

# **Appendix A**



# **Guidelines for Preparation of an Environmental Impact Statement**

## **EXPANSION OF THE REDBANK COPPER OXIDE LEACHING AND SULFIDIC ORE OPERATIONS**

**- Redbank Copper Ltd -**

**September 2009**

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## 1 INTRODUCTION

Redbank Copper Ltd (formerly Redbank Mines Ltd; hereafter Redbank) proposes to expand existing operations at the Redbank Oxide Copper leaching operations mine, located on Wollogorang Pastoral Lease. Redbank is currently preparing an Environmental Impact Statement (EIS) for the oxide expansion. In July 2009, Redbank submitted a Notice of Intent under clause 14A of the *Environmental Assessment Administrative Procedures* to alter the Expansion of the Redbank Copper Oxide Leaching Operations to include the mining and processing of sulfide ores.

The amended proposal includes the development of four mining pits into the sulfidic ore zone ranging from 50 – 150 m depth. Sulfidic ore from the Sandy Flat Pit would initially be mined following successful dewatering of the pit. Waste rock storage areas would be constructed adjacent to the mine pits and a new tailings storage facility constructed. The mine is expected to have a life of eight years. Mining would be by drill and blast open cut methods and ore treated with an oxide processing plant and sulfide concentrator plant.

The mine is located on Wollogorang Pastoral lease, which is ranked as a priority for inclusion in the Northern Territory (NT) reserve system.

The Northern Territory Minister (NT Minister) for Natural Resources, Environment and Heritage has determined that this amended proposal requires formal assessment, under the NT *Environmental Assessment Act 1982* (EA Act), at the level of an EIS. Issues of concern contributing to this decision include:

- The increased risks associated with mining and processing sulfidic ores;
- Management of acid and metalliferous drainage into the environment;
- Increased risks and management issues for site water management;
- Management of larger quantities of problematic waste rock and spent heap leach material;
- Management of process tailings; and
- Challenges to ensuring long-term stability of the site after decommissioning.

The proposal was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and was determined to be a controlled action. The proposed action has the potential to have a significant impact on listed threatened species and communities (sections 18 and 18A), protected under part 3 of the EPBC Act, and will be assessed under the bilateral agreement between the NT and Australian Governments.

These Guidelines have been developed to assist Redbank in preparing an EIS for the proposed action, in accordance with Clause 8 of the Northern Territory (NT) *Environmental Assessment Administrative Procedures* of the EA Act of the Northern Territory and to meet the requirements of the Australian Government.

## **1.1 Amendments to the EIS Guidelines**

Many of the issues from the initial proposal and Guidelines remain the same. Minor additions or modifications to the original guidelines have occurred throughout to accommodate the proposed sulfidic ore mining and processing. Two sections in particular have been expanded in relation to tailings storage facilities (6.4.6) and decommissioning and rehabilitation (now inserted as section 6.5). The requirement for adequate baseline data collection to characterise existing site conditions and environmental legacy issues has been re-emphasised in the relevant sections.

## **2 GENERAL ADVICE ON GUIDELINES**

### **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 supplementary reports and able to be reproduced on request by interested parties who may not wish to read the draft EIS as a whole.

The EIS should demonstrate that the proponent has identified all risks associated with the issues raised, undertaken comprehensive assessment of those risks (including quantification where practicable) and identified effective controls for significant risks. Residual risks should also be identified. All aspects of the risk assessment should be accompanied by statements about levels of uncertainty. Steps to reduce uncertainty or precautions taken to compensate for uncertainty should also be identified and their effect demonstrated.

The EIS should enable interested members of the public and the NT Minister to understand the environmental consequences of the proposed action. Information provided in the EIS should be objective, clear and succinct and, where appropriate, be supported by maps, plans, diagrams or other descriptive detail. The body of the EIS is to be written in a clear and concise style that is easily understood by the general reader. Technical jargon should be avoided wherever possible. Cross-referencing should be used to avoid unnecessary duplication of text.

Detailed technical information, studies or investigations necessary to support the main text should be included as appendices to the EIS.

Redbank is expected to demonstrate the implementation of industry best practice measures in design of the facility, project planning, environmental risk assessment, monitoring and in all future aspects of the life of the project.

The assessment process aims to provide a mechanism for the Proponent and the Government to gain a clear understanding of the potential extent of such impacts, and to examine the likely effectiveness of preventative measures proposed. This understanding creates an opportunity to reduce impacts by adoption of more effective up-front engineering and/or management mechanisms.

Redbank is expected to work with close regard for community expectations and concerns and to respect that the community may perceive the level of risk for this proposal differently to the proponent. In the interest of achieving a balanced risk assessment, it is expected that the proponent will place a high priority on two-way communication with the local community.

## **2.2 Format and style**

The EIS should comprise three elements, namely:

- the executive summary;
- the main text of the document; and
- Appendices - containing detailed technical information and other information that can be made publicly available.

The structure of these Guidelines may be adopted as the format for the EIS. This format need not be followed if the required information can be presented alternatively for better effect. However, each of the elements in these Guidelines must be addressed to meet the requirements of NT Government regulatory requirements and the EPBC Act and Regulations.

The Executive Summary should include a brief outline of the project and each chapter of the draft EIS, allowing the reader to obtain a clear understanding of the proposed project, its environmental implications and management objectives. The main text of the EIS should include a list of abbreviations, a glossary of terms to define technical terms, acronyms and abbreviations, and colloquialisms.

The appendices should include:

- a copy of these Guidelines;
- a list of persons and agencies consulted during the EIS;
- contact details for the proponent;
- names of, and work done by, the persons involved in preparing the EIS; and
- qualifications and expertise of the people involved in work contributing to the EIS.

The EIS should be written so that any conclusions reached can be independently assessed. To this end, all sources must be appropriately referenced using the Harvard Standard. The reference list should include the address of any Internet “web” pages used as data sources.

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

The proponent should consider the format and style of the document appropriate for publication on the Internet. The capacity of the website to store data and display the material may have some bearing on how the document is constructed.

Data collected on species listed under the EPBC Act should be provided in electronic format to the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA). The provision of this information will help facilitate decision-making under the EPBC Act and assist in the protection and recovery of species and communities.

## **2.3 Administration**

Ten bound copies of the draft EIS should be submitted to the Environment, Heritage and the Arts (EHA) Division of NRETAS, for distribution to NT Government advisory bodies and for public requests. Additional bound copies may also be required on request if demand from the public is high.

The EIS should be provided on CD/DVD in ADOBE pdf format for placement on the NRETAS internet site (Chapters and Appendices separate). This should be done at least 4 days before newspaper publication. Additionally, two Microsoft Word copies should be provided to facilitate production of the Assessment Report and Recommendations. The proponent should consider the format and style of the document appropriate for publication on the Internet (to aid downloading, documents should no greater than 2MB in size). The capacity of the website to store data and display the material may have some bearing on how the document is constructed.

To ensure optimal opportunity for public and Government scrutiny of the submitted draft EIS document, EIS submission will not be accepted between December and January in any year, when key staff absences are prevalent. If EIS public exhibition overlaps any December – January period, the document will be required to be exhibited for a longer period to enable maximum opportunity for comment.

The proponent is to advertise the draft EIS for review and comment in the NT News, The Australian and relevant regional newspapers (eg Territory Regional Weekly).

The EIS should be made available for public review at:

- Environment, Heritage and the Arts (EHA) Division, Department of Natural Resources, Environment, The Arts and Sport (NRETAS), 2nd Floor, Darwin Plaza, 41 Smith Street Mall, Darwin;
- Minerals and Energy Information Centre, Department of Regional Development, Primary Industry, Fisheries and Resources, 3<sup>rd</sup> Floor, Paspalis Centrepoint, 48 Smith Street Mall, Darwin;
- Northern Territory Library (NTL), Parliament House, Darwin;
- Casuarina Public Library (e-mail [citylibrary@darwin.nt.gov.au](mailto:citylibrary@darwin.nt.gov.au) , Ph: 89300230);
- Palmerston City Library, Goyder Square, Palmerston (Contact [tree.malyan@palmerston.nt.gov.au](mailto:tree.malyan@palmerston.nt.gov.au) or phone 8935 9993);
- Darwin City Council Library;
- The Environment Centre NT, Unit 3, 98 Woods St, Darwin;
- Borroloola Community Council Library, Borroloola, NT;
- Australian Government Department of Environment, Water, Heritage and the Arts Library, John Gorton Building, Parkes, Canberra.

The Project Officer is Ms Sally-anne Strohmayr from the EHA Division of NRETAS.

The contact phone number is (08) 8924 4002 and facsimile (08) 8924 4053 or e-mail: [sally.strohmayr@nt.gov.au](mailto:sally.strohmayr@nt.gov.au).

### **3 DESCRIPTION OF THE PROPOSED DEVELOPMENT**

This section should describe the proposed development to allow a detailed understanding of infrastructure design and engineering. All construction (including site preparation), operation and management elements of the action must be described in detail. Where applicable these details should be described separately under the appropriate headings.

Details should include the precise location of all works to be undertaken, date or time period over which construction, operation and management will take place, structures to be built and elements of the action that may have impacts on identified environmental factors including matters protected by the EPBC Act. Relevant plans, photos and maps should be included to illustrate specific issues.

This information must also include details on how the works are to be undertaken (including stages of development), design parameters for those structural aspects of the action that have impact potential.

The Redbank project site in these Guidelines is defined as the area encompassing the group of seven mining leases (MLN 631, 632, 633, 634, 636 and 1108). These leases cover the existing operations under the current mining management plan and the proposed future expansion of oxide and sulfide operations.

The following headings should be included in this section:

### **3.1 Project objectives and benefits**

The EIS should contain:

- an explanation of the local and regional socio-economic, commercial and environmental objectives and benefits for the project;
- an assessment of the impact of commodity price volatility on future operations and site management and remediation;
- an outline of new and potentially separate disturbances (e.g. mining of the four oxide and sulfide pits) and provide comprehensive baseline data for the assessment of the environmental feasibility of the proposed action as well as an outline of any potential challenges that may arise during construction, operation and decommissioning;
- an outline of any potential benefits conferred by the proposed project that may assist in the short and long term management of the project site as a whole. This may include but is not limited to site water management during the operational period and placement of materials with beneficial chemistry to assist in water quality management;
- an outline of the existing condition of receiving waters downstream to the Queensland border to provide baseline information prior to the commencement of dewatering Sandy Pit, mining and remediation activities;
- an outline of the existing legacy of environmental issues relevant to the proposed project site and surrounding environment and capacity of the proponent to address these issues;
- a detailed outline of how the proposed project may affect the existing conditions on the project site and surrounding areas during both the operational period and in the closure and rehabilitation phase. This would include the dewatering of Sandy Flat Pit, the further use of the tailings dam, heap leach, process plant, fuel storage areas and their potential impacts on existing environmental liability.

### **3.2 Project location**

Describe the location of the project site in its regional context using appropriately detailed maps. Also indicate the project location in relation to smaller communities, pastoral leases and watercourses.

### **3.3 Timeframes and schedules**

Provide an anticipated timetable for the construction, operation, decommissioning and rehabilitation of the project.

### **3.4 Project components and supporting infrastructure**

The EIS should contain:

- an overall layout of the proposed project site including pits, spent heap leach material facilities, waste rock dumps, power generation, storage of hazardous material and other infrastructure, waterways, access (i.e. roads and airstrips) and features of interest;
- comprehensive maps showing topography and all project components and land tenure;
- location and design criteria for each component of the project, including the four pits and their depth, waste rock dumps, and tailings storage facilities and design limitations imposed by site characteristics;
- an overall layout of the proposed final landform illustrating the designed closure format of the site's key features such as re-contoured or reconfigured waste rock dumps, heap leach pads, tailings storage areas, in-filled pits, pit voids, erosion control, water management features and infrastructure areas;
- land requirements, land tenure, acquisition requirements (permits, rezoning and Native Title), and the tenures under which the project would be held including details of relevant legislative processes required to grant proposed tenure;
- infrastructure requirements and specifications (permanent and temporary) and ancillary activities (e.g. storage areas, waste dump areas etc);
- employment and business opportunities, including sources of workforce, skill levels required, opportunities for local people and businesses, projected number of directly employed and subcontractor employees during the construction and operational phases; and
- methods for storage, handling, containment and emergency management of chemicals and other hazardous substances (including fuel and explosives).

