



ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR THE ARGYLE UNDERGROUND PROJECT

FAUNA MANAGEMENT PLAN



TABLE OF CONTENTS

REVISION EVENTS **ERROR! BOOKMARK NOT DEFINED.**

1. INTRODUCTION 3

 1.1 OVERVIEW **Error! Bookmark not defined.**

 1.1.1. Definitions 4

 1.1.2. Objective **Error! Bookmark not defined.**

 1.1.3. Scope 3

 1.1.4. Operational Area (s) 3

 1.2. BACKGROUND **Error! Bookmark not defined.**

 1.2.1. Aquatic Fauna 5

 1.2.2. Birds 6

 1.2.3. Feral Animals 7

 1.2.4. Herpetofauna 7

 1.2.5. Insects 7

 1.2.6. Mammals 7

 1.3. RESPONSIBLE PEOPLE 8

 1.3.1. Environmental Advisor 8

 1.3.2. Superintendent Environment 8

2. Related documents 9

 2.1.1. Management and Operational Plans 9

 2.1.2. Procedures and Work Instructions 9



1. INTRODUCTION

1.1 PURPOSE

The management of fauna will be carried out in accordance with the documents listed in Section B8.4. Management objectives are to ensure that no fauna species become locally extinct due to Project activities, that there is unnecessary disturbance to them or their habitat and that active control of introduced predators takes place.

These objectives will be achieved by:

- Minimising the area of habitat loss;
- Preferentially selecting previously disturbed areas for new facilities;
- Minimising hydrological impacts on the creeks to avoid downstream impacts; and
- Rehabilitating areas as soon as practicable.

Management actions, which will ensure that these objectives are met, are outlined in Table B8-1 Fauna Management.

1.2 SCOPE

This Management Plan provides an overview of fauna at the site, followed by a discussion of potential impacts on fauna within the primary area of disturbance and habitat loss, the proposed new TSF2 and RCP3. Actions to manage fauna and meet the objectives above during mining and closure operations are allocated to responsible people in Section 3, with timelines for completion and performance targets. Post closure fauna management is included in B16 Decommissioning and Closure Management Plan.

1.3 AREA

Argyle mining lease and miscellaneous licences.

2. DEFINITIONS

Fauna included in this Management Plan are aquatic fauna, birds, feral animals, herpetofauna, insects and mammals. Subterranean fauna is included in Subterranean Fauna Management Plan. There have been no comprehensive surveys of terrestrial insects on site other than for termites.

Specially Protected Fauna are legally protected under the Wildlife Conservation Act 1950 and are those that are rare or likely to become extinct, subject to an agreement between the Australian and Japanese Governments or are in need of special protection.

Priority Fauna are those recognised by CALM as needing further surveys or investigations to establish their status in the wild. Priority Fauna have no statutory protection.

3. DETAILS

The vegetation communities, landforms and thus fauna habitats, within the areas proposed to be disturbed for the Project are well represented on the Lease Area. A fauna assessment was undertaken during the site selection phase for the proposed new TSF2 and RCP3 (BIOSTAT, 2003), which requires an areas of 126 ha and 133 ha, respectively, to be cleared with associated potential disturbance of fauna habitat, food and water resources.

The preferred sites for the TSF2 and RCP3 are located in areas that have been partially previously disturbed by mining activities but have been rehabilitated. The proposed areas are upstream of Limestone Creek, therefore, the maintenance and quality of water flows to the Creek will be considered to avoid downstream impacts on riparian habitats (BIOSTAT, 2003). The Project may also impact fauna indirectly as a consequence of modified drainage, groundwater levels and surface water quality. Potential impacts and actions to manage these for mammals, herpetofauna, birds, aquatic fauna and feral animals are discussed in the following sections.

3.1 AQUATIC FAUNA

The Lease supports a wide range of wetland ecosystems including springs, creeklines, ephemeral and permanent pools. The open cut mine and proposed underground mining operations will affect ground and surface water regimes on which these wetland ecosystems depend. In addition seepage from WRDs and TSFs may generate acid rock drainage and $MgSO_4$.

