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## Fauna Management Plan

Happy Valley Proposal

DRAFT

Prepared for  
Bemax Resources Limited  
by Strategen

April 2009



**BEMAX**  
INCORPORATING CABLE SANDS





# **Fauna and Habitat Management Plan**

Happy Valley Mineral Sands Project

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### **Client: Bemax Resources Pty Ltd**

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## **1. INTRODUCTION**

### **1.1 PURPOSE**

This Fauna Management Plan (FMP) has been prepared as part of the Environmental Review and Management Programme (ERMP) for the Bemax Happy Valley Mineral Sands Mining Proposal (the Proposal). The purpose of the plan is to describe how Bemax will manage impacts to fauna, in terms of species diversity and populations, within and adjacent to the Happy Valley mining operations. The plan addresses the commitments made, advice received and conditions placed during the public ERMP process.

The FMP applies to all ground disturbing activities associated with the mining phase (preparation and operation) of the project that may have the potential to impact on fauna. The Integrated Mining and Rehabilitation Plan (IMRP) includes aspects relating to fauna management in the rehabilitation phase.

### **1.2 CONTENTS**

This document contains the following main sections:

1. A listing of the external (government) and internal (Bemax) management frameworks relating to fauna at the Happy Valley minesite.
2. An overview of fauna species of conservation significance previously identified at the Happy Valley minesite and their habitats.
3. A description of the management objectives, targets and performance indicators defined for the Happy Valley FMP.
4. A summary of the management actions that will be implemented by Bemax to achieve the FMP objectives and targets.
5. A monitoring, reporting and review program, based on the performance indicators and also on continuous improvement principles embodied within the Bemax Environmental Policy.

### **1.3 SCOPE**

The following describes the measures taken by Bemax to identify and incorporate relevant advice on the management of impacts to fauna, including inputs from fauna experts and external stakeholders.

#### **1.3.1 Environmental Scoping Document (2007)**

The Environmental Scoping Document (ESD, Strategen 2007) was released for a two week public review period in March 2007. The ESD proposed several measures to manage impacts to fauna, which are listed in Table 1 and cross-referenced to the relevant sections of the FMP and the supporting ERMP.

**Table 1 Management measures proposed in the ESD (Strategen 2007)**

<b>ESD Proposed management measures</b>	<b>FMP Action</b>
Minimise habitat losses associated with clearing of native vegetation and remnant trees.	1.1, 1.2
Identify measures that will facilitate the long-term successful re-establishment of fauna species and populations.	4.1, 4.2, 4.4
Rehabilitation strategies will ensure a wide range of habitats is available.	
Revegetate previously disturbed areas to improve landscape connectivity, including stream zones.	3.5, 3.7
Feral animal control programs will be initiated or supported to reduce pressures on native fauna populations.	3.1, 3.2
Examine benefits and opportunities to relocate certain fauna species.	2.6, App. F3
Develop clearing protocols to minimise disturbance to resident fauna.	1.2
Outline specific management measures for the protection of conservation significant species.	Table 7

### 1.3.2 Recommendations from consulting ecologists

The survey of *Fauna Values of Bemax's Happy Valley mineral sands deposit* (Bancroft and Bamford 2008) made a number of management and monitoring recommendations aimed at minimising potential impacts to fauna. These recommendations are listed in Table 2 and cross-referenced to the relevant sections of the Fauna Management Plan.

**Table 2 Management measures recommended in Bancroft and Bamford (2008)**

<b>Bancroft &amp; Bamford (2008) recommendation</b>	<b>FMP Action</b>
Limit loss of habitat by restricting clearing.	1.1-1.3
Prevent degradation of surrounding areas by awareness training and restricting access.	2.12
Use existing roads wherever possible. Infrastructure and roads should be located in order to minimise fragmentation of important habitats.	ERMP 2.5
Manage the spread of dieback.	3.6
Implement a fire prevention and control strategy. The creation of a mosaic of fire ages is desirable.	3.8
Minimise hydrological impacts from groundwater use or interference with drainage lines. Monitor seasonal surface flows and groundwater levels. Correct changes attributable to mine activities.	1.1 ERMP 7.7
Where possible, conduct clearing operations outside the breeding season for Black Cockatoos (late winter – early summer).	2.1
Consider deployment and monitoring of nesting boxes for Black Cockatoos.	3.3
Undertake research to determine range and movement of high risk, conservation significant species.	Appendix F2
Minimise night driving.	2.9
Limit speeds in areas of high wildlife activity.	2.9
Report all roadkill to environmental staff. Report roadkill of conservation significant species to DEC.	2.5
Consider measures so that infrastructure does not form a barrier to linear habitats.	ERMP 6.3
Feral fauna should not be encouraged. Control strategies should be implemented.	3.2
Minimise light spill by directing lights away from natural habitats.	3.9
Conduct environmental education and training of staff.	2.12
Provide signage to indicate important habitats.	2.9, 3.4
Return disturbed areas to habitat that can support a fauna assemblage similar to that which occurred prior to mining.	4.1-4.4
Consider the cumulative impact of multiple mine operations in the region.	ERMP 2.5

## 1.4 ENVIRONMENTAL MANAGEMENT SYSTEM

Bemax operates in accordance with its own Environmental Policy, which is the key component of its Environmental Management System (EMS). The Bemax EMS is certified to Australian EMS Standard, AS/NZS 14000. Table 4 lists the EMS procedures relevant to the management of impacts to fauna.

