

# **Review of Flora, Vegetation and Conservation Values of the proposed Hesperus Waste Dump Harmony Gold, Mt Magnet**

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**Table Of Contents**

1.0 Introduction.....	1
2.0 Methods .....	1
2.1 Botanical Survey .....	1
2.2 Limitations and Constraints .....	1
3.0 Results .....	3
3.1 Flora.....	3
3.2.1 Conservation Significance of Flora.....	3
3.2 Vegetation .....	3
3.2.1 Site 1: Mulga Shrubland on Banded Ironstone.....	3
3.2.2 Site 2: Open Mulga Shrubland.....	4
3.2.3 Site 3: Open Mulga-Chenopod Stony Plain .....	5
4.0 Discussion.....	5
Summary of findings against the Clearing Principles ( <i>Environmental Protection Act 1986</i> ) .....	6
5.0 References .....	7
Appendix 1. Species Recorded within Survey Area.....	8

## **1.0 Introduction**

Harmony Gold Australia, Mt Magnet operates open cut and underground mining just outside the town of Mt Magnet. A series of low lying, narrow ridges comprised of Banded Ironstone Formations (BIFs) occur throughout the MMG tenements. Within the broad footprint of current mine operations, many of these have been subjected to historical and more recent disturbance. A number of these sites are proposed for new pits and waste dumps.

Western Botanical was commissioned by Harmony Gold Australia, Mt Magnet (MMG) to undertake a flora and vegetation survey of several areas across MMG tenements. The survey areas comprised proposed pits (Eclipse, Golden Stream) waste dumps (Hesperus) and exploration tenements. This report documents the survey of the proposed Hesperus waste dump footprint.

## **2.0 Methods**

### **2.1 Botanical Survey**

Denise True and Stephen Kern of Western Botanical conducted Field surveys of the MMG tenements, during the period 10<sup>th</sup> to 15<sup>th</sup> October 2006. The proposed Hesperus waste dump footprint area was traversed on foot on the 10<sup>th</sup> October 2006. Relevés were conducted at three sites (Figure 1), selected to represent the diversity of vegetation types within the footprint. Vegetation structure at each site was described according to the classifications of Muir (1977).

Selected information gathered as part of the wider surveys conducted at the time has been considered to provide a regional context on specific issues at Hesperus.

Brief descriptions of soil and landform were recorded within each site. In addition, species inventories were compiled at each site, with sample specimens collected for any taxa unfamiliar to the botanists. Any flora not readily identified in the field were collected and identified at the WA Herbarium while vouchers of all species encountered were also taken as reference material and have been retained by Western Botanical. Good quality specimens and any species with conservation significance will be vouchered at the WA Herbarium.

All locations were recorded using hand held Garmin 76 GPS with an accuracy of approximately 5m using the WGS 84 datum. Digital photographs of representative habitats and known significant flora were taken for reference.

### **2.2 Limitations and Constraints**

Rainfall in has been below average throughout much of Western Australia in 2006. As a result there was a very low occurrence of annual herbaceous species. In addition, flowering of perennial species was also affected. Despite the seasonal affects, only two taxa could not be fully identified to species level.



**HARMONY**

Date: 23/11/2006	<b>Figure 1: Hesperus Flora Survey Sites</b>
Author:	
Office: Environment	
Drawing: E. Carson	
Scale: 1:5000	Projection: WGS84 Zone 50

0 50 100 200  
metres

Filename and Path

## 3.0 Results

### 3.1 Flora

A total of 52 taxa were recorded from within the survey area (Appendix 1), including two weeds (*Opuntia stricta*, *Schinus molle*). The majority of taxa were represented by the families Mimosaceae (9 taxa), Poaceae (9 taxa), Chenopodiaceae (6 taxa), Malvaceae (5 taxa), Myoporaceae (5 taxa), Goodeniaceae (4 taxa) and Amaranthaceae (3 taxa).

Two species, *Acacia* sp. SOK024 and *Hibiscus ?sturtii* SOK034, could not be identified to species level due to insufficient flowering material. Neither specimen matched any known significant species from the region.

#### 3.2.1 Conservation Significance of Flora

The Priority Three taxon, *Acacia speckii*, occurs within the proposed waste dump footprint. Scattered individuals of this species were recorded near Site 2, population size and extent was not quantified at the time of survey. *Acacia speckii* is known from populations ranging from 100 km north of Meekatharra to Yalgoo (Florabase 2006). Surveys conducted on other BIFs within MMG tenements recorded this species from seven different locations. Population sizes have not been quantified at this stage.

### 3.2 Vegetation

The vegetation of the entire Hesperus waste dump footprint is highly degraded from historic activity and workings in addition to heavy grazing by goats. Three vegetation types were distinguished from remaining flora on the perimeter of the area. The centre of the footprint area was highly degraded and comprised of colonising grasses and chenopods. Due to the highly disturbed nature of the ground the distribution of each vegetation type was not mapped.

