

Jervois Base Metal Project

BIODIVERSITY  
MANAGEMENT  
PLAN

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# 1 INTRODUCTION

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When projects are assessed under the Northern Territory *Environmental Assessment Act* (EA Act), the Northern Territory Environment Protection Authority (NT EPA) will in most cases require a draft Environmental Management Plan (EM Plan) to be provided by the proponent as part of a Public Environmental Report (PER) or Environmental Impact Statement (EIS) submitted for public consultation. Before a draft EM Plan can be finalised, it may require revision by the proponent once assessment under the EA Act is complete. This is to accommodate any further, detailed development of management measures and environmental outcomes, allow for consideration of comments on the PER/EIS, and incorporate recommendations and conclusions from the NT EPA's Assessment Report.

The Jervois Base Metal Project EIS Terms of Reference (ToR) requires the EIS to provide a draft EM Plan. The EM Plan is to be strategic, describing a framework for continuing management, mitigation and monitoring programs for the significant environmental impacts of the Project. The EM Plan should not be prepared in isolation but should be consistent and integrated with the principles of an environmental management system. The EM Plan includes specialised management plans where it is necessary to provide a high level of operational detail. The Biodiversity Management Plan (BMP) is one of the specialised management plans.

## 1.1 Scope

The BMP will address the potential impacts associated with mostly flora and vegetation communities and terrestrial fauna. However, it is recognised that the effective management of these components will also involve other biological aspects, particularly surface water, groundwater and contamination. Some mitigation measures will address these components, but more detailed management plans have been provided specifically for these.

The BMP needs to address the Project phases (e.g. construction, operation and decommissioning/rehabilitation) separately. It must state the environmental objectives, performance criteria, monitoring, reporting, corrective action, necessary resourcing, responsibility and timing for each environmental issue.

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## 2 RELEVANT ACTIVITIES

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The Project EL area has been the subject of historic exploration and mining by various operators since 1929. Existing infrastructure in the Project EL area includes open pits, access roads, ruins from an old village and several mines and processing sites, waste rock dumps, tailings storage facilities, evaporation dams, and drains and sumps. The Project involves mining copper and other base metals from up to three deposits. Ore would be processed onsite using a crushing, grinding and flotation plant, producing copper and lead/zinc concentrate.

The proposed Project infrastructure includes a processing plant, workshops, laydown areas, an explosive magazine, offices, warehouses, a laboratory, haul roads, sewage treatment systems, 12 MW power station, powerlines, water storages and an accommodation village. The workforce is estimated to peak at approximately 300 staff during full production of underground and open cut operations, and will operate on a mostly fly-in fly-out basis.

The associated borefield located south of the Lucy Creek homestead will consist of up to six production bores. The proposed pipeline to supply water from the borefield will be approximately 50 km long and will connect the individual production bores and follow a route back to the Project area along the existing road easement. The borefield is located on Lucy Creek Station whilst the pipeline is located partly within Jervois Station, Lucy Creek Station and Road 194. Approximately half of the pipeline route is within the road reserve. This area will be subject to a separate tenure and the appropriate water licenses under the Water Act. Other than disturbance for trenching requirements for the pipeline, this area will undergo minimal additional disturbance from clearing activities as the infrastructure will be located within the existing road easement, existing tracks and previously disturbed areas.

The proposed activities that may have a significant impact on and/or pose a direct or indirect risk to flora and vegetation communities and/or terrestrial fauna, are described as follows:

### 1. Construction phase:

- Land clearing for proposed infrastructure;
- Repair of Jervois Dam (for water supply) and construction of sediment dams;
- Construction of associated infrastructure (i.e. topsoil stockpiles, workshops, laydown areas, explosives magazine, offices, warehouse, laboratory, haul roads, sewage treatment systems, pipelines, power station (diesel or gas), powerlines, water storages and accommodation village);
- Construction of the Tailings Storage Facility (TSF);
- Construction of open pits to access ore;
- Construction of underground mines to access ore (below the pits); and
- Trenching for water supply pipeline installation.

### 2. Operation phase:

- Extraction of ore;
  - Stockpiling of ore in pits;
  - Stockpiling of waste on purpose built waste landforms adjacent to open pits;
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- Transport of ore to Run Of Mine (ROM) processing pad (traffic movements);
- Water extraction;
- Concentration of ore using standard flotation processes to produce concentrate containing copper sulphide and subordinate silver and other metals;
- Discharge of thickened tailings to a purpose built above ground TSF near processing plant;
- Water recycling;
- Transport of concentrate in enclosed truck containers off-site via the Plenty and Stuart highways to Alice Springs where it will be loaded onto trains for transport to Darwin and/or Adelaide; and
- Operation of accommodation village and associated facilities.

**3. Decommissioning / mine closure:**

- Mine void rehabilitation;
  - Rehabilitation of waste rock dumps;
  - Capping water bores used for water extraction;
  - Removal of sediment dams;
  - Re-contouring of landforms;
  - Replacement of native vegetation; and
  - De-construction of infrastructure and the accommodation village.
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## 3 LEGAL OBLIGATIONS

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Acts, guidelines and Plans relating to the management of flora and fauna within and around the Project include:

- Legislation
  - *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act);*
  - *NT Environmental Assessment Act 1994;*
  - *NT Mining Management Act 2001;*
  - *NT Environmental Protection Act 2012;*
  - *NT Environmental Offences and Penalties Act 1996;*
  - *National Environment Protection Council (Northern Territory) Act 1994;*
  - *NT Territory Parks and Wildlife Conservation Act (TPWC Act) 2006;*
  - *NT Biological Control Act 2011;*
  - *NT Weeds Management Act 2001; and*
  - *NT Bushfires Act 1980.*
- Guidelines
  - NT Guidelines for Assessment of Impacts on Terrestrial Biodiversity (NT EPA, 2013);
  - NT Mining Management Plan Structure Guide for Mining Operations (Department of Primary Industry and Resources (DPIR, 2017);
  - NT Guideline for the Preparation of an Environmental Management Plan (NT EPA, 2015)
  - NT Guidelines and Field Methodology for Vegetation Survey and Mapping (Brocklehurst, 2007);
  - Standard terrestrial vertebrate survey methods used by the DLRM (NT EPA, 2013)
  - Survey Guidelines for Australia's Threatened Mammals (Department of Sustainability, Environment, Water, Population and Communities (DSEWPC), 2011);
  - Survey Guidelines for Australia's Threatened Birds (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2010);
  - NT Land Clearing Guidelines (2010); and
  - Guideline on Environmental Offsets and Associated Approval Conditions (Northern Territory Environment Protection Authority (NT EPA), 2013).
- Recovery and Abatement Plans
  - NT Parks and Wildlife Conservation Masterplan (Baker, 2005);
  - NT Weed Management Handbook (Weed Management Branch, 2015);
  - Threat abatement plan for predation by feral cats (DEWHA, 2008); and
  - Threat Abatement Plan for Competition and Land Degradation by Rabbits (DEWHA, 2008).

The site's Environmental Management System (EMS) contains a register of related approvals, licenses and approval conditions. This register is the key source for managers and staff for the relevant legal, regulatory and other associated requirements in relation to environmental risk and performance of the Project.

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## 4 EXISTING ENVIRONMENT

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### 4.1 Flora and Vegetation Communities

The Jervois Base Metal Project EIS ToR has identified terrestrial flora and vegetation as a preliminary environmental factor that may be impacted by the Project. In order to better understand the terrestrial flora and vegetation values of the Project area, a number of ecological investigations were undertaken by Low Ecological Services P/L between 1985 and 2019. The studies included desktop assessments (i.e. interrogation of spatial databases and reviews of relevant literature) and field work involving on-ground vegetation surveys in 1999, 2012, 2013, 2017, 2018 and 2019. Survey methods for vegetation surveys and landscape description were based on “Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping” (Brocklehurst, 2007) and “A resource assessment towards a conservation strategy for the Finke Bioregion” (Neave, 2004). Additional targeted surveys were conducted for flora species of conservation significance listed under the *TPWC Act* that were identified in database searches as potentially occurring within the Project area.

Based on survey results, eight refined vegetation communities have been mapped over the entire Project EL area (3,800 ha) that is located mostly within the Jervois Range Site of Botanical Significance (SoBS). The riparian vegetation community along Unca Creek was identified as having a potential interaction with shallow groundwater. Two flora species listed as near threatened under the *Territory Parks and Wildlife Conservation Act (TPWC Act)*, *Eremophila cordatisepala* and *Sauropus rigens*, were recorded during on-ground surveys. There were no communities or flora species listed under the *EPBC Act* located in the Project EL area. The Project area contained two declared weed species *Tamarix aphylla* (athel pine) and *Cylindropuntia fulgida var. mamillata* (coral cactus), but was generally considered to be in good condition considering a long history (since 1929) of mining and the presence of some existing mining infrastructure.

The borefield and pipeline area consists of seven broad land systems and is dominated by four broad vegetation types. The riparian vegetation communities along Arthur Creek include *Eucalyptus* and *Corymbia* species whilst Bean Trees were observed in the southern section of the pipeline area. The Jervois Range SoBs is traversed by the southern section of the proposed pipeline. No listed threatened ecological communities were identified by the desktop study or field surveys within the area. Only one flora species listed as near threatened under the *TPWC Act*, *Eremophila cordatisepala*, was recorded during on-ground surveys. No communities or flora species listed under the *EPBC Act* located in the borefield or pipeline area. *Cenchrus ciliaris* (Buffel grass) was found to be predominant throughout the area and field surveys observed *Datura ferox* (Thornapple), *Vachellia farnesiana* (Mimosa Bush) and *Tribulus terrestris* (Caltrop). The construction and operation of the Project is associated with a number of potential impacts to the floristic values of the Project area, including:

- Vegetation clearing for pits and infrastructure;
  - Impacts to threatened flora;
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- Introduction of exotic flora;
- Dust pollution;
- Erosion and sedimentation;
- Changes in hydrology;
- Release of contaminants from tailings dams and waste rock; and
- Bushfire.