Construction should be consistent with NT Health and Community Services Requirements for Mining, Construction and Bush Camps (Environmental Health Information Bulletin No. 6) (Appendix A).

In addition to the above subsections, the EIS should also contain details about the development and operation of the mine, and the proposal description should consider, as a minimum, the following:

### **3.5 Site Preparation**

- Provide baseline surveys of the existing condition of the project site and surrounding environment which may include but not be limited to catchment mapping, surface and groundwater quality assessment, hydrogeological assessment, flora and fauna surveys (aquatic and terrestrial) and heritage surveys;
- outline the construction timing, methods, equipment and materials (types, sources and quantities);
- describe water requirements, usage, source, storage, treatment, water quality, water management infrastructure and disposal. Information is to be provided on how much water is required for the entire project and how this water is to be sourced; and
- describe on project site and off-site rock extraction methods and uses and borrow material requirements where appropriate.

### **3.6 Mine Details**

Information on the following would be required:

- total value of investment including construction costs;
- estimated value of production;
- volume of exports via the East Arm Port;
- current ore reserves of the proposed deposits and the mine life of the project;
- design of pits and their dimensions (including maps, plans and geological cross-sections, geotechnical considerations and hydrogeological context);
- geochemical characterisation of ore and waste materials;
- details of planned monitoring programs to ensure that new mining activities do not cause an environmental impact from acid mine drainage;
- outline if additional materials are required for the operation such as road and pad construction materials and rehabilitation capping and topsoils and indicate volumes required and proposed sources on the site;
- describe mining methods, scale of operations and timetable for ore extraction operations and identify the associated risks;
- detail drilling and blasting requirements (including frequency) and identify the associated risks; and
- outline possible future extensions to the mine operation, and discuss the probability of mining additional satellite ore bodies and/or expansion of the proposed pit shells.

### 3.7 Mine Decommissioning and Rehabilitation

The decommissioning and rehabilitation program is to be integrated into the mine plan and considered as part of the progression of the mining operation, rather than as a separate phase at the end of the mine life.

The project description should consider, as a minimum, the following:

- an estimation of the total area of disturbance;
- identification of the post mining land use for the project site agreed with stakeholders and regulators;
- an assessment of the risks associated with achieving the proposed post mining land use and the resultant rehabilitation objectives;
- current surface catchments for the project site and proposed significant alterations to the catchments during the proposed action;
- current hydrogeological and geochemistry understanding of the proposed project site including the plant, waste dumps, tailings and leach pads, pits and other potentially affected areas to provide the reader with sufficient details to assess the potential impacts to groundwater and surface water quality;
- initial information regarding the definition of quantifiable closure criteria for the site and an appropriate environmental monitoring program designed to determine progress in relation to these criteria; and
- Rehabilitation and decommissioning commitments and timetables (for both temporary and permanent facilities) including waste management, pollution control and stabilisation and rehabilitation plans for mined areas.

Describe in detail the following activities:

- progressive and final rehabilitation plans for pits, waste rock dumps, spent leach storage facilities, tailings facilities, Run Of Mine pad, roads, airstrip and infrastructure sites;
- design of rehabilitated landforms, in particular rehabilitation techniques, including methods to reconstruct the landscape using the materials available;
- profile reconstruction and viability for the growth of native species;
- collection and selection strategy for native species, e.g. native grasses and other vegetation;
- runoff and erosion control measures of rehabilitated areas;
- final topographic and drainage morphology including a detailed site water balance explaining the long-term fate of any stored water held on-site after mine closure. This should include all void water, tailings decant water etc;
- water and material management to ensure ground and surface water complies with the relevant guidelines eg: ANZECC 2000; and
- revegetation procedures (including topsoil management).

### **3.8 Exploration and Future Development**

Aspects related to, but not included as part of this proposal.

- outline briefly the potential for additional mining developments in this area, beyond the scope of this proposal; and
- outline the impacts of any exploration activities directly related to the proposed action within the mining tenements – in particular, the potential risks to groundwater and surface water.

## **4 ALTERNATIVES**

Alternative proposals, which may still allow the objectives of the project to be met, should be discussed, detailing reasons for the selection and rejection of particular options. The selection criteria should be discussed, and the advantages and disadvantages of preferred options and alternatives detailed. The short, medium and long-term potential beneficial and adverse impacts of each of the options should be considered and associated risks should be detailed and analysed. The potential impacts of the alternatives should be described.

Alternatives to be discussed should include:

- alternative locations, including process plant;
- alternative sources of raw materials for the project, including water supply;
- alternative transport methods and corridors;
- alternative tailings disposal;
- alternative extraction and processing technologies;
- alternative environmental management technologies, such as treatment and disposal of by-products and waste products including site waters; and
- alternative decommissioning options – analysis should include reference to industry ‘best practice’ guidelines, including exploration of the option of backfilling a pit with waste rock and/or tailings.

## **5 RISK ASSESSMENT**

### **5.1 Risk Assessment Approach**

Processes for risk management assessment are formalised in Standards Australia/ Standards New Zealand (eg. AS/NZS 4360:2004; HB 436:2004; HB 158:2006). In addition, organisations such as the US Environmental Protection Agency have published guidelines for ecological risk assessment (e.g. US EPA 1998).

Information provided in the EIS should permit the reader to understand the likelihood of the risk, its potential consequence with any uncertainty about the effectiveness of controls in relation to the risk and subsequently something happening that would have an impact on the project objectives. If levels of uncertainty do not permit robust quantification of risk, then this should be clearly acknowledged.

The EIS should be a whole-of-project approach identifying all risks in order of priority, presenting a comprehensive assessment of these. The EIS should be undertaken with

specific emphasis on identification, analysis and management of risks through a whole-of-project risk assessment process. Through this process, the EIS will acknowledge and discuss the full range of risks (including quantification where practicable) and identify management, mitigation and/or alternative actions.

It must at a minimum:

- Identify and discuss the full range of the hazards presented by the proposed action, including those of special concern to the public;
- Determine the risk of the event occurring (likelihood versus consequence);
- Rank the hazards/elements quantify (where possible) and rank risks based on their level of risk;
- Identify alternatives or mitigation measures to either eliminate or manage the acknowledged risks and describe the levels of uncertainty regarding risk;
- Provide a quantitative method of measuring performance of mitigation and management measures;
- Acknowledge and describe the levels of uncertainty regarding estimates of risk and the effectiveness of risk control measures in place;
- 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 also be identified and their effect/s demonstrated.

## **5.2 Risks and Hazards to Humans and Facilities**

The EIS should include an assessment of the risks to people, nearby facilities and the environment associated with the construction, operation and maintenance of the proposal including storage and transport of materials to and from the complex. Include also, potable water sourcing and quality assessment for both the operations and the camp. Existing risks should be identified.

The aim of this process is to demonstrate that:

- the proponent is fully aware of the risks to human health and safety, associated facilities and environment 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 for the facility; and
- the risks can and will be managed effectively during the construction, commissioning, operation, and decommissioning of the development.

Sufficient quantitative analysis should be provided to indicate whether risks are likely to be acceptable 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.

These Guidelines detail risk analysis and/or information requirements with respect to specific risks or impacts identified for the project by the Northern Territory and Australian Governments.

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

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

## **6 ASSESSMENT OF THE ENVIRONMENTAL IMPLICATIONS OF THE ACTION**

These Guidelines detail the information requirements to address the environmental issues and factors inherent in the project. The Northern Territory and Australian Governments' analyses of the Notice of Intent (NOI) for the Expansion of the Redbank Oxide Copper Leaching Operation, including mining and processing of Sulfidic Ores, have identified the following aspects requiring additional information in the EIS process:

- the potential for the proposed action to contribute both positively and negatively to the management of the site's existing environmental condition (see also section 6.1);
- the assessment and management of flora and fauna (see also section 6.2);
- the implications of the proposed action on site water management above and beyond the existing approved management practices for the site (see also section 6.3); and
- waste rock, spent leach material and tailings management (see also section 6.4).

The EIS should include at a minimum:

- a comprehensive list of the relevant legislative obligations of the site and pertinent Standards, Codes of Practice and Guidelines applicable to the implementation of the project.
- a detailed description of the existing environment condition of the project site including an agreed end land use outlining any beneficial uses associated with the project site (see section 6.1);
- a description of existing environmental conditions of receiving waters downstream of the project site;
- specifics on how the proposed action will influence the pre-existing project site conditions (see section 6.1);
- management and mitigation measures proposed to be undertaken to reduce or eliminate impacts on and off the project site;
- quantifiable measures to ensure stakeholders and regulators that the project site is being managed appropriately throughout the whole of project and a

acknowledgement of the appropriate standards and codes of practice applicable in the management of the project site;

- a section or tables detailing the environmental monitoring program to be undertaken to assess the performance of the proposed action through the operational phase and into decommissioning and closure. This will include existing relevant monitoring points for the already approved site activities and will encompass at a minimum commitments for surface and groundwater quality monitoring, biological monitoring, air quality, sediment sampling, flora and fauna (aquatic and terrestrial) and weeds; and
- A rehabilitation plan for those areas affected by this proposed action.

Visual material presented should include at a minimum:

- Detailed maps of the project site prior to the proposed disturbance including mineral leases, the current surface water catchments, access roads, the existing Sandy Flat pit, drainage structures, waste rock dumps, the process area, heap leach pads, erosion control structures, fuel and chemical storage areas, the mine camp etc.
- Detailed maps of the features to be overlain over the existing baseline map should the proposed action go ahead including areas to be disturbed, the pits, access roads, infrastructure to be utilised, disturbances to surface water catchments, modifications if any to the existing surface water management structures etc.
- Geological plan and cross sections of the area to provide an understanding of the spatial nature of the deposits and existing relevant hydrogeological information.
- A map of the existing environmental monitoring points for the project site and surrounding environment with particular reference to surface water and groundwater monitoring, sediment sampling and biological monitoring.
- A map of the proposed additional environmental monitoring points on the project site and surrounding environment should the proposed action be approved.

Studies to describe the existing environment within the project site and surrounding area (including receiving water environment) should be of a scope and standard sufficient to serve as a benchmark against which the impacts of the project may be assessed over an extended period. Control areas not impacted by the project should be included in studies and long term monitoring locations established.

All potential relevant impacts must be described in detail, including those within the project site and its surrounds, as they relate to the matters protected under the EPBC Act and other environmental factors in general, during construction, operation and decommissioning phases of the proposal. This must also include an assessment of significance of the impact, at the local, regional and global levels (e.g. global and national implications of greenhouse gases and the localised impact of service roads or artificial water bodies).

Cumulative impacts should also be discussed. The reliability and validity of forecasts and predictions, confidence limits and margins of error should be indicated as

appropriate. Mitigation measures must also be discussed with particular focus on matters under the EPBC Act and other matters determined to be at moderate or greater risk of impact. Specific and detailed measures must be provided and substantiated, based on best available practices.

Section 6 of these Guidelines includes potential issues and impacts that must be discussed. The EIS must also assess any other relevant impacts and issues that emerge throughout the process of preparing the EIS.

## **6.1 Implications of Environmental Legacy Issues**

The proponent would need to describe the extent of pre-existing environmental issues, including receiving waters downstream from the proposed project site. The proponent should outline how the proposed project would influence the existing condition of the project site and downstream receiving waters.

Particular focus should be given to providing an understanding of how the project will potentially affect the management of surface water and groundwater volumes and quality both within the project site and surrounding environment. Additionally the proponent must outline any benefits that may be incurred in relation to the long term management of the pre-existing liabilities on the project site by the proposed action.

### **6.1.1 Context**

The two major identified sources of contaminated discharge from the mine site are the existing tailings dam and waste rock dumps adjacent to the tailings dam, located upstream of the Sandy Flat Pit. Water issues in the Sandy Flat Pit result from receiving contaminated water from these areas. Water with high metal content and low pH in the Sandy Flat Pit continue to have the potential to impact on the surrounding environment, adjoining creek system, paleochannel and unconfined aquifer associated with the mine site.

