Mount Gibson Mining

Iron Hill Deposits

Environment Protection and Biodiversity Conservation Act 1999 (Cth)

Supplementary information for controlled action to a listed threatened species - *Darwinia masonii*

December 2015

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Executive Summary

Mount Gibson Mining Limited (MGM) is proposing to extend the operational life of its approved Extension Hill hematite mining operations (EPBC 2005/2381) by developing the Iron Hill deposits immediately south of Extension Hill on the Mount Gibson ranges. The project is located approximately 270 km east-south-east of Geraldton in the Shire of Yalgoo. The extension to operations is within a development envelope occupying 127.4 ha and will increase the operational mine life by two to three years.

MGM referred the project to the Department of Environment (DoE) in June 2015 as per requirements of the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) for potential matters of national environmental significance. The DoE determined the project to be a controlled action with relevant controlling provisions being listed threatened species and communities, especially for the listed threatened species *Darwinia masonii.*

Darwinia masonii is an erect shrub growing up to three metres in height and is found extensively across the Mt Gibson Ranges. Implementation of the proposal would result in the removal of 1,327 individuals, which represents approximately six percent of the known abundance of the species.

To avoid, mitigate and offset potential impacts to *Darwinia masonii* due to implementation of the proposal, MGM proposes to utilise and further build upon the management measures implemented by the approved mining operations at Extension Hill (EPBC 2005/2381) and make commitments as regulated by State legislation (*Environmental Protection Act 1986,* WA – EP Act) and Federal legislation (EPBC Act).

The existing approved operations (EPBC 2005/2381) have successfully avoided indirect effects to *Darwinia masonii* through implementation of environmental management and monitoring plans aimed at mitigating potential effects such as dust, fire and weeds which may be associated with mining operations. Research and trials for the re-establishment of *Darwinia masonii* at the approved mining operations (EPBC 2005/2381) have also demonstrated that *Darwinia masonii* can be re-established in disturbed areas by:

- Natural colonisation;
- Transplanting of individual specimens; and
- Transplanting of cuttings grown from tube stock.

Also, *Darwinia masonii* may be re-established through the collection and subsequent broad acre spreading of viable *Darwinia masonii* seed, targeting areas subjected to revegetation within the Mt Gibson Ranges.

MGM proposes a set of commitments to mitigate and offset the potential impacts of the proposal to address requirements of the *Environmental Protection Act 1986* (WA) and the *Environment Protection & Biodiversity Conservation Act 1999*, as follows:

Environmental Protection Act 1986 (WA)
These items summarise the key environmental management measures to be considered for conditioning of any approval by WA Ministerial Statement:

a. Commitment S1: MGM will implement an Environmental Management Plan applicable to the proposed Iron Hill mining operations based on the principles, management and mitigations for the existing approved operations at the Mount Gibson Iron Ore Mine (EPBC 2005/2381) (Appendix 3);
b. Commitment S2: Develop and implement a Mine Closure Plan in accordance with WA's Department of Mines and Petroleum and Environmental Protection Authority *Guidelines for Preparing Mine Closure Plans, 2015.*
c. Commitment S3: *Darwinia masonii* Environmental Offsets. MGM will complete direct and indirect environmental offsets for *Darwinia masonii* in accordance with the

environmental offsets framework to be agreed for the Project under the *Environmental Protection Act 1986* (WA).

Environment Protection & Biodiversity Conservation Act 1999.
Commitments made by MGM may be considered for any future approval and may involve a combination of prescriptive and outcomes based conditions; commitment C1 is prescriptive, whilst commitment C2 has been developed by following the *Department of the Environment Outcomes Based Conditions Policy* (DoE 2015a) and the *Department of the Environment Outcomes Based Conditions Guidance* (DoE 2015b).

d. Commitment C1: Implement a *Darwinia masonii* Management and Monitoring Plan to the Iron Hill Deposits proposal based on that currently applied for the approved mining operations and required by EPBC 2005/2381 (Appendix 2).

e. Commitment C2: *Darwinia masonii* from the development envelope are re-established within areas subjected to rehabilitation and revegetation by the proponent within the Mt Gibson Ranges. The recovered plants should:
    i. originate from *Darwinia masonii* 'parents' collected at Iron Hill and Iron Hill South;
    ii. represent more than 100% or greater the number of individuals of plants actually taken from the development envelope;
    iii. produce flowers and viable seeds on or before the time of mine closure.