A risk assessment process as described in AS/NZS 4360 (1999) and ISO 31000 (2009) has been undertaken for each impact before the application of any mitigation measures. Risk levels for impacts to floristic values of the Project area ranged from low to high. The application of mitigation measures will ameliorate the level of risk to an acceptable level for the Project.

## 4.2 Terrestrial Fauna

Based on survey results, six habitat types have been mapped over the entire Project EL area (3,800 ha). The most common habitat type in the Project area is “Tall *Corymbia sp.* and *Acacia sp.* woodland” followed by “Low *Acacia sp.* shrubland”. Two fauna species listed as near threatened under the TPWC Act, emu (*Dromaius novaehollandiae*) and long-haired rat (*Rattus villosissimus*), were recorded during on-ground surveys. There were no listed migratory species recorded during fauna surveys, although the Jervois Dam was identified as potential habitat for migratory species that may be in transit over the Project area. The Project EL area contained four exotic fauna species (cat, rabbit, house mouse and cattle) but is considered to be in good condition despite a long history (since 1929) of mining and the presence of some existing mining infrastructure.

Eight habitat types were mapped across the borefield and pipeline area with the most common being “Low open woodland”. Despite targeted surveys, no fauna species of conservation significance were recorded within the area. The near threatened Red-tailed Black-cockatoo and Australian Bustard (TPWC Act) were recorded within the area. No additional migratory or marine species from those listed in the Project EL 2018 Landscape, Flora and Fauna Assessment were recorded in the area. Three introduced fauna species, *Bos taurus* (domestic cattle), *Mus musculus* (house mouse), and *Felis catus* (feral cat) were recorded or observed during field surveys of the area.

The construction and operation of the Project is associated with a number of potential impacts to the fauna values of the Project area, including:

- Removal of habitat for pits and infrastructure;
  - Change in habitat quality;
  - Impacts to threatened fauna;
  - Impacts to migratory fauna;
  - Introduction of exotic fauna;
  - Fauna mortality; and
  - Hazardous material.
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A risk assessment process as described in AS/NZS 4360 (1999) and ISO 31000 (2009) has been undertaken for each impact before the application of any mitigation measures. Risk levels for impacts to fauna values of the Project area ranged from low to high. The application of mitigation measures will ameliorate the level of risk to an acceptable level for the Project.

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## 5 ENVIRONMENTAL MANAGEMENT

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Each of the sub-plans within this BMP are subject to their relevant performance criteria. The aim of the Performance Criteria is to:

- assess the extent to which risks are being managed within acceptable levels; and
- assess compliance with commitments made in the EM PLAN and/ or approval conditions.

The Performance Indicators are specific, well-defined and measurable and are associated with targets that will define the success of the mitigation and management program for threatened flora. These are listed in the relevant tables for each aspect, together with a corrective action that will be implemented if the target is not achieved.

Mitigation measures and management specifically designed to achieve the management objectives for each aspect and are outlined in their relevant sections below. There are mitigation measures associated with each stage of the Project (Construction, Operation and Decommissioning). In the event that mitigation measures are not implemented, a corrective action is listed for each mitigation measure. The tables also outline the party that takes primary responsibility for the implementation of the mitigation measure.

The aim of the monitoring program is to assess the success of mitigation and management measures in achieving the targets that have been identified for each of the Performance Indicators listed. This is then recorded in the Biodiversity Management Report, which is produced annually and feeds into the annual Mining Management Plan (MMP) audit.

Monitoring of the rehabilitation program is to be undertaken as outlined in the Mine Rehabilitation and Closure Plan (MRCP).

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## 6 FLORA AND VEGETATION COMMUNITIES

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### 6.1 Vegetation Clearing for Pits and Infrastructure

#### Description

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The new mining infrastructure will have an impact area of approximately 382 hectares, which includes 136 hectares of new infrastructure being located over existing disturbance areas within the Project EL area. As there will be no additional clearing outside of the EL for the borefield and pipeline area, it is not anticipated that impacts such as habitat removal will be an impact associated with this area. The vegetation community most affected by the Project EL activities would be vegetation community 5 – *Corymbia* and *Acacia sibirica* woodland. This is a reflection of its distribution over the Project EL area. The entire EL impact area is located within the Jervois Range, which is a Site of Botanical Significance (SoBS). Clearing will include removal of 2.56 ha of sensitive vegetation (mature bloodwood and ironwood woodland containing large trees).

#### Risk Assessment

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Before mitigation, the risk of a significant impact to vegetation communities from clearing activities has been assessed as medium. This is based on a 'moderate' consequence and an 'occasional' likelihood.

#### Management Objective

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To minimise clearing of native vegetation to only that which is necessary for the construction and operation of the Project; and ensure the successful rehabilitation of vegetation communities upon decommissioning of the Project.

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**Table 1: Clearing Indicators and Targets**

Performance Indicator	Target
Clearing	
Clearing is conducted within defined boundaries	No areas identified for retention have been cleared.
Corrective Action	
Areas cleared outside of defined boundaries are included in the progressive rehabilitation of the Project area.	All areas cleared outside of defined boundaries (in the one year reporting period) have commenced rehabilitation or are scheduled to commence rehabilitation.

**Table 2 Clearing Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Stop clearing works until Environmental Officer is advised of pending works.	Mine operator
Vegetation clearing / excavation to be subject to internal permitting system.	Vegetation clearing / excavation to be subject to internal permitting system.	-	Stop clearing works until a permit is obtained. Report unauthorised clearing to Environmental Officer.	Mine operator
Clearing should be undertaken when soil moisture conditions are optimal to avoid excessive disturbance to soil and landform – just after rainfall (as recommended for central Australia).	Clearing should be undertaken when soil moisture conditions are optimal to avoid excessive disturbance to soil and landform – just after rainfall (as recommended for central Australia).	-	Employ other measures to manage soil and landform issues (such as Erosion and Sediment Control Plan - ESCP).	Contractor

<p>Management of site access to avoid creation of unnecessary tracks.</p>	<p>Plan vehicle access routes and haul routes using existing tracks.</p>	<p>Plan vehicle access routes and haul routes using existing tracks.</p>	<p>Closure of informal track and clarify track identification on site. Training and induction.</p>	<p>Mine operator</p>
<p>Demarcate exclusion zones to protect areas of vegetation to be retained prior to clearing. The process for this generally includes:</p> <ul style="list-style-type: none"> <li>• defining areas of vegetation for clearing at the planning stage by producing site plans that clearly indicate where clearing will occur in the Project area. These site plans are to be in line with relevant Project approvals;</li> <li>• clearing will only occur within the areas identified for clearing on the site plan and will be staged with construction;</li> <li>• prior to clearing occurring exclusion markers will be placed or temporary fencing installed at the perimeter of the clearing zone;</li> <li>• exclusion fencing will consist of fauna friendly temporary fencing (generally post and orange safety fence for</li> </ul>	<p>Demarcate exclusion zones to protect areas of vegetation to be retained prior to clearing.</p>	<p>-</p>	<p>Stop clearing works until area is flagged on-site and has been inspected by Environmental Officer.</p>	<p>Contractor</p>

<p>large areas with a 30cm gap underneath for fauna escape);</p> <ul style="list-style-type: none"> <li>there is to be no access to plant or stockpiling of materials and machinery within the exclusion zone (areas of vegetation to be retained);</li> <li>pre-start meetings will include discussion of the exclusion fencing.</li> </ul>				
<p>Use of appropriate clearing methods and machinery to suit site conditions.</p>	<p>Use of appropriate clearing methods and machinery to suit site conditions.</p>	<p>Use of appropriate clearing methods and machinery to suit site conditions.</p>	<p>Stop works until appropriate machinery is available.</p>	<p>Contractor</p>
<p>Implementation of Erosion and Sediment Control Plan.</p>	<p>Implementation of Erosion and Sediment Control Plan.</p>	<p>Implementation of Erosion and Sediment Control Plan.</p>	<p>As per Erosion and Sediment Control Plan.</p>	<p>Mine Operator &amp; Contractor</p>
<p>Measures to retain mature trees or habitat trees where possible. The process for this generally includes:</p> <ul style="list-style-type: none"> <li>pre-clearing inspection of clearing area to identify mature/habitat trees and record their location on the site plan;</li> <li>assess the ability to retain these trees within the plan (for example mature/habitat trees located adjacent to planned buildings or tracks where there is limited earthworks may be able</li> </ul>	<p>Measures to retain mature trees or habitat trees where possible.</p>	<p>-</p>	<p>Report removal of habitat trees to Environmental Officer, who will implement offsets including habitat enhancement elsewhere on the Project area. The process for this generally includes:</p> <ul style="list-style-type: none"> <li>Environmental Officer is alerted by Construction Site Manager that a mature/habitat tree has been identified for removal on site;</li> <li>Environmental Officer inspects tree and arranges management of tree removal</li> </ul>	<p>Mine Operator</p>

<p>to be retained or slight adjustments made to the plans to enable retention);</p> <ul style="list-style-type: none"> <li>trees identified for retention will be flagged on site and protected by exclusion fencing around the trunk (offset by at least 1m);</li> <li>these trees will not be cleared during construction works;</li> <li>mature/habitat trees that need to be removed will be reported to the Environmental Officer who will implement the corrective action.</li> </ul>			<p>(including removal of nesting/denning fauna);</p> <ul style="list-style-type: none"> <li>Environmental Officer will guide tree removal including salvage of hollows or hollow limbs (which can be cut out of the tree) for transportation to adjacent areas of vegetation that will be retained);</li> <li>Large boulders may also be relocated to adjacent areas of vegetation that will be retained.</li> </ul>	
<p>Collection of native seed from the Project area for use in rehabilitation program.</p>	<p>Collection of native seed from the Project area for use in rehabilitation program.</p>	<p>Use of collected native seed in rehabilitation.</p>	<p>As per MRCP.</p>	<p>Mine Operator</p>
<p>-</p>	<p>Progressive rehabilitation of impact areas in Project area.</p>	<p>Progressive rehabilitation of impact areas in Project area.</p>	<p>As per MRCP.</p>	<p>Mine operator</p>

