Northern Territory Environment Protection Authority

**GUIDELINES FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT**

# KILIMIRAKA MINERAL SANDS PROJECT

# MZI RESOURCES LIMITED

March 2013

NORTHERN TERRITORY **ENVIRONMENT PROTECTION AUTHORITY**

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# 1 INTRODUCTION

MZI Resources Limited (MZI) proposes to construct and operate a mineral sands mine on Bathurst Island in the Tiwi Islands, Northern Territory. The mine site is on the south-west coast approximately 50km west of Wurrumiyanga (previously Nguiu).

The proposed Project would involve surface mining of a sand dune system using open cut dozer trap methods and processing of approximately 56.2 million tonnes (Mt) of mineralised ore body over an anticipated mine life of 8 – 10 years. Sand would be removed from the resource, heavy mineral sand would be extracted (1.6%) and the remaining silica sand and clays (98.4%) placed back into the mined area to reinstate the original landform. The mine would produce an estimated 890 000 tonnes of Heavy Mineral Concentrate (HMC), consisting of zircon and titanium-based products, for the Chinese market.

The key components of the Project include:

- Open cut surface mines (four target dune areas);
- Dozer trap unit;
- Trommel screen, slurry unit and pipeline;
- Processing plant (gravity spiral separators and wet concentrate plant);
- Dam;
- Workers camp;
- Upgraded or new airstrip;
- Haul roads for product transport; and
- Two alternative options for export including barge landing (Port Hurd) or wharf (Interview Point) for transhipment to or loading of export vessels.

The Project proposal was referred on 27 August 2012 to the NT Environment Protection Authority (NT EPA) for environmental assessment. On 30 October 2012, the delegate to the NT Minister for Lands, Planning and the Environment decided that the Project required formal assessment under the NT *Environmental Assessment Act* (EA Act) at the level of an Environmental Impact Statement (EIS).

Issues identified include:

- The potential impacts on threatened flora and fauna;
- Water management risks including groundwater extraction and potential spills to surface water;
- Risks and lack of information associated with rehabilitation and closure of the mine site;
- Potential for impacts of the mine on coastal morphology and processes, given its proximity to the coastline;
- Uncertainty regarding the transhipment options for the transport of product;
- Potential impacts on local transport;
- Noise and dust;
- Potential socio-economic changes for local communities; and
- Mining method.

The Project was referred to the Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) and, on 10 December 2012, was determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The proposed action 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 (section 18 and 18A);
- Listed migratory species (sections 20 and 20A); and
- Commonwealth marine areas (sections 23 and 24A).

The proposal is being assessed under the bilateral agreement between the Australian and NT Governments.

# 2 GENERAL ADVICE ON EIS

## 2.1 General content

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

The EIS should enable interested stakeholders and the NT EPA to understand the environmental consequences of the proposed development. Information provided in the EIS should be objective, clear, succinct, factual 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 be discussed.

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

## 2.2 Format and style

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

The EIS should comprise of three elements:

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 project, its environmental implications and management objectives. It must be written as a stand-alone document, able to be reproduced on request by interested parties who may not wish to read the EIS as a whole.

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 and abbreviations, and colloquialisms. The document should consist of a series of chapters detailing the level of significance of the expected and potential impacts on the environment from all aspects of the project.

3. Appendices

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

- A table listing how these Guidelines have been addressed in the EIS, cross-referenced to chapters, page numbers and/or appendices;
- An outline of the relevant legislation, codes, standards and guidelines applicable to the project;
- A list of persons and agencies consulted during the EIS;
- The names of, and work done by, the persons involved in preparing the EIS;
- The qualifications and experience of the people involved in work contributing to the EIS;
- A table listing commitments made by the Proponent; and
- Detailed technical information, studies or investigations necessary to support the main text.

Raw data should be made available to support technical information and reports if required.

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

## 2.3 Administration

The Proponent should lodge ten, bound, hard copies and an electronic (Adobe PDF format) copy of the EIS with the NT EPA and two bound hardcopies with the Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPaC). 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 offered to all neighbours of the Project, and other significant stakeholders.

At a minimum, MZI is to advertise the EIS for review and comment in the *NT News* and *The Australian*.

Please note that the NT EPA requires the 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.

## 2.4 Public Exhibition

The EIS should be made available for public review 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;
- Tiwi Land Council;

- The Australian Government Department of Sustainability, Environment, Water, Population and Communities Library, John Gorton Building, Parkes, Canberra;
- Northern Territory Library (NTL), Parliament House, Darwin.

