



## Mt Magnet Gold Pty Ltd

## Mt Magnet Gold Project

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Mt Magnet Gold Project: Targeted  
Malleefowl Survey

March 2012

**RAMELIUS**  
RESOURCES




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# Mt Magnet Gold Project: Targeted Malleefowl Survey

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## Document Control for Job Number: MMAG\_FS\_12001

Document Status	Author	Reviewer	Signature	Date of Issue
Final Report	M. Gresser	B. Parsons Trinity File		19/03/2012

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## Executive Summary

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In January 2012, Mt Magnet Gold Pty Ltd commissioned Outback Ecology to undertake a targeted Malleefowl (*Leipoa ocellata*) survey within the Mt Magnet Gold Project Study Area, which is located approximately five kilometres north-west of Mt Magnet, in the Mid West region of Western Australia. The Study Area, which encompasses 284.4 hectares, consists of two areas proposed to be cleared as part of the Mt Magnet Gold Project. The survey was commissioned in accordance with Condition Five of Clearing Permit 3713/1, which was granted to Mt Magnet Gold by the Department of Mines and Petroleum (DMP) on 20 May 2011. This report documents the results of a targeted Malleefowl survey conducted within the Study Area on 6 and 7 February 2012.

The primary objective of the survey was to determine the presence or absence of Malleefowl mounds within the areas proposed to be cleared by Mt Magnet Gold. Specific objectives were to:

- Map broad fauna habitats present within the Study Area and assess their suitability for Malleefowl; and
- Undertake targeted searches for Malleefowl within broad fauna habitats likely to support the species (e.g. groves of dense Mulga possessing understorey and/or leaf litter accumulation as opposed to areas of open sparse Mulga over bare soils).

Prior to field work, a preliminary inspection of aerial photography provided by Mt Magnet Gold was used to identify potential Malleefowl habitat within the Study Area. A reconnaissance survey was conducted to confirm the location and extent of such habitat. This was followed by a more comprehensive survey of the entire Study Area in which habitat assessments were conducted within potential Malleefowl habitat and the presence or absence of Malleefowl mounds was determined.

The survey yielded only one direct observation relating to the Malleefowl: one extinct mound that was unlikely to have been used for many years, possibly decades. There was no further evidence of Malleefowl within the Study Area and overall, there was little suitable Malleefowl habitat present. As a consequence, any clearing within the Study Area is highly unlikely to have any impact on Malleefowl.

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## 1. INTRODUCTION

### 1.1. Project Background And Location

In January 2012, Mt Magnet Gold Pty Ltd (Mt Magnet Gold) commissioned Outback Ecology to undertake a targeted Malleefowl (*Leipoa ocellata*) survey within the Mt Magnet Gold Project Study Area, which is located approximately five kilometres (km) north-west of Mt Magnet, in the Mid West region of Western Australia (**Figure 1**). The Study Area, which encompasses 284.4 hectares (ha), consists of two areas proposed to be cleared as part of the Mt Magnet Gold Project (**Figure 2**). The survey was commissioned in accordance with Condition Five of Clearing Permit 3713/1 (**Appendix A**), which was granted to Mt Magnet Gold by the Department of Mines and Petroleum (DMP) on 20 May 2011.

### 1.2. Report Scope And Objectives

This report documents the results of a targeted Malleefowl survey conducted within the Study Area on 6 and 7 February 2012. The primary objective of the survey was to determine the presence or absence of Malleefowl mounds within the areas proposed to be cleared by Mt Magnet Gold.

Specific objectives were to:

- Map broad fauna habitats present within the Study Area and assess their suitability for Malleefowl; and
- Undertake targeted searches for Malleefowl within broad fauna habitats likely to support the species (e.g. groves of dense Mulga possessing understorey and/or leaf litter accumulation as opposed to areas of open sparse Mulga over bare soils).

The survey was designed and conducted in accordance with the appropriate Environmental Protection Authority (EPA) position statements and guidelines, including:

- EPA's (2002) Position Statement No. 3, *Terrestrial Biological Surveys as an Element of Biodiversity Protection*;
- EPA's (2004a) Guidance Statement No. 56, *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia*;
- EPA and Department of Environment and Conservation (DEC)'s (2010) *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*; and
- EPA's (2004b) Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*.

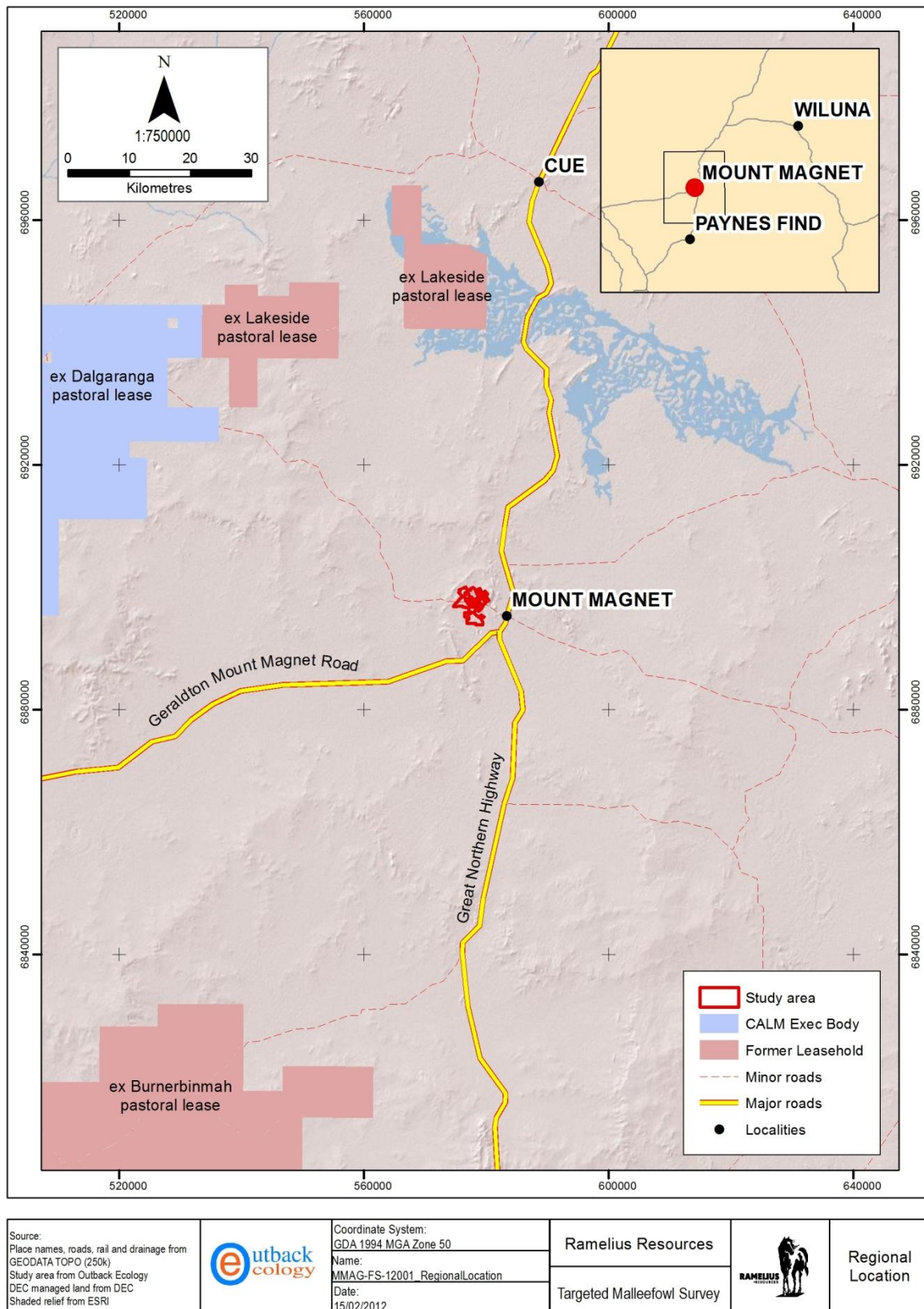


Figure 1: Regional location for the Mt Magnet Gold Project Study Area



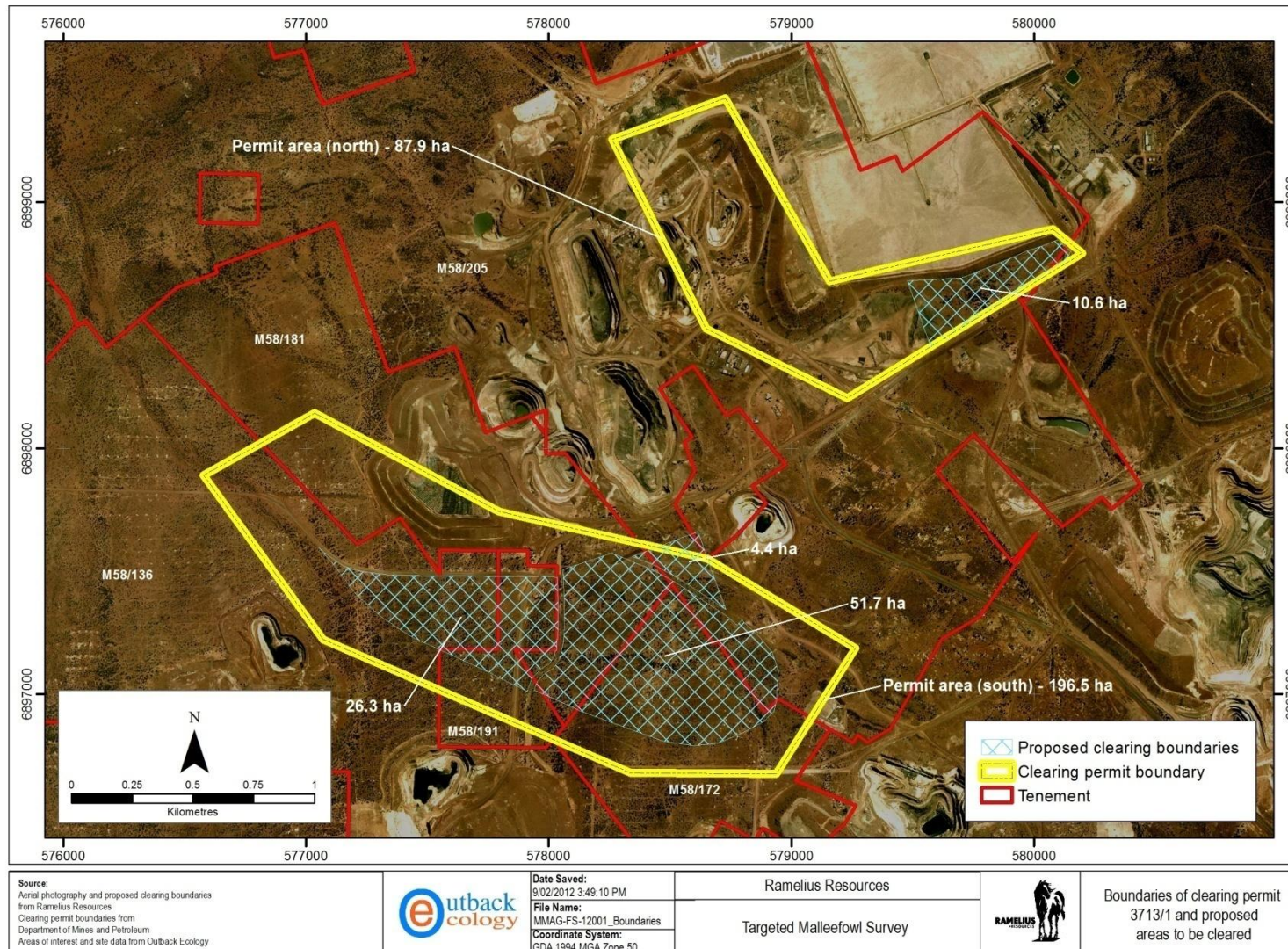


Figure 2: Location of clearing boundaries from DMP's clearing permit 3713/1 and proposed clearing boundaries provided by Mt Magnet Gold

### 1.3. Species Information

The Malleefowl is a ground-dwelling bird that builds large and distinctive mounds of soil and litter in which it incubates its eggs. Malleefowl distribution is fragmented and scattered through semi-arid rangelands and the eastern Wheatbelt of south-western Australia (Garnett and Crowley 2000). The known distribution of the Malleefowl occurs over the Study Area (Barrett *et al.* 2003, Marchant and Higgins 1993), although the species is only thought to be scattered throughout the region (Benshemesh *et al.* 2007). Primary habitat consists of Mallee and semi-arid shrublands (Garnett and Crowley 2000), with a recent survey revealing that regionally this species favours shrubby areas with heights reaching two to four metres (m), as opposed to open areas or woodlands (Benshemesh *et al.* 2007). There are scattered records of Malleefowl within the surrounding 200 km of the Study Area (DEC 2011), although the majority are located towards the west where denser vegetation and rainfall occurs.