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## Monitoring Program

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### Clearing

To manage clearing and ensure that no areas where vegetation is to be retained are affected by clearing for the Project, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect all areas post-clearing to ensure that the area cleared is in-line with that permitted. This can be done using GPS (Global Positioning System) equipment.
  - Any areas that have been cleared outside of the permitted area will be recorded (including the following details: vegetation community, area (ha), location, purpose of clearing, personnel and date) in a central clearing database by the Environmental Officer.
  - Areas (ha) of unintentional clearing will be reported at the end of the construction period and annually during operation.
  - These areas will be added to the rehabilitation program in the Mine Closure and Rehabilitation Plan.
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## 6.2 Impacts to Threatened Flora

### Description

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Two flora species listed as near threatened under the *Territory Parks and Wildlife Conservation Act (TPWC Act)*, *Eremophila cordatisejala* (five specimens) and *Sauropus rigens* (two specimens), were recorded during on-ground surveys of the Project EL area. Only one flora species listed as near threatened under the TPWC Act, *Eremophila cordatisejala*, was recorded during on-ground surveys of the borefield and pipeline area. Whilst there will be no additional clearing for the borefield and pipeline area, the new Project EL infrastructure will have an impact area of approximately 382 hectares and all threatened flora species are outside of the mine footprint, so will not be subject to direct impact. However, there are three specimens (two *E. cordatisejala* and one *S. rigens*) within close proximity (< 100 m) to the mine and associated infrastructure that may be subject to indirect impacts, as follows:

- One *E. cordatisejala* within 10m of the existing Marshall Reward Pit access road;
- One *E. cordatisejala* within 30m of existing Lucy Creek Station Road (in the south of the Project EL area);
- One *S. rigens* within 90m of Jervois Dam;
- A patch of *E. cordatisejala* at site P05 and two isolated plants at site P03 in the borefield and pipeline area.

### Risk Assessment

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Before mitigation, the risk of a significant impact to threatened flora from clearing activities has been assessed as medium. This is based on a 'moderate' consequence and an 'occasional' likelihood.

### Management Objective

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To avoid clearing threatened flora species and adequately manage indirect impacts (such as dust deposition and changes in hydrology) to prevent fatal harm to threatened species.

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**Table 3 Threatened Flora indicators and Targets**

Performance Indicator	Target
Threatened flora	
Clearing does not result in the removal of threatened flora, as far as possible.	No threatened flora specimens have been cleared.
Indirect impacts (dust deposition and changes to hydrology) to threatened flora specimens do not result in the fatal harm of the specimen.	No threatened flora specimens are fatally harmed as a result of mining activities.
Corrective Action	
Threatened flora species cleared or that are fatally harmed as a result of indirect impacts are recorded and offset during rehabilitation.	All threatened flora species cleared or fatally harmed (in the one year reporting period) have been offset at a rate of 3:1 in rehabilitation areas or are scheduled to be included in rehabilitation.

**Table 4 Threatened Flora Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Stop clearing works until Environmental Officer is advised of pending works.	Mine Operator
Avoid clearing of known threatened flora species located in the Project area <i>where possible</i> .	-	-		Mine Operator & Contractor
Vegetation clearing / excavation to be subject to pre-clearing survey within three months of clearing.	Vegetation clearing / excavation to be subject to pre-clearing survey within three months of clearing.	-	Stop works and implement correct procedure.	Mine Operator & Contractor

Flag any areas of vegetation containing threatened flora species in or directly adjacent to the Project area as an exclusion area prior to works commencing.	Flag any areas of vegetation containing threatened flora species in or directly adjacent to the Project area as an exclusion area prior to works commencing.	Flag any areas of vegetation containing threatened flora species in or directly adjacent to the Project area as an exclusion area prior to works commencing.	Stop works and implement correct procedure.	Mine Operator
Collection of seed from mature individuals prior to construction activities commencing.	Undertake propagation program to ensure supply of threatened flora for offset/rehabilitation program.	Use propagated specimens in rehabilitation program.	As per MRCP.	Mine Operator
Plan vehicle access routes and haul routes using existing tracks.	Speed restrictions on haul roads to lessen the impact of dust on specimens of <i>E. cordatisepala</i> located near roads.	-	Closure of informal track and clarify track identification on site. Training and induction.	Mine Operator & Contractor
Future works on Jervois Dam to avoid impacts on nearby <i>S. rigens</i> , as far as possible.  If not possible, collect genetic material and use in rehabilitation works where the habitat is suitable.	-	-		Mine Operator

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## Monitoring Program

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### **Threatened Flora**

To manage clearing and ensure that no areas of threatened flora are affected by clearing for the Project, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect all known populations of threatened flora on a seasonal basis. The extent of the population will be recorded using GPS (Global Positioning System) equipment and a density estimate will be performed (using standard flora survey procedures). Observations on the health of the population and any threats will also be recorded (e.g. dust, erosion etc.).
  - New populations of threatened flora that are detected during the operation of the Project will be recorded in a central database managed by the Environmental Officer and added to the monitoring program.
  - Areas (ha) of unintentional clearing will be reported at the end of the construction period and annually during operation. These areas will be added to the rehabilitation program in the Mine Closure and Rehabilitation Plan.
  - Corrective actions for threats to threatened flora populations caused by the Project will be addressed.
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## 6.3 Introduction of Exotic Flora

### Description

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The current assessment has recorded the presence of a variety of exotic flora, including three declared weeds and WoNS species as follows :

- Buffel grass (*Cenchrus ciliaris*)
- Coral cactus (*Cylindropuntia fulgida* var. *mamillata*) – WoNS, Class A & C
- Couch grass (*Cynodon dactylon*)
- Spiked Malvastrum (*Malvastrum americanum*)
- Athel pine (*Tamarix aphylla*) – WoNS, Class A & B
- Prickly mimosa (*Vachellia farnesiana*);
- Caltrop (*Tribulus terrestris*) - WoNS, Class B & C;
- Thornapple (*Datura ferox*) - WoNS, Class A & C; and
- Prickly acacia (*Vachellia nilotica*) – WoNS, Class A & C.

The spread of weed species is facilitated by disturbance. During construction there would be the potential for disturbing weeds in the Project area resulting in the movement of weeds within and outside of the Project area. This could increase the level of infestation in the Project area and potentially facilitate the spread of weeds to the other adjacent areas. Weed seed can also be transported in soil on machinery or in the machinery itself.

### Risk Assessment

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Before mitigation, the risk of a significant impact to vegetation communities from exotic flora has been assessed as medium. This is based on a 'moderate' consequence and an 'occasionally' likelihood.

### Management Objective

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To manage existing infestations of exotic flora, with a view to eradication, and avoid further spread of exotic flora species.

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**Table 5 Exotic Flora Indicators and Targets**

Performance Indicator	Target
Exotic Flora	
Existing infestations of exotic flora within the Project area are eradicated.	Existing infestations of exotic flora within the Project area are reduced in area by 85%.
Exotic flora do not spread further within the Project area.	No new infestations are identified and assessed as being a result of the Project.
Corrective Action	
Existing infestations of exotic flora are being managed and new infestations are recorded and management commenced.	There are no infestations of exotic flora in the Project area that are not currently under a management program.

**Table 6 Exotic Flora Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
Employees and contractors will be required to participate in an environmental induction program. The program will provide information on employee environmental responsibilities as well as weed identification.	Employees and contractors will be required to participate in an environmental induction program. The program will provide information on employee environmental responsibilities as well as weed identification.	Employees and contractors will be required to participate in an environmental induction program. The program will provide information on employee environmental responsibilities as well as weed identification.	Stop work until training is completed.	Mine Operator

Clearing of vegetation to be restricted to the minimum required to enable the safe construction, operation and maintenance of the Project, including infrastructure corridors.	-	-	Check details of permit. Report unauthorised clearing to Environmental Officer.	Mine Operator & Contractor
Conduct surveys to locate weed infestations prior to commencement of construction.	Ongoing seasonal surveys to monitor known weed populations and locate any new ones.	Ongoing seasonal surveys to monitor known weed populations and locate any new ones.	Conduct seasonal survey as soon as possible.	Mine Operator
Implement weed management program to control weed infestations. Methods used should represent those in the NT Weed Management Handbook (Weed Management Branch, 2015).	Implement weed management program to control weed infestations. Methods used should represent those in the NT Weed Management Handbook (Weed Management Branch, 2015).	Implement weed management program to control weed infestations. Methods used should represent those in the NT Weed Management Handbook (Weed Management Branch, 2015).	Stop works and implement correct procedure.	Mine Operator & Contractor
Appropriate disposal of weed material to prevent further spread.	Appropriate disposal of weed material to prevent further spread.	Appropriate disposal of weed material to prevent further spread.	Clean up of inappropriately disposed weed material. Report to Environmental Officer.	Contractor
Equipment hygiene program to minimise the risk of introduction or spread of weeds or soil borne diseases to the Project area.	Equipment hygiene program to minimise the risk of introduction or spread of weeds or soil borne diseases to the Project area.	Equipment hygiene program to minimise the risk of introduction or spread of weeds or soil borne diseases to the Project area.		Mine Operator & Contractor
	Undertake progressive rehabilitation of the Project area.	Rehabilitation of the Project area.	As per MRCP.	Mine Operator

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## Monitoring Program

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### **Exotic Flora**

To manage known infestations of exotic flora and ensure that no new areas proliferate, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect all known infestations on a seasonal basis to ascertain status and condition. This can be done using GPS (Global Positioning System) equipment to record the area (ha) of the infestation and density estimates can be performed (using standard flora survey techniques).
  - New populations of exotic flora that are detected during the operation of the Project will be recorded in a central database managed by the Environmental Officer and added to the monitoring program.
  - Corrective actions will be initiated for expanding and new populations of exotic flora.
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## 6.4 Dust Deposition

### Description

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Dust deposition from passing vehicles and haul trucks may impact on natural ecosystems adjacent to the Project area if reasonable quantities of dust are sustained over extended periods of time. Dust deposition issues are most likely to occur along haul roads and along the pipeline route during construction, where there is a narrow corridor within natural areas or publicly accessible areas immediately adjacent to activities involving heavy machinery and the transportation of ore. Activities within the Project (i.e. open mine pits and waste dumps) would also create dust, but these issues would be created and managed within the mine disturbance area and are less likely to spill over into adjacent natural areas.