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

# 3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

## 3.1 General information

Provide the background and context of the proposal 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 proposal;
- The proposal's location in the region and its proximity to landmark features, sites of cultural/social significance, regional community centres, and sensitive environments such as major waterways, significant groundwater resources, significant natural features and conservation reserves;

  Climate and atmospheric characteristics relevant to the Project (e.g. air quality, seasonal temperatures, humidity, wind, evaporation, extreme events and rainfall).
- Terms of current agreement between the Northern Territory Government, Tiwi Land Council and the Proponent;
- Details of the Proponent's environmental record, 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;
- The background to the development of the Project including discussion of previous environmental impact assessment and overview of historic mining activities;
- Identification of areas under exploration which may be mined in future, or any other potential future activities being planned;
- How the project relates to any other proposals or actions (of which the Proponent should reasonably be aware) that have been or are being taken, or that have been approved in the region;
- National and Northern Territory standards, codes of practice and guidelines relevant to the Project;
- An overview of the schedule for the whole Project;
- The current status of the project; and
- The consequences, both positive and negative, of not proceeding with the project.

## 3.2 Description of the proposal

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

An outline of the geology of the area including:

  - A summary of the results of studies and surveys undertaken to identify the extent of the resource within the Project area;
  - Geological properties of the Project site; and
  - Characterisation of the mineral sands and heavy mineral concentrate.

- Delineation of the Project footprint using detailed maps and diagrams, including:
  - Location of the resource/s to be explored, developed or mined;
  - All areas to be cleared or disturbed (including mine, haul road/s, Product export facility and other infrastructure), both for the life of the Project and temporarily, prior to progressive rehabilitation;
  - The location of any works to be undertaken, structures to be built or elements of the proposed Project. Where relevant this must include, but is not limited to, the location of the mine, water extraction points and storage facilities, roads, airfield, camp/s, hard stands, stockpiles (soil/ore), haul road/s, product export or transhipment facilities; and
  - Any other infrastructure associated with the proposed Project.

### 3.2.1 Project components

**Mine**

Provide specific details on the following aspects of construction:

- Timetable for construction including staging of construction activities;
- Vegetation clearing and disposal of consequent plant matter;
- Methods of mine construction, volumes of materials required; and
- Plant and machinery required.

Provide specific details on the following;

- Mining types and methods, including the major equipment to be used in the various components of the operation;
- Handling/stockpiling of topsoil and waste materials;
- Quantity of material to be mined annually, including any proposed ramping up of production or staging of development; and
- Timetable for operation of the mine including the targeting of each deposit.

**Processing**

Provide relevant information with respect to the processing plant, including but not limited to:

- Clearing and preparation of the site;
- Transport of materials to the site and assembly of the plant;
- The methods proposed for processing of the ore body;
- Methods for transferring ore to the processing plant;
- Water requirements and sources; and
- Methods for disposal of tailings and screenings.

**Road transport**

Identify proposed routes for transport of construction materials, personnel and product for the Project, including use of existing roads.

Details of road construction / upgrade should be provided, including:

- Maximum width of road corridors required for construction and for transport of product;
- Plant and machinery required;
- Vegetation clearing methods and disposal of plant matter following clearing;
- Location of campsites for construction crews, if required;
- Sources of water;
- Sources of construction inputs and materials;
- Methods including creek crossing techniques where relevant (provide cross section diagram/s);
- Details of road drainage design and construction standards;
- Timeframes for road construction/upgrade; and
- Ongoing provisions for road maintenance, including source and extraction of maintenance inputs and materials.

Details of road use should be provided including:

- Type, size and number of vehicles required during all phases of the proposal;
- Estimated frequency of Project vehicle use on public roads; and
- Hours of Operation.

**Product export**

Describe aspects of the Project associated with construction of product export facilities, including:

- Key plant and equipment, processes, inputs/outputs, capacities and raw materials (sources and volumes) required;
- Barge loading facilities if required;
- Duration and magnitude of any dredging required;
- Dredge spoil disposal activities should dredging be required; and
- Any pile driving requirements including frequency and duration.

Describe operational aspects of the export facilities, including:

- Stockpiling requirements prior to loading;
- Product handling requirements;
- Hazardous materials storage;
- Water storage (ponds or tanks) and/or groundwater extraction requirements;
- Operational hours/days;
- Lighting;
- Frequency of barge trips and/or export vessels;

- Any mooring points required for export vessels, including cyclone mooring facilities;
- Extreme event design criteria (i.e. provide storm surge and wave height that the facility will be designed to withstand).

**Water**

Provide information on the quantity, quality, source (groundwater, surface water), storage, and infrastructure requirements for water use, including a water balance, for both construction and operational aspects of the Project. Include:

  - Slurry formation and processing;
  - Dust suppression;
  - Drinking water;
  - Ablutions and sewage treatment;
  - Processing/ crushing plant;
  - Any wetting of ore materials prior to hauling;
  - Any other uses.

- Provide information on the proportion of water that will be recycled and if treatment is required, provide details of waste water treatment systems and effluent disposal;
- Describe stormwater drainage systems proposed at the Project site, including the export facility, and disposal or re-use arrangements; and
- Identify any requirements for additional clean water in the Dry season and Wet season discharge options for excess contaminated water if applicable.

**Energy**

- Determine Project energy requirements, including mining fleet fuels, export fuel use and electricity demand;
- Provide details of proposed power plant (type of equipment, fuel use) including the potential for use of renewable energy sources;
- Provide details of energy infrastructure requirements, both on and off the site, including fuel storage.