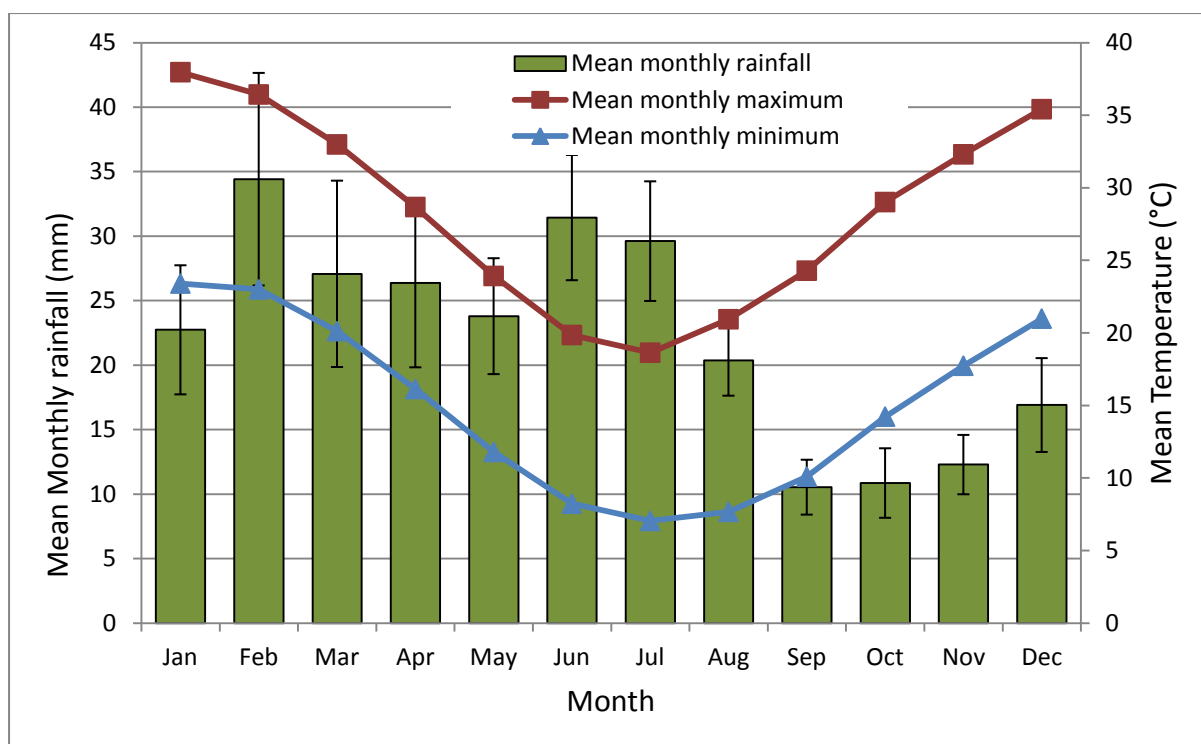
## 2. EXISTING ENVIRONMENT

### 2.1. Biogeographic Region

The Study Area occurs within the Eastern Murchison subregion of the Murchison bioregion, as defined by the Interim Bioregions of Australia (IBRA) classification system (Cowan *et al.* 2001, McKenzie *et al.* 2003). The Eastern Murchison subregion consists of extensive areas of elevated red desert sandplains with minimal dune development, breakaway complexes and salt lake systems associated with the occluded Palaeodrainage system (Cowan *et al.* 2001, McKenzie *et al.* 2003). It is dominated by Mulga woodlands rich in ephemerals, along with hummock grasslands and saltbush shrublands. While the subregion contains a high level of fauna biodiversity, most species are wide ranging and also occur in adjoining bioregions; only one vertebrate species is thought to be endemic to the Murchison bioregion: the Yellow-bellied Black Snake (*Pseudechis butleri*). The subregion is predominantly pastoral land (mining and conservation activities are also common) and exhibits a moderate to high level of environmental degradation.

### 2.2. Climate

The Eastern Murchison subregion has an arid climate with mainly winter rainfall that is often unreliable (Cowan *et al.* 2001, McKenzie *et al.* 2003). Bureau of Meteorology's (BOM) Mt Magnet Weather Station (station number: 007600) is located five km south-east of the Study Area and consequently provides climate information relevant to the Study Area (**Figure 3**). Data collected from this station indicates rainfall occurs consistently throughout the first eight months of the year and then decreases in September, October and November, before increasing again in December with a mean average rainfall of approximately 260 mm and an average of 36 rain days per annum (BOM 2012). Mean daily maximum temperatures range from 19 °C in July to 38 °C in January and peak temperatures are recorded from November to March. The mean daily minimum temperature between June and August ranges from 7 to 8 °C.



**Figure 3: Climate Data for Mt Magnet Weather Station (007600)**

### 3. METHODOLOGY

#### 3.1. Area Searches

Prior to field work, a preliminary inspection of aerial photography provided by Mt Magnet Gold within documentation for Clearing Permit 3713/1 (see **Appendix A**) was used to identify potential Malleefowl habitat (areas containing relatively dense patches of vegetation that may provide suitable cover and mound-building material) within the Study Area. A reconnaissance survey to confirm the location and extent of such potential habitat, followed by a more comprehensive survey of the entire Study Area to determine the presence or absence of Malleefowl mounds, was conducted on 6 and 7 February 2012.

Portions of the Study Area containing potential Malleefowl habitat were surveyed by two qualified zoologists. Both personnel walked parallel linear transects, ensuring that spacing between them allowed for visual inspection of the intervening ground (i.e. between 10 and 50 m). Areas of particularly dense vegetation along these transects were inspected more thoroughly where necessary.

As much of the Study Area was sparsely vegetated (highly unlikely to support Malleefowl) and easily surveyed from a distance greater than ten metres, intensive surveying was not required throughout the entire Study Area. Consequently, sparsely vegetated portions of the Study Area were surveyed by walking or by driving at slow speed (20 km/hr) along existing roads and tracks until all parts of the Study Area were visually inspected.

### 3.2. Habitat Assessment

To describe the range of potential habitats present within the Study Area, habitat assessments were conducted at various locations. For each assessment, the following habitat characteristics were recorded for a 20 m radius around the point of interest: landform, vegetation structure and composition, ground cover percentage and composition, soil type, presence of outcropping, presence of disturbance and effect of any disturbances on vegetation. Habitat assessments were not conducted in areas deemed unsuitable for supporting Malleefowl (i.e. areas of sparsely vegetated mulga with little to no understorey or litter cover).

### 3.3. Mound Assessment

Malleefowl mounds were assessed for signs of activity following guidelines in Section 3.1.4 of the *National Manual for the Malleefowl Monitoring System* (Natural Heritage Trust 2007). As per this Manual, the profile of any mounds found were compared with typical mound types (**Plate 1**), where:

- Profile 1 is typical of either an active, open mound or an inactive mound that may be reused sometime in the future;
- Profiles 2 to 5 are typical of the developmental stages of active mounds being worked by Malleefowl; and
- Profile 6 is typical of a very long unused (extinct) mound.

Any immediate presence of individuals (prints, scats, eggshells, lerp [a food source of the Malleefowl]), was also recorded.

## 4. STUDY TEAM

This targeted Malleefowl survey of the Mt Magnet Gold Project clearing areas (permit 3713/1) was conducted by two qualified staff off Outback Ecology, both of whom have backgrounds in zoology and experience with Malleefowl (**Table 1**). Notably, Dr Blair Parsons completed a PhD with CSIRO Sustainable Ecosystems and UWA, focusing on the distribution, decline and habitat requirements of the Malleefowl in the Western Australian Wheatbelt (Parsons 2008).

**Table 1: Study team for the targeted Malleefowl survey of the Mt Magnet Gold Project clearing areas (permit 3713/1)**

Person	Discipline	Qualifications	Position
Dr Blair Parsons	Zoologist	BSc (Biol/Env Sci) (Hons) PhD (Zool)	Outback Ecology Principal Environmental Scientist
Mark Gresser	Zoologist	BSc (Biol Sci) (Hons)	Outback Ecology Environmental Scientist





Profile 1 Mound



Profile 2 Mound



Profile 3 Mound



Profile 4 Mound



Profile 5 Mound



Profile 6 Mound

**Plate 1: Typical mound types described in the Natural Heritage Trust's National Manual for the Malleefowl Monitoring System (Natural Heritage Trust 2007)**



## 5. RESULTS AND DISCUSSION

### 5.1. Area Searches

A total of 50.7 ha (17.8 % of the Study Area) was identified as potential Malleefowl habitat following a preliminary inspection of aerial photography (**Figure 4**). A reconnaissance survey confirmed that these portions of the Study Area were an accurate representation of the location and extent of potential Malleefowl habitat. Following the reconnaissance survey, approximately 20 person hours (two personnel searching for ten hours) of area searching was conducted within the Study Area, comprising approximately 40.5 km linear coverage, which was either walked or driven. It should be noted that this distance included some duplication of search effort, mostly where tracks were driven in both directions (**Figure 4**).

Area searches yielded only one direct observation relating to the Malleefowl: one long inactive mound located in the centre of the Study Area's southern polygon (mound location: UTM 578418 E, 6897126 N, GDA94, MGA, zone 50; **Figure 4**). This mound is described further in **Section 4.3**.

Area searches were also useful for revealing the overall condition of the Study Area. A large portion of the Study Area's northern polygon (approximately 77.9 % of this polygon) was disturbed by recent mining activities. Remnant native vegetation, which was restricted to a small area at the eastern end, was dominated by low-lying shrubs and grasses, with trees and taller shrubs occurring in a few small patches. The vast majority (92.4%) potential Malleefowl habitat within the Study Area occurred within the southern polygon, where vegetation ranged in density from very sparse (i.e. containing large open areas of exposed soil, **Plate 2**) to relatively dense in some parts (**Plate 3**). Several tracks dissected the southern polygon and non-natural debris (e.g. metal, tyres and glass) was present throughout. The general sparseness of vegetation in the Study Area may be a result of historical clearing, possibly during past mining activities (sporadic mining and exploration has occurred in the area over the last century). Feral animals, specifically rabbits and goats, were observed within the Study Area and additional signs of their presence (tracks, scats, rabbit holes, latrines and browsed plants) occurred throughout. Although no area searches were conducted outside the Study Area, the condition of the surrounding area appeared to be consistent with what was observed inside, with the addition of major mine infrastructure (e.g. mine pits and haul roads) in the immediate vicinity.