### Risk Assessment

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Before mitigation, the risk of a significant impact to threatened flora and vegetation communities from dust deposition has been assessed as medium. This is based on a 'minor' consequence and a 'likely' likelihood.

### Management Objective

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To minimise the impact of dust deposition on native flora, particularly threatened flora species.

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**Table 7 Dust Indicators and Targets**

Performance Indicator	Target
Dust Deposition	
Effects of dust deposition do not lead to fatal harm of threatened flora.	No threatened flora species suffer fatal harm as a result of dust pollution.
Dust deposition does not significantly reduce the health of vegetation communities in the Project area.	Dieback of vegetation communities as a result of dust deposition does not occur in the Project area.
Corrective Action	
In the event that dust exposition is excessive and is having a negative impact on the health of threatened flora or vegetation communities, consider dust exclusion mechanism (e.g. netting or soaking) to mitigate dust during operation OR translocation of threatened flora specimen.	The health of threatened flora and vegetation communities is stable and not declining (measured by tree condition and regeneration).

**Table 8 Dust Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
Stage clearing and construction activities to minimise area of exposed ground.	-	-	Stop works and implement correct procedure.	Mine Operator & Contractor
	Undertake progressive rehabilitation of the Project area.	Rehabilitation of the Project area.	As per MRCP.	Mine Operator

Follow Environmental Management Plan	Follow Environmental Management Plan	Follow Environmental Management Plan	As per Environmental Management Plan	Mine Operator & Contractor
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## Monitoring Program

### Dust Deposition

To manage the risks associated with dust deposition affecting biodiversity values (particularly threatened flora and native vegetation communities), a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect vegetation communities in high risk areas (e.g. adjacent to mine pits and haul roads) on a seasonal basis to ascertain status and condition.
- Health of the vegetation communities will be monitored using standard flora monitoring parameters, including:
  - Extent of community (using GPS (Global Positioning System) equipment);
  - Presence of die back;
  - Presence of thick dust on foliage;
  - Thinning of ground cover or shrub layer;
  - Declining condition of trees (e.g. defoliation); and
  - Presence of regeneration
- Corrective actions will be initiated for vegetation communities that are shown to be declining in extent or condition due to dust deposition.

Threatened flora monitoring is outlined in Section 6.2.

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## 6.5 Erosion and Sedimentation

### Description

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The vegetation clearing and surface disturbance associated with the construction and operation of the Project can lead to increased run-off, erosion of exposed surfaces and ultimately sedimentation of the waterways which can impact native vegetation communities. For example, increased run-off can lead to higher velocities in waterways during rainfall, eroding the banks in areas where riparian vegetation is sparse (Department of Water and Environmental Regulation (DWER), 2018) and in some cases, undermining existing vegetation (e.g. causing instability of mature trees). Sedimentation in downstream areas (where the velocities are lower) can lead to filling of the waterway channel and encroachment of the riparian vegetation into the waterway channel (Department of Water and Environmental Regulation (DWER), 2018).

### Risk Assessment

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Before mitigation, the risk of a significant impact to threatened flora and vegetation communities from erosion and sedimentation has been assessed as high. This is based on a 'moderate' consequence and a 'likely' likelihood.

### Management Objective

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To minimise the impact of erosion and sedimentation on native flora.

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**Table 9 Erosion Indicators and Targets**

Performance Indicator	Target
Erosion and Sedimentation	
Erosion and sedimentation does not significantly reduce the health of vegetation communities in the Project area.	Dieback of vegetation communities as a result of erosion and sedimentation does not occur in the Project area.
Corrective Action	
In the event that erosion and sedimentation is excessive and is having a negative impact on the health of threatened flora or vegetation communities, implement further sediment and erosion control measures (as per the Erosion and Sediment Control Plan) OR translocation of threatened flora specimen.	The health of threatened flora and vegetation communities is stable and not declining (measured by tree condition and regeneration).

**Table 10 Erosion Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
Stage clearing and construction activities to minimise area of exposed ground.	-	-	Stop works and implement correct procedure.	Mine Operator & Contractor
Establish and maintain a complaints management system for nearby landholders.	Establish and maintain a complaints management system for nearby landholders.	Establish and maintain a complaints management system for nearby landholders.	-	Mine Operator
	Undertake progressive rehabilitation of the Project area.	Rehabilitation of the Project area.	As per MRCP.	Mine Operator

Follow Erosion and Sediment Control Plan.	Follow Erosion and Sediment Control Plan.	Follow Erosion and Sediment Control Plan.	As per Erosion and Sediment Control Plan.	Mine Operator & Contractor
Follow Surface Water Management Plan.	Follow Surface Water Management Plan.	Follow Surface Water Management Plan.	As per Surface Water Management Plan.	Mine Operator & Contractor

## Monitoring Program

### Erosion and Sedimentation

To manage the risks associated with erosion and sedimentation affecting biodiversity values (particularly threatened flora and native vegetation communities), a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect vegetation communities in high risk areas (e.g. Unca Creek) on a seasonal basis to ascertain status and condition.
- Health of the vegetation communities will be monitored using standard flora monitoring parameters, including:
  - Extent of community (using GPS (Global Positioning System) equipment);
  - Presence of die back;
  - Presence of thick dust on foliage;
  - Thinning of ground cover or shrub layer;
  - Declining condition of trees (e.g. defoliation); and
  - Presence of regeneration.
- Corrective actions will be initiated for vegetation communities that are shown to be declining in extent or condition, due to erosion and sedimentation.

Threatened flora monitoring is outlined in Section 6.2. Water quality in Unca Creek will be monitored as per the Surface Water Management Plan. Regular monitoring (monthly) of sediment dams to ascertain effectiveness will be undertaken as per the Surface Water Management Plan.

## 6.6 Changes in Hydrology

### Description

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The cumulative impacts of water extraction on the floristic values of the Project area will be most evident in those vegetation communities that rely more heavily on the availability of water. In the Project EL area these areas are represented by vegetation community 7 - *Eucalyptus camaldulensis* tall woodland over sparse grasses in drainage channels and rocky creek beds. This community is present along Unca Creek (in the north of the Project area) and the tributary to Unca Creek (central to the Project area). The *E. camaldulensis* community in the area has been demonstrated to rely on surface water and shallow groundwater (up to 10m below ground) (Horner, 2009).

The riparian vegetation communities along Arthur Creek in the borefield area include *Eucalyptus* and *Corymbia* species whilst *Vigna lanceolate* were observed in the southern section of the pipeline area. *Vigna lanceolate* are deep rooted species which tap into ground water and would be considered facultative GDE species while *Corymbia* species tend to be deeper rooted (8 to 20 m).

Insufficient flows in Arthur and Unca Creek and its tributaries may cause dieback of the existing riparian communities. The dieback of the riparian vegetation may cause bank instability in the long term and contribute to erosion and sedimentation in the creek systems. It will be important to allow for the retention of base environmental flows through Arthur and Unca Creek to maintain the health of the riparian ecosystem.

### Risk Assessment

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Before mitigation, the risk of a significant impact to threatened flora and vegetation communities from changes in hydrology has been assessed as high. This is based on a 'moderate' consequence and a 'likely' likelihood.

### Management Objective

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To minimise the impact of changes in hydrology on native flora, particularly potentially groundwater dependent ecosystems along Arthur and Unca Creek.

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**Table 11 Hydrology Indicators and Targets**

Performance Indicator	Target
Changes in Hydrology	
Changes in hydrology do not lead to a significant decline in the health of vegetation communities along Arthur and Unca Creek.	Dieback of vegetation communities as a result of changes in hydrology does not occur along Arthur and Unca Creek, within the Project area.
Corrective Action	
In the event that changes in hydrology are having a negative impact on the health of vegetation communities along Arthur and Unca Creek, investigations will be undertaken to develop an appropriate course of action.	The health of vegetation communities along Arthur and Unca Creek is stable and not declining (measured by tree condition and regeneration).

**Table 12 Hydrology Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
Use of water is within the limits defined by any approvals or conditions.	Use of water is within the limits defined by any development approvals or conditions.	Use of water is within the limits defined by any development approvals or conditions.	Stop works until issue is rectified.	Mine Operator
The existing Jervois Dam will undergo repairs to minimise water losses and maximise water recovery.	-	-	-	Mine Operator



	<p>Follow hierarchy of water supply:</p> <ul style="list-style-type: none"> <li>• Use of mine water and non-potable raw water;</li> <li>• Jervois dam</li> <li>• External groundwater borefield.</li> </ul>	-	Monitor the use of water and implement water restrictions, where possible.	Mine Operator
-	Monitor the use of water and implement water restrictions, where possible.	-	Conduct missed inspection as soon as possible.	Mine Operator
-	-	Partial removal of dam wall at Jervois dam post-mining to restore environmental flows in Unca Creek.	Monitor the water flows in Unca Creek post-mining.	Mine Operator
-	Undertake progressive rehabilitation of the Project area.	Rehabilitation of the Project area.	As per MRCP.	Mine Operator
Follow Groundwater Management Plan.	Follow Groundwater Management Plan.	Follow Groundwater Management Plan.	As per Groundwater Management Plan.	Mine Operator & Contractor
Follow Surface Water Management Plan	Follow Surface Water Management Plan.	Follow Surface Water Management Plan.	As per Surface Water Management Plan.	Mine Operator & Contractor

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## Monitoring Program

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### **Changes in Hydrology**

To manage the risks associated with changes in hydrology affecting biodiversity values (particularly threatened flora and native vegetation communities), a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect vegetation communities in high risk areas (e.g. Unca Creek) on a seasonal basis to ascertain status and condition.
- Health of the vegetation communities will be monitored using standard flora monitoring parameters, including:
  - Extent of community (using GPS (Global Positioning System) equipment);
  - Presence of die back, leaf wilting, leaf and branch dieback;
  - New species invasion;
  - Presence of thick dust on foliage;
  - Thinning of ground cover or shrub layer;
  - Declining condition of trees (e.g. defoliation); and
  - Presence of regeneration.
- Corrective actions will be initiated for vegetation communities that are shown to be declining in extent or condition, due to changes in hydrology.