**Waste management**

- Describe predicted waste streams, both industrial and domestic, including solid wastes at the mine site, camp site and other relevant locations;
- Provide an inventory of any hazardous wastes requiring management during the Project.

**Workforce and accommodation**

- Describe the number of people to be employed, skills base required, and likely sources (local, regional, overseas) for the workforce during construction, and operational phases.
- Discuss arrangements for transport of workers to and from project areas, including air services required.

For the proposed mine camp, provide brief information on aspects of the facility such as:

- Proximity of the camp to work sites;
- Requirements for food preparation and storage;
- Whether the premises will be licensed and include alcohol storage facilities.

**Ancillary infrastructure**

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

- Telecommunications;
- Information on potentially hazardous materials to be used or produced and methods for storage, transport, handling, containment, disposal and emergency management of these materials (including fuel); and
- Construction of an airfield or upgrade of the existing airfield.

Detail any existing ancillary infrastructure that could be used by the Project.

**Closure and rehabilitation**

Discuss the various aspects of decommissioning, and proposed progressive and final rehabilitation of Project components and disturbed areas, including the mine, roads, product export facility, accommodation facility and ancillary infrastructure including:

- Proposed staging / timing;
- Soil profile reconstruction;
- Final landform design for all aspects of the project, including any voids or landscape depressions to be left after Project closure;
- The rehabilitation techniques to be used and the final topographic and drainage morphology;
- The proposed revegetation program, with selection and collection of local native species e.g. native grasses and other vegetation;
- Other preparations required for successful rehabilitation (seed harvesting, seedling generation, etc.); and
- Water supply.

## 3.3 Alternatives

The EIS should describe any feasible alternatives to carrying out the proposed activity. These alternatives, including the 'no Project' option, should be discussed in sufficient detail to make clear the reasons for preferring certain options and rejecting others.

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

Alternatives should include:

- Not proceeding with the proposal;
- Options for concentrate haulage and export;
- Site selection for mine components;
- Mining methods and management of wastes;
- Rehabilitation methods;
- Alternative sources of water;
- Energy sources for power generation;
- Alternative processes, methods and lifecycle; and

- Consideration of alternative environmental management measures for key risks/impacts.

Discussion should include:

- Sufficient detail to make clear why a particular alternative is preferred to another;
- Adverse and beneficial effects of alternatives at national, territory, regional and local levels;
- The comparison of short (whilst operational), medium (post closure) and long term (> 1000 years) advantages and disadvantages of the options; and
- A comparative description of the impacts of each alternative on the NES matters protected by controlling provisions of Part 3 of the 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 treatment of risks through a whole-of-project risk assessment. Through this process, the EIS will:

- Acknowledge and discuss the full range of risks presented by the project, including those of special concern to the public;
- Quantify and rank risks so that the reasons for proposed management responses are clear;
- Acknowledge levels of uncertainty about estimates of risk and the effectiveness of risk controls; and
- Explicitly identify those members of the community expected to accept residual risks and their consequences, providing better understanding of equity issues.

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

Information provided should permit the reader to understand the likelihood of the risk, its potential severity, and any uncertainty about the effectiveness of controls. Levels of uncertainty that preclude robust quantification of risk should be clearly acknowledged.

Sufficient quantitative analysis should be provided to indicate whether risks are likely to be acceptable compared with similar ventures in Australia and Internationally. Assumptions used in the analyses should be explained. Relevant standards, codes and best practice methodologies that minimise risks should be discussed.

The risk assessment should be based on international best practice. Processes for risk management are formalised in Standards Australia / Standards New Zealand (e.g. AS/NZS ISO 31000:2009; HB 436:2004; HB 158:2010; HB 203:2012).

A number of key Project risks have been identified through a preliminary assessment of the Project. Each of the identified risks 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 be developed.

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

## 4.2 Risks to 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, maintenance and decommissioning of the various components of the project, and the storage and transport of materials to and from the work sites.

The aim of this assessment is to demonstrate that:

- The Proponent is fully aware of the risks to human health and safety associated with all aspects of the development;
- The prevention and mitigation of risks to human health and safety are properly addressed in the design specifications; and
- The risks can and will be managed effectively during the construction, commissioning, operation, and decommissioning of the development.

### Assessment of risks

Aspects to be discussed include:

- Safety risks for the workforce and the general public for the duration of the project;
- Safety risks associated with the Project including:
    - Fire;
    - Infectious disease (including from biting insects);
    - Extreme weather and climatic conditions;
    - Hazardous materials exposure; and
    - Safety risks to road users associated with increased traffic and use of the existing road networks, including post closure.

### Mitigation

Detailed human health, safety, emergency plans and response procedures need to be developed and provided in the final Environmental Management Plan as a contingency in the event of an emergency or accident. Responsibilities and liabilities in such an event should be described.

