

**TERMS OF REFERENCE FOR THE PREPARATION OF AN
ENVIRONMENTAL IMPACT STATEMENT**

**McArthur River Mine – Overburden Management
Project**

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September 2014

1	Introduction.....	1
1.1	Background.....	1
1.2	Scope of EIS.....	2
2	Description of the Proposed Development.....	3
2.1	General Information.....	3
2.2	Description of the Proposal.....	4
3	Alternatives.....	5
4	Risk Assessment.....	5
4.1	Risk Assessment Approach.....	5
4.2	Key Risks Associated with Current Activities at McArthur River Mine.....	6
4.3	Water.....	7
4.4	Biodiversity.....	10
4.5	Rehabilitation and Mine Closure.....	12
4.6	Human Health and Safety.....	14
4.7	Socio-economic Impacts.....	14
4.8	Other Risks.....	16
5	Environmental Offsets.....	17
6	Environmental Management.....	17
7	General Advice on EIS.....	18
7.1	General Content.....	18
7.2	Structure, Format and Style.....	18
7.3	Referencing and Information Sources.....	19
7.4	Administration.....	20
7.5	Public Exhibition.....	20

1 Introduction

1.1 Background

The McArthur River Mine (MRM) is located approximately 45 km south-west of the township of Borroloola and 470 km south-east of Darwin, in the Gulf Region of the Northern Territory. MRM is the world's largest producer of zinc in bulk concentrate form and zinc concentrate. The concentrate is transported from the mine to the Bing Bong loading facility 100 km north-east of the mine.

Following the preparation of an Environmental Impact Statement (EIS) in 1992, development of MRM's underground operation commenced in 1994, with the first shipment of concentrate commencing in mid-1995. Phase 2 of the mining operations involved converting MRM to an open pit. The Phase 2 environmental impact assessment (EIA) process was completed in February 2006, however, the NT Government did not approve the project and the proposal was reassessed at the level of Public Environmental Report in August 2006. The then Minister for Natural Resources, Environment and Heritage recommended that the project proceed subject to conditions.

The MRM Phase 3 Development Project underwent an EIA process at EIS level and was subsequently approved by the Northern Territory Government in 2013. This project involved doubling of the mining rate, from 2.5 million tonnes per annum (Mtpa) of ore to 5.5 Mtpa, and increasing the zinc-lead concentrate from 360 000 dry metric tonnes per annum (dmtpa) to 800 000 dmtpa. The key components of the project included:

- Expansion of the open pit from a footprint of 145 ha to 210 ha and increasing the depth from 210 m to 420 m;
- Addition of a new cell on the existing tailings storage facility (TFS) to create additional capacity;
- Expansion of the existing North Overburden Emplacement Facility (NOEF) and the construction of new Overburden Emplacement Facilities (henceforth and more appropriately termed waste rock dumps) to the east and south of the open pit to store an additional 530 Mt of waste rock (715 Mt in total); and
- Construction of a new gas fired power station through a 'Build, Own, Operate' style contract, which is expected to double in output from the existing station (20 MW to 45-50 MW).

The Mining Management Plan (MMP) 2013-2018 for the McArthur River Mine was referred to the Northern Territory Environment Protection Authority (NT EPA) on 14 February 2014 for consideration under the *Environmental Assessment Act* (EA Act).

The MMP included a reclassification of waste rock types, with division of the material into benign and non-benign waste rock. The updated classification system accounted for non-acid forming (NAF) waste rock that would likely produce metalliferous drainage under circum-neutral conditions and saline drainage, as well as potentially acid forming and highly reactive waste material.

The 2012 EIS predicted that the potentially acid forming (PAF) waste rock would account for less than 25% of the total waste rock mined, the remainder being non-acid forming (NAF) waste rock. Reclassification of the material implies that problematic waste rock with the potential to cause acid and metalliferous drainage (AMD), which includes drainage from non-benign NAF waste, could account for up to 89% of the total waste material in the 2013–2018 mining period.