**Plate 2: Sparse vegetation that was typical of much of the Study Area**



**Plate 3: A patch of relatively dense vegetation within the Study Area**

Presence of Malleefowl is strongly associated with the amount of vegetation remaining within an area (Parsons *et al.* 2008) and the species, which may have home ranges up to 400 ha (Booth 1985, cited in Parsons *et al.* 2009), is thought to require at least 500 ha of suitable habitat (with the surrounding 5 km containing vegetation cover greater than 30%) before the probability of their occurrence is significantly increased (Parsons *et al.* 2009). Furthermore, in the Murchison bio-region, the Malleefowl favours shrubby areas with heights reaching 2 to 4 m, as opposed to open areas or woodlands (Benshemesh *et al.* 2007). Given that the Study Area exhibits high levels of disturbance and is sparsely vegetated, with suitably dense vegetation for Malleefowl habitat restricted to several small patches that do not exceed 30 ha in size, the absence of Malleefowl within the Study Area is not surprising. With the current level of mining activity and the scarcity of suitable Malleefowl habitat, it is highly unlikely the Study Area would be of utility to Malleefowl in the future.

Area searches revealed other information of relevance. Specifically, an area of 28.3 ha was found to have been cleared prior to inspection for Malleefowl mounds (**Figure 4**), which is understood to be a non-compliance with Condition Five of Clearing Permit 3713/1. However, inspection of this area via aerial photography suggests it was potentially unsuitable for Malleefowl as the pre-existing mulga vegetation appeared to be sparse and somewhat disturbed (e.g. mining exploration, tracks). Therefore it is unlikely that any Malleefowl mounds would have been present within this area prior to clearing.

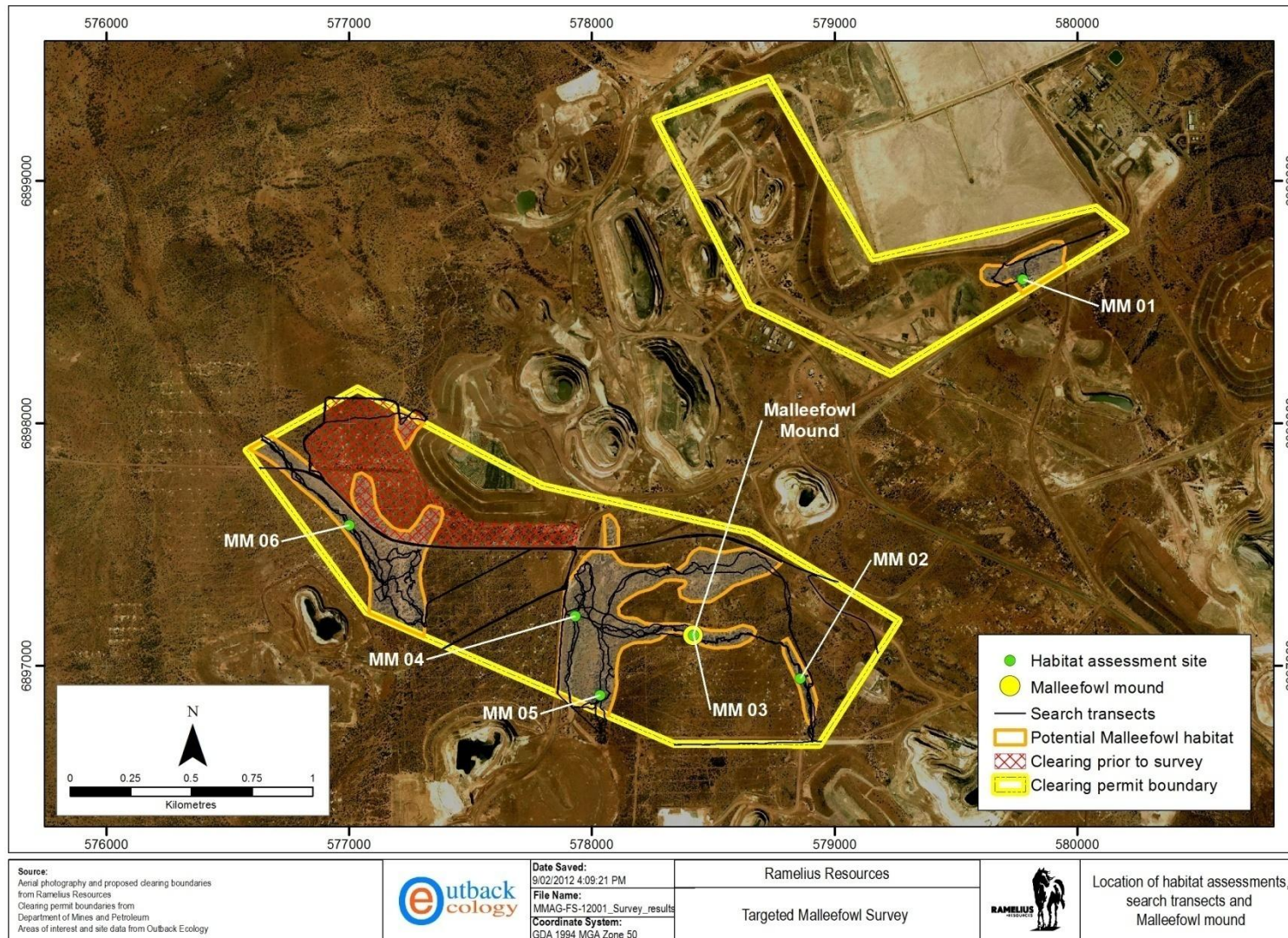
Additionally, 1.0 ha of land falling outside the clearing permit boundary defined by permit 373/1 (a small portion along the northern edge of the southern polygon) has been included as an area proposed to be cleared by Mt Magnet Gold (**Figure 2**). Although this area is highly degraded, sits between two major roads and does not contain any evidence of Malleefowl presence, confirmation should be sought from the DMP that it is appropriate for this area to be cleared.

## 5.2. Habitat Assessment

Habitat assessments were conducted at six locations containing potentially suitable habitat for Malleefowl within the Study Area (**Figure 4; Appendix B**). As Malleefowl are known to avoid open areas and instead select habitat where vegetation is 2 to 4 m in height and provides adequate cover (Benshemesh *et al.* 2007), the most important habitat characteristic recorded was vegetation structure. While all six locations contained trees within this 2 to 4 m range (height of trees ranged from three to seven metres), only three locations (MM03, MM05 and MM06) also provided areas where vegetation cover was sufficiently dense (approx. 50% or greater), even when the maximum percent cover of both upper and mid storey vegetation at the location was combined. As Malleefowl rely on an adequate supply of litter from which to obtain the material needed to maintain their mounds, another important habitat variable recorded is the amount of litter cover present. Two locations contained significant levels of litter cover (30% at MM05 and 55% at MM03); however the

remaining four locations offered less than 5% litter cover. These results suggest that within those portions of the study identified as potential Malleefowl habitat, the quality of such habitat is very low.





**Figure 4: Potential Malleefowl habitat, habitat assessment locations and location of a Malleefowl mound within the clearing boundaries from the Department of Mines and Petroleum’s clearing permit 3713/1**

### 5.3. Mound Assessment

The single Malleefowl mound found during this survey was located amongst mixed *Acacia* spp. in a relatively densely vegetated drainage depression (**Plate 4**). This is consistent with findings that Malleefowl prefer shrubby habitats and avoid open areas (Benshemesh *et al.* 2007). This mound has not been used for many years (i.e. inactive for at least ten to 20 years); however, it is possible the mound has been inactive for a substantially longer period of time. The primary indication that this mound has long been inactive is its profile, which is consistent with that of an extinct mound, i.e. flat with no peak and only a slight hint of a crater (see Profile 6 in **Plate 1** for a representative image of an extinct mound). The mound itself consisted primarily of ironstone gravel and there was very little soil remaining within it. Furthermore, no recent signs of Malleefowl presence, such as scrapings, lerp, egg shells, tracks and scats, were present.



**Plate 4: A long inactive Malleefowl mound located within the clearing boundaries from the Department of Mines and Petroleum's clearing permit 3713/1**

#### 5.4. Limitations And Constraints

There are a number of possible limitations and constraints that can impinge on the adequacy of fauna surveys (EPA 2004a). These are discussed below, with respect to the February 2012 targeted Malleefowl survey (**Table 2**). All fauna surveys are limited to some degree by time and seasonal factors, and ideally multiple surveys of an area would be undertaken over a number of years and within a number of different seasons.

**Table 2: Discussion of potential constraints of the targeted Malleefowl survey of the Mt Magnet Gold Project clearing areas (permit 3713/1)**

Factor	Constraint (Yes or No)	Comments
Competency and experience of consultants	No	Survey team members were fauna specialists employed by Outback Ecology. Both members have previous with the targeted species and one member has completed PhD studies focusing on the species
Scope	No	The survey was conducted using standardised and well-established techniques, and previous survey work local to and in the wider region of the Study Area was reviewed
Proportion of fauna identified	N/A	This survey targeted a single species that was thought to possibly occur in the area
Information sources (e.g. historic or recent)	No	The survey area is located in a relatively well surveyed region, due predominantly to regional surveys and those undertaken for mining operations
Proportion of task achieved, and further work which might be needed	No	The absence of Malleefowl within the Study Area was determined by a comprehensive search as planned and no further work to identify its presence or absence is required
Timing / weather / season / cycle	No	This report details the results of a February survey of the Study Area. The timing to conduct the survey was appropriate to meet the stated objectives
Disturbances	Partial constraint	As described in Section 4.1, some parts of the Study Area had already been cleared prior to inspection for Malleefowl; however, it is thought that prior to clearing, these areas would not have provided suitable habitat for the Malleefowl
Intensity	No	The Study Area was surveyed for approximately 24 person hours over two days and targeted search effort was applied where required
Completeness	No	The survey was complete. The Study Area was adequately covered and all components of the survey, including the reconnaissance survey, area searches, habitat assessments and mound assessments were successfully executed
Resources	No	Resources were adequate to carry out the survey satisfactorily, and the survey participants were competent in identification of Malleefowl and their mounds
Remoteness / access problems	No	Access to areas within the Study Area was good and adequate survey coverage was achieved
Availability of contextual information	No	Data were available for the region from (DEC 2011)



## **6. CONCLUSION**

Following the targeted Malleefowl survey of the Mt Magnet Gold Project clearing areas (permit 3713/1), it was concluded that there is no Malleefowl present within the Study Area. The primary reason for this is a lack of suitable habitat both within the Study Area and in the surrounding landscape. Although one Malleefowl mound was found within the Study Area, this mound may be decades old and there was no other evidence of Malleefowl occurring. Additionally, degradation resulting from a long history of mining, exploration and pastoralism has further reduced the suitability of habitat within the Study Area. The mound observed is likely a relic from an old Malleefowl population that persisted when the area was less disturbed. Consequently, any clearing within the Study Area is highly unlikely to have any impact on Malleefowl.