**Table 4 Environmental Management System procedures relevant to fauna management**

EMS Ref	Title	Brief description
WI395	Fauna Protocol When Encountered	Instruction on interacting (or not) with native fauna, injured or otherwise.
WI410	Clearing of Native Vegetation	Instruction on the clearing of native vegetation to minimise risk of fatality to fauna.
WI067	Fauna Habitat Development for Native Vegetation	Standard for the retention and replacement of fauna habitats within rehabilitated areas.
WI068	Block Harvesting	Procedure for collecting and replacing blocks of intact native vegetation, including roots and soil (blocks aid in recolonisation of rehabilitation areas).
WI224	Native Vegetation Pre-clearing Checklist	Procedure for ensuring all necessary approvals, safeguards and baseline data requirements have been addressed prior to clearing.
WI285	Incident Management and Reporting	Instruction for systematically reporting and recording of incidences and near-misses.
SP01	Reporting	Protocol for the internal reporting of environmental incidents and results from monitoring programmes.
SP03	Identification & Management of Environmental Risks	Protocol for developing and maintaining the Environmental Risk Register.
SP06	Environmental Management Program	Strategy for prioritising and managing the environmental risks in the register.
SP07	Structure and Responsibility	Catalogue of the Bemax internal structure and the responsibilities of each position and department.
SP09	Internal and External Communication	Protocol for internal communiqués and for external correspondence. Includes record keeping and response.
SP15	Internal Audits	Protocol for conducting internal audits and the training of internal auditors.

## 1.5 REVIEW OF BEST PRACTICE FAUNA MANAGEMENT

As part of the ERMP, a review of existing Fauna Recovery Plans, government and industry guidelines and case studies in fauna management was conducted and a list of key strategies and actions for managing potential impacts to fauna was developed. These items have been incorporated into this FMP, the IMRP and the Environmental Management and Monitoring Plan (EMMP) for the site.

## 1.6 OTHER RELATED DOCUMENTS

The protection of native fauna and its habitat is the subject of several articles of legislation and government policies. In addition, the State and Australian governments have prepared plans for the recovery of a number of threatened fauna species or groups of species of particular regard. These articles, policies and plans are listed in Table 5. Also listed and briefly described are the baseline surveys commissioned by Bemax as part of the approvals process.

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Table 5 External documents relating to the content of the FMP and the management of fauna generally

Type	Reference	Description/Background
Legislation	Western Australian <i>Wildlife Conservation Act 1950</i>	The Act and its regulation make it unlawful to take (kill, hunt, remove, disturb, molest, injure, etc) native fauna protected under the Act without due authorisation.
	Western Australian <i>Environmental Protection Act 1986</i>	The Act and its regulations make it an offence to clear native vegetation or otherwise harm the environment without due authorisation (pertains to fauna and its habitat).
	Australian <i>Environment Protection and Biodiversity Conservation Act 1999</i>	The Act and its regulation make it an offence to implement a development that will have a detrimental effect on listed matters of national environmental significance (NES).
Policies & guidelines	EPA 2000, <i>Environmental protection of native vegetation in WA</i> . EPA Position Statement 2, Environmental Protection Authority, Perth	States the position of the EPA in assessing proposals that involve the clearing of native vegetation, including demonstration by the proponent that all options have been considered.
	EPA 2006, <i>Environmental offsets</i> . EPA Position Paper 9, Environmental Protection Authority, Perth	Lists the role of and expectations of the EPA in regards to environmental offsets in contributing to a net environmental benefit, particularly for those proposals that might adversely impact (but not severely) critical assets.
	EPA 2008, <i>Environmental offsets</i> . EPA Guidance Statement 19, Environmental Protection Authority, Perth.	Sets out the EPA's advice on when offsets are considered to be appropriate and how proponents should address and present environmental offsets in those instances.
	EPA 2004, <i>Terrestrial fauna surveys for environmental impact assessment in WA</i> . EPA Guidance Statement 56, Environmental Protection Authority, Perth	Describes the expectations of the EPA in regards to the quality and intensity of fauna resources for environmental impact assessment in WA. Includes reporting requirements.
	DEC (CALM) 1991, <i>Conservation of threatened fauna in the wild</i> . DEC Policy Statement 33, Department of Environment and Conservation, Perth	Describes the procedures and resources for assessing the conservation status of native fauna species in WA.
Management/ recovery plans	Garnett and Crowley 2000, <i>Action Plan for Australian Birds</i> . Environment Australia, Canberra	Outlines the biology of native and migratory bird species in Australia that are considered to be under threat or warrant additional studies and the management priorities for those species.
	Wildlife Australia 1996, <i>Action Plan for Australian Marsupials and Monotremes</i> , Wildlife Australia, Canberra	Outlines the biology of native marsupials and monotremes in Australia that are considered to be under threat or warrant additional studies and the management priorities for those species.
	Cale B 2003, <i>Carnaby's Black Cockatoo Recovery Plan</i> . Department of Environment and Conservation, Perth	Lists the management priorities considered necessary to reverse the decline of population and habitat of Carnaby's Black Cockatoo, including identifying priority and non-breeding areas, monitoring populations, community involvement and captive breeding programmes.
	DEC (CALM) 1994, <i>Chuditch Recovery Plan</i> . Department of Environment and Conservation, Perth	Outlines the biology of the Chuditch and prioritises measures to be implemented to ensure populations are protected.
	Department of Environment, Water, Heritage and the Arts (DEWHA) 2006, <i>Wildlife Conservation Plan for Migratory Shorebirds</i> . Department of Environment, Water, Heritage and the Arts, Canberra	Identifies and lists the biology and distribution of migratory shorebirds protected under international treaties, such as JAMBA, CAMBA, etc.
	Environment Australia 1999, <i>The Action Plan for Australian Bats</i> . Environment Australia, Canberra	Outlines the biology of native bats in Australia that are considered to be under threat or warrant additional studies and the management priorities for those species.
Baseline fauna surveys	Bamford MJ and Bamford AR 2000, <i>Proposed Gwindinup mineral sands mine - fauna surveys August and December 1999</i> . Unpublished report prepared for Bemax Resources Pty Ltd	The 1999 surveys were conducted as part of an earlier environmental impact assessment for the (then) combined Gwindinup and Happy Valley Proposal. The survey included a literature review and a field programme carried out from 31 July to 5 August 1999 and from 12 to 17 December 1999. The field programme involved the use of pitfall, cage and Elliott traps, a bird census and spotlighting.