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

## 4.3 Risks to hydrology and water quality

### Key Risks

- Water quality may be impacted by spills to surface water and runoff containing hazardous substances or elevated sediment concentrations;
- There are swamps and rainforest in the vicinity of the proposed mine site. Extraction of groundwater could impact these swamps and any spring-fed rainforest.

The EIS should include a detailed assessment of the risks to demonstrate that:

- The Proponent is fully aware of the risks to existing surface and groundwater resources and quality associated with all aspects of the Project; and
- The prevention and mitigation of risks to surface and groundwater quality and the groundwater resource are adequately addressed.

**Environmental Objective**

To ensure that surface water and groundwater resources and quality are protected both now and in the future, such that ecological health and the health, welfare and amenity of people and land uses are maintained.

**Information requirements**

- Provide a detailed description of site and regional surface water catchments, waterways and swamps, including springs, in the vicinity of the proposed Project area and along access roads;
- Discuss the sensitivity and significance of site and regional surface water resources from an ecological, public/social and economic perspective, including a description of water quality and flows, and any existing surface water users in the Project area.
- Provide a description of site and regional groundwater resources, quality and significance in the vicinity of the proposed mining areas and their connectivity with surface waters;
- Describe site (and, if relevant, regional) hydrogeology to enable the prediction of potential impacts of the proposal on swamps and vegetation adjacent to mining areas, including drawdown cones and pollution pathways; and
- Indicate the location of groundwater bores for the project with respect to any groundwater dependent natural features.

**Assessment of risk**

- Provide an assessment of the risk to surface and groundwater resources in the vicinity of the site and regionally as a result of Project activities. In particular, discuss:
    - Potential impacts to adjacent areas and vegetation from drawdown if groundwater is used for water supply;
    - Potential impacts to the Wurrumiyanga (Nguiu) water supply from groundwater drawdown; and
    - Potential impacts to groundwater and surface water systems from accidental spills of hydrocarbons or accidental discharge of process water, particularly if seawater is to be used for slurry formation.

**Mitigation**

- Detail preventative, management, treatment and monitoring strategies used to minimise the impacts of the project on hydrological features. In particular, provide details on the following:
    - measures to safeguard surface and groundwater resources and their dependant ecological communities including options for minimising water use, management and treatment of clean and contaminated water, including site stormwater, erosion and sediment control measures for all disturbed areas, and appropriate management of any acid sulphate soils excavated or exposed through mining or wetland road crossings;
    - measures to minimise disturbance to, and erosion of, surface water bodies, particularly where access roads cross wetlands and water courses; provide details of typical waterway crossings that would be constructed if required;
    - if stability issues are identified, measures to reduce associated risks;
    - management of high/extreme rainfall events; and
    - proposed surface water and groundwater monitoring programmes.

- Describe proposed domestic wastewater (sewage) treatment processes.

## 4.4 Risks to biodiversity

**Key risks**

- The Project requires the clearing of native vegetation, which could result in a loss of biodiversity and ecological function if not properly managed;
- Threatened flora, fauna and ecological communities including migratory bird roosting locations, turtle breeding and nesting sites and groundwater dependent ecosystems could be at risk from the Project. Marine fauna could be impacted by construction of port facilities and product export activities both inshore and offshore;
- Degradation of habitat could occur through the introduction of weed and pest fauna species, and increased weed spread in the Project area.

The EIS should include an assessment of the risks to biodiversity to demonstrate that:

- The Proponent is fully aware of the risks to biodiversity associated with all aspects of the Project; and
- The prevention and mitigation of risks to biodiversity are adequately addressed.

Risk assessment to biodiversity should focus on threats to the conservation significance of vegetation types, identified threatened species and areas of potential significance to listed migratory species.

**Environmental Objectives**

To maintain the abundance, diversity, geographic distribution and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

**Information Requirements**

- Vegetation communities within and adjacent to the Project area including:
    - A broad overview of the dominant vegetation communities and their conservation status (rare, endangered, vulnerable, threatened species according to specified listing); and
    - Introduced and weed species, including those declared under the NT *Weed Management Act*.
- Sensitive ecosystems, i.e. ecosystems that provide important ecological function e.g. riparian vegetation, protected area buffer zones, refugia, important habitat corridors, monsoon forests, wetlands, areas of conservation significance or geological features which may support unique ecosystems;
- Identify groundwater dependant ecosystems in the vicinity of project area; and
- Identify and discuss species of traditional Aboriginal cultural significance (particularly aquatic and terrestrial fauna species), based upon consultation with traditional owners and surveys of the Project area.