#### 3.2.1 Site 1: Mulga Shrubland on Banded Ironstone

Several small remnant banded ironstone outcrops are found in the south-western corner of the surveyed area. Vegetation is dominated by *Acacia aneura* var. *aneura* Open Scrub over *Thryptomene decussata*, *Philotheca brucei* Open Low Scrub over *Aristida contorta*, *Thyridolepis mitchelliana* Very Open Low Grass.



### 3.2.2 Site 2: Open Mulga Shrubland

Open Mulga Shrubland is the most extensive vegetation unit across the proposed footprint. Vegetation is dominated by *Acacia ramulosa* var. *ramulosa*, *Acacia aneura* var. *aneura* Open Scrub.



### 3.2.3 Site 3: Open Mulga-Chenopod Stony Plain

Vegetation of site 3 is dominated by *Acacia aneura* var. *aneura* Open Scrub over *Maireana triptera*, *Sclerolaena eriacantha* Open Dwarf Scrub over *Aristida contorta* Very Open Low Grass.



## 4.0 Discussion

The flora of the MMG tenements is representative of the overall flora of the Austin Botanical District (Murchison Biogeographic Region) predominately mulga low woodland on plains, reduced to scrub on hills (Beard, 1990).

Within the MMG tenements a series of low lying, narrow, Banded Ironstone Formations (BIFs) ridges occur. Banded Iron Formations (BIFs) are highly prospective for iron ore and most if not all of the surrounding BIFs are subject to either exploration or mining. Equally there is significant interest in the conservation values of these BIFs, as previous studies have shown high levels of floristic endemism and unique ecological communities associated with these ranges.

The Department of Environment and Conservation is undertaking detailed floristic studies of the flora and vegetation of banded iron formations of the Yilgarn Ranges. The aim of the study is to expand on the currently limited knowledge of the flora and vegetation that occur on the ranges where banded ironstone occurs and to place the plant communities described during the survey into a regional context with other ranges throughout the Yilgarn Craton.

A BIF ridge occurs on the south-western side of the proposed Hesperus footprint. However the area exhibits high levels of both historic and more recent disturbance and is considered a severely degraded site. The remaining BIF ridge, which is approximately 5m wide, has been dissected and cleared to the edges of the outcropping rocks.

During discussions with DEC regarding further surveys of the BIFs within the MMG tenements, it was agreed that given the highly degraded nature of the site, a quadrat based approach as per the BIF Survey Protocol (Gibson & Coffey, 2006), would not result in anymore meaningful data than that collected by the relevés. More importantly, the level of intactness and conservation value of this BIF is considered very low. The BIFs occurring on the MMG tenements will be the subject of extensive survey during 2007-08.

Scattered individuals of the Priority Three taxon, *Acacia speckii*, were recorded on the northern edge of the proposed waste dump footprint. *Acacia speckii* is known from populations ranging from 100 km north of Meekatharra to Yalgoo (Florabase 2006). Surveys conducted on other BIFs within MMG tenements recorded this species from seven different locations. It is not believed that clearing of the individuals recorded would have impact on the conservation status of this species.

### **Summary of findings against the Clearing Principles (*Environmental Protection Act 1986*)**

The findings of the survey work have been assessed against the clearing principles a, c, d and h.

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

Criteria including representativeness of the area within the Bioregion, ecosystem diversity, diversity of plant species at the bioregional and local level, were used to provide an assessment of the flora and vegetation values in addressing this Principle. Acknowledging that this report does not consider the fauna values in addressing this Principle, and taking the above criteria into account it is not considered that the proposed clearing comprises a high level of biological diversity.

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

There were no observations of flora that will be impacted by the clearing that are known as Declared Rare Flora under the *Wildlife Conservation Act 1950*. Scattered individuals of the Priority Three taxon, *Acacia speckii*, were recorded within the proposed waste dump footprint. *Acacia speckii* is known from populations ranging from 100 km north of Meekatharra to Yalgoo (Florabase 2006). During the survey period it was recorded from seven different locations within MMG tenements. It is believed that clearing of the individuals recorded at the Hesperus footprint would not impact on the conservation status of this species.

**Principle (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.**

There are no known Threatened Ecological Communities recorded from the proposed clearing area. None of vegetation types recorded was considered to fit the criteria to be considered as a threatened ecological community.

**Principle (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.**

The proposed clearing is an area surrounded by existing mine operations and associated infrastructure and exhibits high levels of disturbance. There is no nearby or adjacent conservation area.

## 5.0 References

Beard J.S. (1990) *Plant Life of Western Australia*. Kangaroo Press, Australia.