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Type	Reference	Description/Background
	Bamford MJ and Wilcox JA 2004, <i>The use of the proposed sand mining area at Gwindinup by threatened species</i> . Unpublished report prepared for Bemax Resources Pty Ltd	The objective of the 2004 survey was to assess the potential impact of the Gwindinup and Happy Valley mining proposals on Chuditch ( <i>Dasyurus geoffroyi</i> ) and Western Ringtail Possum ( <i>Pseudocheirus occidentalis</i> ), which are both threatened species. In addition, surveys of tree hollows were carried out in both the proposed mining areas and conservation areas to assess the availability of potential nesting sites for cockatoos and to search for nesting pairs. Surveys took place over five days in early November 2004.
	Bancroft W and Bamford MJ 2008, <i>Fauna values of Bemax's Happy Valley mineral sands deposit</i> . Unpublished report prepared for Bemax Resources Pty Ltd	The scope of this report was approved by DEC in August 2007 and involved surveying two areas within the proposed Happy Valley mine area and two control areas further to the south across similar vegetated landforms. After a site inspection of September 2007, the survey was conducted in November 2007 over seven consecutive days using survey methods including pitfall, funnel and Elliott traps and bird observations at each of the four sites. Additional searches were conducted specifically for short-range endemic invertebrates.

## 2. FAUNA AND HABITATS OF SIGNIFICANCE

The Happy Valley ERMP describes in detail the fauna present on the site (or likely to be so) and the habitat requirements of those that are considered to be of conservation significance. Also described were several significant habitats for fauna, considered to be important contributors to the biological diversity of the Proposal site.

The information in this section is a summary of the ERMP, which is itself based on those studies listed in Table 5.

### 2.1 OVERVIEW OF THE FAUNA OF THE HAPPY VALLEY AREA

The potential for individual taxa to occur within the project area is summarised below. The fauna survey programme did not identify any fauna species that are restricted to the Proposal site or its immediate surrounds.

#### ***Short-range endemic invertebrates***

No confirmed short-range endemic invertebrates were found during the 2007 studies, and none had been located in earlier surveys (1999 and 2004). However, two species of millipede, one onychophoran, one isopod, one scorpion and one earthworm were collected and most are potentially short-range endemics. The one scorpion collected is known to be widespread. All invertebrates except for the scorpion were collected close to seasonal watercourses and therefore have restricted distributions in the area. However, seasonal watercourses are a linear habitat that extends well outside impact areas and is well-represented in the general region of the Whicher Range.

#### ***Frogs***

Up to 12 frog species may occur in the project area but only eight species have been recorded despite repeated surveys since 1999. One of the species not recorded, the Motorbike Frog, is known from Capel but is usually associated with permanent water so may be absent from the project area. Two of the remaining three un-recorded species call mainly in the autumn so may have gone undetected as no field work has been undertaken at this time of the year.

All of the frogs recorded are widespread regionally, with most making extensive use of upland environments while relying on seasonal wetlands to breed. They may be sensitive to hydrological impacts of the proposed development, but suitable habitats are widespread.

#### ***Reptiles***

Up to 36 reptile species may occur in the project area but only 25 species have been recorded. Species not recorded are generally cryptic, such as burrowing snakes, but the project area is also on the southern edge of the distribution of some of these species, so they may not be present.

The reptile assemblage does not include species with restricted distributions such as *Elapognathus minor*, restricted to the extreme south coast, while the South-West Carpet Python is the only species of listed conservation significance (CS1). This was recorded in 1999. The skink *Lerista microtis* is considered of local conservation significance (CS3) because it has a restricted distribution, but where

it is present it is usually readily caught (M. Bamford, pers. comm.). Therefore, although included as expected to be present, it may not occur in the project area.

### **Birds**

Up to 121 bird species may occur in the project area but only 78 species have been recorded. The total includes many waterbirds that may be irregular visitors in small numbers to wetlands in the project area, but are likely to be more abundant on the extensive wetlands of the nearby coastal plain. These waterbirds include species that are listed as migratory under the EPBC Act (and therefore as CS1), but the project area is not utilised by them in large numbers or on a regular basis.

Bird species of conservation significance that do use the area regularly are the three species of Black-Cockatoo, with possible regular usage also by the Square-tailed Kite (CS3), Peregrine Falcon (CS3), Barking Owl (CS2), Masked Owl (CS2) and Western Yellow Robin (CS3). The three Black-Cockatoos are of particular concern because they are regularly seen in the area in moderate to large numbers. In general, however, the project area does not contain an unusual concentration of foraging or nesting habitat for Black-Cockatoos. Specifically, Wilcox and Bamford (2004) noted that the area contained a low density of the sort of large eucalypt trees likely to contain hollows used by Black-Cockatoos for breeding.

### **Mammals**

The mammal assemblage may contain up to 29 species, of which six are introduced. Of the 23 expected native species 14 have been recorded, while five of the six expected introduced species have been observed. The mammal fauna has been noted previously as being rich, but the Chuditch, apparently common in 1999, has not been observed subsequently. Likewise the Western Ringtail Possum, with one sighting in 1999, has not been recorded again despite targeted searching in 2004 and 2007. Numbers of captures of mammals were generally too low to permit analysis of captures in relation to habitat, but native mammal populations are known to be affected by introduced predators (particularly the Fox but possibly also the Cat). Structural complexity close to the ground, such as the presence of fallen timber, is likely to be important for the Chuditch, while dense understorey vegetation is favoured by the Quenda.

## **2.2 KEY HABITATS AND HABITAT VALUES**

The review of habitat requirements for larger mammals identified the following broad vegetation structural preferences:

- the Phascogale favours complex vegetation structure, especially small trees in the mid storey, such as *Allocasuarina* and *Banksia* in the mid-storey under eucalypts
- the Chuditch favours forest with a lot of fallen timber, especially with hollows
- the Quenda favours dense understorey vegetation, often associated with wetlands
- the Brush Wallaby utilises thickets for shelter.