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**APPENDIX A**

**Mt Magnet Gold Pty Ltd Clearing Permit 3713/1**



## **CLEARING PERMIT**

*Granted under section 51E of the Environmental Protection Act 1986*

### **PERMIT DETAILS**

Purpose Permit Number: 3713 / 1  
File Number: A0672/201001  
Duration of Permit: From 19 June 2010 to 31 July 2018

### **PERMIT HOLDER**

Harmony Gold Pty Ltd - Mount Magnet Gold NL

### **LAND ON WHICH CLEARING IS TO BE DONE**

Mining Lease 58/136  
Mining Lease 58/172  
Mining Lease 58/181  
Mining Lease 58/191  
Mining Lease 58/205

### **PURPOSE FOR WHICH THE CLEARING MAY BE DONE**

1. Clearing for the purpose of mineral production.

### **CONDITIONS**

#### **Type of clearing authorised**

1. The Permit Holder must not clear more than 120 hectares of native vegetation. All clearing must be within the area cross-hatched yellow on attached Plan 3713/1.
2. The Permit Holder shall not clear native vegetation unless the purpose for which clearing was conducted is enacted within three months of the clearing being undertaken.

#### **Avoid, minimise etc clearing**

3. In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:
  - (a) avoid the clearing of native vegetation;
  - (b) minimise the amount of native vegetation to be cleared; and
  - (c) reduce the impact of clearing on any environmental value.

### **Weed control**

4. When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds*:
  - (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
  - (b) ensure that no *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
  - (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

### **Fauna management**

5. (a) Prior to undertaking any clearing authorised under this Permit, the areas shall be inspected by a *fauna specialist* for the presence of *Leipoa ocellata* (Malleefowl) mounds.
  - (b) Where *Leipoa ocellata* (Malleefowl) mounds are identified in relation to Condition 5(a) of this Permit, the Permit Holder shall ensure that no clearing occurs within 50 metres of the identified *Leipoa ocellata* (Malleefowl) mounds, unless approved by the Chief Executive Officer, Department of Environment and Conservation.

### **Retain and spread vegetative material and topsoil**

6. The Permit Holder shall:
  - (a) Retain the vegetative material and topsoil removed by clearing authorised under this Permit and stockpile the vegetative material and topsoil in an area that has already been cleared.
  - (b) Within 18 months following clearing authorised under this permit, *revegetate* and *rehabilitate* the area(s) that are no longer required for the purpose for which they were cleared under this Permit by:
    - (i) reshaping the surface of the land so that it is consistent with the surrounding 5 metres of uncleared land;
    - (ii) ripping the ground on the contour to remove soil compaction; and
    - (iii) laying the vegetative material and topsoil retained under Condition 6(a).
  - (c) Within 4 years of laying the vegetative material and topsoil on the cleared area in accordance with Condition 6(b) of this Permit:
    - (i) engage an *environmental specialist* to determine the species composition, structure and density of the area *revegetated* and *rehabilitated*; and
    - (ii) where, in the opinion of an *environmental specialist*, the composition, structure and density determined under Condition 6(c)(i) of this Permit will not result in a similar species composition, structure and density to that of pre-clearing vegetation types in that area, *revegetate* the area by deliberately *planting* and/or *direct seeding* native vegetation that will result in a similar species composition, structure and density of native vegetation to pre-clearing vegetation types in that area and ensuring only *local provenance* seeds and propagating material are used.



### Records to be kept

7. (a) In relation to the clearing of native vegetation authorised under this Permit:
- (i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;
  - (ii) the date that the area was cleared;
  - (iii) the size of the area cleared (in hectares); and
  - (iv) purpose for which clearing was undertaken.
- (b) In relation to the revegetation and rehabilitation of areas pursuant to Conditions 6(a), 6(b) and 6(c) of this Permit:
- (i) the location of any areas revegetated and rehabilitated. Recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;
  - (ii) a description of the revegetation and rehabilitation activities undertaken; and
  - (iii) the size of the area revegetated and rehabilitated (in hectares).
- (c) In relation to fauna management pursuant to Condition 5(a) and 5(b) of this Permit:
- (i) the location of each *Leipoa ocellata* (Malleefowl) mound recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings.

### Reporting

8. (a) The Permit Holder shall provide a report to the Director, Environment Division, Department of Mines and Petroleum by 31 July each year for the life of this permit, demonstrating adherence to all conditions of this permit, and setting out the records required under Conditions 7(a), 7(b) and 7(c) of this permit in relation to clearing carried out between 1 July and 30 June of the previous financial year.
- (b) Prior to 31 July 2018, the Permit Holder must provide to the Director, Environment Division, Department of Mines and Petroleum a written report of records required under Conditions 7(a), 7(b) and 7(c) of this Permit where these records have not already been provided under Condition 8(a) of this Permit.

## Definitions

The following meanings are given to terms used in this Permit:

*direct seeding* means a method of re-establishing vegetation through the establishment of a seed bed and the introduction of seeds of the desired plant species;

*environmental specialist* means a person who is engaged by the Permit Holder for the purpose of providing environmental advice, who holds a tertiary qualification in environmental science or equivalent, and has experience relevant to the type of environmental advice that an environmental specialist is required to provide under this Permit;

*fill* means material used to increase the ground level, or fill a hollow;

*local provenance* means native vegetation seeds and propagating material from natural sources within 100 kilometres of the area cleared;

*mulch* means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

*planting* means the re-establishment of vegetation by creating favourable soil conditions and planting seedlings of the desired species;

*rehabilitate/ed/ion* means actively managing an area containing native vegetation in order to improve the ecological function of that area;

*revegetate/ed/ion* means the re-establishment of a cover of *local provenance* native vegetation in an area using methods such as *regeneration*, *direct seeding* and/or *planting*, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area;

*weed/s* means a species listed in Appendix 3 of the "Environmental Weed Strategy" published by the Department of Conservation and Land Management (1999), and plants declared under section 37 of the *Agriculture and Related Resources Protection Act 1976*.



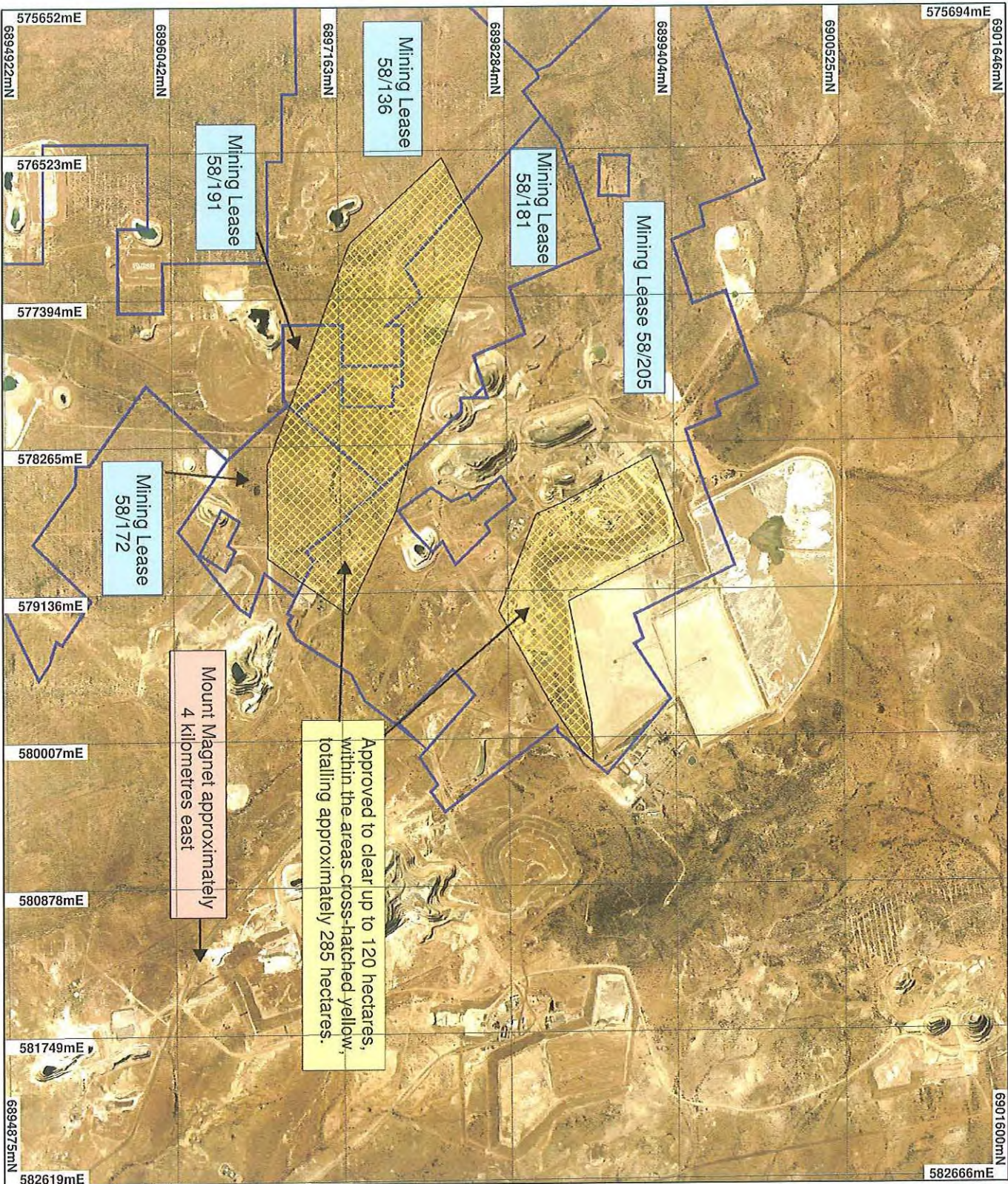
Phil Gorey  
DIRECTOR  
ENVIRONMENT DIVISION  
DEPARTMENT OF MINES AND PETROLEUM

Officer with delegated authority under Section 20  
of the Environmental Protection Act 1986

20 May 2010



# PLAN 3713/1



## LEGEND

- Mining Tenements
- Clearing Instruments
- Areas Approved to Clear
- Mount Magnet 1.4m Orthomosaic - Landgate 2003