In 2002 studies were commenced in conjunction with a Ph D student of the University of Western Australia (UWA) on the fish and macroinvertebrate fauna in and around the Lease Area. The aim of the surveys is to collect data on fish populations and dynamics and to determine the food web structure of fish inhabiting permanent pools in the vicinity of the mine. Samples were taken from 20 sites located as shown on Figure B8-1. Wetlands on the site support a relatively diverse fish assemblage (11 species), including Hyrtl's Catfish (*Neosilurus hyrtlii*) (UWA, 2002), Bony Bream (*Nematalosa erebi*) and Spangled Perch (*Leiopotherapon unicolour*) (UWA, 2004). During UWA surveys in 2004 the most common fish collected were Bony Bream (*Nematalosa erebi*) (22.5% of the total) and Spangled Perch (*Leiopotherapon unicolour*) with 16.5%.

A list of the aquatic macroinvertebrate fauna is not yet available; surveys commenced in April 2002, with follow up surveys in 2003 – 2004. Samples are still being sorted, identified and the data analysed.

Following these studies further work is being undertaken to determine the effects of magnesium sulphate on the environment. The studies involve both chemical and biological assessments by sampling of macroinvertebrates, fish and possibly phytoplankton at sites on and near the Lease Area. The programme (ERISS, 2005a) will be conducted over three consecutive wet seasons and may involve the following:

- Initial site visit and preliminary phytoplankton sampling.
- Stage 1 laboratory based ecotoxicological assessment.
- Scoping and development of interim water quality objectives and trigger values for key constituents
- Stage 2 laboratory based ecotoxicological assessment
- Field survey/monitoring for key environmental variables
- Toxicity testing using local species.
- Refined field monitoring programme.
- Toxicity testing for key constituents in seepage water.
- Isotope studies.

The samples were analysed for water chemistry and phytoplankton, the result are yet to be finalised.

The five step management framework as outlined in the ANZECC/ARMCANZ (2000) Water Quality Guidelines will be used to develop water quality objectives and environmental values of the water bodies. The ecotoxicological studies will be used in the development of trigger values and water quality objectives, as well as assist in decision-making with regards to the management of on-site waters. The acceptable level of impact,

water quality objectives and associated three stage (focus level, action level and guideline limit) trigger values for each identified toxicant will be determined through a consultation process with stakeholders. The level of environmental protection achieved and extent of treatment required to achieve the required level of protection may vary with the location and distance from the waste rock dumps, and the time of the year.

The area proposed for the new TSF2 is primarily dry, with *Corymbia* sp. over spinifex on undulating rises and rehabilitated alluvial creek lines. Therefore no fish or aquatic invertebrates will be directly affected by the construction of this facility. However measures will be taken to avoid impacts of leachates and sediment from TSF2 downstream to Limestone Creek. Impacts on aquatic biota will be further minimised when the proposed RCP3 is constructed as this will intercept upstream catchment water and recycle it to processing (Groundwater MP and Surface Water MP). The fish and aquatic macroinvertebrate monitoring programmes will continue.

3.2 BIRDS

The Lease supports a diversity avifauna assemblage (219 species) and is comparable to that found at other sites in the eastern Kimberley region (BIOSTAT, 2003). Twenty-seven of the birds recorded are listed under international agreements (JAMBA, 1974 and CAMBA, 1986). There are a high proportion of water birds (72 species) reflecting the availability of riparian habitat and colonisation of the TSF1 and Argyle Dam wetlands.

Ten species of birds listed either as Specially Protected Species on the Wildlife Conservation (Specially Protected Fauna) Notice 2004 under the Wildlife Protection Act, 1950, or on the CALM Priority List have been recorded in the Argyle area. These are:

- Gouldian Finch (*Erythrura gouldiae*);
- Radjah Shelduck (*Tadorna radjah*);
- Peregrine Falcon (*Falco peregrinus*);
- Grey Falcon (*Falco hypoleucos*);
- Australian Bustard (*Ardeotis australis*);
- Purple-Crowned Fairy Wren (*Malurus coronatus coronatus*);
- Star Finch (*Neochmia ruficauda*);
- Flock Bronzewing (*Phaps historica*);
- Barking Owl (*Ninox connivens*);
- Pictorella Mannikin (*Heteromunia pectoralis*).