Impact on the surrounding environment and ground water, specifically from the open Sandy Flat Pit continues to be a significant concern. Legacy issues associated with the site are currently managed under the *Mine Management Act* and will continue to be managed under this legislation.

A Beneficial Use Declaration has been made for the Settlement Creek catchment under the *NT Water Act 1992*. The declaration categories are: environment, riparian and cultural uses. Settlement Creek runs from the Northern Territory into Queensland. The Queensland portion of Settlement Creek is protected as a Wild River under the *Queensland Wild Rivers Act*.

### **6.1.2 Baseline - Existing Environment**

For the reviewer to be able to separate the existing approved activities on the project site and the current proposed action it is important to provide a clear picture of how the proposed activities may benefit or impact on the existing environment and how management practices will, if required, mitigate these risks or possibly improve the existing conditions on site.

The EIS should present details on the existing environmental conditions including:

- The existing management practices in place to manage potential impacts on ground and surface water quality throughout the year. Include information on

how practices change in response to the wet dry monsoonal climate and describe the key risks involved in this process; and

- Provide a detailed description of the environmental condition of the project site and receiving water environment based on existing environmental monitoring data, modelling and reporting. Include important aspects such as current environmental liability and challenges;

### **6.1.3 Potential Impacts and Management**

With the establishment of the pre-existing environmental conditions and management practices listed above, the proponent is required to describe the proposed activity and outline how it will impact on, benefit or alter the existing environmental management regime for the project site and the overall environmental contributions to the surrounding environment.

The EIS should present details addressing:

- How the proposed operations will contribute to the future management of the project site in a rehabilitation and closure context; and
- How the additional utilisation of the process area and associated leach/dams/dumps would impact the future management of the project site.

An outline of the overall process is required describing the above features and describing the key risks of the proposed action. Detailed discussions regarding these risks should be presented under the relevant sections in this chapter.

The proponent shall:

- outline in risk management terms, the risks to local groundwater resources from potential contamination. The discussion is to include interrelated surface water ecosystems, flora and fauna and current and future water users;
- outline how mining and processing of the oxide and sulfide pit materials contribute to environmental risk on the project site over and above the existing approved activities. In particular describe potential impacts of water quality and management in relation to the site; and
- for the risk reduction measures proposed, demonstrate the magnitude of risk reduction, and provide the estimated residual risk level to environmental components following proposed treatment.

The EIS is to discuss:

- On-going water management requirements linking storage, quantity and quality (including maintenance of water dependent communities or other systems);
- Provide an indication of the volumes and quality of water proposed to be released from the project site;
- Water monitoring and discharge requirements following decommissioning;

- How the proposed operations will contribute to the future management of the site in a rehabilitation and closure context. Will the additional utilisation of the process area and associated leach/dams/dumps significantly increase or decrease the future management of water and water quality objectives of the project over and above the existing legacy; and
- Actions to prevent the development of mosquito and other biting insect breeding habitats.

## 6.2 Protection of Flora and Fauna

### Outcome

The proponent will ensure that impacts on native flora and fauna species and communities associated with the construction and operation of the mine are minimised and mitigated as far as possible.

#### 6.2.1 Context

Legacy mining has already impacted on Hanrahan's Creek and the downstream drainage systems and there is potential the proposed action is likely to have significant impacts upon listed threatened species and communities protected under the EPBC Act. The proponent should focus on characterising this present condition so that the potential impacts of future mining activities on flora and fauna systems may be better detected.

The mine is situated on Wollogorang Pastoral Lease. The station has been ranked as a priority for inclusion into the NT reserve system due to the outstanding conservation values including plants and animals found nowhere else in the NT or Australia. Some of the species found within the area are classified as rare or threatened under NT and Commonwealth legislation, including the Carpentarian Rock Rat and Carpentarian Grass wren.

The expansion of the mine has the potential to degrade the conservation values in the immediate and off site area if not monitored and managed effectively.

The discharge of contaminated surface and groundwater into Hanrahan's Creek from Sandy Flat Pit has potential to have a significant impact on the riparian flora and fauna within the immediate and downstream areas, including Settlement Creek.

Given the Declared Beneficial Uses of Settlement Creek and that the Queensland section of the creek is a declared Wild River (under the Queensland Government's *Wild Rivers Act*); special consideration should be given to identifying potential impacts on these values.

The NOI does not make any reference to the existence, or non-existence of any threatened species. In addition the NOI fails to supply details of potential impacts, proposed management plans, or give notice of any intention to carry out fauna surveys. No site specific flora and fauna surveys have occurred at the project site and therefore comprehensive flora and fauna surveys must be given high priority.

#### 6.2.2 Baseline - Existing Environment

Describe flora and fauna species and vegetation communities for the proposed project site and surrounding downstream environment (including weeds and exotic species). Flora and fauna is to be surveyed and described with rare, vulnerable or endangered

species identified against relevant Territory and Commonwealth legislation. Reference is to be made to species listed under the NT *Territory Parks and Wildlife Conservation Act* that may not be listed under the EPBC Act. Species with Indigenous cultural uses and values should also be described.

Vegetation communities should be described with particular reference to significant vegetation, which includes:

- rare, threatened, endangered and regionally restricted species, vegetation types or habitats;
- communities that are particularly good examples of their type;
- vegetation types which are outside their normal distribution or have other biogeographical significance;
- ecologically outstanding areas which have importance beyond the immediate site (e.g. woodlands, monsoon rainforests, etc);
- vegetation which is the habitat of rare and threatened fauna or has outstanding diversity; and
- vegetation types with relatively high biodiversity values, including riparian vegetation and rainforest.

Where impacts on Commonwealth and Northern Territory listed vulnerable and endangered species are unavoidable, proposals for appropriate offsets should be incorporated into the proposal. Offsets should be developed in line with the DEWHA Draft Offsets Policy. Information on the DEWHA draft offsets policy can be found at: <http://www.environment.gov.au/epbc/guidelines-policies.html>.

Any biological surveys should include the mining project site and area downstream from the project site to the lower reaches of Settlement Creek, due to the potential for water quality impacts to travel downstream. A survey methodology should be prepared and be:

- developed in consultation with appropriate recognised experts;
- submitted to DEWHA for comment before being implemented; and
- conducted by suitably qualified individuals.

The EIS is to make special reference to the listed *EPBC Act* protected species that have been identified to potentially occur in the area. These include, but are not limited to:

- *Erythrotriorchis radiatus* – Red Goshawk
- *Rostratula australis* – Australian Painted Snipe
- *Erythrura gouldiae* – Gouldian Finch;
- *Elseya lavarackorum* – Gulf Snapping Turtle;
- *Zygomys palatalis* – Carpentarian Rock-rat;
- *Pseudantechinus mimulus* – Carpentarian Antechinus; and
- *Pritis microdon* – Freshwater Sawfish.

Note that there are historically no records of Red Goshawk and Australian Painted Snipe in the area but they have remained on the list as possible species. The NT listed species *Amytornis dorotheae* – Carpentarian grasswren should also be considered.

The EIS is to also include a description of:

- flora and fauna species that *may* be present within or that may utilise habitat within the vicinity of the mining project site and areas downstream from the mining project site; and
- flora and fauna species that *are* present within, or that utilise habitat within the vicinity of the mining project site and area downstream from the mining lease area and the ecological condition of those areas

Targeted surveys must be conducted for the above *EPBC Act* listed species. These surveys must:

- identify whether or not there is suitable habitat for listed species;
- Undertake more detailed targeted surveys for those species that are found to have suitable habitat in the vicinity of the mining project site; and
- If suitable habitat is present downstream for the species *Pritis microdon* (Freshwater Sawfish), *Elseya lavarackorum* (Gulf Snapping Turtle) and the *Rostratula australis* (Australian Painted Snipe), expert advice should be sought to determine whether further targeted surveys are required to determine the magnitude of potential impacts, taking into consideration impacts of survey methods on species.

Habitat assessment of all habitat found suitable must be conducted. The assessment must determine the condition and suitability of habitat. Suitability of habitat should be discussed in terms of:

- whether or not the species is known to utilise the habitat,
- if there is potential that the species will utilise the habitat or
- if it is unlikely that the species will utilise the habitat. Reasoning must be provided.

The surveys should consider seasonality, species rarity, and potential for occurrence of significant species and sensitivity of species to disturbance. Surveys should be designed in consultation with the Biodiversity Unit of NRETAS. Baseline data is to focus on dry season surveys of terrestrial flora and fauna. A survey using pit traps with drift-lines to detect litter-dwelling fauna should be conducted.

### **6.2.3 Potential Impacts and Management**

- potential and likely impacts of the proposal on biodiversity need to be discussed, but not be limited to the following:
  - removal of habitat;
  - fragmentation of habitat;

- impacts on habitat corridors;
  - impacts on water quality of creeks, streams and rivers that may provide habitat for aquatic species and water resources for terrestrial species (including impacts of contamination events caused by flooding or equipment failure);
  - edge effects;
  - human intrusion into habitat areas;
  - light, noise and vibrations;
  - increased traffic;
  - increased risk of fire and habitat destruction; and
  - increased/introduced feral species and weeds.
- an analysis of the significance of these listed impacts should be given in line with the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines (Matters of National Environmental Significance);
  - discuss the impact of the proposal on species, communities and habitats of local, regional or national significance as described in 6.2.2;
  - discuss the impacts and means of mitigating those impacts on species with cultural uses and values. This should be described in terms of their effects on Aboriginal culture, health and well-being, land use and management. The level of consultation undertaken with Aboriginal people in respect of this should also be discussed;
  - describe the impact associated with the proposed vegetation clearing;
  - discuss the ability of identified stands of vegetation and fauna to withstand any increased pressure resulting from the proposal;
  - identify pest species/noxious weeds that are likely to occur as a result of construction and operation;
  - discuss ways in which impacts on species, communities and habitats can be minimised (eg, timing of works, minimise catchment disturbances etc);
  - describe the methods for rehabilitating disturbed areas following construction, including revegetation strategies, surface stabilities and landform and monitoring programs;
  - proposed mitigation measures addressing identified impacts need to be clearly explained; and
  - any risks associated with mitigation measures need to be described along with contingency plans;

Describe and analyse the risks of the proposed action impacting on each element identified above and rate the risk of each impact. Particular consideration should be given to the following:

- impacts of clearing;

- impacts on species, communities or habitats of local, regional or national significance. Detail this with reference to the inputs and outputs from the mining and processing operations;
- impacts of groundwater drawdown on groundwater dependent ecosystems;
- impacts on Declared Beneficial Uses for Settlement Creek.

For each risk, discuss the risk controls to avoid or minimise the occurrence and extent of unacceptable impacts and their likely effectiveness. These should include, but not be limited to:

- minimisation of disturbance;
- rehabilitation methods including revegetation strategies and flora selection;
- Flora and Fauna Management Plan (to be included in the Environmental Management Plan in section 7 and to follow best practice and advice from advisory agencies) – to include consideration of identified vulnerable or endangered fauna;
- Weed Management Plan (to be included in the Environmental Management Plan in section 7 and to follow best practice and advice from advisory agencies) – to include consideration of the impact of vehicle movement off-site;
- Vegetation Clearing Plan (to be developed as part of the Environmental Management Plan in section 7) – including what is planned for the disposal / use of cleared vegetation. This should adhere to the standards applied under the NT Land clearing guidelines;
- Fire Management Plan (to be developed as part of the Environmental Management Plan in section 7);
- actions to prevent the development of mosquito and other biting insect breeding habitats;
- proposed feral animal control; and
- inclusion of the above requirements into company commitments and site and employee induction programs.

Special consideration should be given to any potential to work in collaboration with adjacent land managers, particularly Wollogorang Pastoral Lease, for the management of impacts direct and in-direct, short term and long term, that may impact on surrounding areas of the catchment or the values of the area.

*Please note:*

An Environment Management Plan (EMP) addressing *EPBC Act* matters should be prepared. In addressing the management of matters of National Environmental Significance, the proponent should ensure that the relevant section of the EMP is tailored to meet the DEWHA draft guidelines on how to prepare an EMP addressing *EPBC Act* listed species. The draft EMP guidelines can be made available on request from DEWHA.