Pursuant to clause 14A(1) of the Environmental Assessment Administrative Procedures (EAAP) the NT EPA, on 27 March 2014, determined that the action proposed in the MMP had been altered from that which was assessed in 2012 in such a manner that its environmental

significance had changed. Under clause 14A(3) of the EAAP, the NT EPA decided that an EIS was necessary with respect to the proposed action.

The justification for the NT EPA's decision was that there were significant risks associated with the following:

- Significantly increased volumes of problematic waste rock;
- Inappropriate design of the waste rock dump to adequately contain problematic material;
- Insufficient quantities of suitable material available to encapsulate problematic waste rock and cap the NOEF, and to construct tailings storage facility and water management containments; and
- Significant water management challenges associated with exposure of problematic waste rock during Wet seasons.

On 15 June 2014, a delegate for the Australian Government Minister for the Environment decided that the Project (EPBC 2014/7210) was a controlled action and would require assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Project has the potential to have a significant impact on the following matters of National Environmental Significance (NES) that are protected under Part 3 of the EPBC Act:

- Listed threatened species and communities (sections 18 and 18A).

On 27 June 2014, the Proponent formally withdrew the MMP 2013-2018 from the NT EPA assessment process. On the same day, the Proponent submitted a Notice of Intent (NOI) for the Overburden Management Project for consideration by the NT EPA under the EA Act.

Pursuant to clause 14A(1) of the EAAP the NT EPA, on 10 July 2014, determined that the action proposed in the NOI changed the environmental significance of the action that was approved in 2012. Under clause 14A(3) of the EAAP, the NT EPA decided that an EIS was necessary with respect to the proposed action as the risks had not changed since its previous decision.

The Overburden Management Project is being assessed under the accredited assessment between the NT and Australian Governments.

Highly reactive waste rock has been smouldering on the waste rock dump for seven months creating plumes of sulphur dioxide. This has resulted in an increase level of community concern regarding the offsite impacts of mining activities.

1.2 Scope of EIS

These Terms of Reference (ToR) have been developed to assist the Proponent in preparing an EIS for the proposed action, in accordance with clause 8 of the Environmental Assessment Administrative Procedures, and to meet the requirements as provided for in Chapter 4, Part 8, Division 6 of the EPBC Act.

This ToR document will address those aspects of the Project that have significantly changed since the assessment of the Phase 3 EIS in 2012 and the Phase 3 authorisation in 2013.

The EIS should consider the significant risks and matters outlined in Section 1.1 above and detailed in Section 4 as important focus areas of assessment.

In order to continue with activities associated with the previously authorised Phase 3 project, the Proponent will need to provide justification for not including aspects of Phase 3 activities within this EIS. Aspects of the Phase 3 project that may not be affected by the alterations and might therefore not require further assessment could include:

- Activities at Bing Bong and alternative authorised ore transport and export activities;
- Processing of ore;
- Revegetation of the McArthur River diversion channel;
- Disposal of tailings at the existing tailings storage facility (if the geochemistry/volume of the tailings discharges has not significantly changed), excluding decommissioning;
- If sufficient and suitable clay and benign material are available within the authorised footprint, construction of water management structures (including Cell 4 of the TSF) and other earthen infrastructure required as part of Phase 3; and
- Stockpiling of waste rock demonstrated to be genuinely benign within the footprint of authorised waste rock dump areas.

Henceforth, where the term ‘the Project’ is used in this document, it refers to the components of the mine that have been, are being or will be altered from the 2012 assessment and/or would be affected by the alterations to those components and are defined as being within the scope of these ToR.

2 Description of the Proposed Development

2.1 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;
 - Areas in the National Reserve System; and
 - Sensitive environments such as major waterways, significant groundwater resources, significant natural features, conservation reserves.
- 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, seasonal temperatures, humidity, wind, evaporation, extreme events and rainfall);
- Details of any current agreements (unless confidential) between the Proponent, Northern Territory Government, and Traditional Owners of the Project site;
- History of the development of the McArthur River Mine to date;

- Summary description of the previous environmental impact assessments of the McArthur River Mine, including findings of the Assessment Report, commitments made by the Proponent, and environmental outcomes;
- Identification of areas proposed for future expansion, or any other potential future activities being planned;
- National and Northern Territory standards, codes of practice and guidelines which may be relevant to the Project;
- Information on requirements for approval or conditions that apply, or that the Proponent reasonably believes are likely to apply, to the Project; and
- The current status of the Project.