The Gouldian Finch, Purple Crowned Fairy Wren and Star Finch are also listed as Threatened Species under the Commonwealth *EPBC Act, 1999*. The other species recorded in the Argyle area that are on the EPBC Threatened Species List are the Yellow Chat (*Epthianura crocea*), sighted at Lake Argyle, and the Buff- Banded Rail (*Gallirallus philippensis*).

The Project will not affect birds directly other than during the initial clearing of land for the proposed TSF2 or RCP3 plus disturbance for infrastructure. The vegetation to be cleared for the project is not of significance in terms of providing habitat for any of the specially protected or priority bird species.

The Gouldian Finch (*Erythrura gouldiae*) and Purple - Crowned Fairy Wren (*Malurus coronatus*) are unlikely to be resident or regular visitors to the area selected for proposed TSF2 or RCP3. The Star Finch (*Neochmia ruficauda*) and the Pictorella Mannikin (*Heteromunia pectoralis*) may occur in the bulrush environment in Limestone Creek and may be affected by the loss of this habitat. The Peregrine Falcon (*Falco peregrinus*) may hunt in the proposed development area but is more likely to nest in the nearby

cliffs. The relatively mobile, Australian Bustard (*Ardeotis australis*) is likely to be a regular visitor to the grasslands and woodland areas of the proposed TSF2 and RCP3.

3.3 FERAL ANIMALS

Feral cats (*Felis catus*), donkeys (*Equus asinus*) and foxes (*Vulpes vulpes*) have been recorded on the site. Donkey numbers have decreased significantly in recent years. The proposed underground development is not expected to have any noticeable impact on feral cat and fox populations.

Feral cats are significant predators of native fauna and are widespread on site, therefore the key focus of feral animal control on the site is to manage this species. The following measures are being implemented:

- No pets are allowed on site (Site Induction and Camp Rules)
- Feral cat trapping will continue on an as needs basis. During the past two years, 36 cats have been trapped and anaesthetised.

3.4 HERPETOFAUNA

A relatively diverse herpetofauna comprising nineteen amphibian and 79 reptile species have been recorded on the lease. These are representative of both the arid and wetter northern zones of the Kimberley (BIOSTAT, 2003). Frogs that disperse outside of wetlands after breeding may be present within the area proposed for clearing for the TSF, however none of these are of conservation significance.

3.5 INSECTS

Over 300 termite series have been collected on site, representing 10 genera and 23 species (Curtin University of Technology, 2004). These were collected during research to determine species richness and abundance between rehabilitated and undisturbed sites. The areas proposed for the Project facilities were not surveyed for termites or other insects.

3.6 MAMMALS

A total of 27 native mammal species, typical of the more arid East Kimberley region (BIOSTAT, 2003) have been recorded on the lease. Two Priority Species (CALM, 2004), the Water Rat (*Hydromys chrysogaster*) and the Lakeland Downs Mouse (*Leggadina lakedownensis*) have been recorded on the lease but not specifically in the areas proposed for the new TSF2 or RCP3 (Bamford, 2005). The habitat within the preferred site although likely to be utilised by priority species is unlikely to represent significant habitat for these mammals.

4. RESPONSIBLE PEOPLE

The following people are responsible for actions to manage fauna at Argyle:

4.1 ENVIRONMENTAL ADVISOR

The Environmental Adviser is responsible for presenting environmental inductions to new starters that include information about potential impacts of mining on fauna and how these impacts are managed at the mine.

4.2 SUPERINTENDENT ENVIRONMENT

The Superintendent Environment is responsible for ensuring that the Clearance Permit system is adhered to prior to any clearing, for monitoring of fauna and water quality; implementation of feral animal management programmes and overseeing research projects.