Threatened flora monitoring is outlined in Section 6.2. Water quality in Unca Creek will be monitored as per the Surface Water Management Plan.

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## 6.7 Release of Contaminants (including from tailings dams and waste rock)

### Description

The potential for the release of contaminants into the environment will be generated by storage of chemicals and fuel within the Project EL and borefield areas and activities involving the extraction of ore (pit dewatering), its subsequent processing at the mine site (tailings from crushing and beneficiating the ore) and storage of waste rock. The use of chemicals and hydrocarbons in the Project and borefield areas means that some potentially hazardous waste materials (defined in the *Waste Management and Pollution Control (Administration) Regulations 2014*) will be generated on site. There is potential for chemical spills to occur within these areas, impacting nearby ecosystems and causing scalding or dieback of native vegetation. Both the tailings and the waste rock are likely to be non-acid forming (NAF) but there will be some potentially acid forming (PAF) waste rock zones that will need selective handling to prevent potential impacts. It is predicted that only a small percentage of the waste rock and tailings produced by the Project has the potential to release harmful contaminants to the environment. In any case, the treatment of waste rock and tailings will provide for the protection of the environment from contamination. Although management strategies will be in place to prevent the release of contaminants into the surrounding environment, in the event that uncontrolled overflow is experienced from the pits, waste rock storage areas or tailings dams, the receiving environment would be the Unca Creek tributary and Unca Creek.

### Risk Assessment

Before mitigation, the risk of a significant impact to threatened flora and vegetation communities from release of contaminants into the environment has been assessed as medium. This is based on a 'major' consequence and an 'unlikely' likelihood.

### Management Objective

To prevent harm to native flora as a result of the release of contaminants into the environment, particularly ecosystems along Unca Creek.

**Table 13 Contamination Indicators and Targets**

Performance Indicator	Target
Contamination	
Contamination does not lead to a significant decline in the health of vegetation communities in the Project area.	Dieback of vegetation communities as a result of contamination does not occur within the Project area.

Corrective Action	
Spills, seepage or exceedance of water quality parameters are to be reported to the Environmental Officer, who will take appropriate action in accordance with the Waste Management Plan or Emergency Response Plan.	All spills, seepage or incidences of exceedance of water quality parameters have been dealt with to the satisfaction of regulatory bodies.

**Table 14 Contamination Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
The TSF will be designed in accordance with the ANCOLD “Guidelines on Tailings Dams” and will be designed to withstand a 1 in 100 year 24 hour storm event in addition to maximum operating volumes.	Maintenance of TSF in accordance with specifications.	In accordance with MRCP.	Stop works until issue is rectified.	Mine Operator
-	Ongoing monitoring and maintenance of the TSF facility.	Closure and rehabilitation in accordance with the MRCP.	If maintenance issue is identified, stop works until rectified.	Mine Operator
-	Undertake progressive rehabilitation of the Project area.	Rehabilitation of the Project area.	As per MRCP.	Mine Operator
Follow Surface Water Management Plan.	Follow Surface Water Management Plan.	Follow Surface Water Management Plan.	As per Surface Water Management Plan.	Mine Operator & Contractor

Follow Waste Management Plan.	Follow Waste Management Plan.	Follow Waste Management Plan.	As per Waste Management Plan.	Mine Operator & Contractor
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## Monitoring Program

### Contamination

To manage the risks associated with contamination affecting biodiversity values (particularly threatened flora and native vegetaiton communities), a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect vegetation communities in high risk areas (e.g. Unca Creek) on a seasonal basis to ascertain status and condition.
- Health of the vegetation communities will be monitored using standard flora monitoring parameters, including:
  - Extent of community (using GPS (Global Positioning System) equipment);
  - Presence of die back;
  - Presence of thick dust on foliage;
  - Thinning of ground cover or shrub layer;
  - Declining condition of trees (e.g. defoliation); and
  - Presence of regeneration
- Corrective actions will be initiated for vegetation communities that are shown to be declining in extent or condition, due to contamination.

Threatened flora monitoring is outlined in Section 6.2. Water quality in Unca Creek will be monitored as per the Surface Water Management Plan. Potential sources of contamination will also be monitored in accordance with the Mining Management Plan.

## 6.8 Bushfire

### Description

A fire starting in the Project or borefield areas may be caused by sparks originating from machinery, or an accident (such as a collision), scheduled burns getting out of control, hot works, spontaneous combustion of chemicals or explosives, or from operators and personnel dropping matches or cigarette butts in these areas, which may then cause fires that spread to the surrounding area. The Project is not likely to increase the potential for bushfires to occur within the surrounding landscape given the mitigation and management measures which would be implemented for the Project. Bushfire management would include clearing restrictions, restricted vehicle movements, fire breaks, the use of diesel vehicles, prohibition of smoking in fire prone areas and rapid response to any outbreak of fire.

### Risk Assessment

Before mitigation, the risk of a significant impact to threatened flora and vegetation communities from bushfire has been assessed as medium. This is based on a 'moderate' consequence and an 'occasionally' likelihood.

### Management Objective

To prevent the Project from causing the ignition of a bushfire and damage to native vegetation communities.

**Table 15 Bushfire Indicators and Targets**

Performance Indicator	Target
Bushfire	
The Project does not lead to an increase in bushfire occurrence in the Project area or immediate surrounds.	No bushfires in the Project area or immediate surrounds are caused by the Project.
Corrective Action	
In the event that bushfires are being caused by the Project, the reason for the ignition of the fire will be identified and any safety issues rectified to ensure ongoing safety.	The cause of all bushfires starting in the Project area or immediate surrounds is known (for the annual reporting period) and any safety issues have been rectified or are programmed for rectification.

**Table 16 Bushfire Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
Provide appropriate buffer distances between the Project area and surrounding bushland and manage vegetation within the buffer areas to maintain safe fuel loads	Provide appropriate buffer distances between the Project area and surrounding bushland and manage vegetation within the buffer areas to maintain safe fuel loads	-	Conduct management of firebreaks to reduce fuel loads, as soon as possible.	Mine Operator
Implement a Safety Management System and associated frameworks to record and monitor fire including: <ul style="list-style-type: none"> <li>incident management framework,</li> <li>hazard / near miss reporting process,</li> <li>incident notification,</li> <li>crisis management and evacuation framework.</li> </ul>	Implement a Safety Management System and associated frameworks to record and monitor fire including: <ul style="list-style-type: none"> <li>incident management framework,</li> <li>hazard / near miss reporting process,</li> <li>incident notification,</li> <li>crisis management and evacuation framework.</li> </ul>	Implement a Safety Management System and associated frameworks to record and monitor fire including: <ul style="list-style-type: none"> <li>incident management framework,</li> <li>hazard / near miss reporting process,</li> <li>incident notification,</li> <li>crisis management and evacuation framework.</li> </ul>	As per Safety Management System	Mine Operator
Follow Bushfire Management Plan	Follow Bushfire Management Plan	Follow Bushfire Management Plan	As per Bushfire Management Plan	Mine Operator & Contractor

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## Monitoring Program

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### **Bushfire**

To manage the risks associated with bushfire, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to record any incidences of bushfires and their causes (within and immediately surrounding the Project and borefield areas) in a database.
  - Bushfires caused by the Project will be reported and investigated to prevent similar future occurrences.
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## 7 TERRESTRIAL FAUNA

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### 7.1 Removal of Habitat for Pits and Infrastructure

#### Description

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The new infrastructure will have an impact area of approximately 382 hectares. The habitat type most affected by the Project would be habitat type 4 – Tall *Corymbia sp.* and *Acacia sp.* woodland, closely followed by habitat type 2 – Low *Acacia sp.* shrubland. This is a reflection of the distribution of these habitat types over the Project area. As there will be no additional clearing outside of the EL for the borefield and pipeline area, it is not anticipated that impacts such as habitat removal will be an impact associated with this area.

#### Risk Assessment

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Before mitigation, the risk of a significant impact to terrestrial fauna habitat from clearing activities has been assessed as medium. This is based on a ‘moderate’ consequence and an ‘occasional’ likelihood.

#### Management Objective

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To minimise clearing of terrestrial fauna habitat to only that which is necessary for the construction and operation of the Project; and ensure the successful rehabilitation of habitat areas upon decommissioning of the Project.

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**Table 17 Habitat Removal Indicators and Targets**

Performance Indicator	Target
Removal of Habitat	
Clearing is conducted within defined boundaries	No areas identified for retention have been cleared.
Corrective Action	
Areas cleared outside of defined boundaries are included in the progressive rehabilitation of the Project area.	All areas cleared outside of defined boundaries (in the one year reporting period) have commenced rehabilitation or are scheduled to commence rehabilitation.