PHIL GOREY  
 Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

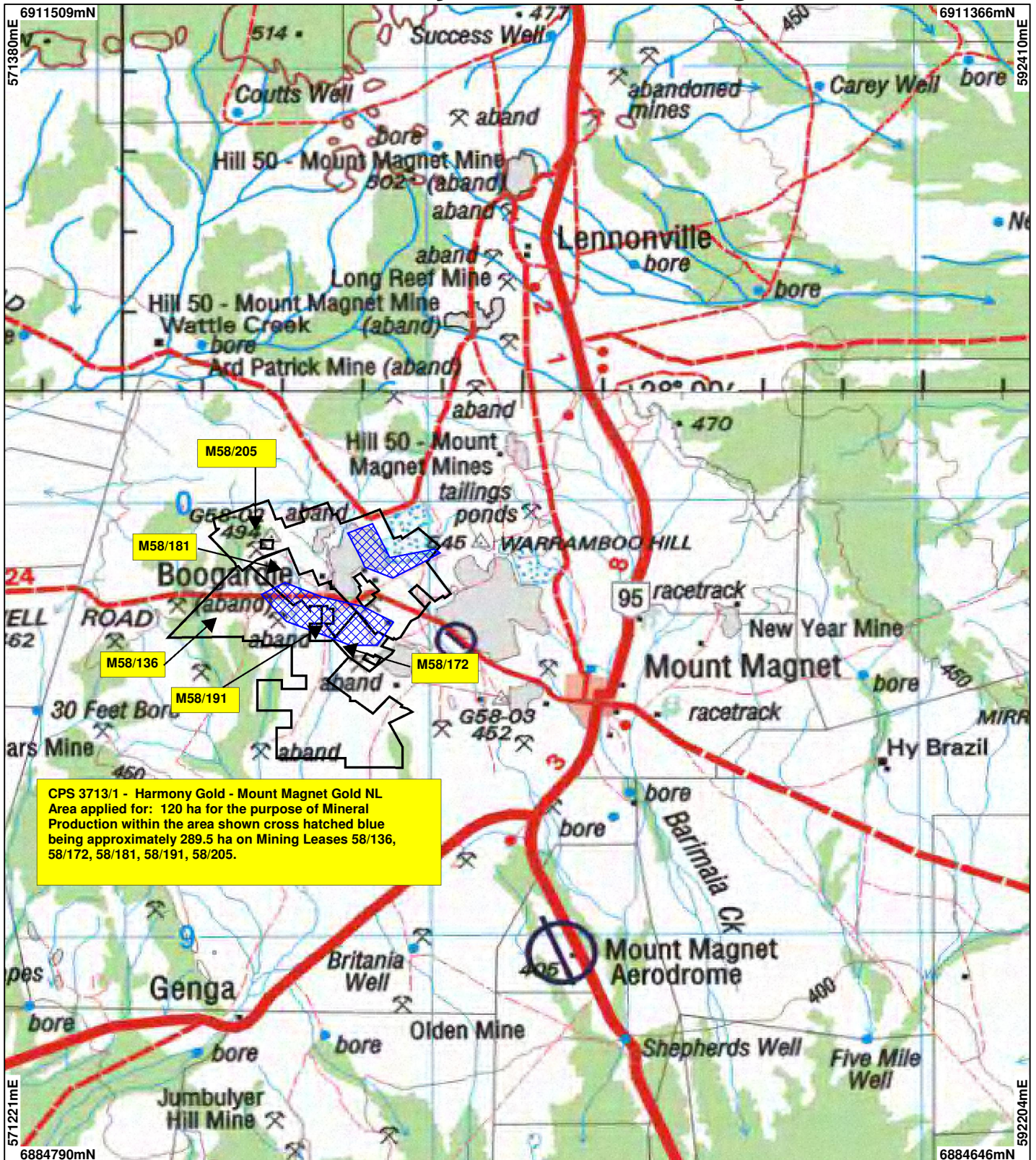
Date: 20/5/10



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# CPS 3713/1 - Harmony Gold - Mount Magnet Gold NL



CPS 3713/1 - Harmony Gold - Mount Magnet Gold NL  
 Area applied for: 120 ha for the purpose of Mineral  
 Production within the area shown cross hatched blue  
 being approximately 289.5 ha on Mining Leases 58/136,  
 58/172, 58/181, 58/191, 58/205.

## LEGEND

-  Mining Tenements
-  Clearing Instruments
- NATMAP 250K Series Mapping  
 - GA 08/03



0  3 km

Scale 1:120000

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

..... Date .....

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

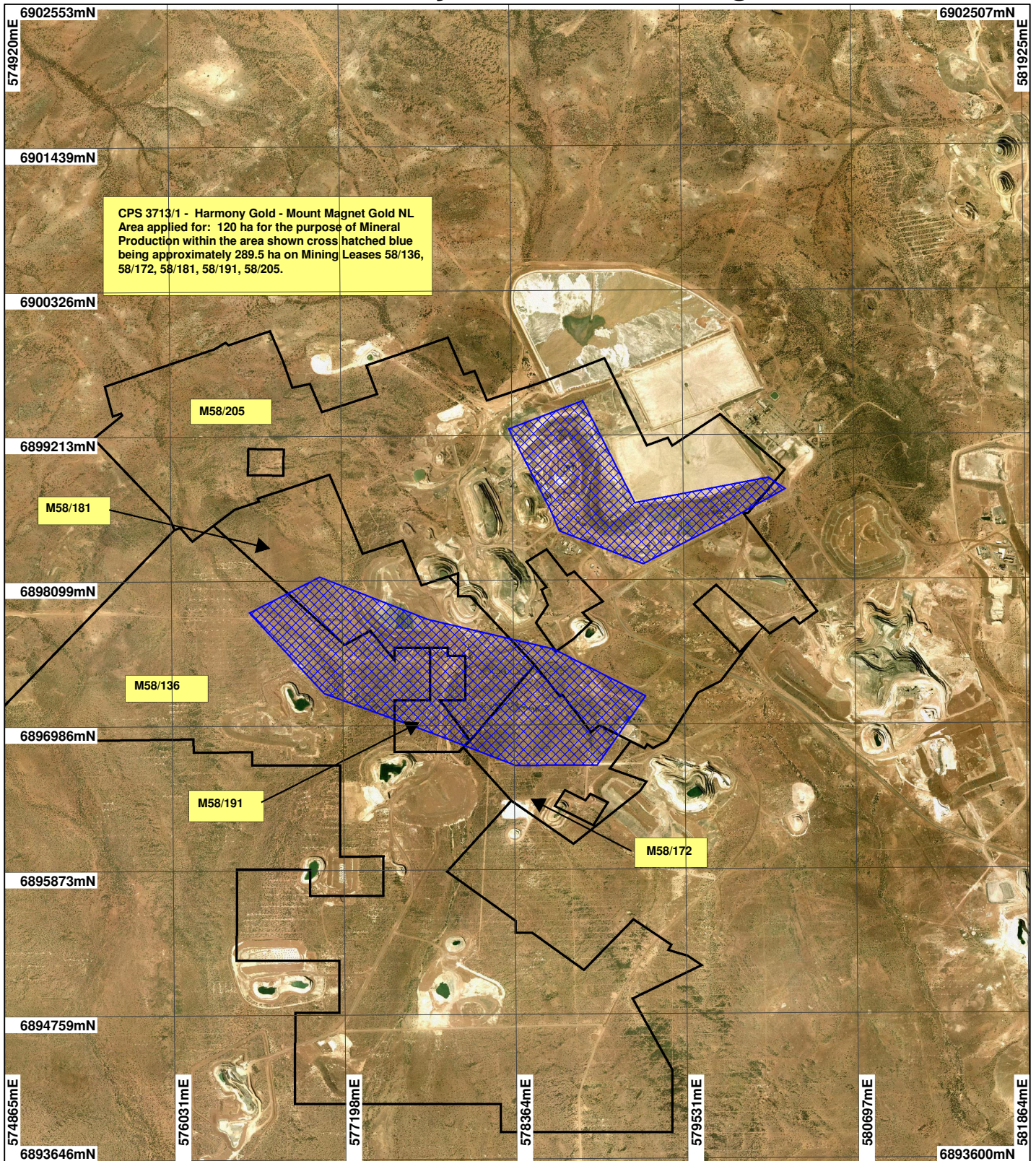


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\* Project Data. This data has not been quality assured. Please contact map author for details.



# CPS 3713/1 - Harmony Gold - Mount Magnet Gold NL



## LEGEND

- Mining Tenements
- Clearing Instruments
- Mount Magnet 1.4m Orthomosaic - Landgate 2003



Scale 1:40000  
 (Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

..... Date .....

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



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\* Project Data. This data has not been quality assured. Please contact map author for details.





# Clearing Permit Decision Report

## 1. Application details

### 1.1. Permit application details

Permit application No.: 3713/1  
Permit type: Purpose Permit

### 1.2. Proponent details

Proponent's name: Harmony Gold Pty Ltd - Mount Magnet Gold NL

### 1.3. Property details

Property: Mining Lease 58/136  
Mining Lease 58/172  
Mining Lease 58/181  
Mining Lease 58/191  
Mining Lease 58/205  
Local Government Area: Mount Magnet  
Colloquial name: Galaxy Open Pit

### 1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
120		Mechanical Removal	Mineral Production

## 2. Site Information

### 2.1. Existing environment and information

#### 2.1.1. Description of the native vegetation under application

##### Vegetation Description

Beard Vegetation Associations have been mapped at a scale of 1:250,000 for the whole of Western Australia. Two Beard Vegetation Associations are located within the application areas (Shepherd, 2007):

**Beard Vegetation Association 312:** succulent steppe with very open shrubs; very sparse mulga and *Acacia sclerosperma* over saltbush and bluebush; and

**Beard Vegetation Association 313:** succulent steppe with open scrub; scattered *Acacia sclerosperma* and *Acacia victoriae* over bluebush.

Niche Environmental Services conducted a flora and vegetation survey of the application areas in September 2009. Eight vegetation units were identified within the application areas (Niche Environmental Services 2010a; 2010b):

- 1. Rehabilitated vegetation comprised of a mix of *Acacia* spp. and *Eucalyptus* spp. over an understorey of *Maireana* spp.**
- 2. Low woodland of *Acacia* spp. over Low Open Shrubland of mixed species in an ephemeral drainage line.**  
This vegetation consisted of an overstorey to 4 metres of *Acacia aneura* var. *aneura*, *Acacia craspedocarpa*, *Acacia tetragonophylla*, *Acacia ramulosa* var. *ramulosa* over an understorey of *Ptilotus obovatus*, *Enchylaena tomentosa* spp. *tomentosa*, *Atriplex nummularia*, *Eremophila lachnocalyx*.
- 3. Low Open Forest of *Acacia* spp. over Low Open Shrubland of mixed species over Very Open Herbland of mixed species in an ephemeral drainage line.**  
The vegetation consisted of an overstorey to 4 metres of *Acacia aneura* var. *aneura*, *Acacia tetragonophylla*, *Acacia craspedocarpa*, *Acacia aneura* var. *fuliginea*, *Acacia ramulosa* var. *ramulosa* over a midstorey of *Eremophila clarkei*, *Eremophila galeata*, *Eremophila georgei*, *Thryptomene costata* over an understorey of *Stenopetalum filifolium*, *Olearia stuartii*, *Maireana planifolia*, *Trachymene costata*, *Velleia rosea*, *Pogonolepis stricta*, *Eriachne pulchella* ssp..
- 4. Low Woodland of *Acacia* spp. over Low Open Shrubland of mixed species on a low Banded Ironstone Formation**  
This vegetation association consisted of an overstorey of *Acacia aneura* var. *aneura*, *Acacia tetragonophylla*, *Acacia ramulosa* var. *ramulosa* over a mid storey of *Philotheca brucei* spp. *brucei*, *Aluta aspera* spp. *hesperia*, *Eremophila latrobei* ssp. *latrobei* over an understorey of *Arthropodium dyeri*, *Cheilanthes sieberi*, *Eragrostis eriopoda*.

