prevention and mitigation of potential risks to existing sites or items of historic and cultural heritage in a Cultural Heritage Management Plan (CHMP). The CHMP should include:

- procedures to avoid significant sites and areas
- protection of key sites during construction, operation and decommissioning work
- measures to enable the Proponent, or contractor to the Proponent, to meet its duty of care to protect the cultural and heritage values of any places or items of significance
- procedures for the discovery of surface or sub-surface items during the course of the Project.

5.8.4 Monitoring

The CHMP should include details of a monitoring and reporting program to determine the effectiveness of mitigation measures (Section 5.8.3). The monitoring and reporting program should identify when further action is required and outline contingency measures should the proposed mitigation measures result in degradation to the values of sites or items with heritage or cultural significance.

5.9 Air

5.9.1 Environmental Objectives

Sensitive receptors to Project generated emissions to air, including dust, will be identified and protected from significant impacts.

5.9.1 Assessment of Risks

Risks to air quality and sensitive receptors generated by Project activities should be identified and assessed, including emissions of chemicals, particulates, biological materials and dust, from:

- each processing circuit option, sulfuric acid plant, vehicles, power plants, machinery
- drilling, blasting and materials handling (including transportation from the pit to export facilities)
- crushing and processing
- general site movements over unsealed surfaces
- haulage and transport of material along the haul road between the pit, stockpiling site and export facilities
- wind erosion mobilising dust from exposed surfaces, such as from waste dumps, laydown areas, stockpiles, roads and sites of vegetation clearing.

Identify existing variability in air quality target parameters, such as the impact of seasonal smoke haze, and any relevance to potential risks to sensitive receptors from Project emissions.

The potential nuisance and human health issues associated with air quality, including dust, and mitigation measures should be discussed in Sections 5.4 and 5.5.

Consideration should be given to the acute and chronic exposure and pathways, such as inhalation, ingestion and dermal contact. Potential sensitivity of receptors to air quality, including dust, and mitigation measures should be discussed in relevant sections of the EIS. Identified risks and contaminant pathways should also be included in the conceptual site model for the Project (section 5.3.2).

5.9.2 Mitigation

The EIS should provide details of mitigation measures to avoid, mitigate and/or minimise identified risks, including but not limited to:

- risks associated with toxic or nuisance emissions from Processing plants (all options), vehicles, machinery, power plants or a sulfuric acid plant
- Project emissions to air
- mobilisation of dust from disturbed areas and roads, where risks exist to identified sensitive receptors
- contingency measures to be implemented in the event that monitoring demonstrates that management measures have not been effective

5.9.3 Monitoring

The EIS should provide details of a proposed monitoring program, including:

- technique, location, frequency and target parameters
- proposed monitoring and reporting to be used to evaluate and report on the effectiveness and performance of the mitigation measures
- outcome and assessment criteria that will give early warning that management and mitigation measures are not achieving the outcomes and benefits expected and identified by the Proponent.

5.10 Rehabilitation, Decommissioning and Closure

5.10.1 Environmental Objectives

The EIS should provide a detailed identification and assessment of the risks to demonstrate that:

- rehabilitation will achieve a stable and functioning landform that is consistent with the surrounding landscapes and other environmental values and will remove potential for long term, post closure impacts on downstream water quality, beneficial uses and environmental values.
- identified risks associated with closure and rehabilitation of the Project have been prevented or adequately mitigated.

5.10.2 Assessment of Risks

The EIS should identify and assess risks to successful rehabilitation and closure, including risks of:

- the Project not realising its projected outcomes, such as associated with delays, unexpected / forced closure, or falling market prices
- inadequate identification and management of materials with AMD/NMD/SD potential
- changes in the assumptions used as a basis for the post-closure risk assessment
- natural events, including earthquakes, cyclones, rain depressions, fire and flood.

Discuss and assess risks associated with proposed levels of pit backfilling and rehabilitation including:

- target level of backfilling of pits and progressive rehabilitation according to strip-mining principles, or other principles
- proposed methods and location for stockpiling and final placement of tailings / process waste streams, overburden and topsoils
- variability / mapping of the resource in terms of P_2O_5 concentrations and depth

- the extent of ore-grade mixing that will be required to meet target P_2O_5 concentrations, required by markets or processing circuits. Discuss how target grades will be achieved, such as through mine sequencing using multiple pits
- potential need for creation of temporary vs permanent overburden stockpiles, and double handling of overburden and processing waste / gypsum
- costs / affordability of material double-handling
- implications of the above to the level of pit backfilling proposed, and to final landscape topography
- management of waste rock landform(s) (if relevant)
- visual amenity of the proposed final landscape topography, its acceptability to future owners, including traditional owners, and suitability of that profile to projected future uses of the sites.

Discuss and assess risks 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.