The Proponent may summarise this information and refer to previous reports where appropriate, but must clearly outline which of these reports are current and correct, which have been superseded and which are no longer relevant.

2.2 Description of the Proposal

To assist in determining the environmental impacts associated with the proposed works, a section should be provided that describes the Project in sufficient detail to allow an understanding of all stages of the proposed works. Emphasis should be given to those components that have significantly changed since the Phase 3 authorisation in 2013.

As a background to discussion of specific components, the following should be included:

- An outline of the geology of the area, focussing on the key issues listed in Section 1.1, 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;
 - General description of classes of ore and waste rock, estimated quantities of each class; and
 - Outline of the geology of other areas in which additional clay and/or benign material may be sourced.
- Delineation of the Project footprint using detailed maps and diagrams, including:
 - All areas to be cleared or disturbed (including mine, haul roads, product and waste material stockpiles and other infrastructure), both for the life of the Project and temporarily, prior to rehabilitation; and
 - The location of any works to be undertaken, structures to be built or elements of the proposed Project relative to the existing mine site and the previously authorised Phase 3 project.

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

Proposed infrastructure and any current infrastructure affected by changes to geochemical classification of waste rock/overburden should be described, including:

- Waste rock dump infrastructure, referred to by the Proponent as overburden emplacement facilities (OEFs);
- Water management infrastructure including dams, bunding and engineered channels;
- Mine pit; and
- Tailings storage facility (TSF).

The EIS should include a schedule for construction of proposed infrastructure and sequencing of mining activities, and waste handling and management.

Details should be provided of any variation from what has previously been approved (Phase 3 2013) in the current management of non-benign waste rock and how this will affect future infrastructure designs.

The Proponent needs to consider all areas that may be impacted by the revised geochemistry and/or any resultant AMD, including metalliferous drainage under neutral conditions and saline drainage. Details are required on the extent of change from what has already been assessed.

3 Alternatives

The EIS should describe any feasible alternatives to 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:

- Design options of waste rock dumps, TSFs and water management structures;
- Alternative layouts and alternative locations that improve Project outcomes, such as location of waste rock dumps;
- Mine scheduling/sequencing;
- Options to optimise ecological sustainability for the Project;
- Alternative processes, methods and lifecycles;
- Closure and rehabilitation planning; and
- Consideration of alternative environmental management measures for key risks/impacts.

Discussion should include:

- Adverse and beneficial effects of alternatives at regional and local levels;
- The comparison of short and long term advantages and disadvantages of the alternatives; and
- A comparative description of the impacts of alternatives on the matters of national Environmental Significance protected by relevant controlling provisions of Part 3 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the action.

4 Risk Assessment

4.1 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:

- Acknowledge and discuss the full range of risks presented by the Project, including those of special concern to the community;
- 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.

The Proponent should assess, where relevant, the potential for the cumulative impacts of the proposed actions on the existing site and its surrounds

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 developments 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 identified risks described in this Chapter (5) 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 identifying environmental values to be protected, have been identified for each key risk.

4.2 Key Risks Associated with Current Activities at McArthur River Mine

The Northern Territory Government has examined the McArthur River Mine Mining Management Plan 2013-2018, Mining Management Plan 2013-2015, Overburden Management Project NOI and visited the site on 16 July 2014. Although major risks were identified, it is possible that further risks will be identified in the environmental impact assessment process. The major risks identified for the current mine design are:

- Significant AMD generated from the NOEF and other mine infrastructure such as the TSF that may be constructed from problematic material;