5. **Low Woodland of *Acacia* spp. over Low Open Shrubland of mixed species on gibber flat with quartz and ironstone.**  
The vegetation consisted of an overstorey to 4 metres of *Acacia aneura* var. *aneura*, *Acacia tetragonophylla*, *Acacia ramulosa* var. *ramulosa* over a midstorey of *Eremophila latrobei* spp. *latrobei*, *Eremophila lachnocalyx*, *Eremophila clarkei*.
6. **Low Open Woodland of *Acacia* spp. over a Low Open Shrubland of mixed species on flats.**  
This vegetation consisted of an understorey to 4 metres of *Acacia aneura* var. *aneura*, *Acacia ramulosa* var. *ramulosa*, *Acacia aneura* var. *fuliginea* over a midstorey of *Eremophila forestii* spp. *forestii*, *Ptilotus obovatus*.
7. **Low Open Woodland of *Acacia* spp. over a Low Open Shrubland of mixed species on lower gibber slopes of BIF ridges.**  
The vegetation consisted of an overstorey to 4 metres of *Acacia aneura* var. *aneura*, *Acacia ramulosa* var. *ramulosa* over a Low Open Shrubland of *Eremophila forestii* ssp. *forestii*, *Ptilotus obovatus*.
8. **Low Open Shrubland of *Tecticornia disarticulata* on a clay pan.**  
This association was depauperate of species, with the main species being *Tecticornia disarticulata*.

<b>Clearing Description</b>	<p>Harmony Gold (2010) proposes to clear up to 120 hectares of native vegetation and rehabilitated native vegetation, within an area totalling approximately 289.5 hectares. The proposed clearing is located approximately 4 kilometres west of Mount Magnet (GIS Database).</p> <p>The purpose of the proposed clearing is for the creation of an open pit cut-back mining programme and to facilitate the creation of new waste rock landforms and mine related infrastructure (Harmony Gold, 2010). Vegetation will be cleared by bulldozer and vegetation and topsoil will be stockpiled for rehabilitation purposes (Harmony Gold, 2010).</p>
<b>Vegetation Condition</b>	<p>Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).</p> <p style="text-align: center;">To</p> <p>Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).</p>
<b>Comment</b>	<p>The vegetation condition rating is derived from a flora and vegetation survey conducted by Niche Environmental Services in September 2009. The vegetation applied to be cleared consists of native vegetation in addition to rehabilitated native vegetation (Harmony Gold, 2010). The vegetation within the application areas has previously been disturbed by past and present mining activities, tracks and pastoral activities (Niche Environmental Services, 2010a; 2010b).</p>

### 3. Assessment of application against clearing principles

#### (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

<b>Comments</b>	<p><b>Proposal is not likely to be at variance to this Principle</b></p> <p>The application areas are located within the Eastern Murchison subregion of the Murchison Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). The Eastern Murchison subregion is described by CALM (2002) as being rich and diverse in both its flora and fauna. CALM (2002) reports that most species are wide ranging and usually occur in at least one, and often several, adjoining subregions.</p> <p>Niche Environmental Services (2010a; 2010b) conducted a flora and vegetation survey of the application areas in September 2009. The proposal includes two separate application areas; the Perseverance project area and the Saturn project area (Niche Environmental Services, 2010a; 2010b). Within the Perseverance project area Niche Environmental Services (2010a) recorded a total of 27 plant taxa from nine families and 13 genera. Within the Saturn project area Niche Environmental Services (2010b) recorded a total of 104 plant taxa from 31 families and 67 genera. Niche Environmental Services (2010b) did not record any Declared Rare Flora or Threatened Ecological Communities within the application areas, however, three Priority Flora species were recorded within the application areas. Despite that the application areas have been degraded by past and current mining and pastoral activities, the overall flora diversity appears to be quite high, particularly when compared to other flora surveys conducted in the region (Niche Environmental Services, 2010b).</p> <p>There were numerous weed species identified within the application areas (Niche Environmental Services, 2010a; 2010b). The presence of introduced weed species lowers the biodiversity values of the proposed clearing areas. Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. The risk of spreading weeds can be mitigated by imposing a condition for the purpose of weed management.</p> <p>Outback Ecology conducted a desktop fauna survey of the application areas and adjacent areas in February 2010. This survey indicates that a total of 189 terrestrial fauna species have the potential to occur within the search area (Outback Ecology, 2010). These fauna species comprise of 22 mammals (16 native and 6</p>
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introduced), 117 native birds, 42 native reptiles and 8 amphibian species (Outback Ecology, 2010). The application areas are reported by Niche Environmental Services (2010) as being in primarily degraded condition due to previous and current mining activities, haul roads, exploration lines, informal tracks and grazing. Given this, it is unlikely that all the fauna species identified during the desktop survey would occur within the application areas and it is likely that the higher quality vegetation found in areas outside of the minesite footprint would have higher fauna diversity than the application areas.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** CALM (2002)  
Niche Environmental Services (2010a)  
Niche Environmental Services (2010b)  
Outback Ecology (2010)  
GIS Database  
- IBRA WA (Regions - Subregions)

**(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.**

**Comments** **Proposal is not likely to be at variance to this Principle**

Outback Ecology conducted a terrestrial fauna desktop survey on behalf of Harmony Gold in November 2009. The fauna search was conducted for ten mining tenements, four of which occur within the application areas; Mining Leases 58/205, 58/181, 58/191 and 58/172 (Outback Ecology, 2010). No site inspection was undertaken and the results from the fauna search are conclusions based on a desktop study only (Outback Ecology, 2010). Seven fauna habitats that are likely to be present within the application areas were identified by Outback Ecology (2010):

- Mixed *Acacia* and *Eucalyptus* species rehabilitation;
- Mixed *Acacia* woodlands;
- Breakaways;
- Hillcrests and slopes;
- Minor drainage lines;
- Shrub plains; and
- Claypans.

Outback Ecology (2010) states that Mixed *Acacia* woodlands and Shrub plains are likely to be the most widespread of these broad habitat units. Furthermore, Outback Ecology (2010) reports that the project disturbance footprint will not directly impact breakaway habitat.

Outback Ecology (2010) has listed the conservation fauna most likely to occur within the application areas based on the results of a desktop survey. Based on the habitat types within the application areas the conservation significant fauna species most likely to occur and most at risk from native vegetation clearing are listed below (Outback Ecology, 2010):

- Malleefowl (*Leipoa ocellata*) – Schedule 1;
- Gilled Slender Blue-tongue (*Cyclodomorphus branchialis*) – Schedule 1; and
- Western Spiny-tailed Skink (*Egernia stokesii badia*) – Schedule 1.

Outback Ecology (2010) reports that the Gilled Slender Blue-tongue and Western Spiny-tailed Skink may occur as their preferred habitats; Shrub Plains for the blue-tongue and Shrub Plains and Mixed *Acacia* woodland for the skink, are found within the application areas. Outback Ecology (2010), reports that the disturbance footprint will affect approximately 10% of the Gilled Slender Blue-tongue habitat that occurs within the application areas and approximately 20% of the Western Spiny-tailed Skink habitat that occurs within the application areas. Given that large amounts of better quality habitat for these species is available outside of the proposed disturbance footprint, the vegetation within the application areas is not likely to represent significant habitat for these species.

Habitat for the Malleefowl occurs within the application areas in the form of Mixed *Acacia* woodland (Outback Ecology, 2010). According to Outback Ecology (2010) the disturbance footprint will affect approximately 10% of this habitat that occurs within the application areas, however, no Malleefowl or Malleefowl mounds have previously been recorded within the application areas. Potential impacts to Malleefowl as a result of the proposed clearing may be minimised by the implementation of a fauna management condition.

Outback Ecology (2010) reports that habitats with the potential to support terrestrial invertebrate Short Range Endemic species occurs within the project area in the form of south facing breakaways. Outback Ecology (2010) states that this habitat will not be impacted by the areas of disturbance within the application areas.

The vegetation within the application areas has suffered disturbance from past and present mining activities, tracks, roads and grazing (Niche Environmental Services, 2010a; 2010b). Furthermore, the vegetation within the application areas is widespread locally and within the Murchison region generally (Niche Environmental Services, 2010a; 2010b). Given this, the vegetation of the application area is unlikely to represent significant habitat for any fauna species and fauna species would be more likely to utilise the higher quality vegetation that

exists in areas outside of the minesite footprint.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** Niche Environmental Services (2010a)  
Niche Environmental Services (2010b)  
Outback Ecology (2010)

**(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.**

**Comments Proposal is not likely to be at variance to this Principle**

Niche Environmental Services conducted a flora and vegetation survey of the application areas in September 2009. This survey consisted of a database search, in addition to a field survey (Niche Environmental Services, 2010a; 2010b). The database search consisted of a search of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* Protected Matters Database, a search of the Department of Environment and Conservation online databases, in addition to a review of previous surveys that have been conducted in the area (Niche Environmental Services, 2010a; 2010b). The field based survey was conducted between 11 September 2009 and 14 September 2009 and consisted of a preliminary reconnaissance in addition to releve and ground-truthing (Niche Environmental Services, 2010a; 2010b).

Niche Environmental Services (2010a; 2010b) reports that no Declared Rare Flora was identified during the survey, however, the following three Priority Flora species were recorded within the application areas:

- *Acacia speckii* (Priority 3);
- *Stenanthemum mediale* (Priority 1); and
- *Verticordia jamiesonii* (Priority 3).

*Acacia speckii* is described by Western Australia Herbarium (2010) as preferring rocky hills over granite, basalt or dolerite, rocky hills or rises. This species has been recorded numerous times in areas adjacent to the application areas (Niche Environmental Services, 2010b). According to Niche Environmental Services (2010b) impacts to this species would be minor as there are numerous records of this species in surrounding areas and few individuals are expected to be impacted by the proposed clearing.

*Stenanthemum mediale* is reported by Western Australian Herbarium (2010) as preferring red clayey sands. Niche Environmental Services (2010b) reports that there have been records of this species occurring in areas adjacent to the application areas. According to Niche Environmental Services (2010b) this species is unlikely to be affected by the proposed disturbance as there are numerous records of this species in areas surrounding the application areas and few individuals are expected to be impacted by the proposed clearing.

*Verticordia jamiesonii* is generally found in sandy clay soils and on lateritic breakaways (Western Australian Herbarium, 2010). Niche Environmental Services (2010b) reports that approximately 30 plants were recorded in the area in addition to another 10 plants recorded approximately 100 metres south-east. Niche Environmental Services (2010b) reports that no specimens of this species will be impacted by the proposed disturbance.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** Niche Environmental Services (2010a)  
Niche Environmental Services (2010b)  
Western Australian Herbarium (2010)

**(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.**

**Comments Proposal is not likely to be at variance to this Principle**

There are no known Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) within the areas applied to clear (GIS Database). The nearest known PEC is located approximately 10 kilometres north-east of the application areas (GIS Database).

Niche Environmental Services (2010a; 2010b) reports that no TECs or PECs were identified during the flora and vegetation survey of the application areas.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** Niche Environmental Services (2010a)  
Niche Environmental Services (2010b)  
GIS Database  
- Threatened Ecological Sites

**(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.**

**Comments Proposal is not at variance to this Principle**

The application areas fall within the Murchison Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). Shepherd (2007) reports that approximately 100% of the pre-European vegetation still exists within this bioregion (see table below). The vegetation within the application areas is recorded as the following two Beard Vegetation Associations (Shepherd, 2007):

**Beard Vegetation Association 312:** succulent steppe with very open shrubs; very sparse mulga and *Acacia sclerosperma* over saltbush and bluebush; and

**Beard Vegetation Association 313:** succulent steppe with open scrub; scattered *Acacia sclerosperma* and *Acacia victoriae* over bluebush.

According to Shepherd (2007) approximately 100% of these vegetation associations remain within the bioregion (see table below).