5.10.3 Mitigation

Provide details of proposed rehabilitation and closure planning for the Project, including:

- an outline of final rehabilitation, revegetation and closure plans for all aspects of the Project on completion of mining on site
- rehabilitation objectives for the Project area beyond the intended use
- final topographic and drainage morphology, including design concepts and methodology to be used
- proposed staging and timing of rehabilitation and closure
- removal of plant, equipment, structures, linear infrastructure, hardstand and concrete footings, buildings, water storages, and methods proposed for stabilisation of affected areas
- protocols for the safe and stable securing of the mine
- rehabilitation techniques to be used
- investigation of various methodologies of topsoil management and their effectiveness for rehabilitating disturbed areas
- ancillary preparations for rehabilitation/closure, such as: establishment of an on-site nursery, local native species selection/collection/grow-out and revegetation trails
- closure criteria and future land tenure and land-use arrangements.

A draft Mine Closure Plan (MCP), specific to the Project should be prepared to address identified risks associated with rehabilitation, decommissioning and closure. The MCP must provide an outline of the issues that require management at closure and demonstrate that all relevant issues and appropriate management measures have been identified. The MCP should demonstrate that ecologically sustainable mine closure can be achieved consistent with agreed post-mining outcomes and land uses, and without unacceptable liability to the Territory.

The MCP should include:

- mitigation measures to address identified risks
- measures required to prevent contamination of surface and groundwater resources

- measures to ensure that tailings and overburden with AMD/NMD/SD potential, and poor quality mine waters, will be physically isolated from the environment, and not result in any short (whilst operational), medium (post closure and under institutional control) or long term (post-institutional control) detrimental ecological impacts
- measures to minimise the long term introduction and control of weeds
- revegetation strategies for disturbed sites to utilise local native plant species similar in type, density and abundance to those existing in adjacent areas
- measures to ensure the environmental sustainability and full containment of contaminated drainage / runoff post-closure
- measures to ensure the stabilisation of erosion, to a level similar to comparable landforms in surrounding undisturbed areas
- contingencies to make landforms and mine components secure and non-polluting in the event of unexpected or temporary closure, or failure of rehabilitation, revegetation or closure actions.

The MCP should include a Care and Maintenance Plan based on the MCP. The Care and Maintenance Plan should include measures outlining how the Proponent will maintain its environmental obligations and commitments should the Project be temporarily or unexpectedly closed or suspended at any stage in the Project life.

5.10.4 Monitoring

The EIS should:

- Describe proposed post-mining monitoring and reporting to be used to evaluate and report on the effectiveness and performance of the mitigation measures.
- Describe contingency measures to be implemented in the event that monitoring demonstrates that management measures have not been effective.

Provide outcome and assessment criteria that will give early warning that management and mitigation measures are not achieving the outcomes and benefits expected and identified by the Proponent

5.11 Other Risks

Other risks not assessed in the preceding sections (5.3 - 5.9) should be identified and management strategies proposed that detail avoidance, minimisation, mitigation and monitoring for the risks. The following risks and advice should also be addressed as a minimum:

5.11.1 Bushfires and Emergency

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, in a Fire Management Plan for the Project. The Plan should be developed in consultation with traditional owners, pastoralists and their representative organisations, where appropriate, that have specialist knowledge in fire management. The Fire Management Plan should be incorporated into the Environmental Management Plan (Section 6) for the Project.

5.11.2 Noise and Vibration

The potential sensitivity of human and biological receptors to noise and vibration and mitigation measures should be discussed in a relevant section of the EIS. The Proponent should address the impact of noise and vibration resulting from the Project on residents and the community in a relevant section of the EIS. The EIS should outline

methods for communicating with, and reducing the impact on, residents within the vicinity of the Project who may be affected by the Project.

The EIS should outline proposed management to mitigate any identified risks from the Project with regard to noise and vibration emissions. If relevant, the EIS should describe proposed communication with any residents and communities predicted to be impacted by noise and vibration from the project.

5.11.3 Visual Amenity

The extent and significance of the changed landscape on visual amenity during all stages of the Project should be discussed in a relevant section of the EIS. Aspects of the project that would be visible from key vantage points, publicly accessible areas and areas of significance, should be discussed.

5.11.4 Mosquito Breeding

There is potential for mine sites to create mosquito breeding sites. The Proponent should be aware of sections of the *Public and Environmental Health Act* that apply to the Project and address risk and management of biting insects in a relevant section of the EIS. In particular, the EIS should provide:

- measures to ensure water pond (i.e. sediment pond) is designed with minimal mosquito breeding potential (i.e. steep sides, deep open water). The Project should conform to '*Guidelines for Preventing Mosquito Breeding Associated with Mining Sites*'¹³
- Measures to prevent mosquito breeding should be outlined in a biting insect management section in the Environmental Management Plan. Information on personal protection can be found in '*Personal protection from mosquitoes and biting midges in the Northern Territory*'¹⁴

6 Environmental Management

The specific safeguards and controls proposed to be employed to minimise or remedy environmental impacts identified in the risk assessment process are to be included in an EMP. The EMP should be strategic, describing a framework for continuing management, mitigation and monitoring programs for the significant environmental impacts of the Project.