- Highly reactive PAF material present in the waste rock dump, capable of spontaneously combusting;
- Contamination of groundwater from AMD causing groundwater quality impacts outside of the mineral lease or expression of contaminated groundwater to surface water;
- Contamination of on-site surface water from AMD and mining activities causing adverse impacts to downstream environmental values;
- Seepage of contaminated water from storage areas;
- Biodiversity impacts associated with AMD and erosion/sedimentation;
- Inadequacy of the final design of the NOEF leading to structural stability issues, generation of significant AMD and failure to meet stakeholder expectations for final land use structures;
- Insufficient quantities of benign material and clay to meet requirements for best practice encapsulation of problematic waste and final closure of waste structures;
- The potential for reductions in social and economic benefits flowing from the mine to the community due to significant cost blowouts associated with waste rock management; and
- Potential social and economic impacts associated with potentially significant, downstream environmental degradation.

Each of the identified risks should be comprehensively addressed by the Proponent in the risk assessment and management process, including the practicability and expected effectiveness of management measures. Additionally, any further risks identified through the comprehensive risk assessment process required for the EIS should be addressed and appropriate management initiatives instigated.

4.3 Water

Key Risks

- Contamination of groundwater from mining activities potentially causing groundwater quality impacts outside of the mineral lease or expression of contaminated groundwater to surface water.
- Contamination of on-site surface water from AMD including metalliferous and saline drainage under circum-neutral conditions, potentially causing adverse impacts to downstream environmental values.

Environmental Objectives

Ensure that ground and surface water 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

Provide a summary of site and regional hydrology and surface water resources in the vicinity of the proposed Project, including:

- A discussion of the sensitivity and significance of site and regional surface water resources from ecological, public/social and economic perspectives. Include general description of beneficial uses, water quality, flow rates, flood extent, receiving waters and existing surface water users;

- Baseline (i.e. pre-mining) surface water quality (acidity, metals, sulfate, salinity, nutrients, major ions etc.) for Surprise Creek, Barney Creek, and the McArthur River, including sampling methods;
- The hydrology of the McArthur River, including catchment size, seasonal flows and discharge rates to receiving waters;
- Hydrogeological site description including aquifer locations and qualities, faults, paleochannels or other preferential pathways for groundwater and their interactions with surface water; and
- Details of the history and likelihood of flooding, including the major flow pathways, extent, levels and frequency of floods in and around the Project site. Include depth contours in relation to mine site infrastructure, both existing and planned.

Describe, with respect to the waste rock dumps and other Project infrastructure, the potential for AMD generation. Include:

- Characterisation of waste rock including the classes and quantities of different types, and their chemical and physical properties;
- An assessment of potential for AMD using specific AMD chemical analyses (pH, Total Sulphur, Net Acid Producing Potential (NAPP), Net Acid Generation (NAG), Acid Neutralising Capacity (ANC), multi-element composition and mineralogy) of mine waste and tailings samples. Such an assessment should include leachate analysis to determine the solute generating potential from non-PAF material. Testing should be carried out in accordance with recommendations of the NT EPA Environmental Assessment Guidelines for Acid and Metalliferous Drainage (http://www.ntepa.nt.gov.au/data/assets/pdf_file/0005/349934/guideline_assessment_acid_metalliferous_drainage.pdf);
- A full waste characterisation report as an appendix in the EIS which includes details on selection of samples (drill core, drill cuttings) and sampling methodology as well as field identification methods and selective handling to minimise AMD for life of mine planning. Interpreted results must be summarised in the EIS;
- An estimate of the quantities of material required to adequately encapsulate non-benign waste rock, and cover waste rock dumps and TSFs, and the quantities of material available from the mine site to achieve best practice design; and
- Detailed plans of where encapsulation materials (clay and benign material) will be sourced. In particular, the studies undertaken on the quality, quantity and location/depth of clay and other benign material to be used for encapsulation.