The discussion on listed species should include species listed under both *Territory Parks and Wildlife Conservation Act* (TPWC Act) and EPBC Act. Listed threatened fauna species to be considered in the EIS should include, but not be limited to:

- Northern Brush-tailed Phascogale (*Phascogale pirata*);

- Brush-tailed Rabbit-rat (*Conilurus penicillatus*);
- Butler's Dunnart (*Sminthopsis butleri*);
- Water Mouse (*Xeromys myoides*);
- Red Goshawk (*Erythrotriorchis radiatus*);
- Masked Owl (*Tyto novaehollandiae kimberli*);
- Partridge Pigeon (*Geophaps smithii*);
- Hooded Robin (*Melanodryas cucullata melvillensis*);
- Olive Ridley Turtle (*Lepidochelys olivacea*);
- Flatback Turtle (*Natator depressus*);
- Hawksbill Turtle (*Eretmochelys imbritica*);
- Leatherback Turtle (*Dermochelys coriacea*);
- Loggerhead Turtle (*Caretta caretta*);
- Green Turtle (*Chelonia mydas*);
- Mertens Water Monitor (*Varanus mertensi*);
- Yellow-spotted Monitor (*Varanus panoptes*);
- Atlas Moth (*Attacus wardi*); and
- Plains Death Adder *(Acanthophis hawkei);*
- Freshwater Sawfish *(Pristis microdon);*
- Green Sawfish *(Pristis zijsron);* and
- Dwarf Sawfish *(Pristis clavata).*

Additionally, listed migratory species potentially occurring in the area should be considered in the EIS, specifically including:

- Dugong (*Dugong dugon*);
- Australian Snubfin Dolphin (*Orcaella heinsohni*);
- Spotted Bottlenose Dolphin (*Tursiops aduncas*);
- Indo-pacific Humpback Dolphin (*Sousa chinensis*)
- White-belllied Sea-Eagle (*Haliaeetus leucogaster*)
- Fork-tailed Swift *(Apus pacificus);*
- Great Egret *(Ardea alba);*
- Cattle Egret *(Adrea ibis);*
- Streaked Shearwater *(Calonectris leucomelas)* and *(Puffinus leucomelas);*
- Melville Cicadabird *(Coracina tenuirostris melvillensis);*
- Barn Swallow *(Hirundo rustica);*
- Rainbow Bee-eater *(Merops ornatus);*
- Rufous Fantail *(Rhipidura rufifrons);*
- Oriental Plover *(Charadrius veredus)*; and

- Oriental Pratincole *(Glareola maldivarum).*

All listed flora species potentially occurring in the area should be considered in the EIS. In particular, the following species are considered to be most at risk and should be discussed:

- *Hoya australis* subsp. *oramicola*;
- *Typhonium jonesii*;
- *Typhonium mirabile*
- *Xylopia monosperma*; and
- *Burmannia* sp. Bathurst Island (R.Fensham 1021).

Other listed flora species that could be present in adjacent rainforest should be considered in the context of the potential impact of the Project on this habitat.

For each of the species identified, the following information must be provided as a minimum:

- Information on the abundance, distribution, ecology, and habitat preferences of listed species and communities;
- Information on the conservation value of each habitat type from a local and regional perspective, including the percentage representation of each habitat type on site in relation to its local and regional extent;
- If a population of a listed species is present on the site, its size and the importance of that population from a local and regional perspective. Include;
    - Details of the scope, timing (survey season/s) and methodology for studies or surveys used to provide information on the listed species/community/habitat at the site (and in areas that may be impacted by the Project). Where surveys are proposed for the above species and where survey methods are provided by the Australian Government, these should be used or an explanation as to why alternate methodology has been used. The survey methods are available at www.environment.gov.au/epbc/guidelines-policies.html; and
    - Other details required for site-specific species should be included here.
- Discussion of known existing threats to the species, whether or not attributable to the proposed action, with reference to relevant impacts from the proposed action (including taking into consideration any relevant guidelines, policies, plans and statutory provisions);
- Baseline information and maps identifying at both the site and regional levels:
    - Known occurrences of the species;
    - Potential habitat for species or communities (differentiating where relevant on the basis of use e.g. breeding habitat, migration pathways, roosting and feeding habitat); and
    - Regional migration pathways for species or communities.

A description of the marine environment relevant to the proposal should be provided, including both inshore areas and Commonwealth marine areas. Note that the level of detail provided should reflect the level of significance of the expected and potential impacts on the environment. Include:

- Oceanographic conditions, especially those which may have a bearing on the proposed action. Provide information on seasonal variation, waves, tides, currents, water salinity, clarity, temperature and depths. Discuss frequency and severity of extreme weather conditions, such as storms and cyclones, for the 2, 10 and 100 year conditions;

- Known flora and fauna, including baseline information and maps on communities and individual species, and where known, population genetics and stock structure, in the immediate and surrounding areas that may be subject to relevant impacts, as determined by literature search and survey and sampling programs if required;
- The EIS must provide an evaluation of the flora and fauna communities identified with reference to:
    - Habitat values in a local, regional and national context;
    - Presence of endemic species;
    - Local and regional representation;
    - Conservation and biodiversity values;
    - Economic and cultural values of species;
    - Migratory species; and
    - Unique habitats.
- Discuss the likely presence of any unique, rare, threatened, endangered or vulnerable flora and fauna species and communities or listed migratory species, as well as cetaceans in the marine environment that may be impacted in the event of a hydrocarbon spill. This should include an evaluation of the significance of their occurrence (including conservation status, distribution, population viability and habitat requirements);
- A broader description of the biodiversity and biogeography of the potentially impacted environment must be included. Sensitive environments must be identified along with key ecological relationships and interdependencies (e.g. coral spawning, fish spawning aggregations, flora and fauna relationships etc.);
- The extent of existing disturbance to flora and fauna, and the incidence of introduced pest species must be discussed.