The scope, content and structure of the EMP will be a function of the outcomes of the environmental risk assessment and determined by the significance of the environmental impacts. The EMP should not be prepared in isolation but should be consistent and integrated with the principles of an environmental management system. The EMP should include specialised management plans where it is necessary to provide a high level of operational detail (e.g. Water Management Plan, Erosion and Sediment Control Plan, etc.). As much detail as is practicable should be provided to enable adequate assessment of the proposed environmental management practices and procedures

The EMP needs to address the Project phases (development, operation, decommissioning, closure and post-closure) separately. It must state the environmental

¹³ *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites*.
[http://www.health.nt.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/32/40.pdf&siteID=1&str_title=Guidelines for preventing mosquito breeding sites associated with mining sites.pdf](http://www.health.nt.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/32/40.pdf&siteID=1&str_title=Guidelines+for+preventing+mosquito+breeding+sites+associated+with+mining+sites.pdf)

¹⁴ *Personal protection from mosquitoes and biting midges in the Northern Territory*
[http://digitalibrary.health.nt.gov.au/prodjspu/bitstream/10137/264/3/Personal protection from mosquitoes and biting midges in the NT 25 OCT 2011_5_doc.pdf](http://digitalibrary.health.nt.gov.au/prodjspu/bitstream/10137/264/3/Personal+protection+from+mosquitoes+and+biting+midges+in+the+NT+25+OCT+2011_5_doc.pdf)

objectives, performance criteria, monitoring, reporting, corrective action, necessary resourcing, responsibility and timing for each environmental issue.

The EMP should include:

- the proposed management structure of the Project and its relationship to the environmental management of the site, including personnel responsible for maintaining and approving the EMP
- description of the main elements of the environmental management system and reference to related documents determined by the Proponent to be necessary to ensure the effective planning, operation and control processes that relate to the environmental management system
- a register of ownership for the mining and infrastructure interests associated with the Project, including the title numbers, title holders and status
- the name of the agency responsible for endorsing, approving and/or overseeing each mitigation measure or monitoring program
- proposed reporting procedures consistent with Territory and Australian Government legislative requirements
- a summary table listing the commitments made in the EIS, including clear timelines for key commitments and performance indicators, with cross-references to the text of the EIS
- management targets and objectives for relevant environmental impacts and/or factors
- performance indicators by which all anticipated and potential impacts can be measured
- proposed monitoring programs to allow early detection of adverse impacts
- sampling procedures and frequency, where relevant:
 - how results will be recorded
 - laboratory techniques and methods of data analysis
 - equipment and instruments calibrated or verified at specified intervals
 - sample preservation techniques.
- contingencies for emergency events, such as hydrocarbon and other hazardous chemical spills or natural disasters
- procedures for dealing with failure to meet performance criteria and targets, non-compliance with environmental management controls, environmental incidents and emergencies
- Where interpretation of the monitoring data or other observations have detected the potential for or actual adverse trends in performance or impacts, detail what remedial/corrective strategies and actions will be implemented. Include scopes of work where appropriate together with a commitment to an implementation timetable and any modifications to the monitoring program required in order to assess the performance of the actions.
- an overview of the environmental awareness training and education process regarding responsibilities, including:
 - the induction program (e.g. general, site, department)
 - communication of the requirements of the EMP to all employees and contractors
 - environmental emergency response training

- particular training requirements for targeted personnel
- any other environmental training or education requirements
- provision for the periodic review of the EMP
- provision for independent environmental auditing of the Project.

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 (if any) and conclusions.

7 General Advice on the Environmental Impact Statement

7.1 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 Project. 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 or accompanied by a clear explanation so that it is readily understandable. 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 potential impacts on the environment, as determined through adequate technical studies. Consideration of appropriate spatial, temporal and analytical scales should be used to clearly communicate the potential impacts to the environment.

Information materials summarising and highlighting risks of the Project should be provided in a culturally appropriate format and language, accompanied by graphics and illustrations that assist with interpretation, where relevant.

7.2 Structure, Format and Style

The EIS should comprise of three elements:

1. 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 action, 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.