These structural characteristics of vegetation are not limited to particular vegetation types.

Several habitats within the Happy Valley Proposal site and surrounds are considered likely to be important to fauna diversity, abundance and productivity (Figure 2) and are described below.

1. Yellow sandy soils. Sampling in 2007 indicated a greater abundance of reptiles (no increase in species richness) on yellow sandy soils.
2. Riparian vegetation. Support higher abundance of birds; important for most frog species and short-range endemic invertebrates.
3. Linear vegetation features. Linear remnants of vegetation that traverse from the Blackwood Plateau down to the Swan Coastal Plain are important to provide connection between the different habitat types.
4. Black-Cockatoo nesting and foraging habitat.

As the three black-cockatoo taxa that potentially utilise the project area are of high conservation significance, any clearing of nesting or foraging habitat is considered significant. However, neither foraging or nesting habitat is limited in the area as there is extensive state forest to the east and south. Potential nesting trees (i.e. those that may have suitable nesting hollows) are those with a diameter at breast height greater than 70 cm (Whitford and Williams 2002, Johnstone et al. 2002, cited in Bancroft and Bamford 2008). Surveys conducted in 2004 found that the density of potential nesting hollows varied across the proposed disturbance area and off from 1.3 to 3.1 per ha, with the frequency of logging appearing to influence density.

All conservation significant fauna identified in the ERMP as potentially present in the project area have habitats that are distributed throughout the Whicher Scarp, Blackwood Plateau and Swan Coastal Plain and are not limited to the project area. However, many of these habitats are widely recognised as being restricted or subject to threatening processes.

## **2.3 POTENTIAL SOURCES OF IMPACT**

### ***Vegetation clearing and soil disturbance***

The Happy Valley Proposal will disturb 248 ha in total, including the clearing of 155 ha of native vegetation. This disturbance is spread across a number of different habitats, but predominantly Eucalyptus woodland of the Whicher Scarp.

### ***Habitat fragmentation***

The proposed mine lies across the landscape, with the Swan Coastal Plain below and the Blackwood Plateau above. The mine therefore has the potential to isolate or restrict the movements of fauna populations and individuals living within vegetation remnants from the wider area.

### ***Physical injury or fatality***

The use of heavy machinery and other vehicles during clearing, mining and transport has the potential to result in death or injury to individual animals. This will affect fauna on a relatively small and local scale over the short term and will be managed using an array of precautionary measures.

### ***Indirect effects on adjacent habitats***

The effects on fauna in adjacent habitats resulting from increased human activity, such as changes in the level and nature of background noise and night-time lighting, are difficult to predict, although they may affect predator-prey relationships, reduced nesting or day-time refuge and a reduction in fecundity for some species.

### Other minor hazards

Other aspects of the Proposal that might affect indigenous fauna, but only to a minor extent, include:

1. **Changes to hydrological conditions** are expected to be negligible, as the mine does not extend below the water table (i.e. no dewatering) and does not include any of the ephemeral water courses
5. **Increases in wildfires** are often anticipated with developments in vegetated areas, although the opposite is usually the case as a result of increased surveillance and availability of quick response fire-fighting resources
6. **Increases in the activity or influence of threatening processes**, such as dieback and feral animals brought about by increased disturbances or competition for habitat, are difficult to quantify but can be managed through precautionary measures. These matters are addressed in the EMMP.
7. **Poor provisions for fauna habitat within rehabilitation** are not expected to be an issue, as the rehabilitation plan will include such provisions (refer to the IMRP).

## 3. MANAGEMENT OBJECTIVES AND ACTIONS

### 3.1 ENVIRONMENTAL OBJECTIVES

The avoidance, minimisation and mitigation of environmental impacts in relation to fauna will be pursued by adopting the following management objectives:

1. Minimise the impact of clearing activities on fauna.
8. Minimise injury or death of individual (macro) fauna during mining, with particular regard to species of conservation and/or cultural significance.
9. Protect (and enhance) the fauna habitat values and functions of the environment surrounding the operations.

**Table 6 Environmental targets and performance indicators for fauna management**

Objective	Target	Key performance indicator
Minimise the impact of clearing activities on fauna	No clearing of riparian vegetation.	No clearing undertaken within 30 m of the creek centreline (HVS) and 50 m (HVN).
	Only areas to be mined within 18 months should be cleared, unless rehabilitation and/or noise constraints apply.	Area of clearing in comparison to the mine plan.
Minimise injury or death of individual (macro) fauna during mining, with particular regard to species of conservation and/or cultural significance.	No death or injury to fauna caused from vehicle collisions after the site has been cleared	Environmental incident reports relating to collisions with fauna.
	All clearing operations to be undertaken under the supervision of a fauna expert	Pre-clearing inspection reports
	Allow fauna opportunities to escape during clearing	Staged clearing practices implemented
Protect the fauna habitat values and functions of the environment surrounding the operations	Implement programs to manage threatening processes (fox baiting and feral bee control) and enhance habitat value (rehabilitation and installation of nest boxes) in vegetation surrounding the areas to be cleared.	Programs implemented as documented in the Annual Environmental Review.

Rehabilitation, including habitat re-creation, is addressed in the IMRP. Offsets for habitat clearing are addressed in the Conservation Offsets Program.

### **3.2 MANAGEMENT ACTIONS**

The management actions are detailed in Table 7. Further explanatory notes relating to the management actions are provided below where required.

#### ***Development of specific clearing procedures (1.1)***

The mine plan presented in the ERMP has been developed with a key objective of minimising disturbance to native vegetation, particularly in regards to the placement of infrastructure, such as stockpiles and roads. Where clearing of native vegetation for such purposes is proposed, the alternatives to the clearing have been documented and assessed.