## **6.3 Protection of Water Resources**

### **Outcome**

The proponent shall manage the quality of ground and surface water onsite and moving offsite as a result of such direct and indirect mining influences such that it complies with relevant standards and guidelines such as the ANZECC and ARMCANZ 2000 and beneficial use declarations.

#### **6.3.1 Context**

A Beneficial Use Declaration has been made for the Settlement Creek catchment under the *NT Water Act 1992*. The declaration categories are: environment, riparian and cultural uses. Mine water contaminants have previously entered Settlement Creek.

It is acknowledged in the NOI that contamination has occurred historically both on the project site and in downstream receiving waterways. Water management issues are of high priority in the environmental assessment of this project. The detail of management and monitoring strategies provided in the EIS should reflect this priority. Given the contamination legacy issues on and off the project site, the proponent must demonstrate that a sufficient number of upstream and downstream monitoring sites and monitoring bores are in place to allow for adequate water quality monitoring and management.

In risk management terms, the proponent shall demonstrate that the risk of significant degradation of water quality in groundwater aquifers from direct and indirect mining influences is low, that is, the measures put in place to mitigate impacts reduce the combined likelihood and consequence of an event occurring so that the residual risk is low. Any data gaps or impact uncertainties should be openly acknowledged in assessing risks to surface and groundwater resources.

#### **6.3.2 Baseline - Existing Environment**

The EIS should provide baseline information and describe and discuss the existing environment in the following aspects:

- surface and groundwater quality data, inclusive of sediment and biological sampling (ie: macro invertebrates, fish community/flesh analysis in the downstream environment) for the proposed action that will:
  - allow the separation of existing mineralogical influences; and
  - provide a realistic target for environmental management and closure criteria .
- natural and artificial, permanent and ephemeral catchment systems, drainage lines, waterways, wetlands and groundwater systems;
- downstream receiving waters such as Echo, Hanrahan's and Settlement Creeks;
- hydrology and hydrogeology including drainage patterns, flow/discharge rates, likelihood of flooding;

- detail groundwater modelling to include potential interaction with all waste storage facilities;
- water and sediment quality of fresh waters including temporal and spatial variations;
- beneficial uses and environmental values of water resources in the project locality;
- connectivity between groundwater systems at the mine site and the surrounding surface water systems (i.e. Echo Creek, Hanrahan's Pool);
- include localised rainfall data.
- Reference to the baseline recommendations (section 3.2.4.2 'Baseline data collection') and balance of indicators for measurement (chemical and biological, section 7.2.1) from ANZECC & ARMCANZ (2000) should be used as a starting point for initiating baseline data collection and ongoing monitoring. For aquatic systems, wet season or recessional flow surveys are to be included.

### **6.3.3 Potential Impacts and Management**

Describe and assess the risks of project components impacting on each of the following elements:

- surface and groundwater water quality, alteration to surface waters and aquatic and riparian flora and fauna;
- current downstream surface and groundwater users and their requirements; and
- surface water and groundwater quality of the open pits after the operational life of the mine.

For each risk, discuss the risk control measures to avoid or minimise the occurrence and extent of unacceptable impacts and their likely effectiveness. These should include, but not be limited to:

- treatment, storage and disposal of waste water, including pit dewatering and stormwater run off;
- management of clean, dirty and contaminated water;
- management of high rainfall events;
- protection of beds and banks of watercourses;
- need for a waste discharge licence;
- protection of surface and groundwater from potential contamination;
- proposed monitoring of surface and ground waters;
- proposed site protection, management and monitoring activities are robust in light of climate change projections (eg. an increase in extreme weather events);
- continued water monitoring and discharge requirements following decommissioning; and
- ongoing water requirements for the maintenance of water management structures.

The proponent should provide a map of the water management system showing all mine structures, routes, details of surface water sampling points and groundwater investigation bores.

The proponent must detail in the EIS how the proposed action may, over and above the existing approved activities, contribute to surface-water runoff from Sandy Flat Pit, with a focus on the implications to surface and ground water quality downstream. The proponent should also demonstrate that this runoff will not further degrade water quality within the downstream drainage system. This includes Hanrahan's Creek and Echo Creek down to Settlement Creek. The proponent should detail safeguards and management strategies used to minimise the impacts of construction and operation on the hydrological features described above. In particular, provide details on the following:

- measures to safeguard surface water resources including options for appropriate treatment and disposal of construction and operational wastewater. Identify the preferred option and the selection criteria used; and
- measures to safeguard downstream water quality.

The proponent is to demonstrate that sufficient mine structures, water storage capacity, water quality protection measures and sediment control devices are in place during life of mine. The EIS should describe and evaluate monitoring and management mechanisms to mitigate identified impacts of the proposed action:

- describe with suitably detailed maps the geology and aquifers underlying the waste water, rock storage and the surrounding areas, to the outer extent of the underlying aquifers. Contour maps should include overlays of all proposed infrastructure;
- describe surface connections and expressions of groundwater aquifers potentially affected by the waste water, waste rock and tailings storage facilities (eg. bores; springs, soaks, water courses);
- describe the water quality monitoring to be conducted with regard to the release of pit water from Sandy Flat, Azurite, Bluff and Redbank pits to the natural drainage;
- describe the volume and quality of wastewater discharge and how it will be monitored to minimise impacts on sensitive flora and fauna;
- describe water quality monitoring to offsite receiving waters (eg Echo Creek down to Settlement Creek);
- describe the potential for water contamination if connectivity is established between the mine site and Echo Creek;
- describe site water requirements and identification of sources in relation to resource capacity and current use;
- provide a site water balance (all inputs and outputs) for the expected mine life, including rehabilitation;
- demonstrate management of process waters and acid drainage waters;
- provide details supporting how mine operations will operate on a contained water cycle;

- undertake a biological monitoring program using stream macroinvertebrates for surface waters in the project site. This should be designed in consultation with relevant NT NRETAS aquatic ecology staff and using advice offered in ANZECC & ARMCANZ 2000;
- present the multiple lines of evidence assessment of surface water ecosystem condition, including water quality data, biological monitoring data and existing land use data, and using the advice of ANZECC & ARMCANZ (2000; section 7.2.1);
- in consultation with the EHA Division of NRETAS, establish Draft Water Quality Objectives (WQO) for surface and groundwater affected by the project;
- demonstrate how draft WQO will be protected at the project site through wastewater management processes including avoidance of wastes, reuse, recycling, treatment and disposal of wastes;
- if a discharge to surface water is required, the proponent is to demonstrate that for all water uses and conditions (low flow, base flow, cease to flow etc) that the treatments and discharge regimes will be adequate to ensure draft WQO are protected; and
- include analysis of historical water quality monitoring data for ground and surface water in the project site and surrounding environment.

#### **6.4 Prevention of Contaminated Discharges from Ore Processing, Waste Rock, Spent Heap Leach Material and Tailings Storage Facilities**

##### **Outcome**

The proponent shall manage and mitigate the risk of degradation of adjacent land and water from direct and indirect mining influences through the provision of appropriately designed waste rock, tailings and heap leach material storage facilities. These storage facilities are to be designed and constructed to minimise and mitigate as far as possible impacts upon water quality within and adjacent to the mine site. The proponent shall demonstrate that the risk of significant degradation of adjacent land and water from direct and indirect mining influences is low.

##### **6.4.1 Context**

Existing operations have resulted in poor water quality discharge from the mine site. The main sources of discharge have been identified as the existing tailings dam and waste rock dump.

The proposed action intends to develop new waste rock dumps adjacent to the new pits. Spent heap leach material from the proposed action will remain in-situ on the plastic lined heap leach pads above ground. Processing of ore will occur on site.

The NOI states that Acid Mine Drainage test work will demonstrate that acid drainage generation will not occur. This statement must be supported by sufficient geochemical assessment and analysis.

##### **6.4.2 Baseline – Existing Environment**

The EIS is to provide the following details:

- identify total amount of waste rock and spent heap leach material to be produced;
- characterise the waste rock and spent heap leach material, including mineralogy and base metal content, full range of likely constituents and qualities of environmental significance. Include likely ranges of mineralogy / base metal content, neutralising capacity and net acid production potential;
- describe waste rock and spent heap leach material management and impoundment principles addressing surface configurations, wall/pad designs and construction, estimated flood heights and provisions for extreme rainfall and flood events, erosion protection, sub drainage and collection sumps; and
- provide details on the linings proposed for all facilities on site including ore stockpile, waste rock dump, waste dump settlement pond and spent heap leach material storage facilities.
- describe and justify design selected for both the waste rock dump and spent heap leach material storage facilities with emphasis on the prevention rather than treatment of impact;

#### **6.4.3 Ore Processing Management**

- detail the proposed method for processing the ore. Include flow diagrams;
- describe capacity of the ore processing facility to treat the ore and safely dispose of the tailings produced;
- indicate all input products (solids, gases and liquids) and pathways for each item in the process; and
- detail any proposed stockpiling of ore on site and associated management;
- detail options for processing the ore and identify the risks these activities present; and
- detail the nature, toxicity and management of reagents to be used during on-site processing.

#### **6.4.4 Waste Rock Dump Facilities – Potential Impacts and Management**

- describe in detail the methods for waste rock handling, disposal and waste rock dump construction;
- provide details on quantity of waste rock produced, when it will be produced and how waste rock receptacle design will accommodate expected waste volumes and avoid exposure of waste rock to the elements;
- outline proposed waste dump locations, dimensions, water catchments, surface treatment and final landform (discuss alternatives) and identify associated risks and risk treatments;
- characterise waste rock in terms of Acid Generation Potential, acid consuming and neutralising capacity from drill core samples and in-situ assessments (kinetic tests and field trials), including sample selection methodology;
- Provide analysis of waste rock to better understand the potential for:
  - metals mobilisation; and

- surface water and groundwater contamination;
- detection and remediation plans for potential waste rock dump seepage;
- present detailed designs demonstrating how formation of acid and/or metalliferous seepage to groundwater aquifers would be prevented;
- predict and demonstrate the permeability of all waste storage facility layers and calculate likely oxygen diffusion and water percolation rates through the layers;
- demonstrate that seepage from waste water storage facilities will not cause a loss of water quality in local groundwater resources;
- establish vertical and horizontal permeability data through the geological strata underlying the new waste storage facilities to enable appropriate design and construction;
  - Demonstrate how construction quality control will be achieved;
  - Quantitatively estimate (with evidence) the capacity of the underlying geology to neutralise any acid and/or metalliferous seepage outputs;
  - Describe final rehabilitation and revegetation plans for the completed waste storage facilities;
  - Describe ongoing monitoring, and (contingency) management plans for the waste storage facilities after mining ceases;
- review the effectiveness of the impoundment methods and evaluation of the risk of failure and management strategies should failure occur;
- seepage quality is to be comprehensively predicted, with impact analysis presented of qualities significant to environmental and/or human health, over time;
- compare predicted seepage quality with existing groundwater quality;
- detail mitigation measures available/proposed to manage/contain seepage, with a focus on the post-mine-closure period; and
- provide details of planned monitoring programs to ensure that new mining activities do not cause an environmental impact from acid mine drainage.

#### **6.4.5 Spent Heap Leach Material Storage Facilities – Potential Impacts and Management**

##### *Existing heap leach facilities*

- provide liner system details including design depths, composition, life expectancy etc as well as underlying geological strata;
- demonstrate the availability of suitable clays or appropriate low permeability material to construct any proposed liner systems for waste facilities;
- provide design depths of all liner systems and underlying geological strata;
- present details discussing the establishment of the heap leach facility on top of the waste rock dump and existing leaching vats (where appropriate). Information should include the effectiveness of liner systems as a management strategy to ensure acid generation in the waste dump is minimised or managed;

- present details addressing future plans for the existing leaching vats. Information should address; management details for the ongoing use of the vats or details of decommissioning and removal; and
- if the vats are to be removed, and contamination is present, provide remediation details.