2. Main text of the document

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

3. Appendices

The appendices must include detailed technical information, studies or investigations necessary to support the main text. These will be made publicly available and should include:

- a table listing how these Terms of Reference have been addressed in the EIS, cross-referenced to chapters, page numbers and/or appendices;
- the name of, work done by and the qualifications and experience of the persons involved in preparing the EIS
- a table listing commitments made by the Proponent
- detailed technical information, studies or investigations necessary to support the main text.

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.

7.3 Referencing and Information Sources

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 and data, or documents cited in the EIS must be available upon request. For information given in the EIS, the EIS must state:

- the source of the information
- how recent the information is
- how the reliability of the information was tested
- what uncertainties (if any) are in the information.

All known and unknown variables or assumptions made in the EIS must be clearly stated and discussed. Confidence levels must be specific, as well as the sources from which they were obtained. The extent to which a limitation, if any, of available information may influence the conclusions of the environmental assessment should be discussed.

Reliability of the data and an explanation of the sampling criteria and approach should be provided where data are used to support statements, studies and claims in the EIS. Sufficient discussion should accompany the data to demonstrate that the data and results of quality control and quality assurance testing are suitable and fit for purpose.

Spatial data should be provided to the NT EPA as importable Geographic Information System shape files, with relevant features and areas geospatially referenced and marked as polygons, lines and points.

Topography / contours should be detailed at appropriate intervals with respect to Australian Height Datum (AHD).

The reporting of exploration results, ore reserve and mineral resource estimates in the EIS should be consistent with the *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves*, of the Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia (JORC), 2012. Available at: http://www.jorc.org/docs/JORC_code_2012.pdf.

The EIS must include information on any consultation about the Project, including:

- any consultation that has already taken place
- a list of persons and agencies consulted during the EIS
- if there has been consultation about the Project, any documented response to, or result of, the consultation
- proposed consultation about relevant impacts of the Project

- identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.

The EIS has an important role in informing the public about this Project. It is essential that the Proponent demonstrate how any public concerns were identified and 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 because of consultation. Details of any ongoing liaison should also be discussed.

If it is necessary to make use of material that is considered to be of a confidential nature, the Proponent should consult with the NT EPA on the preferred presentation of that material, before submitting it to the NT EPA for consideration. Information of a confidential nature should not be disclosed in the draft EIS if disclosure of the information might:

- prejudice inter-governmental relations between an Australian body politic and a body politic overseas or between two (2) or more bodies politic in Australia or in the Territory
- be an interference with a person's privacy
- disclose information about an Aboriginal sacred site or Aboriginal tradition
- disclose information obtained by a public sector organisation from a business, commercial or financial undertaking that is:
 - a trade secret
 - other information of a business, commercial or financial nature and the disclosure is likely to expose the undertaking unreasonably to disadvantage.

It is an offence under the *Northern Territory Environment Protection Authority Act* (NT EPA Act) to give information to the NT EPA that the person knows is misleading or contains misleading information.

7.4 Administration

The Proponent should lodge ten bound hard copies and an electronic copy (Adobe PDF format) of the draft EIS with the NT EPA. The electronic copies should be provided both as a single file of the entire document and separate files of the document components. A Microsoft Word copy of the EIS should be provided to facilitate the production of the 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 documents are constructed.

The Proponent is to advertise that the draft EIS is available for review and comment, in the:

- NT News;
- Tennant and District Times
- Centralian Advocate.

The NT EPA requires the complete draft EIS document and a draft of the advertisement at least one week prior to advertising the draft EIS, to arrange web upload of the document and review and comment on advertising text.

Spatial data should be provided to the NT EPA as importable Geographic Information System shape files, with relevant features and areas geospatially referenced and marked as polygons, lines and points.

7.5 Public Exhibition

Sufficient copies of the draft EIS should be provided to and be made available for public exhibition at:

- NT EPA, 2nd Floor, Darwin Plaza, 41 Smith Street Mall, Darwin
- Department of Lands, Planning and the Environment, Floor 1, Alice Plaza Building, Todd Street Mall, Alice Springs
- Mines and Energy Information Centre, Department of Mines and Energy, 3rd Floor, Paspalis Centrepont, 48 Smith Street Mall, Darwin
- Northern Territory Library, Parliament House, Darwin
- Tennant Creek Public Library, Peki Road, Tennant Creek
- Central Land Council, Main Office, 27 Stuart Highway, Alice Springs
- Central Land Council, Regional Office, 63 Patterson Street, Tennant Creek
- Arid Lands Environment Centre, 18 Warburton St, Alice Springs
- Environment Centre Northern Territory, Unit 3, 98 Woods St, Darwin.

The draft EIS should be available for viewing at appropriate locations or services by residents from:

- Ampilatwatja
- Ali Curung.

The public exhibition period for the draft EIS will be six (6) weeks. 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. The NT EPA will direct the Proponent to extend the EIS exhibition period if the EIS exhibition overlaps any Christmas and January periods.