Assessment of Risk

The EIS should include an assessment of the Project's risks to the surface and groundwater resources in the vicinity of the site, as well as downstream. Risks should be measured from baseline conditions (i.e. pre-mining) and any cumulative impacts reported as a result of previous activities. In particular, the EIS should identify and assess the risks associated with:

- The formation, leakage, seepage and surface expression of AMD including uncontrolled or unplanned releases of environmental contaminants from all potential sources, particularly the mine pit, TSF, waste rock dumps and water containment structures;
- Groundwater drawdown (cone of depression) and its impacts on other groundwater users, existing springs and groundwater dependent ecosystems, if the Project is likely to change the groundwater interception regime. Identify sensitive receptors and risks to sensitive receptors from the predicted cone of depression as a result of dewatering activities;

- The construction of any proposed infrastructure that intercepts or is adjacent to waterways with the potential to alter the hydrology, and rates of erosion and sedimentation of waterways; and
- Land degradation caused by discharges from retention ponds.

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. 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).

Mitigation

- Site water balance modelling that accounts for changed geochemical classification of waste rock and includes current and proposed water containment and management infrastructure, retention capacities, current volumes, and all likely sources and volumes of potentially contaminated water requiring containment, treatment and/or discharge including in worse case rainfall conditions;
- An assessment of the potential requirement for a Waste Discharge Licence under the *Water Act*;
- A summary of the proposed ongoing treatment of existing AMD at the McArthur River Mine site;
- A geological waste block model based on static and kinetic test data to facilitate AMD management;
- Provide design alternatives for the effective management of non-benign material to minimise the potential for AMD seepage. In particular, detail waste rock dump design options which should include consideration of:
 - Base and covers to limit the potential for AMD formation;
 - Non-benign waste encapsulation cell design ensuring that the cells can cope with the high temperatures and gases generated by the reactive PAF waste;
 - Treatment options for highly reactive PAF material;
 - Designs to cope with the consumption through combustion of reactive material and the consequent voids and slumping created by the reduction in volume;
 - Different designs based on whether the Northern OEF is the only waste rock dump or if other waste rock dumps are to be used, whether existing or planned; and
 - Designs based on worse case scenarios, where the composition of waste material is significantly worse than predicted.
- Proposed strategies to prevent, mitigate and manage AMD including but not limited to avoidance of disturbance, dry covers, underwater storage, neutralisation, and collection and treatment.

Monitoring

- Provide details of a program to monitor geochemical and geotechnical characteristics of placed waste, oxygen and temperature and water quality to evaluate AMD management performance; and

- Detail a monitoring program to ensure the waste rock dumps are performing in accordance with design specifications (e.g. proposed instrumentation to monitor oxidation of sulphides and the performance of encapsulation layers and cover systems).

4.4 Biodiversity

Key Risks

Biodiversity risks were assessed in the Phase 3 project EIS. To the extent that land use in new areas or new discharge arrangements may now be required, the implications on biodiversity must be addressed. The key risks include:

- 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.
- Altered Project inputs of environmental pollutants may result in reduced water quality (offsite) and impacts on ecosystems, such as aquatic, riparian or wetland habitats;
- Increased sedimentation from additional cleared areas (expanded waste rock dump and associated infrastructure) impacting downstream biodiversity;
- Wildlife may be exposed to metals and/or pollutants from the altered Project that may result in ongoing impacts, especially to long-lived species that accumulate toxicants and metals; and
- Impacts to the biodiversity at alternate sites where additional clay and benign material may be sourced.

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 altered Project.

Information Requirements

The following information should be included in the EIS in relation to the altered Project's risk to biodiversity:

- Details of listed threatened species likely to be present in the Project area and in areas that may be impacted by the proposal, including detail of the scope, timing and

methodology of studies or surveys used to provide information on the listed threatened species and their habitat potentially impacted by Project activities;

- The results of surveys for species listed as threatened under the EPBC Act and TPWC Act in the area of the proposed action and potentially impacted areas; and
- Details of the area and location/s of any proposed land disturbance required for the Project within the context of habitat for listed species that may be impacted.

Further details can be found at:

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

Assessment of Risk

- Discuss potential impacts on species and habitats of local, regional or national significance including sensitivity of species to disturbance; and
- Discuss potential impacts on water quality of creeks, streams and ephemeral water holes (habitat for aquatic fauna and drinking water for terrestrial species).