#### *Expanded heap leach facilities*

- present details of the expanded heap leach facilities and associated infrastructure to ensure soil and ground water contamination is prevented. Details should include; lining, bunding and containment details for associated infrastructure which uses or stores environmentally hazardous chemicals (heap leach pad, pipelines, ponds, tanks etc);
- present details of stormwater management for the heap leach facilities, storm surge capacity in the processing circuit and depth to groundwater to ensure adequate separation distances from the lining systems;
- provide details of the final capping strategy for the heap leach pad, to take into account the probability of infiltrated rainfall ponding within the bunded structure of the heap leach pad and leading to subsequent subsurface overflows of metal laden water;
- demonstrate how construction quality will be achieved;
- describe final rehabilitation and revegetation plans for the facility;
- describe ongoing monitoring and (contingency) management plans for the expanded leach facilities;
- review the effectiveness of the impoundment methods and evaluation of the risk of failure and management strategies should failure occur;
- seepage quality is to be comprehensively predicted, with impact analysis presented of qualities significant to environmental and/or human health, over time;
- compare predicted seepage quality with existing groundwater quality; and
- detail mitigation measures available/proposed to manage seepage, with a focus on the post-mine-closure period;
- Provide analytical evidence to demonstrate that ores previously mined are oxidised. There is significant potential for acid and metalliferous drainage issues from the new mine pits if they are not oxidised; and
- Provide details of planned monitoring programs to ensure that new mining activities do not cause environmental impact from acid or neutral mine drainage.

#### **6.4.6 Tailings storage facility**

- Characterise the tailings, including mineralogy, base metal content, neutralising capacity, sulfide content and net acid production potential;

- Describe the proposed tailings storage facility location in relation to surface water drainage (catchment details);
- Describe tailings disposal and impoundment principles (including lining), surface configurations, wall designs and construction, estimated flood heights, erosion protection, spillway design and location, subdrainage and collection sumps. Ensure current geotechnical engineering principles/practices and ANCOLD guidelines (<http://www.ancold.org.au/publications.asp>) are met;
- Outline geotechnical details of dam (specifically seepage potential and expected chemistry of leachate);
- Outline seepage quality and compare with existing groundwater quality;
- Indicate contingency arrangements including reporting protocols for dealing with both minor leakage and catastrophic failure of the tailings dam;
- Groundwater interactions with the tailings storage facility should be fully described and investigated; and
- Detail mitigation measures available / proposed to manage seepage, with focus on the post-mine-closure period.

## **6.5 Decommissioning and Rehabilitation**

### **6.5.1 Context**

As stated in the NOI, previous operations have caused contamination to surface and groundwater and have required a number of remediation and control measures. The flooded Sandy Flat Pit contains acidic copper laden water, and during exceptionally high rainfall years the pit has discharged this contaminated water into downstream waterways and shallow aquifers, causing serious environmental harm. A Waste Discharge Licence was issued following the declaration of the Beneficial Uses of the Settlement Creek Catchment. Additional information on the existing condition of the closed mine is detailed in section 6.1.

Decommissioning and rehabilitation must be considered in context of the wet–dry tropical environment in which the proposal is located.

### **6.5.2 Baseline**

With the expansion of the mine into four sulfidic pits (Sandy Flat, Bluff, Azurite and Redbank) the decommissioning and rehabilitation of the site should be of high importance. The EIS should outline a time scale for decommissioning and for determination of compliance with, and release from, the requirements of appropriate authorities.

Specific information requirements include:

- Agreed post mining land use;
- Decommissioning of the proposed mining areas, including pits, waste dumps and other disturbed areas, tailings facility, process areas and infrastructure. This must include at a minimum:

- design of rehabilitated landforms including final topographic and drainage morphology and maintenance of water quality;
  - description of progressive and/or final rehabilitation plans for the pit and surrounds;
  - collection and selection strategy for native species, e.g. native plant species to be used for runoff and erosion control, prevention of leaching and revegetation procedures;
  - establishment of vegetation to include seeding, flora selection, fertiliser use (if needed), and rehabilitation trials, including native plants to prevent future weed problems;
  - monitoring of vegetation establishment and stabilisation to achieve rehabilitation objectives; and
  - implementation of erosion and sediment control measures.
- Proposed quantitative completion criteria or the process of developing these criteria.

### **6.5.3 Potential impacts and management**

The EIS must detail how the area is to be managed following closure:

- Proposed environmental indicators to measure progress in achieving the completion criteria (or process to develop these);
- A detailed environmental monitoring program for flora, fauna, surface and groundwater, erosion, biological aspects, sediments and other relevant aspects pertinent to demonstrating that the disturbance incurred by the proposed action is leading towards or has achieved closure criteria. The programs must outline duration and frequency, coordinates for monitoring points where appropriate, a description of the parameters being measured and why;
- Integration of the rehabilitation program with mine design and operation;
- Natural and constructed drainage system design to ensure runoff discharge does not erode or add to downstream siltation;
- On-going water management requirements linking storage, quantity and quality (including maintenance of water dependent communities or other systems);
- Water monitoring and discharge requirements following decommissioning;
- Capping requirements for the final rehabilitation of tailings storage facility with consideration of best practice rehabilitation in a wet-dry tropical environment to prevent poor quality runoff and seepage from the facility;
- Risk reduction measures required at the Sandy Flat Pit site, to prevent further down stream contamination of groundwater resources;
- Management of clean, dirty (i.e. sediment laden) and contaminated water;
- Management of the contaminated pit water during high/extreme rainfall events;

- Clean up of current contaminated drainage impacts on the adjoining creek system;
- Management of oxidation of sulfidic minerals present in pits below the surface oxidation zone;
- Final rehabilitation of voids; and
- Proposed final pit water quality modelling including assessment of effects of walls rocks, waste materials that may be present in the final pit and extent of possible contributions of contaminated catchment runoff from rehabilitated mine footprint areas.

## **6.6 Social Environment**

### **6.6.1 Baseline**

- Describe the socio-economic characteristics of the region (including a prediction of trends over the expected operational life of the project); and
- Describe the range of services, facilities and infrastructure existing in the area.

### **6.6.2 Potential Impacts**

- Identify the overall economic benefits of the proposed project, the likely contribution of the project to the development of mining industry, regional economic development and Indigenous economic development in the Northern Territory, employment and skills development outcomes and linkages with other Territory business and sectors, including suppliers and other service providers;
- Identify any negative impacts or potential synergies between the mine and existing land uses;
- Identify opportunities for training and employment during construction of the project and how this would be structured, managed and implemented;
- Identify opportunities for local industry and indigenous/non-indigenous workforce participation in the construction and operation of the project.

### **6.6.3 Management**

- Identify measures to reduce negative impacts and maximise benefits.

## **6.7 Landform and Erosion Control**

### **6.7.1 Baseline**

- Provide maps and an interpretation of the regional geology and geomorphology of the site and peripheral areas;
- Discuss the soil types and land units of the site and peripheral areas;
- Provide seismic information for the site and peripheral areas;

- Detail the existing level of soil erosion and other disturbances;

### **6.7.2 Information Requirements**

Describe and analyse risks of how the project will or has the potential to impact on each element with particular consideration given to the following:

- Discuss limiting properties of landform considering erosion, rehabilitation etc. This information may be provided through the development of a landform evolution model for the life of the project and beyond (this would also have benefit in assisting in progressive rehabilitation over the life of the project); and
- Detail impacts of mining to landform.

### **6.7.3 Management**

For each risk, discuss the risk controls to avoid or minimise the occurrence and extent of unacceptable impacts and their likely effectiveness. These should include, but not be limited to:

- Measures to avoid or minimise impacts from identified risks;
- Management of topsoil; and
- Erosion and sediment control procedures and associated erosion and sediment control management plan e.g. further information on erosion and sediment management can be found at <http://www.nt.gov.au/nreta/natres/soil/management/index.html> .

A high priority should be given to ensuring sediment is prevented from entering into the surrounding waterways. This should be reflected in the management plans.

## **6.8 Waste Management and Hazardous Materials Management**

### **6.8.1 Baseline**

- Identify and describe (amount and characteristics) all wastes and their sources, including hazardous wastes, associated with construction, operation and decommissioning of all project components; and
- Detail all chemicals, including acid and fuels, to be stored and/or used on the project site. Outline the proposed methods for transportation, storage and use of these substances.

### **6.8.2 Potential Impacts**

- The potential impacts of extreme weather events on waste management and containment (particularly fuel and reagents stored on-site); and
- Discuss the potential impacts (including soil and water contamination) associated with identified wastes and leakage/spills of hazardous materials.

### 6.8.3 Management

- Discuss waste management strategies including avoidance, reduction, reuse, recycling, storage, transport and disposal of waste;
- Details of any pollutants that have the potential to be released into the environment and measures to prevent or minimise this release of pollutants;
- Management of listed waste as per the *Waste Management and Pollution Control Act*;
- Management of hazardous materials such as chemicals, fuels, oils and explosives; and
- Details of technical response procedures in the event of an emergency.

## 6.9 Historic and Cultural Environment

### Outcome

Redbank is required to ensure protection of any sites, additional to those areas identified in the Aboriginal Areas Protection Area Authority Certificate.

### 6.9.1 Baseline

Identify all indigenous/non-indigenous places of historic or contemporary cultural heritage significance, including:

- Areas nominated for listing or listed on the Register of the National Estate or the Northern Territory Heritage Register;
- Areas nominated for listing or listed on Commonwealth and Territory registers of indigenous cultural heritage;
- Sacred sites – provide evidence of an Authority Certificate under the Northern Territory Aboriginal Sacred Sites Act 1989 and compliance with protection of sites under both the Aboriginal Land Rights (Northern Territory) Act 1976 and the Northern Territory Aboriginal Sacred Sites Act 1989;
- Areas of historic or archaeological significance likely to have or require consideration under the Heritage Conservation Act;
- Demonstrate that the expansion of this project will remain within the scope of the above proposed work or use and that Redbank seek a reissue of Aboriginal Areas Protection Authority Certificate C1991/111 on that basis to cover the expired three year mine life or seek a variation to C1991/111 to cover new works.

### 6.9.2 Potential Impacts

Describe potential impacts to the features identified in baseline studies including heritage places, traditional hunting/fishing areas, indigenous/non-indigenous culture generally and impacts of increased visitation.

### **6.9.3 Management**

Traditional owners have advised the Northern Land Council (NLC) that there are burial grounds in this region and that they may be affected by opening of new pits. While it is noted that an AAPA Authority Certificate is required, information from the AAPA Certificate is to be supplemented by consultation with Aboriginal people who may hold Native Title rights to the areas to be disturbed.

Redbank is to detail measures required to ensure protection of any sites, additional to those identified by AAPA, describe how they will be protected and describe the level of consultation undertaken with Aboriginal people in this respect.

The 2008 Notice of Intent Section 6.0 states that there are two sites of European heritage significance associated with William Masterton (Masterton's Grave and Masterton's Cave), and that as part of the 1992 PER Redbank Copper agreed to act as custodian of these sites.

Detail measures to mitigate impacts to any features at risk from the project. Information should include: procedures to avoid significant areas and ongoing protection measures.

## **6.10 Traffic and Transport**

### **6.10.1 Baseline**

- Describe the existing transport infrastructure at locations likely to be impacted by the project; and
- Identify constraints with existing infrastructure and transport networks within the project context.

### **6.10.2 Information Requirements**

- Provide information on the use of and impact on existing roads required by the project
- Provide information on the transport of concentrate and the storage facilities at transport end points;
- Additional road infrastructure works required including site access and signage;
- Detail consultation undertaken with relevant regulatory agencies; and
- Necessary approvals required.

### **6.10.3 Management**

- Detail the management of impacts on the road system and other existing infrastructure; and
- Include where relevant measures to upgrade, maintain and restore gazetted or nominated roads, access tracks and creek crossings with detail about the mitigation of erosion.

## **6.11 Air Quality and Noise**

### **6.11.1 Baseline**

- Identify any sensitive receptors adjacent to the project site and during ore transportation and discuss their potential level of sensitivity to air quality aspects.

### **6.11.2 Information Requirements**

Provide details of how the project will or has the potential to impact on sensitive receptors with particular consideration given to the following:

- Potential air emissions;
- Dust, including projected particle size and distribution; and
- Fugitive dust on water quality due to surface water run-off.

### **6.11.3 Management**

Detail measures and safeguards to avoid/minimise impacts. These should include, but not be limited to:

- Dust suppression and monitoring, including during ore processing and transportation; and
- Noise mitigation.