**Assessment of risks**

- Identify and discuss the risks of impacts associated with the proposed vegetation clearing with particular focus on significant habitats and habitats supporting species of conservation significance;
- Identify risks to listed flora that may be present in areas adjacent to or could be affected by the Project. For example, discuss the importance of fire regime and management on *Hoya australis* subsp. *Oramicola* and how Project activities could impact this species;
- Assess the potential for the Project to introduce or increase the spread of weed species, including weed species declared under the NT *Weed Management Act*;
- Assess the potential for the Project to introduce pest fauna and plant pathogens to the area;
- Discuss potential impacts on aquatic habitat;
- Determine and discuss potential impacts to marine fauna, including transient species, and habitat during construction and operation, in particular:
    - Vessel collision due to increased boat traffic;
    - Hydrocarbon spills;
    - Marine pests;
    - Potential impacts from dredging and spoil disposal, if required;
    - Underwater noise levels and duration; and
    - Illumination and lighting, including disorientation of fauna such as marine turtles and seabirds/shorebirds from illumination of infrastructure, support vessels and ongoing operations.

- For all listed threatened, migratory or marine species that are believed not likely to be impacted by the proposed action, but for which suitable habitat is present and could be impacted by the proposed action, detailed information must be included to demonstrate that significant impact on the species will not occur.

**Mitigation**

- Discuss ways in which impacts on sensitive ecosystems, and listed species, communities and habitats will be minimised (e.g. timing of works, minimising disturbance area) and managed, including an assessment of the expected effectiveness of the mitigation measures, any statutory or policy basis for the mitigation measures and the cost of the mitigation measures;
- Detailed biodiversity management plans, with clear and concise methods, need to be developed in the final Environmental Management Plan. Mitigation and monitoring should be in accordance with best practice advice from relevant NT and Australian Government advisory agencies and focus on:
    - Potentially significant impacts to biodiversity as a whole; and
    - Potentially significantly impacted vegetation types, threatened species, migratory species and the biology of these entities.

## 4.5 Rehabilitation and mine closure

**Key Risks**

- The mine may be forced to close earlier than expected leaving disturbed areas exposed if closure planning is inadequate at any stage of the development;
- Rehabilitation of the mine site may not be successful leading to erosion of coastal habitats and degradation of ecosystems important for listed threatened and migratory species;
- Ongoing management of the site could be required well after mining is completed.

**Environmental Objective**

Rehabilitation of the mine site and associated disturbed areas is undertaken in a manner that requires minimal maintenance inputs post closure, but maximum protection of the environment from weed incursion, erosion or other impacts.

**Information Requirements**

- Investigate the physical, geo-mechanical and chemical properties of the ore body with respect to rehabilitation characteristics such as slope stability and vegetation establishment;
- Determine availability and volumes of key materials required for rehabilitation, including water;
- Provide relevant scheduling information with respect to material stockpiling and deployment;
- Describe proposed post-mining land uses which have been identified and agreed upon through consultation with stakeholders;
- Discuss provisions for post-mining infrastructure ownership and maintenance, including roads and wharf / barge loading facilities.

**Assessment of risks**

- Provide an assessment of the risks to the environment associated with closure of the mine and ancillary infrastructure prior to scheduled closure;

- If relevant, identify and discuss environmental risks associated with potentially acid forming materials;
- Identify any other risks that may interfere with successful closure and rehabilitation of the Project, for example, fire management and extreme weather events.

**Mitigation**

- Describe contingencies to make landforms secure and non-polluting in the event of unexpected or temporary closure;
- Demonstrate potential success of proposed rehabilitation plans through either a pilot scale demonstration or by reference to other Project sites which have similar geographical and geological characteristics and support similar vegetation types;
- Develop a protocol for measuring site rehabilitation success through appropriate ecological indices;
- Identify contingency measures in the event that monitoring demonstrates that management measures have not been effective;
- Include provisions for protection from fauna, including feral animals;
- Discuss fire management in the context of ecological communities and listed species that may be sensitive to particular fire regimes.

Provide a conceptual Mine Closure Plan (MCP) referring to the information requirements in the West Australian Environment Protection Authority and Department of Mines and Petroleum mine closure guidelines http://edit.epa.wa.gov.au/EPADocLib/Guidelines-for-preparing-mine-closure-plans-210611.pdf. The MCP must provide an understanding of the issues that require management at closure and demonstrate that all relevant issues and appropriate management measures have been identified.

## 4.6 Historic and cultural heritage

**Key Risks**

Operations associated with the life of the project and increased human activities in the project area have the potential to disturb or damage areas of historic and/or cultural heritage.