To ensure the actual areas of vegetation cleared match exactly those proposed in the ERMP, Bemax has developed EMS procedures for conducting clearing activities. These procedures include specifications for information gathering (e.g. survey), demarcation of cleared areas, special instructions (e.g. fauna checks, topsoil removal, etc.) and authorisation requirements. Implementation of these procedures is regularly assessed by both internal and external auditors as part of EMS performance management and accreditation.

#### ***Timing of clearing (2.1)***

Intensive native vegetation clearing campaigns will be prioritised for the period mid-summer to late autumn, which is designed to coincide with the non-breeding season of the birds and arboreal animals of conservation significance. However, there are important rehabilitation commitments that may be constrained by this timeframe, particularly targets for the direct return (i.e. same season) of topsoil within the yellow sands and the Whicher Slopes vegetation communities. For these communities, clearing may need to be brought forward<sup>1</sup>, but prior assessment of the areas by a fauna specialist will still be required as will other controls relevant to clearing (Table 7).

#### ***Staged clearing of habitat trees (2.6, 2.7)***

Following the commencement of clearing, all vegetation and debris, with the exception of habitat trees and habitat areas identified by the fauna specialist, will be removed from the clearing footprint that same day and stockpiled, mulched or burnt in cleared areas away from remaining vegetation (2.7). The habitat trees and habitat areas will be left overnight prior to being felled or otherwise disturbed (2.6). Staging the clearing in such a manner may provide opportunity for tree-dwelling animals to escape overnight into the surrounding bushland.

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<sup>1</sup> The alternative is to clear the vegetation in the summer-autumn period preceding topsoil removal - however, this is contrary to other commitments and raises the risk of dust and topsoil loss.

**Feral bee control (3.1)**

The European honey bee (*Apis mellifera*) is an exotic species that competes with native birds, mammals and invertebrates for floral resources (nectar and pollen), disrupts natural pollination and seed set processes, aids in the spread and establishment of introduced weeds and competes with a range of native birds and mammals that are dependant on hollows in trees for shelter or nests.

Bemax will commence a feral bee control program for the vegetation surrounding the disturbance area at least six months prior to ground-disturbing activities<sup>2</sup>. Although the maximum height that can be reached to destroy hives will be determined by safety requirements, a significant positive effect can still be achieved in terms of increasing available tree hollows for habitat nesting (Natsync Environmental, pers. comm.). The feral bee control program will continue throughout the mining and early rehabilitation period (2 years after planting is concluded), at which stage it will be reviewed.

**Nest boxes (3.4)**

The use of artificial nesting structures, such as boxes, tubes and even sections of hollow tree limbs, to supplement the availability of nesting sites is a widely accepted practice. Bemax will commission the installation of appropriate artificial nesting structures to increase the available nesting habitat of Black Cockatoo, arboreal animals such as phascogales and bats. The structures will be constructed or sourced and located on the advice of a relevant specialist. The artificial nests will be installed prior to the commencement of clearing activities, on a rolling schedule based on each year's clearing campaign. The nests will be mapped so they can be maintained and any activity in them recorded. The number and distribution of the artificial nests will be revised each year, based on advice from the specialist.

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<sup>2</sup> Or as soon as approval to commence operation is received from the Minister, whichever is the shorter.

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**Table 7 Key management commitments for the protection of fauna at Happy Valley**

Environmental objective	#	Management commitment
Minimise the impact of clearing activities on fauna.	1.1	Develop and implement site and/or area specific Clearing Procedures as part of EMS. The procedure will include demarcation of areas to be cleared, fauna checks, authorisation requirements and a pre-start checklist that includes sign-off and a map clearly outlining vegetation to be cleared.
	1.2	Retain a 50 m mining buffer from the centre of creek GWSW2 and a 30 m mining buffer from the centre of creeks HVSWS2 and HVSWS3 (only disturbance will be crossings).
	1.3	Develop procedures to ensure clearing activities are staged over the life of the mine development to reduce net impact on habitat availability.
Minimise injury or death of individual (macro) fauna during mining, with particular regard to species of conservation and/or cultural significance	2.1	Conduct clearing activities between January to May (inclusive) to avoid the majority of breeding/nesting period for the majority of conservation significant fauna.
	2.2	Prior to clearing, the area to be cleared will be surveyed by a fauna specialist to identify trees that contain tree hollows that have the potential to be habitat for conservation significant fauna. These trees will be flagged and their positions and habitat values recorded. Logs, rock piles and moist areas within the clearing footprint will also be flagged and recorded.
Protect the fauna and fauna habitat values and functions of the environment surrounding the operations.	2.3	Ensure a recognised Fauna Carer is on-site during clearing activities to undertake or supervise those tasks related to the protection of individual fauna (additional resources will be employed if advised by the Carer).
	2.4	The Fauna Carer is to conduct daily pre-start checks of vegetation to be cleared and retrieve fauna if required. No clearing is to be undertaken until the Fauna Carer is satisfied that as few animals as practicable remain or potentially remain in the clearing area.
	2.5	Prepare and implement a Procedure and training materials for when fauna (injured or otherwise) are encountered. Ensure all encounters are recorded.
	2.6	Stage clearing of vegetation: leave habitat trees overnight after clearing surrounding vegetation.
	2.7	Develop procedures to remove felled vegetation from clearing area as soon as possible for burning/mulching/stockpiling to minimise recolonisation. The basis of the procedures will be to remove cleared vegetation the same day or, if not possible, then to locate temporary stockpiles as far away from remaining uncleared habitat as possible
	2.8	Record, collate and report the performance of the clearing controls in terms of fauna impacts and interactions, on an annual basis.
	2.9	Prohibit the feeding, disturbance, harassing or hunting of fauna, or the presence of firearms or pets on-site. Training and signage will be used on-site. Ensure that all domestic waste is placed in bins with either catches or weighted lids.
	2.10	Restrict speeds for light vehicles and trucks to 10 km/hr off road and 30 km/hr on formed roads on the site. Heavy earthmoving vehicles (scrapers) may exceed these speed limits in disturbed areas during daylight hours. All creek crossings will have a speed limit of 10 km/hr from half an hour before sunset to half an hour after sunset. The speed limits will be signposted in these areas. All collisions with macro-fauna i.e. birds, mammals and large reptiles will be reported and recorded in EMS.
	2.11	Include an outline of the Fauna Management Plan in the site induction process for all contractors and staff before conducting unsupervised activities on the site.
	3.1	Implement a feral bee control programme for the vegetation surrounding the disturbance area and offset areas (to a minimum of 150 ha) at least 6 months prior to clearing to increase availability of tree hollows (pending approval timeframe). Continue programme until two years after completion of rehabilitation works, then review.
3.2	Implement a fox control (baiting) programme (six-monthly) of the lands under the control of BEMAX and agreed offset areas, including Lots 215, 4485, 4965, 3829 and 107, for the period from six months prior to clearing to two years after completion of rehabilitation works, then review.	
3.3	Contribute \$5000 per year to DEC for fox control program for the Whicher Scarp, with a focus on the Happy Valley tenements and the Argyle forest block, for the period of mining and for two years following.	
3.4	Install artificial nesting boxes for small animals, such as phascogales and bats, and birds, such as the Black Cockatoos on advice of a fauna consultant.	
3.5	Install signs, fences, obstacles and/or gates at all known possible vehicle entry points to the site to minimise uncontrolled access to the surrounding area. Mine site personnel and contractors will be prohibited from accessing vegetated areas without authorisation.	
3.6	Increase habitat value of creek lines by planting native seedlings where native cover is less than 50% and creating areas of mulch/timber debris for quenda, SRE, etc.	