Department of Environment and Conservation (2006) *Florabase*.

<http://florabase.calm.wa.gov.au/browse/flora?f=163&level=s&id=14615>

(accessed September 21, 2006).

Muir, B.G. (1977) Biological Survey of the Western Australian Wheatbelt. Part II: Vegetation and habitat of the Bendering Reserve. *Records of the Western Australian Museum*, Suppl. No. 3.

**Appendix 1. Species Recorded within Survey Area**

Family #	Family	Species	Site 1	Site 2	Site 3	Opp
7	Adiantaceae	<i>Cheilanthes lasiophylla</i>	1			
31	Poaceae	<i>Aristida contorta</i>	1	1	1	
31	Poaceae	<i>Digitaria brownii</i>	1			
31	Poaceae	<i>Eriachne pulchella</i>	1			
31	Poaceae	<i>Monachather paradoxus</i>	1			
31	Poaceae	<i>Paspalidium basicladum</i>	1			
31	Poaceae	<i>Thyridolepis mitchelliana</i>	1			
31	Poaceae	<i>Eragrostis eriopoda</i>		1		
31	Poaceae	<i>Austrostipa nitida</i>			1	
31	Poaceae	<i>Austrostipa scabra</i>				1
105	Chenopodiaceae	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>		1		
105	Chenopodiaceae	<i>Maireana carnosa</i>			1	
105	Chenopodiaceae	<i>Maireana georgei</i>			1	
105	Chenopodiaceae	<i>Maireana triptera</i>			1	
105	Chenopodiaceae	<i>Sclerolaena eriacantha</i>			1	
105	Chenopodiaceae	<i>Sclerolaena fusiformis</i>			1	
106	Amaranthaceae	<i>Ptilotus schwartzii</i>	1	1	1	
106	Amaranthaceae	<i>Ptilotus obovatus</i>		1		
106	Amaranthaceae	<i>Ptilotus exaltatus</i>			1	
163	Mimosaceae	<i>Acacia aneura</i> var. <i>aneura</i>	1	1	1	
163	Mimosaceae	<i>Acacia aulacophylla</i>	1			
163	Mimosaceae	<i>Acacia ramulosa</i> var. <i>ramulosa</i>		1		
163	Mimosaceae	<i>Acacia tetragonophylla</i>			1	
163	Mimosaceae	<i>Acacia aneura</i> var. <i>fuliginea</i>				1
163	Mimosaceae	<i>Acacia exocarpoides</i>				1
163	Mimosaceae	<i>Acacia grasbyi</i>				1
163	Mimosaceae	<i>Acacia speckii</i> (P3)				1
163	Mimosaceae	<i>Acacia</i> sp. SOK024				1
164	Caesalpiniaceae	<i>Senna artemisioides</i> subsp. <i>x sturtii</i>			1	
164	Caesalpiniaceae	<i>Senna artemisioides</i> subsp. <i>filifolia</i>				1
175	Rutaceae	<i>Philotheca brucei</i> subsp. <i>brucei</i>	1			
194	Anacardiaceae	* <i>Schinus molle</i>				1
221	Malvaceae	<i>Sida</i> sp. unisexual (N.H. Speck 574)	1	1		
221	Malvaceae	<i>Sida atrovirens</i>	1			
221	Malvaceae	<i>Sida calyxhymenia</i>			1	
221	Malvaceae	<i>Hibiscus ?sturtii</i> SOK034				1
221	Malvaceae	<i>Sida excedentifolia</i>				1
256	Cactaceae	* <i>Opuntia stricta</i>				1
273	Myrtaceae	<i>Thryptomene decussata</i>	1			
273	Myrtaceae	<i>Micromyrtus sulphurea</i>				1
315	Solanaceae	<i>Solanum lasiophyllum</i>	1	1	1	
326	Myoporaceae	<i>Eremophila jucunda</i> subsp. <i>jucunda</i>	1	1		
326	Myoporaceae	<i>Eremophila latrobei</i>	1			
326	Myoporaceae	<i>Eremophila clarkei</i>		1	1	
326	Myoporaceae	<i>Eremophila fraseri</i> subsp. <i>galeata</i>			1	
326	Myoporaceae	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>				1
341	Goodeniaceae	<i>Goodenia macroplectra</i>	1			

Family #	Family	Species	Site 1	Site 2	Site 3	Opp
341	Goodeniaceae	<i>Goodenia mimuloides</i>			1	
341	Goodeniaceae	<i>Scaevola spinescens</i>			1	
341	Goodeniaceae	<i>Goodenia havilandii</i>				1
343	Stylidiaceae	<i>Stylidium longibracteatum</i> <i>Erymophyllum ramosum</i> subsp. <i>ramosum</i>	1			
345	Asteraceae				1	