**Table 18 Habitat Removal Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Stop clearing works until Environmental Officer is advised of pending works.	Mine operator
Vegetation clearing / excavation to be subject to internal permitting system.	Vegetation clearing / excavation to be subject to internal permitting system.	-	Stop clearing works until a permit is obtained. Report unauthorised clearing to Environmental Officer.	Mine operator
Clearing should be undertaken when soil moisture conditions are optimal to avoid excessive disturbance to soil and landform – just after rainfall (as recommended for central Australia).	Clearing should be undertaken when soil moisture conditions are optimal to avoid excessive disturbance to soil and landform – just after rainfall (as recommended for central Australia).	-	Employ other measures to manage soil and landform issues (such as Erosion & Sediment Control Plan).	Contractor

Management of site access to avoid creation of unnecessary tracks.	Plan vehicle access routes and haul routes using existing tracks.	Plan vehicle access routes and haul routes using existing tracks.	Closure of informal track and clarify track identification on site. Training and induction.	Mine operator
Demarcate exclusion zones to protect areas of vegetation to be retained prior to clearing.	Demarcate exclusion zones to protect areas of vegetation to be retained prior to clearing.	-	Stop clearing works until area is flagged on-site and has been inspected by Environmental Officer.	Contractor
Staging of the works to manage habitat loss.	-	-	Stop works and implement correct procedure.	Contractor
Use of appropriate clearing methods and machinery to suit site conditions.	Use of appropriate clearing methods and machinery to suit site conditions.	Use of appropriate clearing methods and machinery to suit site conditions.	Stop works until appropriate machinery is available.	Contractor
Implement measures to retain mature trees or habitat trees where possible.	Implement measures to retain mature trees or habitat trees where possible.	-	Report loss of habitat tree to Environmental Officer. Salvage habitat tree for use in habitat enhancement.	Mine Operator
Implementation of Erosion and Sediment Control Plan.	Implementation of Erosion and Sediment Control Plan.	Implementation of Erosion and Sediment Control Plan.	As per the Erosion and Sediment Control Plan.	Mine Operator & Contractor
Follow the MRCP.	Follow the MRCP.	Follow the MRCP.	As per the MRCP.	Mine operator
Collection of native seed from the Project area for use in rehabilitation program.	Collection of native seed from the Project area for use in rehabilitation program.	Use of collected native seed in rehabilitation.	As per MRCP.	Contractor
	Progressive rehabilitation of impact areas in Project area.	Progressive rehabilitation of impact areas in Project area.	As per MRCP.	Mine Operator

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## Monitoring Program

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### **Removal of Habitat**

To manage clearing and ensure that no areas where vegetation is to be retained are affected by clearing for the Project, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect all areas post-clearing to ensure that the area cleared is in-line with that permitted. This can be done using GPS (Global Positioning System) equipment.
  - Any areas that have been cleared outside of the permitted area will be recorded (including the following details: vegetation community, area (ha), location, purpose of clearing, personnel and date) in a central clearing database by the Environmental Officer.
  - Areas (ha) of unintentional clearing will be reported at the end of the construction period and annually during operation.
  - These areas will be added to the rehabilitation program in the Mine Closure and Rehabilitation Plan.
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## 7.2 Change in Habitat Quality

### Description

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#### **Dust**

Dust deposition from passing haul trucks and along the pipeline route during construction may impact on natural ecosystems adjacent to the Project area if reasonable quantities of dust are sustained over extended periods of time. Lower growth rates and subsequently slower recovery from grazing may have a negative impact on habitat quality for native fauna, particularly grazing species (e.g. macropods).

#### **Erosion & Sedimentation**

The vegetation clearing and surface disturbance associated with the construction and operation of the Project can lead to increased run-off, erosion of exposed surfaces and sedimentation of the waterways; which ultimately affects habitat quality. Refer to Section 6.5 for mitigation and monitoring.

#### **Noise**

The noise associated with the construction and operation of the Project may have a low risk of impact to fauna, such as stress or avoidance, interference with communication, and masking the sounds of predators and prey. In the case of exposure to extreme levels of noise, temporary or permanent hearing damage may also be possible.

#### **Hydrology**

Some of the floodplain in surrounding areas is subject to grazing, with remnant vegetation concentrated in riparian areas. Some of these areas have been indicated as having a moderate potential to support Groundwater Dependent Ecosystems (GDE). The impacts of hydrological change may include redirection or drainage of water away from a water dependent ecosystem, or flooding of normally dry areas. These changes are ultimately expressed by the vegetation communities, which may die-back or expand into new areas. Refer to Section 6.6 for mitigation and monitoring.

#### **Connectivity**

In the Project area the Unca Creek (and major tributary) and associated floodplain vegetation connects areas of habitat in and around the Project area to Arthur Creek (north-east of the Project area). The Project would retain the vast majority of the Unca Creek corridor, with additional haul-road crossings of

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minor drainage lines and sediment dams. The expansion of the 'Reward' pit in the north of the Project area will result in the redirection of Unca Creek and the removal of some riparian vegetation. In the short-term this will result in the severance of the wildlife corridor provided by Unca Creek. In the long-term (>20 years), the redirection of Unca Creek will be rehabilitated and the riparian vegetation will recover to provide a connectivity pathway in the landscape. As there will be no additional clearing outside of the EL for the borefield and pipeline area, it is not anticipated that impacts such as connectivity will be an impact associated with this area.

### **Edge Effects (including light)**

The construction and operation of the Project would cause ongoing and localised increases in light disturbance in habitats directly adjacent to the Project. The extent of this impact would depend on the distance between the Project and the adjacent habitat, the level of light emanating from the Project, the type of habitat (dense forest is more resilient) and the hours of operation. Nocturnal animals would be more susceptible to this disturbance, due to their sensitivity to light. The mine is expected to operate 24 hours a day, seven days a week. Areas of remaining habitat potentially exposed to light pollution are located adjacent to mine pits, haul roads and processing plant. These areas contain mostly low *Acacia sp.* shrubland and some *Corymbia* and *Acacia sp.* woodland habitats (sparse vegetation) that are easily penetrated by light. It is anticipated that more sensitive, nocturnal fauna species inhabiting these woodland areas would be affected by light issues, including native marsupials and rodents.

### Risk Assessment

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Before mitigation, the risk of a significant impact to habitat quality from the Project has been assessed as medium. This is based on a 'moderate' consequence and a 'occasional' likelihood.

### Management Objective

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To allow for continued fauna movement through the Project area, particularly along Unca Creek, and lessen the disturbance to native fauna caused by operational light and noise pollution.

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**Table 19 Habitat Quality Indicators and Targets**

Performance Indicator	Target
Habitat Quality	
The riparian habitat along Unca Creek is maintained and, where diversion is necessary, restored to allow continued fauna movement.	Fauna survey along Unca Creek detects native species moving through the area.
Light and noise levels beyond the mine are acceptable.	Monitoring shows that the Project is in accordance with Mining Management Plan for allowable light and noise limits.
Corrective Action	
Implement MRCP to revegetate areas important for connectivity and wildlife movement.	All riparian habitat along Unca Creek is maintained and those areas that are disturbed are rehabilitated (or scheduled for rehabilitation).

**Table 20 Habitat Quality Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
Minimise disturbance to Unca Creek (particularly from Reward Pit expansion) as far as possible.	Follow the MRCP.	Follow the MRCP.	As per the MRCP.	Mine Operator
Limit Project lighting.	Where lighting is required, use directional lighting to reduce the spill over into surrounding areas.	-	Install appropriate infrastructure or implement light saving system.	Mine Operator Contractor

-	Use lighting in buildings only as required, i.e. sensor lighting or switch off during non-operational hours.	-	Install appropriate infrastructure or implement light saving system.	Mine Operator & Contractor
Blasting to be undertaken (if necessary) during the middle of the day when fauna movement is generally at its lowest.	Blasting to be undertaken (if necessary) during the middle of the day when fauna movement is generally at its lowest.	-	Stop works and implement correct procedure.	Mine Operator & Contractor
To minimise noise from construction equipment, equipment to be where practicable the quietest available in existing stock, properly maintained, monitored to ensure noise emissions in accordance with manufacturer's specifications and Australian Standards, and fitted with noise suppression equipment consistent with the requirements of the activity.	Maintain machinery to ensure optimal operation and minimal unnecessary noise.	-	Stop works and rectify issue with machinery or equipment.	Mine Operator & Contractor

## Monitoring Program

### Habitat Quality

A monitoring program focused on recording fauna within Unca Creek will be undertaken. The monitoring program will include:

- Contracting local ecologists to conduct seasonal fauna surveys along Unca Creek (wet and dry season);
- Set up of two permanent monitoring sites – one in the undisturbed portion of Unca Creek and one in the diverted portion of Unca Creek;



- Seasonal surveys to include a number of survey methods (deemed appropriate by ecologists), including spot-lighting, trapping, call-playback, active searches, etc.;
  - Surveys to include targeted methods for key indicator species which are likely to include the long-haired rat (*Rattus villosissimus*);
  - Results of surveys within undisturbed and disturbed portions of Unca Creek will be reported and compared in an annual report submitted to the Environmental Officer.
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## 7.3 Impacts to Threatened Fauna

### Description

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Surveys recorded two species of conservation significance; *Dromaius novaehollandiae* (emu) and *Rattus villosissimus* (long-haired rat) within the Project EL area. Despite targeted surveys, no fauna species of conservation significance were recorded within the borefield and pipeline area. The near threatened Red-tailed Black-cockatoo and Australian Bustard (TPWC Act) were recorded within the area.

Four conservation significant fauna were indicated as 'likely' to occur within the Project area:

- Australian bustard (*Ardeotis australis*) – Near threatened (TPWC Act);
- Red-tailed black cockatoo (*Calyptorhynchus banksii samueli*) – Near threatened (TPWC Act);
- Grey honeyeater (*Conopophila whitei*) – Data deficient (TPWC Act);
- Australian painted snipe (*Rostratula australis*) – Endangered (EPBC Act), Vulnerable (TPWC Act);
- Grey falcon (*Falco hypoleucos*) – Vulnerable (TPWC Act).

Three of these species have very broad habitat requirements and may utilise any of the mapped habitat types located in the Project area: emu, long-haired rat and Australian bustard. The removal of potential habitat in the Project area is not considered to have a significant impact on these species, which will be able to utilise areas of habitat that are not impacted in the Project area and surrounding environment.

### Risk Assessment

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Before mitigation, the risk of a significant impact to threatened fauna from clearing activities has been assessed as very low. This is based on a 'minor' consequence and an 'unlikely' likelihood.

### Management Objective

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To avoid fatal harm to threatened fauna species and adequately manage indirect impacts.