When assessing the risk of impacts to biodiversity, the EIS should refer to relevant research as well as relevant statutory plans including: action plans, recovery plans and threat abatement plans. The EIS should outline the following information:

- A detailed assessment of the presence and potential impacts on native fauna including consideration of altered hydrology, water quality impacts, groundwater contamination, impacts on surface and groundwater systems, waste material and inappropriate/ineffective rehabilitation. If additional areas, outside the current mining lease, are impacted to source clay and benign material, they will need to be included in the risk assessment. Species assessed must include, but not be limited to:
 - Freshwater Sawfish (*Pristis pristis*);
 - Gulf Snapping Turtle (*Elseya lavarackorum*);
 - Plains Death Adder (*Acanthophis hawkei*);
 - Partridge Pigeon (*Geophaps smithii*);
 - Red Goshawk (*Erythrotriorchis radiatus*);
 - Masked Owl (*Tyto novaehollandiae*);
 - Crested Shrike-tit (*Falcunculus frontatus*);
 - Gouldian Finch (*Erythrura gouldiae*); and
 - Northern Quoll (*Dasyurus hallucatus*).
- Discuss the potential impact of any additional vegetation clearing at a local and regional scale, including the potential for ongoing indirect impacts as a result of edge effects, or other processes exacerbated as a result of mining activities.

Mitigation

The EIS must provide information on proposed safeguards and mitigation measures to deal with the relevant potential impacts of the action on listed threatened species. Detail preventative, management and treatment strategies used to minimise the impacts of the Project on listed species, including the following elements:

- A description of proposed safeguards and mitigation measures to deal with relevant potential impacts of the action, including mitigation measures that are currently or proposed to be undertaken by the Territory government or the Proponent;
- Assessment of the expected or predicted effectiveness of the mitigation measures; and
- Any statutory or policy basis for the mitigation measures.

Proposed mitigation measures must be incorporated in the Environmental Management Plan (EMP).

Monitoring

The EMP should include details of a fauna monitoring program which is designed to monitor the effectiveness of the mitigation measures proposed. The 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. Detail reporting and monitoring programs that will be used to evaluate and report on the effectiveness of mitigation measures.

4.5 Rehabilitation and Mine Closure

Key Risks

- Following closure and rehabilitation, potential may exist for the mine to negatively impact the environment and/or associated communities; and
- The Project may 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 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 risks associated with closure and rehabilitation of the Project, including the ongoing generation of AMD and contamination of the downstream environment, can be mitigated.

Information Requirements

- Outline rehabilitation, including progressive rehabilitation, revegetation and closure plans on site in consideration of the changed management requirements for waste rock since the previously authorised Phase 3 project;
- Describe proposed post-mining land uses which have been identified and agreed on through consultation with stakeholders; and
- Detail the availability, sources and volumes of suitable materials required for rehabilitation, revegetation and mine closure (e.g. clay, capping materials).

Assessment of Risks

Closure planning should take into account results of materials characterisation, data on the local environmental and climatic conditions, and consideration of potential impacts through contaminant pathways and environmental receptors. Identify risks to the successful closure of the Project, including:

- Closure timeframes and objectives and the Project not realising its projected outcomes (i.e. delays, unexpected or forced closure, etc.);
- The lack of availability of benign material for construction of infrastructure and AMD management;
- The effects of quantities and characteristics of problematic waste rock, particularly the pyrogenic characteristics of highly reactive PAF material, on the final pit lake water quality, long term manageability of the waste material and integrity of management structures; and
- The potential impacts of natural events such as flooding to the integrity and stability of final landforms.

Mitigation

A conceptual mine closure plan (MCP), specific to the Project, should be prepared to address identified risks associated with rehabilitation, decommissioning and closure. The conceptual 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 placement of waste rock will physically isolate it from the environment and that any contaminants arising from the waste rock will not result in any short (whilst operational), medium (post-closure and under institutional control) or long term (post institutional control) detrimental environmental impacts;
- Measures to ensure the final landform is compatible with natural landforms in the surrounding landscape;
- Contingencies to make landforms secure and non-polluting in the event of unexpected or temporary closure; and
- Measures to ensure the stabilisation of erosion to a level similar to comparable landforms in surrounding undisturbed areas.