The vegetation within the application areas is not a remnant of native vegetation within an area that has been extensively cleared.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion - Murchison	28,120,590	28,120,590	~100	Least Concern	~1.1
Beard vegetation associations - State					
312	41,502	41,502	~100	Least Concern	0.0
313	68,844	68,844	~100	Least Concern	0.0
Beard vegetation associations - Bioregion					
312	41,502	41,502	~100	Least Concern	0.0
313	68,844	68,844	~100	Least Concern	0.0

\* Shepherd (2007)

\*\* Department of Natural Resources and Environment (2002)

Based on the above, the proposed clearing is not at variance to this Principle.

**Methodology** Department of Natural Resources and Environment (2002)  
Shepherd (2007)  
GIS Database  
- IBRA WA (Regions - Subregions)

**(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.**

**Comments Proposal is not likely to be at variance to this Principle**

The application areas have numerous ephemeral drainage lines transecting them (GIS Database). Based on the low rainfall and high evaporation rate of the region (Niche Environmental Services, 2010a; 2010b), these watercourses are expected to be dry for the majority of the year and only flow following heavy rainfall.

According to descriptions provided by Niche Environmental Services (2010a; 2010b) and aerial photography (GIS Database) these drainage lines appear to have been highly disturbed by mining and pastoral activities and have been modified by the pre-existing mine infrastructure. Harmony Gold (2010) reports that due to this disturbance these ephemeral watercourses have no connection to other drainage lines in the area.

Niche Environmental Services (2010a; 2010b) reports that although the density of the vegetation increased within the ephemeral drainage lines, the vegetation was noted as consisting of the same species occurring on the plains and ridges and was not groundwater dependent vegetation. There are numerous ephemeral drainage lines present outside of the mine footprint and the vegetation communities growing along the watercourses within the application areas are well represented in the local areas and within the Murchison region generally and are therefore not restricted vegetation communities.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** Harmony Gold (2010)  
Niche Environmental Services (2010a)  
Niche Environmental Services (2010b)  
GIS Database  
- Mount Magnet 1.4m Orthomosaic Landgate - 2003  
- Hydrography, linear

**(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.**

**Comments** **Proposal may be at variance to this Principle**

The application areas have been mapped as occurring within five land systems (GIS Database). The following four land systems are most at risk of land degradation based on land system descriptions by Pringle et al. (1994) and Curry et al. (1994) and landforms within the application areas:

**Austin Land System:** saline stony plains with low rises and drainage foci supporting low halophytic shrublands with scattered mulga (Curry et al., 1994). Drainage tracts in this system may be susceptible to erosion if perennial vegetation is degraded (Curry et al., 1994).

**Jundee Land System:** hardpan plains with ironstone gravel mantles, supporting mulga shrublands (Pringle et al., 1994). Impedance to natural sheet flows can initiate soil erosion and cause water starvation and consequent loss of vigour in vegetation downslope (Pringle et al., 1994). Gravel mantles provide effective protection against soil erosion (Pringle et al., 1994).

**Violet Land System:** undulating stony and gravelly plains and low rises, supporting mulga shrublands (Pringle et al., 1994). Abundant mantles provide effective protection against soil erosion over most of this land system, except where the soil surface has been disturbed, for example by the construction of tracks and gridlines (Pringle et al., 1994). Narrow drainage tracts are mildly susceptible to water erosion (Pringle et al., 1994).

**Wiluna Land System:** low greenstone hills with occasional lateritic breakaways and broad stony slopes, lower saline stony plains and broad drainage tracts; supports sparse mulga shrublands with patches of halophytic shrubs (Curry et al., 1994). Sandy surfaced gravelly plains, alluvial fans and plains and drainage floors are moderately susceptible to accelerated erosion when degraded (Curry et al., 1994). The system shows extensive disturbance and localised erosion as a result of mining activities (Curry et al., 1994).

Based on the above, the proposed clearing may be at variance to this Principle.

The application areas are in an area that experiences low rainfall and the application areas have fairly gentle topography (Niche Environmental Services, 2010a; 2010b). These factors may reduce sheet flow and help mitigate the risk of soil erosion caused by vegetation removal. The areas proposed to be cleared are highly disturbed and modified by current and previous mining activities and many of the watercourses have already been dissected by existing roads and infrastructure, however the removal of native vegetation may exacerbate soil erosion in some areas, particularly during times of heavy rainfall. The risk of soil erosion may be mitigated by imposing a staged clearing condition.

**Methodology** Curry et al. (1994)  
Niche Environmental Services (2010a)  
Niche Environmental Services (2010b)  
Pringle et al. (1994)  
GIS Database  
- Hydrography, linear  
- Rangeland land system mapping

**(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.**

**Comments** **Proposal is not at variance to this Principle**

The proposed clearing is not located within any conservation areas (GIS Database). The nearest Department of Environment and Conservation managed land is the Karroun Hill National Park, located approximately 180 kilometres south of the application areas (GIS Database).

Based on the above, the proposed clearing is not at variance to this Principle.

**Methodology** GIS Database  
- DEC Tenure



**(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.**

**Comments Proposal is not likely to be at variance to this Principle**

There are no permanent watercourses within the application areas although there are numerous ephemeral drainage lines (GIS Database).

The nearest Public Drinking Water Source Area (PDWSA) is located approximately 100 metres west of the application areas (GIS Database). Given that the application areas are highly disturbed and located within an active minesite, the further clearing of 120 hectares of native and rehabilitation vegetation is unlikely to have any significant impact on surface or underground water quality.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** Harmony Gold (2010)  
Niche Environmental Services (2010a)  
Niche Environmental Services (2010b)  
GIS Database  
- Hydrography, linear  
- Public Drinking Water Source Areas (PDWSA)

**(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.**

**Comments Proposal is not likely to be at variance to this Principle**

There are numerous ephemeral drainage lines within the application areas (GIS Database). Due to a climate with low annual rainfall and high annual evaporation rates, these drainage lines are expected to be dry for the majority of the year (Niche Environmental Services, 2010a; 2010b). Natural flood events are known to occur within the Murchison region following significant rainfall, however, Niche Environmental Services (2010a; 2010b) reports that there are few records of local flooding.

The application areas and adjacent areas are highly disturbed from current and previous mining and pastoral activities (Niche Environmental Services, 2010a; 2010b). The removal of sparse vegetation within an area that is already degraded and has an arid to semi-arid climate is unlikely to cause or exacerbate the incidence or intensity of flooding (Niche Environmental Services, 2010a; 2010b).

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

**Methodology** Niche Environmental Services (2010a)  
Niche Environmental Services (2010b)  
GIS Database  
- Hydrography, linear

**Planning instrument, Native Title, Previous EPA decision or other matter.**

**Comments**

There is one Native Title claim (WC96/008) over the area under application (GIS Database). This claim has been registered with the Native Title Tribunal on behalf of the claimant group. However, the tenements have been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process. Therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

According to available databases there are two registered Aboriginal Sites of Significance (site ID's: 18155 and 15832) within the application areas (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

It is the proponent's responsibility to liaise with the Department of Environment and Conservation and the Department of Water to determine whether a Works Approval, Water Licence, Bed and Banks permit or any other licences or approvals are required for the proposed works.

It is noted that the proposed clearing may impact on a protected matter under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. The proponent may be required to refer the project to the (Federal) Department of Environment, Water, Heritage and the Arts (DEWHA) for environmental impact assessment under the EPBC Act. The proponent is advised to contact the DEWHA for further information regarding notification and referral responsibilities under the EPBC Act.

The clearing permit application was advertised by the Department of Mines and Petroleum on 26 April 2010, inviting submission from the public. There were no submissions received.

**Methodology** GIS Database  
- Aboriginal Sites of Significance

#### 4. Assessor's comments

##### Comment

The application has been assessed against the clearing principles, planning instruments and other matters in accordance with s51O of the *Environmental Protection Act 1986*, and the proposed clearing may be at variance to Principle (g), is not likely to be at variance to Principles (a), (b), (c), (d), (f), (i) and (j) and is not at variance to Principles (e) and (h).

#### 5. References

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- Shepherd, D.P. (2007) Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth.
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#### 6. Glossary

##### Acronyms:

<b>BoM</b>	Bureau of Meteorology, Australian Government.
<b>CALM</b>	Department of Conservation and Land Management, Western Australia.
<b>DAFWA</b>	Department of Agriculture and Food, Western Australia.
<b>DA</b>	Department of Agriculture, Western Australia.
<b>DEC</b>	Department of Environment and Conservation
<b>DEH</b>	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
<b>DEP</b>	Department of Environment Protection (now DoE), Western Australia.
<b>DIA</b>	Department of Indigenous Affairs
<b>DLI</b>	Department of Land Information, Western Australia.
<b>DMP</b>	Department of Mines and Petroleum, Western Australia.
<b>DoE</b>	Department of Environment, Western Australia.
<b>DoIR</b>	Department of Industry and Resources, Western Australia.
<b>DOLA</b>	Department of Land Administration, Western Australia.
<b>DoW</b>	Department of Water
<b>EP Act</b>	Environment Protection Act 1986, Western Australia.
<b>EPBC Act</b>	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
<b>GIS</b>	Geographical Information System.
<b>IBRA</b>	Interim Biogeographic Regionalisation for Australia.
<b>IUCN</b>	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
<b>RIWI</b>	Rights in Water and Irrigation Act 1914, Western Australia.
<b>s.17</b>	Section 17 of the Environment Protection Act 1986, Western Australia.
<b>TECs</b>	Threatened Ecological Communities.

##### Definitions:

{Atkins, K (2005). *Declared rare and priority flora list for Western Australia, 22 February 2005*. Department of Conservation and Land Management, Como, Western Australia} :-

- P1 Priority One - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P2 Priority Two - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P3 Priority Three - Poorly Known taxa:** taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.
- P4 Priority Four – Rare taxa:** taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- R Declared Rare Flora – Extant taxa (= Threatened Flora = Endangered + Vulnerable):** taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.
- X Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

**{Wildlife Conservation (Specially Protected Fauna) Notice 2005} [Wildlife Conservation Act 1950] :-**

- Schedule 1 Schedule 1 – Fauna that is rare or likely to become extinct:** being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.
- Schedule 2 Schedule 2 – Fauna that is presumed to be extinct:** being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.
- Schedule 3 Schedule 3 – Birds protected under an international agreement:** being birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is need of special protection.
- Schedule 4 Schedule 4 – Other specially protected fauna:** being fauna that is declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

**{CALM (2005). Priority Codes for Fauna. Department of Conservation and Land Management, Como, Western Australia} :-**

- P1 Priority One: Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P2 Priority Two: Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P3 Priority Three: Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P4 Priority Four: Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
- P5 Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

**Categories of threatened species (Environment Protection and Biodiversity Conservation Act 1999)**

- EX Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.
- EX(W) Extinct in the wild:** A native species which:  
 (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or  
 (b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
- CR Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in

the immediate future, as determined in accordance with the prescribed criteria.

**EN**

**Endangered:** A native species which:

- (a) is not critically endangered; and
- (b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

**VU**

**Vulnerable:** A native species which:

- (a) is not critically endangered or endangered; and
- (b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

**CD**

**Conservation Dependent:** A native species which is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

## **APPENDIX B**

### **Habitat Assessment Data Obtained During the Targeted Malleefowl Survey Of The Mt Magnet Gold Project Clearing Areas (Permit 3713/1)**

This Appendix contains the raw data obtained from habitat assessments conducted within areas that were considered as potentially supporting Malleefowl.