## **6.12 Greenhouse Gas Emissions**

Refer to the NT Environmental Impact Assessment Guide – “Greenhouse Gas Emissions and Climate Change” at Appendix B.

## **6.13 Biting Insects**

### **6.13.1 Baseline**

An understanding of existing biting insect species present at the site, populations and their seasonal variability in the project site.

### **6.13.2 Potential Impacts**

- Impact of biting insects on workforce;
- Impacts of the project on biting insect populations/habitats.

### **6.13.3 Management and Monitoring**

- Provide a biting Insect Management Plan which is to include measures to prevent an increase in biting insect habitats/populations;
- Refer to the guideline: “Guidelines for Preventing Mosquito Breeding Sites associated with Mining Sites” at Appendix C.
- The proponent or relevant environmental consultant should liaise with the Medical Entomology Branch of the Department of Health and Families

regarding potential biting insect issues and management measures that should be included in the EIS;

## 7 PROJECT ENVIRONMENTAL MANAGEMENT

Specific safeguards and controls which would be employed to prevent, manage and monitor environmental impacts are to be detailed in an Environmental Management Plan or Plans (EMP) for the project. The draft EMP should be strategic, describing a framework for environmental management for construction and operational phases of the project; however, as much detail as is practicable should be provided to enable adequate assessment during the public exhibition phase.

Where possible, specific management policies, practices and procedures should be included in the draft EMP. The EMP would be finalised at the conclusion of the assessment, taking into consideration comments on the EIS and incorporating the Assessment Report recommendations and conclusions

A draft EMP should be provided in a form suitable for inclusion in a Mine Management Plan as required under the *Mining Management Act*. A section on addressing *EPBC Act* matters should also be prepared and be tailored to meet the DEWHA draft guidelines on how to prepare an EMP addressing *EPBC Act* listed species. (The draft EMP guidelines can be made available on request from DEWHA.)

Specific management plans listed in sections above are required in the EMP and include:

- A Flora and Fauna Management Plan (to follow best practice and advice from advisory agencies) – to include consideration of identified vulnerable or endangered fauna;
- A Weed Management Plan (to follow best practice and advice from advisory agencies) – to include consideration of the impact of vehicle movement off-site;
- A Vegetation Clearing Plan – including what is planned for the disposal / use of cleared vegetation. This should adhere to the standards applied under the NT land clearing guidelines; and
- A Fire Management Plan.

The draft EMP should:

- Define the management structure of both the construction and operational phases and the relationship to the environmental management of the site;
- Describe the proposed measures to minimise adverse impacts and the effectiveness of these safeguards (e.g. provide performance indicators by which all anticipated and potential impacts can be measured);
- Describe how employees and visitors will be made aware of environmental responsibilities and safeguards (including induction process);
- Describe monitoring to allow early detection of adverse impacts;
- Describe remedial action for any impacts that were not originally predicted;

- Detail how monitoring will be able to determine the differences between predicted and actual impacts;
- Include a summary table listing undertakings and commitments made in the EIS, including performance indicators, with cross-references to the text of the report; and
- Provide for the periodic review of the management plan itself.

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

## **8 PUBLIC INVOLVEMENT AND CONSULTATION**

The EIS has an important role in informing the public about the proposal. It is essential that the proponent demonstrate how public concerns were identified.

Public involvement and discussions with the NT and Australian Government agencies should be clearly detailed and any outcomes referenced. Liaison with stakeholders and interested groups should also be discussed, and any resulting changes made to the proposal clearly identified. Details of any ongoing liaison with these parties should also be discussed.

The proponent should fully outline their proposed methods for community consultation, including how they will respond to community feedback, questions and concerns. Consultation with stakeholders needs to place emphasis on two-way communication and open dialogue; it should not be simply a means for the proponent to “sell” their project.

## **9 INFORMATION SOURCES, REFERENCES AND BIBLIOGRAPHY**

The EIS should contain a comprehensive reference list or bibliography. Any source of information such as studies, research, maps and personal communications used in the preparation of the EIS should be clearly identified, cited in the text and referenced in the bibliography.

## **10 APPENDIX AND GLOSSARY IN THE EIS**

Information and data related to the EIS, but unsuitable for inclusion in the main body of the statement, should be included as appendices. This may include detailed analyses, monitoring studies, baseline surveys, and raw data.

A glossary should be provided, defining the meaning of technical terms, abbreviations and colloquialisms. (Note: throughout the EIS, technical terms and jargon should be minimised).

## APPENDIX A: REQUIREMENTS FOR MINING, CONSTRUCTION & BUSH CAMPS

### ENVIRONMENTAL HEALTH INFORMATION BULLETIN No. 6

This information bulletin has been developed to provide information to proponents of Mining, Construction & Bush Camps with regard to the Department of Health and Community Services' (DHCS) environmental health requirements. Issues covered include food business registration, boarding house registration, on-site wastewater disposal, wastewater stabilisation ponds, potable water supply, solid waste disposal, fuel storage, public health nuisances, and environmental management plans.

#### Registration as a Food Business

Larger camps that are not self-catering generally incorporate a commercial food preparation area (kitchen). The *Food Act 2004* defines a food business as 'any business or activity that handles food intended for sale or selling regardless whether the business is of a commercial, charitable or community nature or whether it involves handling or selling on one occasion only'. Consequently the camp's commercial food preparation area is considered to be a food business and therefore requires registration with DHCS in accordance with the *Food Act 2004*.

Registration can be carried out on-line and does not attract a fee. The Registration period is for 12 months with renewals due on 1 July.

To register, go to the DHCS website link or contact the relevant Environmental Health Office:

<http://www.transact.nt.gov.au/thh/healthmanager/HealthNotifications.nsf>

The *Food Act 2004* also requires all food businesses to meet the minimum standards prescribed by the *Food Safety Standards*:

#### 3.1.1 Interpretation and Application

#### 3.2.2 Food Safety Practices and General Requirements

#### 3.2.3 Food Premises and Equipment

These nationally endorsed standards have been designed to be descriptive, rather than prescriptive and provide the food industry with an increased flexibility in meeting the desired outcome of providing safe food to consumers. Accordingly, Environmental Health Officers (EHO) are also now required to adopt a more flexible approach when assessing how businesses are able to meet the criteria contained within these Standards.

Australian Standard AS 4674 "*Design, Construction and Fit-out of Food Premises*" has been developed to assist the food industry in meeting the outcomes of the Standards. It is not prescribed by law that a premises must meet the requirements contained within, however a premises that meets AS4674 is deemed to comply with the *Food Act* and *Food Safety Standards*.

A food premises that does not meet the requirements of AS 4674 may still be able to meet the requirements of the relevant legislation. However, further evidence may be required to be provided to the EHO to ensure that they can be assured that the business will comply through other means. In some instances, a design issue may be able to be addressed through the development and implementation of appropriate workplace policies or procedures. This may, in turn, sometimes result in a delay of the approval process, and require the submission of more information than the typical application.

## **Approval Process**

The approval process of a food business is dependent on its location, however it generally involves at least one inspection. Camps are by nature located in remote areas where Building Control in terms of the *Building Act* is not applicable. Building Control essentially means that a Building Certifier must certify all building structures to ensure compliance with the Building Code of Australia. Proponents are referred to Appendix 1 to determine if their project is located within a Building Control Area.

### **Inside a Building Control Area**

Under the provisions of the *Building Act*, DHCS is a Reporting Authority and as such, Building Certifiers are required to seek the Department's comments on all building applications involving, amongst other things, new or existing food businesses. The Building Certifier must submit detailed plans to the relevant Environmental Health Office prior to the construction of works. Following assessment and approval, the premises must be registered as a Food Business with the relevant Environmental Health Office prior to operating.

### *Outside a Building Control Area*

Since Building Certification does not apply then DHCS becomes the first point of contact for approval of a food business. The proponent must submit detailed plans and specification to the relevant Environmental Health Office prior to the construction of works. Following assessment and approval, the premises must be registered as a Food Business with the relevant Environmental Health Office prior to operating.

## **Registration as a Boarding House**

The accommodation section of the Camp will require registration as a boarding house in accordance with the *Public Health Act and Public Health (Shops, Eating-Houses, Boarding Houses, Hostels and Hotels) Regulations*. The Registration period is for 12 months with renewals due on the 31 December. Annual Fees are applicable and are based on the number of bedrooms:

3-10	Bedrooms	\$100 p.a.
11-20	Bedrooms	\$125 p.a.
21-40	Bedrooms	\$150 p.a.
> 40	Bedrooms	\$250 p.a.

A Boarding House application form can be downloaded online or by contacting the relevant Environmental Health Office:

[http://www.nt.gov.au/health/healthdev/environ\\_health/environ\\_health.shtml](http://www.nt.gov.au/health/healthdev/environ_health/environ_health.shtml)  
>application forms

Following a review of Northern Territory public health legislation, DHCS has developed *Public Health Guidelines for Commercial Accommodation 2005*. These Guidelines will eventually replace the current provisions relating to boarding houses in the *Public Health (Shops, Eating-Houses, Boarding Houses, Hostels and Hotels) Regulations* offering a less prescriptive approach and a clear set of minimum standards.

Room sizes in the Camp must comply with the provisions of *Public Health (Shops, Eating-Houses, Boarding Houses, Hostels and Hotels) Regulations* or the yet to be endorsed Guidelines. However, if the latter is chosen, it will be necessary for the proponent to make application in writing to the Chief Health Officer seeking approval to utilise the Guidelines.

### **Approval Process**

The approval process of a boarding house is dependent on its location in a similar manner to food businesses, and also generally involves at least one inspection. Camps are by nature located in remote areas where Building Control in terms of the *Building Act* is not applicable. Building Control essentially means that a Building Certifier must certify all building structures to ensure compliance with the Building Code of Australia. Proponents are referred to Appendix 1 to determine if their project is located within a Building Control Area.

### **Inside a Building Control Area**

Under the provisions of the *Building Act*, DHCS is a Reporting Authority and as such, Building Certifiers are required to seek the Department's comments on all building applications involving, amongst other things, new or existing boarding houses. The Building Certifier must submit detailed plans to the relevant Environmental Health Office prior to the construction of works. Following assessment and approval, the premises must be registered as a Boarding House with the relevant Environmental Health Office prior to operating.

### *Outside a Building Control Area*

Since Building Certification does not apply then DHCS becomes the first point of contact for approval of a boarding house. The proponent must submit detailed plans and specification to the relevant Environmental Health Office prior to the construction of works. Following assessment and approval, the premises must be registered as a Boarding House with the relevant Environmental Health Office prior to operating.

## **Sanitary Accommodation & Ablution Facilities**

Adequate numbers of ablution facilities and sanitary accommodation to be accessible for all operations in accordance with Building Code of Australia and relevant Northern Territory legislation.

## **Environmental Management Plans**

The proponent shall provide the relevant Environmental Health Office with copies of Environmental Management Plans that relate to the Camp or Project Operations for initial comment.

## **On-site Wastewater Disposal**

On-site wastewater disposal using septic tanks is likely to be the most suitable option for camps that have no major site constraints and comprise less than 20 staff. Larger camps may need to consider other options such as a treatment plant or waste stabilisation ponds. In all cases, the proponent should seek advice from a qualified hydraulic consultant about the most suitable wastewater disposal system. Reliability and low maintenance costs of remote on-site wastewater disposal systems should not be underestimated.

The design of septic tank systems is detailed in the Northern Territory *Code of Practice for the small on-site sewage and sullage treatment systems and the disposal or reuse of sewage effluent* (The Code). The Code was gazetted on the 11 November 1998 and is called up in Regulations 28-28B of the *Public Health (General Sanitation, Mosquito Prevention, Rat Exclusion and Prevention) Regulations*.

## **The Role of Regulatory Authorities**

Local Government Authorities in the Northern Territory have no jurisdiction over on-site wastewater management, i.e. approval or monitoring of septic tank installations.

The Department of Planning and Infrastructure (DPI) administer the provisions of the *Building Act & Regulations* with respect to all septic tank installations within a Building Control Area.

DHCS administers the provisions of the *Public Health Act & Regulations* with respect to the:

- type approval of septic tanks and associated products.
- conventional septic tanks located outside Building Control Areas.
- notification to install an Alternative Septic Tank System (ASTS) for a single residential dwelling.
- site-specific design approval of an ASTS.