The EIS should include a detailed assessment of the risks to demonstrate that the Proponent is fully aware of the risks and mitigation measures to existing areas of historic and cultural heritage value.

**Information Requirements**

Baseline information should be provided regarding cultural heritage sites in the region, including:

- A description of Indigenous and non-Indigenous sites, places or objects of historic or contemporary cultural heritage significance, including:
    - Areas nominated for listing or listed on the Register of the National Estate or the Interim list of the Register of the National Estate;
    - Areas nominated for listing or listed on Commonwealth and Northern Territory Heritage registers and Commonwealth and Northern Territory registers of Indigenous cultural heritage;
    - Sacred sites - provision of evidence of an Aboriginal Areas Protection Authority (AAPA) Authority Certificate under the *Northern Territory Aboriginal Sacred Sites Act;*

- Traditional and historic Aboriginal, Torres Strait Islander and Macassan archaeological and heritage places and objects protected under relevant Territory and/or Commonwealth legislation; and
- European historic sites.

- A description of areas with special values to Indigenous and non-Indigenous people (e.g., traditional land use).

**Assessment of risks**

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

- An assessment of the Project's (mine, transport and export operations) potential effects on sacred sites, heritage places, and any potential impacts on Indigenous culture generally, including impacts on Traditional Ecological Knowledge and Land Management Practices;
- An assessment of the risks to traditional food and fresh water sources, and hunting grounds;
- Details of any requirements to apply to, or applications already made to, the NT Minister for Lands, Planning and the Environment to disturb or destroy a heritage place and/or object under the *Heritage Act.*

**Mitigation**

The Proponent should describe the prevention and mitigation of risks to existing areas of historic and cultural heritage. A management plan should be developed to address matters including:

- Procedures to avoid significant areas;
- Protection of key sites during construction, operation and decommissioning work;
- Ongoing protection measures; and
- Procedures for the discovery of surface or sub-surface materials during the course of the Project.

## 4.7 Socio-economic risks

**Key Risk**

Mining operations and increased human activities on Bathurst Island and the Tiwi Islands generally, have the potential to alter the economy and social demographic of the Islands.

Assessment and monitoring is required to ensure the local community receives a net benefit from the Project.

**Objectives**

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

**Information Requirements**

The EIS should include a balanced summary of the project's economic value (positive and negative) to the regional, state and national economies, in terms of direct and indirect effects on employment, income and production. The following are suggestions that may assist with highlighting the economic value of the project and are not intended to result in the inappropriate

disclosure of confidential information. It should be noted in the EIS if data are not available or unsuitable.

Aspects to be covered include:

- The project's contribution to the NT and Australian economy;
- A summary of project feasibility;
- Estimated total project revenue for the duration of the project (to provide the economic scale of the project);
- Total contribution to Gross State Product (GSP) and Gross Domestic Product (GDP) over the economic life of the project;
- Opportunities available to regional centres based on the activity generated by the project (construction, rehabilitation and operation);
- Estimated overall tax;
- Estimated capital expenditure for the whole project;
- Expected annual operational expenditure;
- Estimated workforce and contractor numbers by occupational classification;
- Overall employment training proposed during commencement, construction and operations;
- Planned Indigenous employment, training and other project participation;
- Expected level of overseas recruitment (if appropriate);
- Availability of goods and services;
- Community and economic value of any residual infrastructure, such as roads, following the life of the project; and
- Other contributions to local communities, including traditional owners.

The EIS should include a balanced summary of the project's social value (positive and negative) on a regional, state and national scale. A brief description of the current population, demography and social aspects of the region affected by the Project should be provided in the EIS. This should be done through community consultation, historic research and field survey. No information of a confidential nature, particularly related to anthropological matters relevant to Indigenous people or groups is to be disclosed in the EIS.

Existing social aspects, and their components, to be discussed must include:

- Key stakeholders;
- Regional community structures and vitality (e.g. demography, health, education and social well being, access to services, housing);
- The number and capacity of existing human services to support the construction work force:
    - Skills audit of affected communities;
    - Workforce characteristics; and
    - Accommodation type and quantity.
- Social amenity.

**Assessment of risk**

An Economic and Social Impact Assessment (ESIA) should be conducted. The ESIA should include consideration of the following:

- Estimates of the quantity and value of production/exports relating to the mine, including expected reduction in revenue should the proposal not proceed;
- An estimate of the value to the local economy associated with expenditure during the construction phase and the annual expenditure on regional goods and services as it relates to the mine and associated infrastructure;
- Benefits to the local community, 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;
- The risks of the mine, related infrastructure and associated workforce negatively impacting on identified social issues in the region.

**Mitigation**

A Social Impact Management Plan (SIMP) should be prepared to address any identified risks associated with the ESIA. The SIMP should:

- Describe how MZI proposes to manage any identified economic, social, cultural or spiritual risks from the Project, or its associated workforce, in the Tiwi Islands;
- Describe how potential local and regional business and employment opportunities related to the mine will be identified and managed;
- Establish a mechanism for monitoring any identified potential socio-economic and cultural impacts;
- Provide outcome and assessment criteria that will give early warning that management and mitigation measures are failing;
- 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.