# Draft

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Fauna and Habitat Management Plan

Environmental objective	#	Management commitment
	3.7	Prior to the commencement of mine development, Bemax will prepare a Dieback Management Plan for the Happy Valley operations as part of the IMRP. The Plan will include hygiene measures to be adopted prior to entering areas of State Forest or crossing from infected areas to un-mappable or uninfected areas.
	3.8	Rehabilitation of disturbed quarry sites and disused tracks will be addressed within the IMRP.
	3.9	An operational fire-fighting pump and tank will be on-site at all times in a ready state to respond to any outbreak of fire on the minesite or its immediate surrounds. Any personnel sighting smoke or a fire in vegetation will immediately alert the site supervisor who will be responsible for contacting Fire and Emergency services. A fire response procedure will be developed prior to commencement of site activities. The fire response procedure shall be outlined in all site inductions.
	3.10	The placement of night-time lighting will be in accordance with the guidance contained in Australian Standard AS4282-1997 <i>Control of the obtrusive effects of outdoor lighting</i> .



## 4. MONITORING AND REVIEW

### 4.1 PERFORMANCE MONITORING

The performance monitoring programme is described in Table 8. All monitoring records will be collected as per the relevant standards or EMS procedures and will be stored at the Bemax North Shore Administration Centre.

**Table 8 Monitoring program for fauna protection and management**

Parameter	Frequency	Location	Purpose	Responsibility
Reports of fauna encounters/ collisions	Opportunistic Annually	Project Area	To determine if further fencing or warning signs are needed beyond those existing.	Environmental officer
Feral animals	Opportunistic	Project Area, specifically focusing on the remaining native vegetation at the site or any refuse areas.	To determine the requirement to undertake control of feral animals.	Environmental officer
Feral bees and foxes	Two years after rehabilitation planting has completed	Fox and bee control areas (to be identified)	To review requirement for further fox and bee control	Environmental officer
Fauna recolonisation	Biennially, commencing once rehabilitation is two years old	Rehabilitated areas and control sites (as mapped by Bancroft & Bamford 2008)	To follow trends in fauna recolonisation of the mined areas following rehabilitation	Environmental officer

### 4.2 PERFORMANCE REVIEW

Monitoring results will be reviewed by Bemax environmental staff as they are recorded, to enable a response to be implemented if required. The results of the monitoring programme will be reviewed internally every three months as part of the EMS procedures.

### 4.3 COMPLIANCE AUDITING

Bemax operates a certified ISO 14001:2004 Environmental Management System. The core of which is the company's Environmental Policy, which has been approved and signed by the Managing Director. Bemax routinely conducts internal audits (SP15 Internal Audits) to assess the compliance with, and effectiveness of various components of its EMS, including Environmental Management Plans. In addition, the entire EMS is audited externally every six months, with a full re-certification audit every three years. Audit findings are fed back into the EMS in order to improve environmental performance.

The Environmental Policy also requires that Bemax regularly monitor and audit its environmental compliance. Auditing of performance occurs via a series of compliance, internal and external audits that occur via the Integrated Management System.

The auditing of compliance with this management plan and any conditions or commitments related to management of mining and rehabilitation will be conducted on a 12-monthly basis throughout the project's life as part of the Annual Environmental Report. The auditing will be conducted by the Senior Environmental Officer – Compliance/Operations.

#### **4.4 NON-COMPLIANCES**

The EMS contains procedures for managing internal and external communications of environmental matters. Environmental hazards and incidents are reported using an incident report (CD018). All external complaints automatically generate an incident report that is forwarded to and dealt with by the Environmental Department.

Non-compliances identified during the auditing process, through the EMS, or by stakeholder consultation will be brought to the attention of the Operations Manager and an incident report will be completed. Non-compliances will be reported to the DEC, along with any measures that will be or have been taken to prevent recurrence of the conditions leading to the non-compliance.

#### **4.5 REPORTING**

A report describing the performance of the FMP in working towards its objectives, based on monitoring results, and the extent to which it has been complied with, will be submitted to the DEC each twelve months on 31 March each year. The report will be provided to documented stakeholders and will be otherwise publicly available on request.