5. RELATED DOCUMENTS

5.1 MANAGEMENT AND OPERATIONAL PLANS

- Argyle (2001b) Standard for Training and Induction

5.2 PROCEDURES AND WORK INSTRUCTIONS

- Nil

Fauna research references and other background documents are listed in Part C References of the Environmental Protection Statement (EPS).

6. RECORDS MANAGEMENT

As subsequent revisions of this document are carried out, previous versions are retained within DM5 for records management purposes in accordance with the **Management of Controlled Documents Procedure #AD-226750**.

7. APPENDICES

7.1 TABLE: FAUNA MANAGEMENT

| Action | Key Issue | Objective | Management Action | Timing | Responsibility | Target | Work Instruction - Procedure |
|--------|---|--|--|----------------------------|---|---|--|
| B.8.1 | Disturbance to fauna and loss of habitat. | Minimise loss of habitat for fauna. | Continue to use Clearance Permit system for any proposed clearing. Ensure areas to be cleared have been survey pegged and inspected prior to and after clearing. | Ongoing | Superintendent responsible for cleaning project | Only areas required for TSF, Reclaim and infrastructure facilities are cleared. | Argyle Land Clearance Guidelines (Argyle, 2003). |
| B.8.2 | | | | | Mine Planning Survey Superintendent Environment | | Nil |
| B.8.3 | | | Induction to all new employees includes section regarding minimising vegetation (habitat) disturbance – drive only on formed tracks, no clearing, permit system etc. Maintain awareness program for Clearance Procedure and permit system. | Ongoing | Environmental Advisor | All site personnel attend induction. | Nil |
| B.8.4 | | | Revise the Procedure for Clearances and ensure adequate reference to conduct fauna surveys prior to clearance approval. Conduct fauna surveys of all new areas proposed for clearing or other disturbance. | 2005 As required | Superintendent Environment | No new areas cleared without conservation values being assessed. | Procedure for Clearances (Argyle, 2003zf). |
| B.8.5 | Impact of contaminants on aquatic fauna. | Assess impacts of underground mining on aquatic fauna. | Monitor population sizes and species diversity of fish and aquatic macroinvertebrates. Ecotoxicological assessment of magnesium sulphate which may involve: <ul style="list-style-type: none"> • Phytoplankton sampling; • Developing water quality objectives and triggers for key parameters; • Monitoring; • Toxicity testing using local species; and • Isotope studies. | Annually for first 3 years | Superintendent Environment | Identify impacts on fauna populations or species. | ERISS (2005a) |
| B.8.6 | | | Monitor water quality in: | Annual and as required | Superintendent Environment | Data set suitable to assess potential impact. | Nil |



APPENDICES

| Action | Key Issue | Objective | Management Action | Timing | Responsibility | Target | Work Instruction - Procedure |
|--------|--|--|---|------------------|----------------------------------|--|------------------------------|
| B.8.7 | Impact of contaminants on aquatic fauna. | Assess impacts of underground mining on aquatic fauna. | <ul style="list-style-type: none"> ▪ TSF underdrains and WRD seepage; ▪ licenced discharge points; ▪ Ephemeral pools in creeklines within and outside of mining area; ▪ Proposed RCP3 and spillway; ▪ Gap Dam and Jacko's Dam; and ▪ Wesley Creek and Devil Devil Springs. Conduct studies on fish and aquatic macroinvertebrates to determine: <ul style="list-style-type: none"> ▪ Ecotoxicity of MgSO₄ ▪ Food web dynamics using stable isotope analyses. | Complete by 2007 | Superintendent Environment | Research data available for analyses. | Nil |
| B.8.8 | Impact of feral animals on native fauna. | To reduce predation pressure on native animals. | Maintain feral animal (cat and fox) control programmes. | As required | Environmental Advisor/Officer(s) | Reduction in numbers of feral animals. | Nil |