## Conventional Septic Tanks & Alternative Septic Tank Systems

**Conventional Septic Tanks** (e.g. septic tank reticulating to absorption trenches or evapotranspiration bed) must be installed by self-certifying plumbers and drainers within Building Control Areas or by licensed plumbers and drainers outside Building Control Areas. The administrative process is dependent on whether the installation is located within a Building Control Area (urban areas and along main highways) or outside a Building Control Area (remote areas).

**Alternative Septic Tank Systems** (ASTS) are septic tank systems that treat effluent to a higher quality than that offered by conventional septic tank system. For example, these include Aerated Wastewater Treatment Systems (AWTS), Composting Toilets, Hybrid Systems and Ecomax Systems. In addition to the self-certification of the installation, ASTS require either a notification to install or site specific design approval.

Septic Tank application forms can be downloaded online or by contacting the relevant Environmental Health Office:

[http://www.nt.gov.au/health/healthdev/environ\\_health/environ\\_health.shtml](http://www.nt.gov.au/health/healthdev/environ_health/environ_health.shtml)  
>application forms

### Connection to existing Septic Tank Systems

If the proposal can utilise existing infrastructure such as septic tank systems, then the proponent will need to demonstrate that such infrastructure has adequate hydraulic capacity. This will require the proponent to engage a qualified hydraulic consultant to provide the relevant Environmental Health Office with as-constructed drawings of the existing infrastructure.

### Trade Waste Pre-treatment Devices

Trade waste is defined as a *“liquid or liquid borne waste generated from any industry, business, trade, manufacturing process or similar that is approved for discharge to sewer but does not include wastewater from a toilet, shower, hand basin or similar fixture”*.

It is not recommended that trade waste be discharged to septic tank system, however a Camp’s commercial food premises may prepare cooked food generating liquid trade waste that comprises of food scraps, detergents, fats, oils and grease. This liquid trade waste has a substantial impact on a septic tank system, and if not contained by pre-treatment equipment will cause system failure. For this reason, it is mandatory that all greasy liquid trade waste must be discharged to sewer via a pre-treatment device that has been approved by Power and Water Corporation’s Trade Waste Section.

The requirements for trade waste pre-treatment devices are detailed in the following documents:

- Power and Water Corporation - *Guidelines for On-site Pre-treatment* which can be downloaded from the website at: [http://www.powerwater.com.au/powerwater/business/trade\\_waste.html](http://www.powerwater.com.au/powerwater/business/trade_waste.html)
- DHCS Information Bulletin – *Trade Waste Pre-treatment Devices* which can be obtained from the relevant Environmental Health Office.

## **Waste Stabilisation Ponds**

Waste stabilisation ponds (also known as sewage ponds) are used extensively in the Northern Territory for the treatment of wastewater prior to final disposal.

There is legislation to control the reuse or disposal of treated sewage effluent. The responsibility for enforcement of such legislation is vested with DHCS and the Environment, Heritage and the Arts (EHA) Division. The discharge of treated sewage effluent to land or water may therefore occur, but only in accordance with pertinent legislation, or in its absence, to any reasonable conditions imposed by the relevant government agency.

Where treated sewage effluent is proposed to be discharged to a waterway and where the discharge does not have a potential to impact on public health, DHCS will liaise with the EHA as part of the approval process. Consideration will be given to the reuse/irrigation of treated sewage effluent in controlled public access areas, constructed and operated for this express purpose.

### **Approval Process**

Any proposal to construct waste stabilisation ponds at a camp shall require the submittal of plans, design specifications and disposal methodology to the relevant Environmental Health Office & the EHA for approval, prior to construction.

Environmental Health Office will seek specific comment with regard to mosquito breeding from the Department's Medical Entomology Branch.

## **Potable Water Supply**

The camp must have a potable that complies with the NH&MRC *Australian Drinking Water Guidelines*. The relevant Environment Health Office may set conditions on the provision of water testing results. Proponents should note that water analysis can be carried out by the Water Laboratories at:

Alice Springs – Department of Natural Resources, Environment, the Arts and Sport - located at the Tom Hare Building, phone (08) 8951 8233

Darwin – Department of Regional Development, Primary Industry, Fisheries and Resources - located at Berrimah Farm, phone (08) 8999 2346

Bore setbacks to onsite wastewater disposal shall be in accordance with the Code of Practice for Small On-Site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent.

## **Solid Waste Disposal**

The *Waste Management and Pollution Control Act 1998* requires that certain waste management activities be licensed or approved by the EHA. An EHA approval for a landfill (rubbish dump) is not required if the landfill is for domestic waste generated on the premises or domestic waste from temporary construction camps.

An EHA licence for a landfill is required if the Camp serves a permanent population of more than 1000 persons or if the Project Operations generates hazardous waste. Further information can be obtained by contacting the EHA on (08) 8924 4139 or by going to their website > <http://www.nt.gov.au/nreta/environment/index.html>

Providing the landfill does not have to be licensed or approved by the EHA, then the proponent will still need to demonstrate to the relevant Environmental Health Office that the Camp's landfill meets best practice and will not cause an environmental or public health nuisance. Reference should be made to the *Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003* which can be downloaded from the EHA website:  
<http://www.nt.gov.au/nreta/environment/waste/codes/index.html>

### **Fuel Storage**

Camps and their respective operations generally have a fuel storage facility. Environmental Health does not regulate fuel storage and therefore proponents should discuss this issue with the EHA. Reference should be made to AS 1940-2004 (and amendments) *Storage and handling of flammable and combustible liquids*.

### **Public Health Nuisance**

The proponent shall ensure that the construction and operation of the Camp does not create a public health nuisance, in particular from dust or other particulate matter. Environmental Health has provisions to deal with public health nuisances under the *Public Health (Nuisance Prevention) Regulations*.



## APPENDIX B: NT ENVIRONMENTAL IMPACT ASSESSMENT GUIDE: GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE<sup>1</sup>

### PURPOSE

The Northern Territory Government's objective for managing greenhouse gas emissions from new and expanding operations is to minimise emissions to a level that is as low as practicable. This will help fulfil the objective of minimising greenhouse gas emissions from the NT into the future.

The Northern Territory Government's objective for considering future climate change in the assessment process is to ensure projects and developments are planned taking climate change science and projections into account, to minimise future environmental, social and economic costs and take advantage of any opportunities.

This Guide aims to assist proponents in providing the information needed by the Department of Natural Resources, Environment, the Arts and Sport (NRETAS) to assess the impact of greenhouse gas emissions from proposed projects and assess other potential impacts from proposed projects under projected future climatic conditions under the Northern Territory *Environmental Assessment Act 1984*.

### GUIDANCE

#### Emissions estimates

Note that the Australian Government is establishing a national greenhouse gas emissions trading system (the proposed Carbon Pollution Reduction Scheme – CPRS), which may have implications for some proponents. More information on the CPRS is available at <http://www.climatechange.gov.au/emissionstrading/index.html>

Proponents should detail the following in their environmental impact assessment documentation:

1. **An estimate of the greenhouse gas emissions for the construction and operation phases:**
  - (a) in absolute and carbon dioxide equivalent figures (refer to the Glossary in this Guide) for each year of the project;
  - (b) identified on a gas by gas basis; and
  - (c) by source (including on site and upstream sources such as emissions arising from land clearing and the production and supply of energy to the site).

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<sup>1</sup> Last updated 2 July 2009.

Emissions estimates are to be calculated using the methodology developed and periodically updated by the National Greenhouse Gas Inventory Committee or another national or internationally agreed methodology. See <http://www.climatechange.gov.au/workbook/index.html> for access to the National Greenhouse Accounts Factors which may assist.

For emissions from clearing of vegetation, emissions estimates are to be calculated using the National Carbon Accounting System, or another nationally recognised methodology. For more information see <http://www.climatechange.gov.au/ncas/index.html>

## **2. Details of the project lifecycle greenhouse gas emissions and the greenhouse gas efficiency of the proposed project (per unit and/or other agreed performance indicators).**

Lifecycle emissions and greenhouse gas efficiency should be compared with similar technologies producing similar products.

To provide an understanding of the broader impact of the proposal, proponents are encouraged to place the estimated greenhouse gas emissions from the proposal into a national and global context. Information on Australia's national emissions profile can be obtained from the Department of Climate Change at <http://www.climatechange.gov.au/inventory/2005/index.html>. International emissions can be seen at the United Nations Framework Convention on Climate Change (UNFCCC) website at [http://unfccc.int/ghg\\_emissions\\_data/items/3800.php](http://unfccc.int/ghg_emissions_data/items/3800.php)

### **Measures to minimise greenhouse gas emissions**

Proponents must demonstrate consideration of a wide range of options and indicate the intended measures and efficient technologies to be adopted to minimise total greenhouse gas emissions from the proposed project, including:

- (a) identifying energy conservation measures, opportunities for improving energy efficiency and ways to reduce fugitive emissions where applicable;
- (b) indicating where potential savings in greenhouse gas emissions can be made through the use of renewable energy sources, taking into account fossil fuels used for supplementary power generation; and
- (c) whilst recognising the likely commencement of an emissions trading scheme, their commitment to offsetting greenhouse gas emissions.

The design measures to maximise efficiency and minimise emissions should represent best practice at the time of seeking project approval.

### **Offsets**

Emission offsets include activities that remove carbon from the atmosphere or reduce the greenhouse gas intensity (output per unit product) from current or future activities. No Australian standards for offsets currently exist, although the Australian Government is developing a National Carbon Offset Standard (see: <http://www.climatechange.gov.au/carbonoffsetting/ncos/ncos.html>).

Measures that offset emissions within the NT are strongly encouraged, and NRETAS staff can discuss possible options with proponents. Proposed emissions offsets projects should include an estimate of greenhouse gas emissions savings that will be achieved through implementation.

### **Emissions monitoring and reporting**

Consistent with the principles of continuous improvement, a program is to be outlined in the proponent's Environmental Management Plan which includes ongoing monitoring, investigation, review and reporting of greenhouse gas emissions and abatement measures.

The Australian Government is developing a nationally consistent framework for greenhouse and energy reporting by industry. Projects with significant emissions may be required to report their emissions under the *National Greenhouse and Energy Reporting Act 2007*. Data reported through the system will underpin the proposed CPRS. For more information see <http://www.climatechange.gov.au/reporting/index.html>

### **Impacts of climate change**

Climate change is projected to result in changes to sea level, land and sea temperatures, cyclone intensity, frequency of fire weather, and frequency of extreme weather events including storms, drought and flood.

Proponents should discuss how projected climate change has been taken into account in planning the proposal, and how climate change is expected to affect the proposal over its stated lifetime. Proponents should discuss how climate change-related risks (for example, risk of failure of project infrastructure during potential extreme weather events) will be managed.

Potential impacts of climate change on the surrounding environment including water, land, biodiversity and ecosystems, coastal zones, and the social environment should also be taken into account in proposal planning.

In assessing climate change risk, proponents should be guided by recent projections published by organisations such as the CSIRO, the Bureau of Meteorology (BoM), and the Intergovernmental Panel on Climate Change. For the latest CSIRO and BoM projections for Australia, see: <http://www.climatechangeinaustralia.gov.au>

## GLOSSARY OF GREENHOUSE TERMS

**Abatement:** Limiting, abating, avoiding or sequestering greenhouse gas emissions through source reduction, fuel displacement or switching, carbon stabilising techniques or sink enhancement.

**Absolute emissions:** Refers to the total emissions of greenhouse gases expressed in terms of the actual mass of each individual gas emitted over a specified time period.

**Best Practice:** A best practice is a process, technique, or use of technology, equipment or resource that has a proven record of success in minimising energy use and greenhouse gas emissions. A commitment to use best practice is a commitment to use all available knowledge and technology to ensure that greenhouse gas emissions are minimised.

**Carbon Dioxide Equivalent:** A unit of greenhouse gas emissions calculated by multiplying the actual mass of emissions by the appropriate Global Warming Potential. This enables emissions of different gases to be added together and compared with carbon dioxide (see Table 1 below).