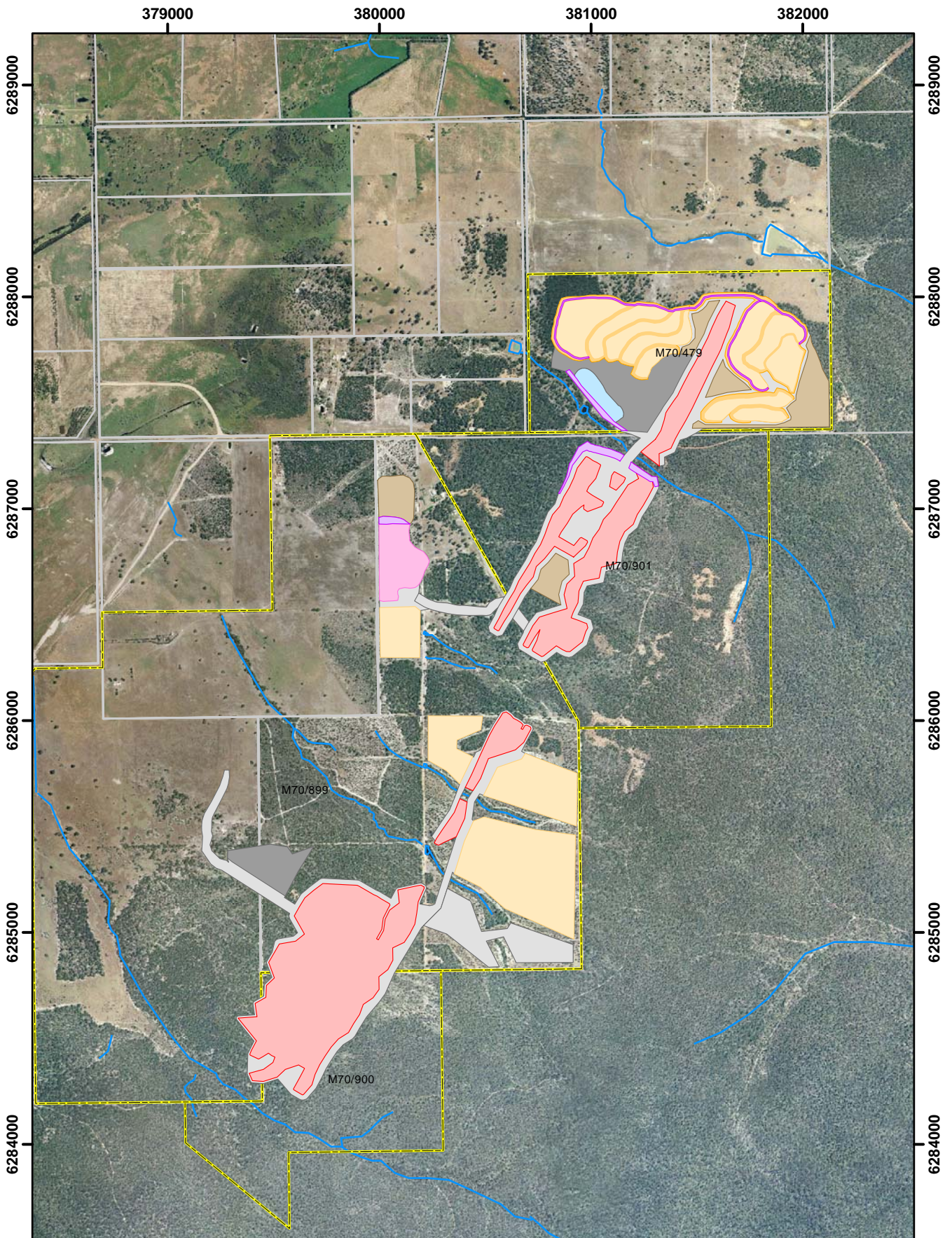
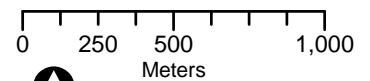


Figure 1  
Happy Valley mine Plan

Legend

- |              |            |            |                      |
|--------------|------------|------------|----------------------|
| Disturbance  | Noise Bund | Plant Site | Tenement Boundaries  |
| Fines        | OB         | TS         | Cadastral Boundaries |
| Fines (Wall) | Pit        | Water Dam  | Creeks               |