## 4.8 Other Issues

Other environmental impacts should be identified and management strategies proposed, including, but not limited to:

**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.

An assessment of cumulative environmental impacts should be undertaken that considers the potential impact of a proposal in the context of existing developments and future developments to ensure that any potential environmental impacts are not considered in isolation. The extent of cumulative impacts to be considered depends upon the nature of the environmental issue. Cumulative Impact Assessment accounts for impacts on a regional scale, such as:

- Landscape-scale 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; and

- 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.

**Bushfires**

The Proponent should be aware of sections of the *Bushfires Act 2009* and Regulations that may apply to the Project and address risk and management of fires occurring both within the mine site (e.g. during site clearing operations) and outside the mine site.

**Biting insects**

A 12 month baseline mosquito assessment should be conducted at both the proposed accommodation camp site and the mine site, to determine the risk of transmission to workers of mosquito borne diseases such as Ross River virus, Barmah Forest virus and the potentially fatal Murray Valley encephalitis virus.

**Noise**

- Describe the expected noise levels associated with the Project construction and operation, including timing and duration, in comparison to background levels, sensitivity of receptors and nominated performance indicators and standards, including transport of product to the export facility and product export operations.
- Describe the management of noise impacts.

**Air**

- Describe the sources (including land clearing) and projected quantities of greenhouse gases emitted by the Project.
- Describe management of dust on transport routes and from all stockpiles.
- Discuss dust suppression strategies and monitoring of dust impacts.

**Waste**

- Identify the Project's waste disposal facility and describe the associated leachate management systems;
- Discuss the opportunities for waste minimisation and recycling in the Project.

# 5 ENVIRONMENTAL MANAGEMENT

Specific safeguards and controls proposed to be employed to minimise or remedy environmental impacts identified in previous sections are to be included in an Environmental Management Plan (EMP), which would become part of the Mining Management 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;
- 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;
- Contingencies for events such as hydrocarbon and other hazardous chemical spills or natural disasters;
- The EMP needs to address the Project phases (construction, operation, decommissioning) separately. It must state the environmental objectives, performance criteria, monitoring, reporting, corrective action, responsibility and timing for each environmental issue;
- The name of the agency responsible for endorsing or approving each mitigation measure or monitoring program;
- A summary table listing the undertakings and commitments made in the EIS, including clear timelines for key commitments and performance indicators, with cross-references to the text of the EIS; and
- Provision for the periodic review of the EMP.

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

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

# 6 NT POLICY AND GUIDANCE NOTES

## 6.1 Environmental offsets

The Australian Government Environmental Offsets Policy, October 2012, requires residual significant 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 or ecological communities and listed migratory species and an explanation as to how these proposed offsets meet the requirements of the Environmental Offsets Policy and Offsets assessment guide, where relevant.

## 6.2 Public health premises and food premises

NT Department of Health will require detailed plans submitted via a building certifier, prior to construction, for accommodation facilities, and food preparation and serving areas on the project site. The *Food Act* and *Public and Environmental Health Act* are both applicable to this Project.

Further information from the NT Department of Health is provided in fact sheet 700 *Requirements for Mining and Construction Projects*.

## 6.3 Radiation safety

The Proponent currently holds a number of authorities, which are issued under Part 2, Requirements for Radiation Sources and Related Matters, of the *Radiation Protection Act*. It is the responsibility of the Proponent to maintain all authorities as required by the Act.

## 6.4 Water supply

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

## 6.5 Wastewater

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

Further information can be found at:

www.health.nt.gov.au/Environmental_Health/Wastewater_Management.

Any discharge of wastewater from the project area into tidal waters, groundwaters or waterways may require licensing under the NT *Water Act*. Guidance and application forms can be found at:

www.ntepa.nt.gov.au.

## 6.6 Solid waste storage and disposal

Disposal of waste should be conducted in such a way as to avoid potential public health nuisances and environmental pollution.

## 6.7 Mosquito breeding

A biting insect assessment should be conducted to ensure new facilities are designed to have minimal mosquito breeding potential. The biting insect assessment should include trapping to determine the current seasonal population and abundance of adult mosquitoes. Refer to the Medical Entomology guideline Department of Health (2005) *Guidelines for preventing mosquito breeding sites associated with mining sites in the Northern Territory.*

http://health.nt.gov.au/Medical_Entomology/Publications/Development_Guidelines/index.aspx.

## 6.8 Aquatic surveys

In undertaking aquatic surveys, the use of sampling gear and the collection of samples requires a Special Permit pursuant to section 17 of the *Fisheries Act*. All permits are subject to approval and any conditions put in place by the Director of Fisheries. The form can be downloaded from:

http://www.nt.gov.au/d/Fisheries/index.cfm?newscat1=&newscat2=&header=Licensing%20Application%20Forms.