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1 Introduction

Mount Gibson Mining Ltd (MGM) is a wholly owned subsidiary of Mount Gibson Iron Ltd (MGX). MGM currently operates the approved mining operations at Extension Hill (EPBC 2005/2381) sited within the Mount Gibson Ranges and the Shire of Yalgoo, approximately 270km east-south-east of Geraldton. The approved operations (EPBC 2005/2381) include iron ore comprised of both hematite and magnetite ore, with MGM managing the current hematite operations and Extension Hill Proprietary Ltd (EHPL) managing the proposed magnetite operations (post hematite mining).

MGM is proposing to mine hematite deposits at Iron Hill / Iron Hill South (the Project) immediately south of Extension Hill (Figure 1, Figure 2, Table 1). The Project is an extension of the approved hematite mining operations at Extension Hill which was approved by the State of WA and under the EPBC Act in full for the Mount Gibson Iron Ore Mine (EPBC 2005/2381). The implementation of the Project would increase the mine life for the mining of hematite on the tenements by approximately two to three years. The Project will cover a spatial area of 127.4 ha (Figure 2) and will produce approximately 3.5 million tonnes of ore per annum once freighted to Port for export.

The Project will utilise existing infrastructure and facilities associated with the approved Extension Hill mining operations (EPBC 2005/2381) including:

- Crusher and associated processing, product loading and haulage infrastructure;
- Rail and road transport facilities; and
- Accommodation village facilities.

Infrastructure proposed to be developed for the Project includes:

- Mine pits;
- Waste rock landforms; and
- Support infrastructure such as workshops, laydown yards, ponds for dust suppression water, landfill and bioremediation facilities.

On the 26th of June 2015, MGM referred the Project to the Department of Environment (DoE) as per section 68(2) of the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act). The referral (Appendix 1) covered potential impacts to matters of national environmental significance including the following species:

a) *Darwinia masonii* (a plant);
b) *Leipo ocellata* (malleefowl, a bird); and
c) *Idiosoma nigrum* (shield-backed trapped door spider).

On the 18th of September 2015, MGM received correspondence from DoE advising that, under Section 75 of the EPBC Act, the proposal is a controlled action requiring assessment. Specifically, the controlled action is in relation to the listed threatened species *Darwinia masonii* with the action involving the clearing of plants in the wild. Implementation of the proposal would result in the removal of 1,327 *Darwinia masonii* individuals.

DoE determined that the proposal would be assessed by 'Preliminary Documentation'. On the 6th October 2015, DoE provided detail of the information to be included as preliminary documentation and this document meets those requirements. This document describes the following:

- Biology, distribution and status of *Darwinia masonii*;
- Management of both direct and indirect risks to *Darwinia masonii* associated with approved mining operations at Extension Hill (EPBC 2005/2381) and the Proposal; and
- Management measures and commitments to avoid, mitigate and offset potential direct and indirect effects associated with the proposed development.

For further information see **Appendix 1** – Referral of Proposed Action – Mt Gibson Ranges, Iron Hill Deposits. A minor revision to the design within the project area occurred after the lodgment of the referral which had no effect on potential matters of NES. The predicted impact in this document relates to the area described and presented in Table 1.

Table 1: Coordinates and arrangement of the Project area (shown in yellow below)

	Latitude			Longitude		
Location Point	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-29°	34'	27.17" S	117°	9'	9.93" E
2	-29°	34'	28.55" S	117°	9'	13.00" E
3	-29°	36'	29.99" S	117°	10'	55.13" E
4	-29°	36'	40.25" S	117°	10'	48.59" E
5	-29°	36'	45.89" S	117°	10'	30.96" E
6	-29°	36'	14.37" S	117°	9'	13.78" E