The EIS should also include details of a Care and Maintenance Plan, which should include measures which outline how the Proponent will maintain its environmental obligations should the Project be temporarily closed or suspended.

Include a revised closure plan for the open pit. The revised geochemistry of the ore body may alter the quality of water that will fill the pit void following mine closure.

Monitoring

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

- 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.

4.6 Human Health and Safety

Key Risks

The EIS should include an assessment of the risks to human health and safety associated with the construction, operation, decommissioning and closure of the new or altered Project components. For existing and approved infrastructure, where changes to waste rock classification do not change health and safety risks, there should be a reference made to previous reports.

Information requirements

- Identify all hazards, including physical hazards and emissions, both air and water, as a consequence of the proposed waste rock management;
- Identify workers and any members of the general public, including their location and patterns of activity and occupation, with the potential for exposure to these hazards as a consequence of the Project.

Assessment of Risks

Aspects to be discussed include:

- Health and safety risks for the workforce and general public in the vicinity of the mine site for the duration of the Project including post-closure;
- Potential risks relating to the downstream environment and public safety associated with water management aspects of the Project, both during mining and following closure.

Mitigation

- 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 to minimise impacts to human health and safety, and describe how these strategies will be incorporated into the EMP.
- Detail a communication strategy to inform the workforce and general public of potential health and safety risks.

4.7 Socio-economic Impacts

Key Risks

Socio-economic impacts were assessed in the Phase 3 EIS. To the extent that the revised arrangements involve a significant change to personnel requirements or cause new or different socio-economic impacts, these implications must be addressed. The key risks include:

- Benefits to the community may be less than previously expected as a result of the increases in costs to the Proponent associated with changes to management requirements of the problematic material;
- Potential negative social and economic impacts to the Roper-Gulf region and the Northern Territory associated with environmental degradation into the long term.

Environmental Objectives

To analyse, monitor and manage the Project's intended and unintended social consequences, both positive and negative, such that outcomes are optimised. Information content should be in accordance with the NT EPA Guidelines for the Preparation of an Economic and Social Impact Assessment

(http://www.ntepa.nt.gov.au/_data/assets/pdf_file/0007/349936/guideline_assessment_economic_social_impact.pdf).

Information Requirements

- Contribution to the NT and Australian Economy
 - Estimated total project revenue for the planned project duration (to provide the economic scale of the project);
 - Expected project duration;
 - Value of any value-adding in the NT and Australia;
 - Estimated overall tax and royalty payments, showing the NT proportion, if available;
 - Expected value of exports and any imports;
 - Estimated capital expenditure for the amended project compared with estimated expenditure for previous Phase 3 development, particularly with respect to remediation of problem areas and construction of proposed infrastructure;
 - Expected annual operational expenditure, showing the proportion in the NT; and
 - Any overall direct and indirect economic impact data if available.
- Contribution to Business Development
 - Expected value of NT/Australian business supply and service participation during construction and operations.
- In comparison to the Phase 3 project, contribution to Employment and Training
 - Expected direct and indirect project employment during construction and operations;
 - Estimated workforce/contractor numbers by occupational classification if available;
 - Overall employment training proposed during commencement, construction and operations;
 - Planned Indigenous employment, training and other project participation; and
 - Expected level of overseas recruitment.
- Contribution to Regional Development
 - Value of the proposed Community Benefit arrangements (already included);
 - Estimated overall regional economic benefits;
 - Other contributions to local communities, including Indigenous traditional owners; and
 - Community value of any residual infrastructure.

Assessment of Risk

An Economic and Social Impact Assessment (ESIA) should be conducted which gives consideration to the potential impacts as a result of any environmental degradation and the expected ramp up in costs associated with changes to management requirements of the problematic material. The ESIA should include consideration of the following:

- An estimate of the value of the Project to the local economy;
- 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
- Negative impacts to local communities during and beyond the life of the mine as a result of any ongoing environmental degradation and increased costs to the company.