**Greenhouse Gases:** Table 1 lists the greenhouse gases proponents are required to report on.

**Global Warming Potential (GWP):** The warming potential of a gas, compared to that for carbon dioxide. GWPs are revised from time to time as knowledge increases about the influences of different gases and processes on climate change. Refer Table 1.

**Project Lifecycle Greenhouse Gas Emissions:** Those greenhouse gas emissions measured cumulatively over a defined period. Typically this period is from the point of extraction of the raw materials to either the beginning of the consumer phase of a product or the final disposal or recycling stage of a product, depending on its nature. Proponents should justify their choice of the defined period.

**National Greenhouse Gas Inventory Committee:** A committee comprising representatives of the Commonwealth, State and Territory Governments that oversees the development of greenhouse gas inventory methods and compilation of inventories for Australia.

**Sequestration:** Removal of greenhouse gases from the atmosphere by vegetation or technological measures. Sequestration is not yet precisely defined for the purposes of recognised trading or offset schemes. Accordingly, NRETAS will take a common sense approach on a case by case basis in the interim. To assist proponents, NRETAS regards sequestration as a process that results in the isolation of carbon dioxide from the atmosphere for a period which is significant in terms of influencing the global warming effect.

**Source:** Any process or activity that releases a greenhouse gas into the atmosphere.

**Table 1: Greenhouse gases and respective Global Warming Potential (GWP) factors**

Greenhouse Gas	Global Warming Potential
Carbon dioxide (CO <sub>2</sub> )	1
Methane (CH <sub>4</sub> )	21
Nitrous oxide (N <sub>2</sub> O)	310
Perfluorocarbons (CF <sub>x</sub> )	6,500 – 9,200
Hydrofluorocarbons (HFCs)	140 - 11,700
Sulphur hexafluoride (SF <sub>6</sub> )	23,900

Greenhouse gas emissions expressed in carbon dioxide equivalent (CO<sub>2</sub>-e) are calculated by multiplying the actual mass of emissions for each greenhouse gas by its respective GWP factor. GWP factors listed are those published by the International Panel on Climate Change in its 4<sup>th</sup> Assessment Report, 2007, see [http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1\\_Print\\_Ch02.pdf](http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch02.pdf)

## **APPENDIX C: GUIDELINES FOR PREVENTING MOSQUITO BREEDING SITES ASSOCIATED WITH MINING SITES**

### **BITING INSECT ASSESSMENT (Baseline Survey)**

Biting insects need to be considered due to the potential of mine sites to create extensive breeding sites for mosquitoes of pest and disease significance, and the potential for the introduction into the NT of dengue carrying mosquito species from North Queensland and overseas. The location of the mine site to natural creeklines and large water bodies created by past mining activities could also potentially expose mine workers to mosquitoes and mosquito borne disease. It is therefore recommended that a Biting Insect Assessment be conducted at the proposed mine site, with an outline of the proposed Biting Insect Assessment provided below.

A Biting Insect Assessment generally includes a 12 month adult biting insect trapping program, with traps set once a month around the time of the full moon to locate monthly abundance of mosquito and biting midge species. Ground assessments are also conducted to locate actual and potential mosquito breeding sites within the development area, and an assessment of aerial photography is undertaken to locate potential mosquito breeding sites outside of the development area that may impact on the development area. Mining plans are also examined to evaluate the potential for mining operations to create new mosquito breeding sites.

A detailed report is then prepared based on the findings of the biting insect assessment, with recommendations provided on how to prevent new mosquito breeding sites and reducing the impact of biting insects on mine personnel. The proponent or relevant environmental consultant should contact the Medical Entomology Branch to discuss the proposed Biting Insect Assessment.

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# GUIDELINES FOR PREVENTING MOSQUITO BREEDING SITES ASSOCIATED WITH MINING SITES

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November 2005

## General Comments

All mining operations need to include a section in an Environmental Management Plan for the monitoring and control of mosquitoes. This is necessary because of the potential of mine sites to provide extensive breeding sites for mosquitoes of pest and disease significance. Mine sites also provide the potential for the introduction of mosquito species and mosquito borne diseases into the NT that are either exotic to the NT or have previously been eliminated.

The monitoring of adult mosquitoes in any new mine should include trapping of adult mosquitoes once a month at a number of sites for the initial 12 months baseline mosquito monitoring program. The baseline mosquito monitoring program provides an indication of the seasonal distribution of the mosquito species present and the relative potential impact of mosquito borne disease to mine personnel.

The monitoring and control of mosquito larvae should be an ongoing operation for the life of the mine. Mosquito larvae must be controlled with an approved mosquito larvicide (*Bacillus thuringiensis* var. *israelensis* or methoprene) as part of an organised monitoring and control program. Any mosquito control program should be discussed with the Medical Entomology Branch of the Department of Health and Community Services with regard to methods and insecticides.

Accommodation for personnel should be sited as far as possible from the most important biting insect breeding sites and be adequately insect screened or otherwise protected to reduce the impact of mosquitoes.

The potential for artificially created mosquito breeding sites can be minimised with the appropriate design of water holding facilities and water management procedures.

## 1. WATER DAMS

All water storage dams should be constructed with relatively steep sides (45° slope minimum) to discourage the establishment of semi-aquatic vegetation (eg. *Typha* and *Eleocharis* reeds) that will provide suitable habitats for mosquito breeding.

Dam margins should be as straight as possible to minimise the linear area available for the establishment of semi-aquatic vegetation.

Where possible, any closely grouped dams should be joined together to minimise the linear margin of vegetation.

The bottom of any dam should be graded as level as possible, with a slight slope to one end to form a deeper section for periods of low water. This will remove the potential for the formation of isolated pools as the water level recedes in the dry season.

Areas surrounding any dam that will be flooded during the wet season should be graded to enable water to drain freely into the dam as the water level recedes, without the formation of isolated pools that are capable of retaining water for a period greater than 5 days.

There must be no islands formed within any dam. All areas of impounded water should have a relatively deep (2 m) wet season stabilised water level to prevent the emergence of semi-aquatic vegetation.

Any drainage line directed into a dam must be fitted with a sediment trap or erosion prevention structures just upstream from the dam. This is necessary to prevent the formation of "alluvial fans" that will promote the establishment of semi-aquatic vegetation in the area of the fan where silt will be progressively deposited.

Any overflow areas from dams should have erosion protection measures to prevent the creation of plunge pools.

Local native fish should be introduced or have access into any dams where the water quality is suitable for their survival, to provide natural predators for the control of mosquito larvae.

The margins of any water dam should be inspected annually for vegetation growth such as semi-aquatic vegetation and grass. Any dense marginal vegetation should be herbicided or physically removed, to prevent the vegetation from creating suitable mosquito breeding sites.

## **2. WETLAND FILTERS**

Wetland filters have the potential to provide prolific breeding sites for mosquito species of pest and disease significance. If no other alternative is available for the treatment and disposal of waste water, a wetland filter should incorporate the ability to annually reduce the build up of any dead vegetation. Plans for wetland filter design and siting should be forwarded to the Department of Health and Community Services (Medical Entomology Branch) at the planning stage to ensure that their potential impact on the health of mine site personnel is minimised.

Annual maintenance could be achieved by dividing a wetland filter into separate sections. A dual system will enable water to be directed into one section of the filter while vegetation is burnt or otherwise reduced in the other section. An ability to manipulate the water level in the filter to strand or drown vegetation would be beneficial for the management of vegetation and mosquito numbers.

Stocking the wetland filter with local native fish will provide a significant measure for controlling mosquito larvae. The provision of fish however will not remove the need for annual maintenance of the wetland filter.

Where appropriate, consideration should be given to the provision of a fish ladder on any overflow facility to enable the dispersal of fish into and upstream of the filter.

Wetland filters may need to be removed after mining operations are completed to enable the future development of adjacent land.

### **3. WEIRS**

Any spillways must be fitted with erosion prevention structures to prevent scouring and siltation of creek lines during periods of overflow.

Fish ladders should be constructed where appropriate to enable the upstream dispersal of fish following periods of dam overflow.

### **4. MINE WASTE DUMPS**

The final surface of mine waste dumps should be contoured so that the surface area is free draining and has no surface depressions.

Any runoff from a waste dump should be directed to a silt trap to prevent any siltation of natural creek lines. Siltation in creek lines can promote the formation of isolated pools or disrupt fish ecology and may lead to the subsequent establishment of mosquito breeding sites.

Mine waste dumps should be located away from natural drainage lines, to prevent the upstream impoundment of natural surface water flows. If impractical to locate mine waste dumps away from natural drainage lines, diversion drains will be required to direct surface water flows around the waste dump.

### **5. SEDIMENT TRAPS**

Sediment traps need to be designed so that they are free draining within a period of 5 days after flooding.

Sediment traps should be maintained by silt and vegetation removal on an annual basis.

### **6. BORROW PITS**

Borrow pits, costeans or scrapes must be rehabilitated such that they do not hold water for a period greater than 5 days. These sites can be rectified either by filling or rendering them to be free draining.

### **7. DRAINAGE PATHS**

Natural drainage patterns should be maintained where possible. Access roads across drainage lines may need to be fitted with culverts of sufficient size to prevent upstream flooding for periods that will enable mosquito breeding. Culverts should be installed flush with the upstream surface level. Erosion prevention structures will need to be

constructed on the downstream side of any culvert, and erosion prevention structures may also be required at the headwalls of any culvert.

Any disruption to surface drainage should be removed at the end of the mining operations.

## **8. WASTE WATER DISPOSAL**

Septic tanks must be installed to DHCS guidelines and should be inspected on an annual basis by the Environmental Officer to ensure that tanks and their effluents do not breed mosquitoes.

Discharge, overflow or excess effluent from sewage treatment systems must be disposed of in a manner approved by DHCS. A sprinkler disposal system is suitable under most situations. Infiltration systems are acceptable if soil conditions are favourable. The discharge of excess effluent into ephemeral creek lines is not acceptable.

Sewage ponds should be constructed with steep sides with an impervious lining and be regularly maintained to prevent vegetative growth at the margins (see *"The prevention of mosquito breeding in sewage treatment facilities"*, available from the Medical Entomology Branch). Surface debris and algal scum should be removed on a regular basis. Monitoring of mosquito larvae should be conducted in sewage ponds on a regular basis and control treatments conducted when necessary.

Disposal of water into "Application areas" must ensure that water does not pool for a period greater than 5 days.

## **9. ARTIFICIAL CONTAINERS**

Rainwater tanks must be adequately screened to prevent the entry of mosquitoes.

Any container capable of holding water, eg. machinery tyres, drums, disused tyres, tanks, pots, etc. should be stored under cover, be provided with drainage holes, emptied on a weekly basis, treated with an appropriate insecticide on an appropriate schedule, or disposed of in an appropriate dump site to prevent the formation of mosquito breeding sites.

No used tyres, machinery or other containers that have previously held rain water should be brought to the NT from Queensland unless the containers or machinery has been thoroughly treated with chlorine or an appropriate insecticide to remove the possibility of the introduction of drought resistant eggs of exotic *Aedes* mosquito species.

## **10. RUBBISH AND GARBAGE DUMPS**

Rubbish and garbage dumps must be operated in such a manner that there is no ground surface or water filled receptacle pooling of water for a period greater than 5 days, to prevent the formation of mosquito breeding sites.

Rubbish and garbage dumps must be rehabilitated by filling and surface contouring to ensure they are free draining and have no surface depressions.

## **11. DECOMMISSIONING AND REHABILITATION**

A decommissioning and rehabilitation plan should be in place for all mining operations to ensure no actual or potential mosquito breeding sites remain after cessation of mining operations. All disturbed areas should be rehabilitated to be free draining where practical. The proponent should consult the Medical Entomology Branch for input when preparing this document.

Aspects to consider when decommissioning and rehabilitating a mine site include removing and appropriately grading all sediment ponds, removing all bund walls created for the development, removing infrastructure and artificial receptacles that could pond water, removing water dams and reinstating existing flowpaths where practical, rehabilitating borrow pits, removing wetland filters, sediment traps, and other facilities that could pond water and breed mosquitoes.

Facilities such as open pit voids and water dams can be left as water holding pits if they are constructed with steep sides (at least 1:2 slope), and stocked with fish during the rehabilitation process.

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