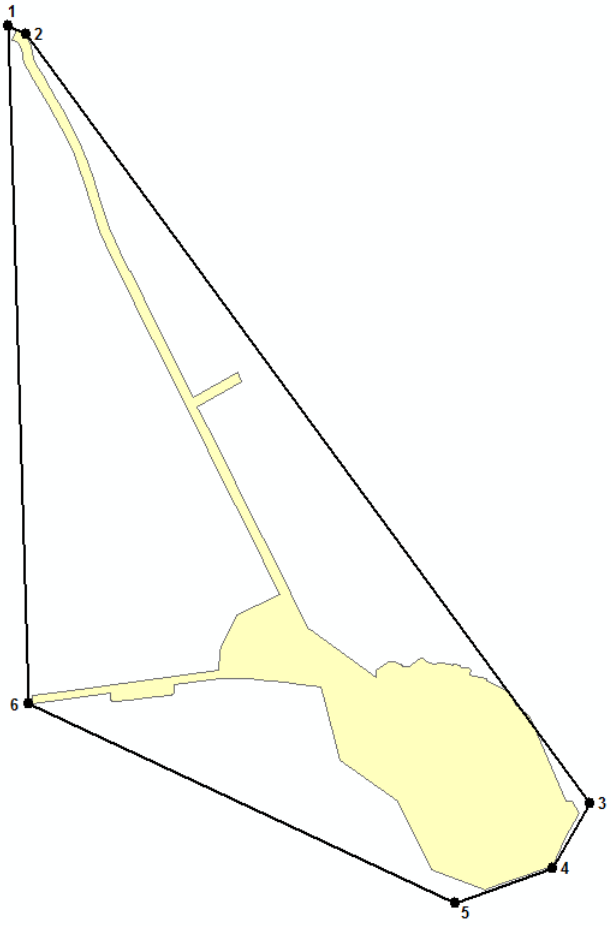




Figure 1: Regional location of the Mt Gibson Ranges in the Mid-west of Western Australia.