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**Table 21 Threatened Fauna Indicators and Targets**

Performance Indicator	Target
Threatened Fauna	
The Project does not result in direct impact on threatened fauna species.	No threatened fauna specimens are killed or injured as a result of the Project.
Indirect impacts (i.e. habitat loss or reduced breeding opportunity) do not result in a significant impact to threatened fauna species.	Threatened fauna species continue to be observed within the Project area.
Corrective Action	
Threatened fauna species killed or harmed as a result of the Project are reported and the reason for the incident identified.	The cause of all incidents with threatened fauna in the Project area or immediate surrounds is known (for the annual reporting period) and any safety issues have been rectified or are programmed for rectification.

**Table 22 Threatened Fauna Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Stop clearing works until Environmental Officer is advised of pending works.	Mine Operator
Vegetation clearing / excavation to be subject to pre-clearing survey within three months of clearing.	Vegetation clearing / excavation to be subject to pre-clearing survey within three months of clearing.	-	Stop works and implement correct procedure.	Mine Operator & Contractor

Measures to retain mature trees or habitat trees where possible.	Measures to retain mature trees or habitat trees where possible.	Provide offsets for the removal of areas of mature Eucalyptus sp. or Corymbia sp. that may provide nesting resources for large parrots (such as Red-tailed black cockatoo) and feeding resources for Grey honeyeater.	-	Mine Operator
Ensure that Jervois Dam is retained with a buffer area to construction of 200m.	Ensure that Jervois Dam is retained.	Ensure that Jervois Dam is retained.	Stop works, notify Environmental Officer of unauthorised clearing within buffer. Implement rehabilitation.	Mine Operator
Limit works to Jervois Dam to that which is essential to the repair of the dam for water supply efficiencies.	Maintain and monitor Jervois Dam to ensure the ongoing provision of aquatic habitat.	Maintain and monitor Jervois Dam to ensure the ongoing provision of aquatic habitat.	Stop works and repair damage to Jervois Dam resulting in significant impact to habitat quality.	Mine Operator & Contractor
-	Progressive rehabilitation of impact areas in Project area.	Progressive rehabilitation of impact areas in Project area.	As per MRCP.	Mine operator
Follow Surface Water Management Plan	Follow Surface Water Management Plan	Follow Surface Water Management Plan	Follow Surface Water Management Plan	Mine Operator

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## Monitoring Program

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### **Threatened Fauna**

To manage direct impacts on threatened fauna species caused by the Project, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- Contracting local ecologists to monitor all known populations of threatened fauna on a seasonal basis (including long-haired rat and Australian painted snipe. The location and number of individuals observed will be recorded using GPS (Global Positioning System) equipment. Observations on the health of the population and any threats will also be recorded (e.g. clearing of habitat, noise, contamination etc..).
  - New populations of threatened fauna that are detected during the operation of the Project will be recorded in a central database managed by the Environmental Officer and added to the monitoring program.
  - The Environmental Officer is to review the results of seasonal fauna surveys, particularly in relation to the management of threats to threatened fauna populations and implement corrective action where appropriate.
  - The Environmental Officer is to maintain a database recording incidents involving native fauna (particularly threatened species). This is to be reported annually and any safety issues rectified or programmed for rectification.
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## 7.4 Exotic Fauna

### Description

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The field surveys have recorded the presence of a variety of exotic fauna, namely:

- *Bos taurus* (domestic cattle)
- *Mus musculus* (house mouse)
- *Oryctolagus cuniculus* (rabbit); and
- *Felis catus* (feral cat).

Activities associated with the Project may provide increased refuge and scavenging resources (e.g. discarded food scraps) for introduced fauna species. Feral animals would be discouraged within the Project area by maintaining a clean, rubbish-free environment, and appropriately qualified persons would be engaged to undertake pest animal monitoring within the Project area. Feral animal control strategies (e.g. baiting, trapping) would be implemented in accordance with relevant standards to maintain low abundance of declared animals.

### Risk Assessment

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Before mitigation, the risk of a significant impact to native ecosystems from exotic fauna has been assessed as medium. This is based on a 'minor' consequence and a 'likely' likelihood.

### Management Objective

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To manage existing populations of exotic fauna, with a view to eradication, and avoid further spread of exotic fauna species.

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**Table 23 Exotic Fauna Indicators and Targets**

Performance Indicator	Target
Exotic Fauna	
Existing populations of exotic fauna within the Project area are eradicated.	There are no populations of exotic fauna in the Project area.
Exotic fauna do not spread further within the Project area.	No new populations of exotic fauna are identified and assessed as being a result of the Project. Populations of exotic fauna are not increasing.
Corrective Action	
Existing populations of exotic fauna are being managed and new infestations managed.	There are no populations of exotic fauna in the Project area that are not currently under a management program.

**Table 24 Exotic Fauna Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
Employees and contractors will be required to participate in an environmental induction program. The program will provide information on employee environmental responsibilities as well as exotic fauna identification.	Employees and contractors will be required to participate in an environmental induction program. The program will provide information on employee environmental responsibilities as well as exotic fauna identification.	Employees and contractors will be required to participate in an environmental induction program. The program will provide information on employee environmental responsibilities as well as exotic fauna identification.	Stop work until training is completed.	Mine Operator

Inspection of all machinery (including motor vehicles) and equipment prior to entering and exiting the Project area.	Inspection of all machinery (including motor vehicles) and equipment prior to entering and exiting the Project area.	Inspection of all machinery (including motor vehicles) and equipment prior to entering and exiting the Project area.	Stop works and implement correct procedure.	Contractor & Mine Operator
Follow the Waste Management Plan.	Follow the Waste Management Plan.	Follow the Waste Management Plan.	Training and induction.	Mine Operator & Contractor
	Undertake progressive rehabilitation of the Project area.	Rehabilitation of the Project area.	As per Mine MRCP.	Mine Operator

## Monitoring Program

### Exotic Fauna

To manage known populations of exotic fauna and ensure that no new populations proliferate, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- The Environmental Officer is to inspect all known populations of exotic fauna on a seasonal basis to ascertain status and condition. The location and number of individuals observed will be recorded using GPS (Global Positioning System) equipment.
- New populations of exotic fauna that are detected during the operation of the Project will be recorded in a central database managed by the Environmental Officer and added to the monitoring program.
- Corrective actions will be initiated for expanding and new populations of exotic fauna.



## 7.5 Fauna Mortality

### Description

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Fauna present in the areas proposed to be cleared would be at risk of injury or fatality during clearance activities. The removal of habitat would also result in displacement of mobile species (such as birds and mammals) to similar habitats in the surrounding area. All of the fauna habitats mapped in the Project area occur more extensively within the surrounding landscape.

Vehicle movements and road haulage has the potential to result in fauna mortality through vehicle strike. The main access road for the Project will make use of an existing road (Lucy Creek Access Road) and is located through sparsely wooded areas where visibility on the adjoining road shoulders is good. This will help to minimise the risk of vehicle strike to native fauna. There is one location, however, where the main access road would cross the Unca Creek major tributary and associated riparian woodlands, which serves as a movement corridor and refuge habitat for native fauna. It is possible that a higher occurrence of vehicle strike may affect this area.

The construction of a water supply pipeline has been identified as a risk for fauna mortality due to the potential for fauna to become trapped in the trench during construction.

There are other activities within the Project area that have the potential to result in a fauna mortality, for example:

- Entrapment of fauna within mine pits;
- Entrapment of fauna within drill holes;
- Falling down unstable slopes;
- Electrocution in transmission lines; and
- Drowning in dams.

### Risk Assessment

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Before mitigation, the risk of native fauna fatalities as a result of the Project activities has been assessed as medium. This is based on a 'minor' consequence and a 'likely' likelihood.

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## Management Objective

To avoid fatal harm to native fauna species and adequately manage indirect impacts.

**Table 25 Fauna Mortality Indicators and Targets**

Performance Indicator	Target
Native fauna Mortality	
The Project does not result in direct impact on native fauna.	No native fauna are killed or injured as a result of the Project.
Corrective Action	
Native fauna killed or harmed as a result of the Project are reported and the reason for the incident identified.	The cause of all incidents with native fauna in the Project area or immediate surrounds is known (for the annual reporting period) and any safety issues have been rectified or are programmed for rectification.

**Table 26 Fauna Mortality Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Stop clearing works until Environmental Officer is advised of pending works.	Mine Operator
Staff, including contractors, to be inducted in relation to the risks of fauna injury and	Staff, including contractors, to be inducted in relation to the risks of fauna injury and	-	Stop works until appropriate training is completed.	Mine Operator
deaths and how to manage animals that are injured or displaced, including threatened species.	deaths and how to manage animals that are injured or displaced, including threatened species.			