**Study Area:** Mt Magnet Gold Project  
**Habitat Type:** Native vegetation  
**Site Code:** MM01

**Coordinates (GDA 1994, MGA z 50):**  
 579776 E                      6898594 N



### Vegetation:

Stratum	Height		Percent cover		Growth Form	Dom spp.
	min (m)	max (m)	min (%)	max (%)		
Upper	4	6	15	30	Tree	<i>Acacia aneura</i> , <i>A. tetragonophylla</i>
Middle	1	2	5	10	Shrub	<i>Acacia tetragonophylla</i> , <i>Acacia spp.</i>
Ground	0.1	0.3	0	50	Herb	Chenopods, annuals

### Ground Cover:

Bare soil	Litter	Perennial	Annuals
70	< 5	< 5	30

**Soils:** colour: light red                      type: clay loam                      exposed bedrock? no

### Coarse Surface Particles:

presence: < 30 %                      abundance: < 10 %                      roundness: angular  
size range: 6 - 200 mm

**Env:** slope: flat                      aspect: N/A                      landform: plain  
erosion: slightly disturbed  
disturbance: highly disturbed (mining, tailings dam dust, drainage from roads, clearing)  
introduced species: goats, rabbits                      grazing: moderate

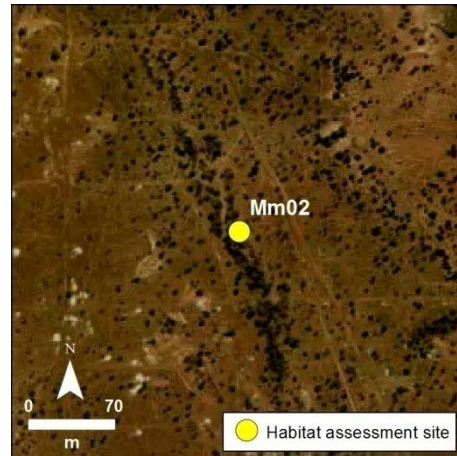
**Other:** waterlogging: no                      inundation: yes                      flooding: yes  
fire: no                      when: n/a                      burnt standing remnants: n/a  
large trees: no                      visible hollows: no  
weeds present: no(?)                      woody debris:                      occasional





**Study Area:** Mt Magnet Gold Project  
**Habitat Type:** Native vegetation  
**Site Code:** MM02

**Coordinates (GDA 1994, MGA z 50):**  
 578860 E                  6896948 N



**Vegetation:**

Stratum	Height		Percent cover		Growth Form	Dom spp.
	min (m)	max (m)	min (%)	max (%)		
Upper	3	4	10	15	Tree/Shrub	<i>Acacia aneura</i>
Middle	1	1.5	0	5	Shrub	<i>Thryptomene(?) spp.</i>
Ground	0	0.3	0	1	Tussock grass	<i>Eragrostis sp., Atriplex sp.</i>

**Ground Cover:**

Bare soil	Litter	Perennial	Annuals
> 95	< 1	1	1

**Soils:** colour: red    type: clay loam                                  exposed bedrock? Yes (< 20%)

**Coarse Surface Particles:**  
 presence: 30-60 %    abundance: < 50 % roundness: angular  
 size range: 6 mm – 2 m

**Env:** slope: gently inclined    aspect: E-W    landform: ridge  
 erosion: none  
 disturbance: moderate (powerlines, grazing, tracks)  
 introduced species: goats, rabbits      grazing: moderate

**Other:** waterlogging: no    inundation: no    flooding: no  
 fire: no    when: n/a    burnt standing remnants: n/a  
 large trees: no    visible hollows: no  
 weeds present: no(?)    woody debris:    occasional



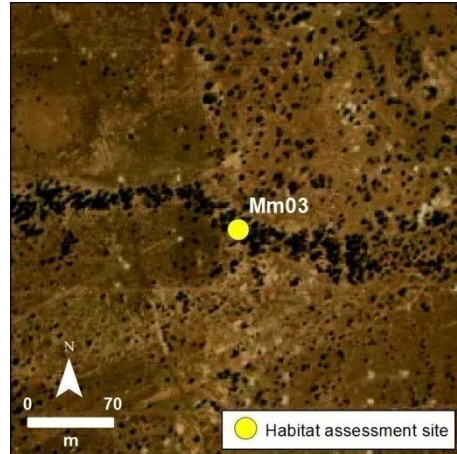
**Study Area:** Mt Magnet Gold Project

**Habitat Type:** Native vegetation

**Site Code:** MM03

**Coordinates (GDA 1994, MGA z 50):**

578418 E                      6897126 N



**Vegetation:**

Stratum	Height		Percent cover		Growth Form	Dom spp.
	min (m)	max (m)	min (%)	max (%)		
Upper	4	6	70	90	Tree	Mulga ( <i>Acacia spp.</i> )
Middle	1	2	10	20	Shrub	mixed Acacia (e.g. <i>tetragonophylla</i> )
Ground	0.1	0.3	5	10	Herb/shrub	Wanderrie grass, chenopods

**Ground Cover:**

Bare soil	Litter	Perennial	Annuals
35	55	< 5	< 5

**Soils:** colour: red    type: clay loam                      exposed bedrock? No

**Coarse Surface Particles:**

presence: < 30 %    abundance: < 10 %      roundness: angular  
size range: 6 – 60 mm

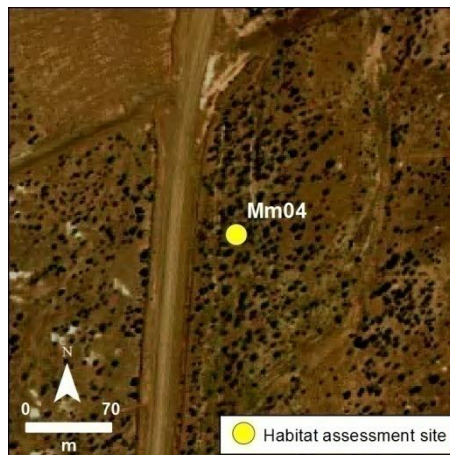
**Env:** slope: gently inclined    aspect: NNW                                      landform: drainage depression  
erosion: none  
disturbance: moderate (exploration, grazing, tracks)  
introduced species: goats, rabbits      grazing: moderate

**Other:** waterlogging: no    inundation: no                                      flooding: no  
fire: no    when: n/a    burnt standing remnants: n/a  
large trees: no    visible hollows: no  
weeds present: no(?)    woody debris:                                      occasional



**Study Area:** Mt Magnet Gold Project  
**Habitat Type:** Native vegetation  
**Site Code:** MM04

**Coordinates (GDA 1994, MGA z 50):**  
 577925 E 6897208 N



**Vegetation:**

Stratum	Height		Percent cover		Growth Form	Dom spp.
	min (m)	max (m)	min (%)	max (%)		
Upper	3	5	20	30	Tree	Mulga ( <i>Acacia spp.</i> )
Middle	1	2	5	10	Shrub	mixed Acacia (e.g. <i>tetragonaphylla</i> )
Ground	0.1	0.3	2	5	Tussock grass	Wanderrie grass

**Ground Cover:**

Bare soil	Litter	Perennial	Annuals
90	< 5	< 5	< 5

**Soils:** colour: red type: clay loam exposed bedrock? No

**Coarse Surface Particles:**

presence: < 30 % abundance: < 10 % roundness: angular  
 size range: 6 – 200 mm

**Env:** slope: flat aspect: N/A landform: plain

erosion: slightly disturbed (some shallow channels)  
 disturbance: moderate (exploration, grazing, tracks)  
 introduced species: goats, rabbits grazing: moderate

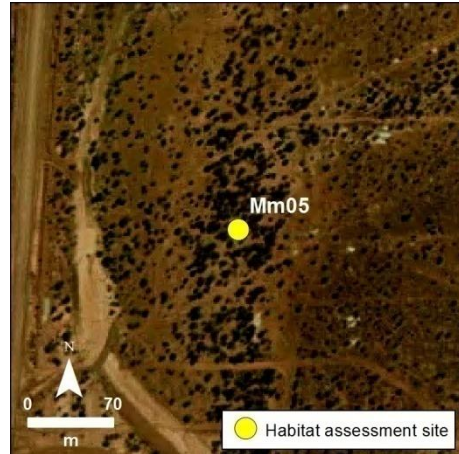
**Other:** waterlogging: no inundation: no flooding: no  
 fire: no when: n/a burnt standing remnants: n/a  
 large trees: no visible hollows: no  
 weeds present: no(?) woody debris: occasional





**Study Area:** Mt Magnet Gold Project  
**Habitat Type:** Native vegetation  
**Site Code:** MM05

**Coordinates (GDA 1994, MGA z 50):**  
 578032 E                  6896883 N



**Vegetation:**

Stratum	Height		Percent cover		Growth Form	Dom spp.
	min (m)	max (m)	min (%)	max (%)		
Upper	5	7	50	80	Tree	Mulga ( <i>Acacia</i> spp.), <i>Eremophila</i> spp.
Middle	2	3	10	20	Shrub	mixed <i>Acacia</i> (e.g. <i>tetragonophylla</i> )
Ground	0.1	0.5	30	50	Tussock grass/shrub	<i>Maireana</i> spp., Wanderrie grass

**Ground Cover:**

Bare soil	Litter	Perennial	Annuals
20	30	10	40

**Soils:** colour: red                                  type: clay loam                  exposed bedrock? No

**Coarse Surface Particles:**

presence: < 30 %                                  abundance: < 10 %   roundness: angular  
size range: 20 - 60 mm

**Env:** slope: flat                                  aspect: N/A                          landform: plain  
erosion: slightly disturbed (some shallow channels)  
disturbance: no effective disturbance  
introduced species: goats, rabbits   grazing: minor

**Other:** waterlogging: no                          inundation: no                          flooding: no  
fire: no    when: n/a                                  burnt standing remnants: n/a  
large trees: no    visible hollows: no  
weeds present: no(?)                          woody debris:                          occasional





**Study Area:** Mt Magnet Gold Project  
**Habitat Type:** Native vegetation  
**Site Code:** MM06

**Coordinates (GDA 1994, MGA z 50):**  
 577001 E              6897581 N



**Vegetation:**

Stratum	Height		Percent cover		Growth Form	Dom spp.
	min (m)	max (m)	min (%)	max (%)		
Upper	4	6	20	40	Tree	<i>Acacia</i> spp. ( <i>A. aneura</i> , <i>ramulosa</i> ?)
Middle	1	2	5	10	Shrub	mixed <i>Acacia</i> (e.g. <i>tetragonaphylla</i> )
Ground	0.1	0.3	60	90	Tussock grass/shrub	<i>Eragrostis</i> spp.

**Ground Cover:**

Bare soil	Litter	Perennial	Annuals
10	< 5	< 5	80

**Soils:** colour: red    type: clay loam              exposed bedrock? No

**Coarse Surface Particles:**

presence: < 30 %    abundance: > 50 % roundness: angular  
 size range: 2 - 200 mm

**Env:** slope: gentle incline    aspect: E    landform: plain  
 erosion: moderately effected by erosive forces (shallow channels, collected debris, mounding)  
 disturbance: no effective disturbance  
 introduced species: goats, rabbits grazing: minor

**Other:** waterlogging: no    inundation: no    flooding: yes  
 fire: no    when: n/a    burnt standing remnants: n/a  
 large trees: no    visible hollows: no  
 weeds present: no(?)    woody debris:    occasional