Datum: GDA 1994 MGA Zone 50  
Drawn: DH  
Date: 8/4/09





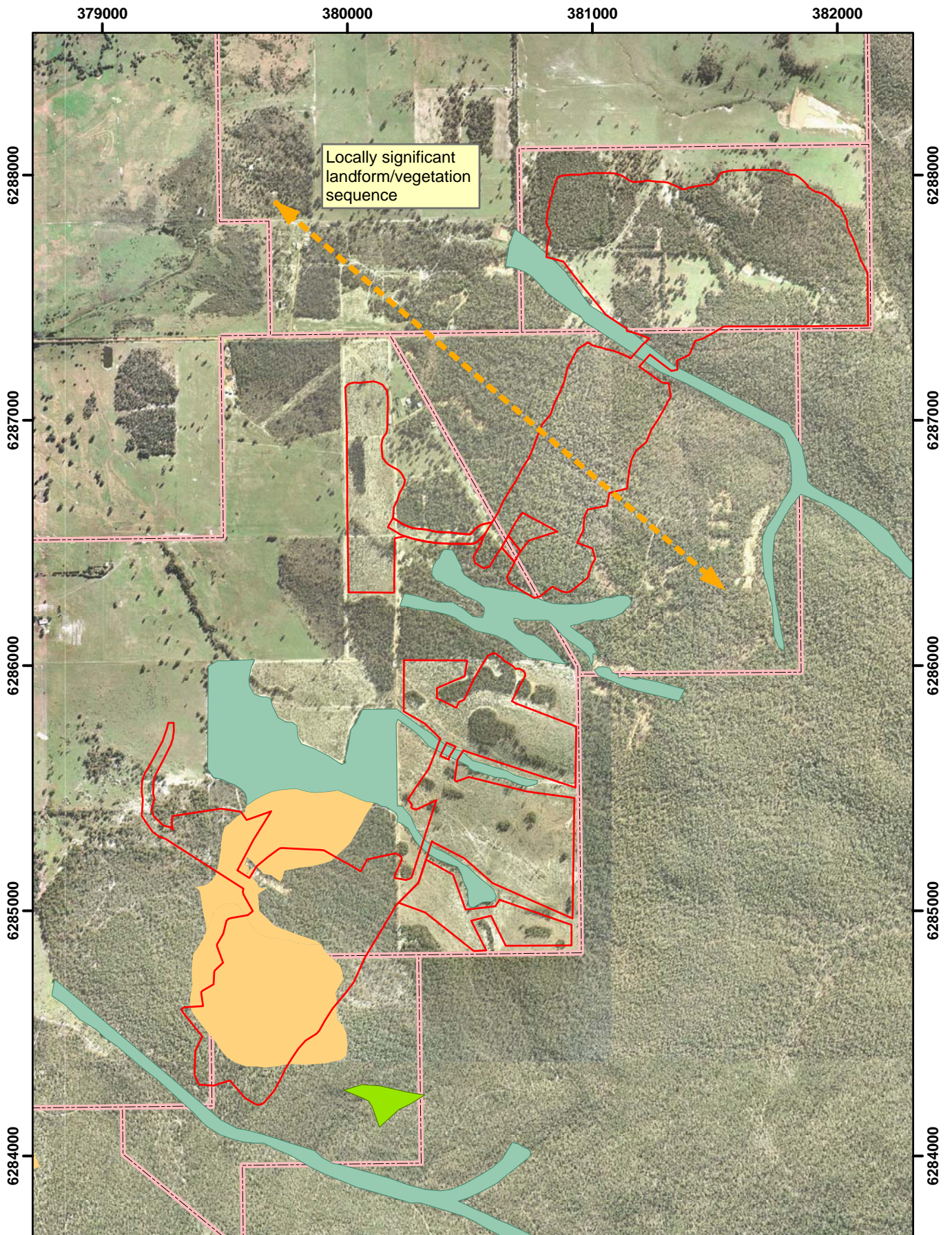
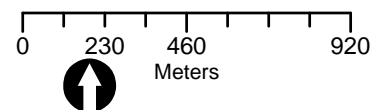


Figure 2:  
Locally significant fauna habitats

- |                     |                   |
|---------------------|-------------------|
| <b>Habitat Type</b> | Disturbance       |
| Yellow Sands        | Tenement Boundary |
| Riparian            |                   |
| Shady Valleys       |                   |



Datum: GDA 1994 MGA Zone 50  
Drawn: DH  
Date: 9/4/09





## 5. REFERENCES

### 5.1 EXTERNAL DOCUMENTS

- Bamford MJ and Bamford AR 2000, *Proposed Gwindinup mineral sands mine - fauna surveys August and December 1999*. Unpublished report prepared for Bemax Resources Pty Ltd
- Bamford MJ and Wilcox JA 2004, *The use of the proposed sand mining area at Gwindinup by threatened species*. Unpublished report prepared for Bemax Resources Pty Ltd
- Bancroft W and Bamford MJ 2008, *Fauna values of Bemax's Happy Valley mineral sands deposit*. Unpublished report prepared for Bemax Resources Pty Ltd
- Cable Sands (WA) Pty Ltd (Cable Sands) 2000, *Gwindinup Mineral Sands Mine Consultative Environmental Review*. Cable Sands, Bunbury
- Cale B 2003, *Carnaby's Black Cockatoo Recovery Plan*. Department of Environment and Conservation, Perth
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- DEC (CALM) 1994, *Chuditch Recovery Plan*. Department of Environment and Conservation, Perth
- Department of Environment, Water, Heritage and the Arts (DEH) 2006, *Wildlife Conservation Plan for Migratory Shorebirds*. Department of Environment, Water, Heritage and the Arts, Canberra
- Environment Australia 1999, *The Action Plan for Australian Bats*. Environment Australia, Canberra
- EPA 2000, *Environmental protection of native vegetation in WA*. EPA Position Statement 2, Environmental Protection Authority, Perth
- EPA 2004, *Terrestrial fauna surveys for environmental impact assessment in WA*. EPA Guidance Statement 56, Environmental Protection Authority, Perth
- EPA 2006, *Environmental Offsets*. EPA Position Paper 9, Environmental Protection Authority, Perth
- Garnett ST and Crowley GM 2000, *Action Plan for Australian Birds*. Environment Australia, Canberra
- Standards Australia 1997, *Control of the obtrusive effects of outdoor lighting*. SAI Global, Sydney
- Strategen 2007, *Happy Valley Mineral Sands Project - Environmental Scoping Document*. Unpublished report prepared for Bemax Resources Pty Ltd
- Wildlife Australia 1996, *Action Plan for Australian Marsupials and Monotremes*, Wildlife Australia, Canberra

## 5.2 INTERNAL DOCUMENTS

Reference	Title	Type
CD915	Happy Valley Integrated Mining and Rehabilitation Plan	Controlled Document
SP01	Reporting	System Procedure
SP03	Identification & Management of Environmental Risks	System Procedure
SP06	Environmental Management Program	System Procedure
SP07	Structure and Responsibility	System Procedure
SP09	Internal and External Communication	System Procedure
WI067	Fauna Habitat Development for Native Vegetation	Work Instruction
WI068	Block Harvesting	Work Instruction
WI224	Native Vegetation Pre-clearing Checklist	Work Instruction
WI395	Fauna Protocol When Encountered	Work Instruction
WI410	Clearing of Native Vegetation	Work Instruction