Breeding places and trees containing hollows to be marked prior to construction and fauna to be removed.	Breeding places and trees containing hollows to be marked prior to construction and fauna to be removed.	-	Stop works and implement correct procedure.	Contractor
Appropriate signage in prominent positions to reduce vehicle speeds in the Project area, to promote awareness and to provide safety for fauna crossing or inhabiting the area.	Appropriate signage in prominent positions to reduce vehicle speeds in the Project area, to promote awareness and to provide safety for fauna crossing or inhabiting the area.	Appropriate signage in prominent positions to reduce vehicle speeds in the Project area, to promote awareness and to provide safety for fauna crossing or inhabiting the area.	Installation of signage, as soon as possible.	Mine operator
Vehicular traffic generally to be restricted to access tracks and not to exceed speed restrictions.	Vehicular traffic generally to be restricted to access tracks and not to exceed speed restrictions.	Vehicular traffic generally to be restricted to access tracks and not to exceed speed restrictions.	Training and induction	Mine Operator & Contractor
Measures to minimise fauna entrapment in trenches or pits. The process for this generally includes: <ul style="list-style-type: none"> <li>• Planning the pipeline to avoid traverses through large areas of intact fauna habitat, where possible;</li> <li>• Avoid construction during and just after the wet season;</li> <li>• Construct the pipeline in shorter sections (i.e. excavate, install and back-fill one section at a time), to avoid a long open trench on the ground for any lengthy duration;</li> </ul>	Progressive rehabilitation of impact areas in Project area.	Progressive rehabilitation of impact areas in Project area.	As per MRCP.	Mine operator

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<ul style="list-style-type: none"><li>Daily monitoring of trenches prior to construction recommencing every morning.</li></ul>				
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## Monitoring Program

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### **Native Fauna Mortality**

To manage direct impacts on native fauna species caused by the Project, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include:

- Contracting local ecologists to monitor native fauna in high value habitats on a seasonal basis (including Unca Creek and Jervois Dam and forested areas around the Project). The location and number of individuals observed will be recorded using GPS (Global Positioning System) equipment.
  - The Environmental Officer is to review the results of seasonal fauna surveys, particularly in relation to the management of threats to threatened fauna populations and implement corrective action where appropriate.
  - The Environmental Officer is to maintain a database recording incidents involving native fauna (particularly threatened species). This is to be reported annually and any safety issues rectified or programmed for rectification.
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## 7.6 Hazardous Material

### Description

Exposure of fauna to hazardous material at the tailings dams is a potential impact primarily to birds that are attracted to large bodies of water. At the Project site, the tailings dam is located next to the processing plant and is surrounded by roads and other noisy infrastructure that will assist in deterring birds from utilising the tailings dam. The design of the tailings dam will also follow best practice for the Northern Territory to be less attractive to birds. The Jervois Dam in the north-west of the will provide a more appropriate habitat for birds and act to entice them away from the tailings dam. Impacts to fauna that may arise from exposure to chemical or fuel spills associated with other activities in the mine are discussed in Section 6.7.

### Risk Assessment

Before mitigation, the risk of native fauna mortality from exposure to hazardous material has been assessed as medium. This is based on a 'moderate' consequence and an 'occasional' likelihood.

### Management Objective

To prevent harm to native fauna as a result of the release of contact with hazardous materials.

**Table 27 Hazardous Materials Indicators and Targets**

Performance Indicator	Target
Hazardous Material	
The Project does not result in direct impact on native fauna as a result of contact with hazardous material.	No native fauna are killed or injured as a result of contact with hazardous material caused by the Project.
Corrective Action	
Native fauna killed or harmed as a result of contact with hazardous material at the Project are reported and the reason for the incident identified.	The cause of all incidents with native fauna in the Project area or immediate surrounds is known (for the annual reporting period) and any safety issues have been rectified or are programmed for rectification.

**Table 28 Hazardous Materials Mitigation**

Mitigation Measures			Corrective Actions	Responsibility
Construction	Operation	Decommissioning		
Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Ensure there is an appropriately qualified Environmental Officer on-site.	Employ appropriately qualified Environmental Officer.	Mine Operator
The TSF will be designed in accordance with the ANCOLD “Guidelines on Tailings Dams”.	Maintenance of TSF in accordance with specifications.	In accordance with MRCP.	Stop works until issue is rectified.	Mine Operator
Reduce the attractiveness of the dam landscape for wildlife via design that includes, but is not limited to, the reduction of the dam surface area, removing dam bank vegetation, creating steep dam walls, and avoiding the creation of islands in the dam.	Should ground dwelling fauna become an issue, consideration will be given to appropriate actions to prevent access to the tailings dam.	In accordance with MRCP.	Installation of appropriate infrastructure, as soon as possible.	Mine Operator
-	Ongoing monitoring and maintenance of the TSF facility.	Closure and rehabilitation in accordance with the MRCP.	If maintenance issue is identified, stop works until rectified.	Mine Operator
-	Undertake progressive rehabilitation of the Project area.	Rehabilitation of the Project area.	As per MRCP.	Mine Operator
Follow Waste Management Plan	Follow Waste Management Plan	Follow Waste Management Plan	As per Waste Management Plan	Mine Operator & Contractor

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## Monitoring Program

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### **Hazardous Material**

To manage direct impacts on native fauna species caused by hazardous material associated with the Project, a monitoring program will be established and undertaken by the Environmental Officer. The process for this will generally include the maintenance of a database recording incidents involving native fauna (particularly threatened species) and annual reporting to rectify safety issues or those programmed for rectification.

Water quality in Unca Creek will also be monitored as per the Surface Water Management Plan. Potential sources of contamination (i.e. waste rock, ROM stockpiles and TSF) will also be monitored in accordance with the Mining Management Plan.

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## 8 EMERGENCY PROCEDURES

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An emergency is a situation that poses a serious threat to life, health or the environment and requires immediate attention by site staff. This Biodiversity Management Plan deals with emergencies involving the environment and may include (but not be limited to):

- Entrapment of wildlife (e.g. in a mine void, bore, TSF);
- Vehicle collision with wildlife;
- Natural disaster (e.g. flood, bushfire);
- Chemical spill;
- Breach in TSF causing spill of waste material; and
- Spill of non-benign ore or waste rock, particularly in a waterway.

In the event of an emergency, Project personnel and subcontractors are to follow the procedures in the Emergency Response Plan. This plan includes the appropriate response to an incident which has a direct or indirect environmental impact – for example, the following steps would be undertaken:

1. Stop works.
2. Make the site safe and secure.
3. Isolate the source or cause of pollution or environmental damage, if possible.
4. The site Environmental Officer is to be contacted immediately for further instruction on how to address an incident.
5. The site Environmental Officer will attend the incident or allocate to appropriate personnel trained for the situation (e.g. a spill response team).
6. An incident report would be filed by the Environmental Officer.

The contact names and phone numbers of key Project personnel, other relevant authorities, and off site emergency services will be displayed on site. Emergency procedures and contact telephone numbers will be displayed in a noticeable position. A record of dangerous goods, chemicals and fuels stored and used on the site will be developed. Specific management and handling procedures will be developed for each storage facility.

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## 9 REPORTING REQUIREMENTS

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The reporting requirements for the Project include:

- event-based (e.g. incident reports);
- monitoring reports required by licences or approvals; and
- internal environmental reporting requirements (or periodic reporting, e.g. annual compliance reports).

### 9.1 Incident Reporting

There is a requirement for all employees and contractors to report all environmental incidents. An Environmental Incident Report Proforma will be developed for the Project. These proformas will be held by the Environmental Officers and made available at various other locations. The reporting procedure will be:

1. Key employee/s involved in incident to fill out Environmental Incident Report Proforma;
2. Environmental Officer in attendance to fill out Environmental Incident Report Proforma;
3. Incident will be entered into relevant database by Environmental Officer (to be included in quarterly or annual reporting);
4. Where relevant, copies of the Environmental Incident Report Proforma will be submitted to the relevant regulatory body;
5. Non-conformances relating to the EMP objectives will be reported (and investigated).

Department of Primary Industry and Resources (DPIR) may present a written request for further details in relation to any incident / matters if it is not satisfied within the report provided.

An EMP non-conformance is defined as a failure to:

- Meet the nominated environmental objectives;
- Comply with environmental approval conditions, environmental legislation or other requirements;
- Comply with EMP procedures.

Once a non-conformance has been identified, corrective and preventative action will be implemented to minimise the risk of reoccurrence. Non-conformances relating to the EMP objectives are reported (and investigated) to ensure continual improvement of environmental performance.

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## 9.2 Monitoring Reports

Activities that have the potential to have a significant environmental impact require the establishment of regular monitoring and measurement. A monitoring program has been established for each of the sub-plans outlined in this Biodiversity Management Plan.

The monitoring programs are designed for measuring:

- Performance against policy, objectives and targets;
- Performance against regulatory requirements; and
- Against international or national measurement standards (if no such standards exist, the basis used for calibration should be recorded).

The Environmental Officer is responsible for ensuring the monitoring reports are undertaken (as frequently as required in accordance with the sub-plan). The monitoring reports will be collated by the Environmental Officer, who will review them and record results (i.e. conformance or non-conformance) in a central database. Over time this will allow the findings to be assessed against trends, trigger levels or benchmarks to determine the effectiveness of control strategies.

In the case of non-conformance, the cause of the non-conformance must be determined, actions taken to avoid the recurrence documented and a review of the corrective action will need be undertaken.

## 9.3 Internal Environmental Reporting

Adaptive management is a systematic process for continually improving management practices in response to monitoring and evaluation of the effectiveness of current management practices (such as through incident reporting). The EMP will be reviewed annually as part of internal annual reporting requirements, auditing and Mining Management Plan (MMP). All of the information from the incident reports and monitoring reports will be collated into an annual environmental report that assesses whether the Project is achieving the objectives outlined in the Biodiversity Management Plan (amongst other environmental objectives). This report will then be audited. Environmental audits will be conducted after construction and regularly during operations (annually).

Where the audit identifies the need for corrective action, the EMP procedures and EMP will be amended accordingly. The EMP will be reviewed and updated on an as-needs basis depending on any significant non-conformance issue or incident or legislative requirement. Review may also be initiated by a change in operating strategy or production process, or by any amended license or approval and associated conditions.

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Site and Management Personnel will be made aware of issues regarding the Projects environmental performance. A written report of significant non-conformance issues will be reported to the Project Manager as necessary. Details provided will include the date, type and location of the non-conformances, how the non-conformances occurred and the corrective action employed. The Project Manager is responsible for ensuring the response to significant non-conformance issues is appropriate. The Project Manager will monitor general environmental performance based on the annual environmental report received from the Environmental Officer and other personnel.

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## 10 ASSOCIATED PLANS

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Biodiversity management refers specifically to flora (threatened species, vegetation communities and weeds) and fauna (wildlife, including native and non-native animals). However, the close link between biodiversity and other environmental elements is recognised, particularly soil and water. In addition to this BMP, the management of biodiversity is addressed in several other sub-management plans within the Environmental Management Plan (EMP):

- Water Management Plan;
- Groundwater Management Plan;
- Waste Management Plan;
- Bushfire Management Plan; and
- Mine Rehabilitation and Closure Plan.

As well as, in addition to the EMP:

- Emergency Response Plan; and
  - Voluntary Offset Strategy.
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