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, and/or cultural 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 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; and
- 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.

4.8 Other Risks

Air Quality

The potential nuisance and human health issues associated with air quality, including dust and air pollutants such as sulphur dioxide, and mitigation measures must be discussed. Consideration should be given to the acute and chronic exposure and pathways, such as inhalation, ingestion and dermal contact. The potential sensitivity of receptors to air quality and mitigation of impacts should be discussed in relevant sections of the EIS.

Details of the proposed air quality monitoring, including technique, location, frequency and details of laboratory analysis and target parameters, and proposed reactive management tied to monitoring thresholds, must be provided.

Cultural Heritage

The Northern Territory Aboriginal Sacred Sites Act (NT) establishes the Aboriginal Areas Protection Authority (AAPA) as the body responsible for overseeing the protection of sacred sites in the Northern Territory. The AAPA provides a process for avoidance of sacred sites and entry onto sacred sites and the issue of Authority Certificates which indemnify the holder against prosecution under the Act for damage to sacred sites in the certificate area, provided works or use has occurred in accordance with the conditions of the Authority Certificate.

There are some highly significant Aboriginal archaeological sites within the footprint of the McArthur River Mine. There is the potential for activities associated with the Project to impact upon these sites.

The Proponent must provide detailed maps in the EIS indicating the location of all Aboriginal archaeological sites in relation to current and proposed mine infrastructure, and describe measures to ensure these sites will be preserved from disturbance or harm.

The Proponent must detail any potential impacts, and associated mitigation measures, that the Project may have on cultural sensitive site outside of the Project area, including contamination of key food sources and culturally important species.

5 Environmental Offsets

The Australian Government Environmental Offsets Policy, October 2012 requires residual adverse impacts (after avoidance and mitigation measures have been implemented) 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.

6 Environmental Management

Specific safeguards and controls proposed to be employed to minimise or remedy environmental impacts of AMD are to be included in an Environmental Management Plan (EMP) or similar plan.

The EMP should be strategic, describing a framework for environmental management of the 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, storm surge, king tides and high rainfall events;
- The proposed measures to minimise adverse impacts and maximise opportunities, including environmental protection outcomes;
- Performance indicators by which all anticipated and potential impacts can be measured;

- Proposed monitoring programs to allow early detection of adverse impacts;
- Information on how areas of land will be managed should it be changed from existing land uses;
- The EMP needs to address the Project phases (planning, construction, operation) 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.

7 General Advice on EIS

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 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.

7.2 Structure, Format and Style

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 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.

- 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 and management of the expected and potential impacts on the environment from the proposed action.

- 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 ToR have been addressed in the EIS, cross-referenced to chapters, page numbers and/or appendices;
- The name/s of, work done by and qualifications and experience of the persons involved in preparing the EIS;
- A table listing commitments made by the Proponent; and
- 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; and
- 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, or available information may influence the conclusions of the environmental assessment should be discussed.

The results of quality assurance and quality control (QA/QC) testing are to be provided where data are used to support statements or findings in the EIS. Sufficient discussion should accompany the data to demonstrate that the QA/QC and data are suitable and fit for purpose.

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; and
- 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 demonstrates 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 proposal as a result of consultation. Details of any ongoing liaison should also be discussed.

7.4 Administration

The Proponent should lodge five, 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. 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, 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 is constructed.

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

The Proponent is to advertise when the EIS will be available for review and comment in:

- The NT News; and
- Other forms of media including local papers/newsletters.

The NT EPA requires the complete 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.

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.

7.5 Public Exhibition

Sufficient copies of the EIS should be made available for public exhibition at:

- 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;
- Borroloola Community Government Council Building (ph. 8975 8618);
- Environment Centre Northern Territory, Unit 3, 98 Woods St, Darwin; and
- Northern Territory Library, Parliament House, Darwin.

McArthur River Mine – Overburden Management Project

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 - January periods.