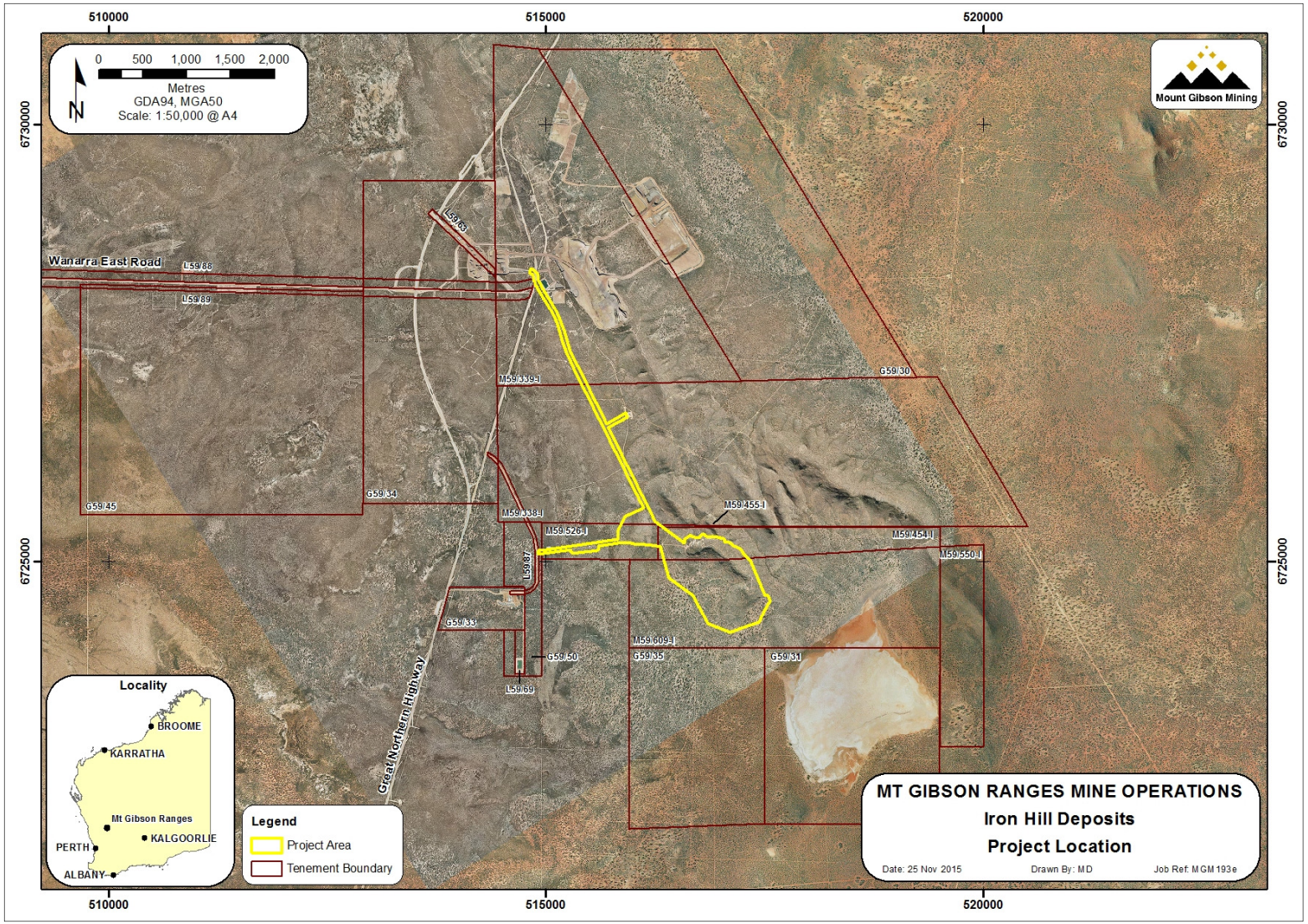


Figure 2: Siting of the proposed development on the mining tenements and in relation to the existing mining operations.

2 Regional Contribution

2.1. MGM Operations in the Mid-west Region

MGM mine and process hematite ore from the approved mining operations (EPBC 2005/2381) at Extension Hill and Extension Hill North and transport the processed hematite ore to Geraldton for shipping via Perenjori rail siding (Figure 1). Mining commenced in December 2010 and the first shipment of ore from this site left Geraldton Port in December 2011. A brief overview of the existing mining, freight and shipping operations involves:

Mine Site

- The hematite and associated waste rock is mined via conventional open pit methods of blasting and excavation.
- The excavated hematite is loaded onto dump trucks and transported to a processing area for crushing and screening.
- The overburden and waste rock material from the open pit mining operation is stockpiled in a purpose-designed waste rock landform to the east of the hematite mine pit. The Run of Mine (ROM) pad is located to the west of the pit.
- To operate the mine, ancillary infrastructure and facilities including crushing and screening plant, office buildings, workshops, crib rooms, an accommodation village, waste water treatment plant, bioremediation facility, bore fields, landfill, haul roads and access tracks have been constructed.
- The Great Northern Highway has been diverted west of its original alignment to ensure the infrastructure and public access is a safe distance away from the mine. There is also grade separation of the public highway and the product haul road.

Road Haulage

- After processing, the hematite is transported by road to Perenjori.
- The public roadway from the mine site to the rail siding has been upgraded to a sealed, two lane roadway. This roadway passes beneath the Great Northern Highway with a constructed bridge supporting the realigned highway.

Rail Haulage

- The rail siding is located 2 km to the south-east of the Perenjori township.
- The rail siding facility is located on private land, for which MGM has acquired freehold title.
- The rail siding provides two open stockpile areas of approximately 600,000 tonnes capacity each (one for lump and one for fines product) on either side of a train line spur. An additional overflow stockpile with approximately 150,000 tonne capacity will be constructed as required.
- The rail siding links into the Brookfield, formerly WestNet, rail line south of Perenjori, from which hematite product is transported by rail to the Geraldton Port via Mullewa.

Figure 3 illustrates the existing Mt Gibson Iron Ore Mine as approved by EPBC 2005/2381 at Extension Hill.



Figure 3: Mt Gibson Iron Ore Mine

(From left to right (1) mining of ore, (2) processing of ore and road haulage, (3) rail siding at Perenjori, (4) Geraldton Port Bulk Handling Facility showing Rail Unloader, Shiploader and MGX berths.)

2.2. Economic and social benefits

In mid-2015 terms, the gross economic value predicted to be generated by development and operation of the Iron Hill deposit was estimated to be A$370 million. It is anticipated that similar flow on effects generated from the approved Extension Hill mining operations (EPBC 2005/2381) to the regional and State economy may continue throughout the life of the Iron Hill Project, until such time as the mine commences with mine closure. The figures and data provided are based on the MGX 2013 Annual Report (MGX 2013) and the 2015 MGX Annual Report (MGX 2015).

The approved mine operations generate a direct gross economic benefit of approximately A$270 million per year within the Western Australian economy, of which approximately A$21 million per year is paid to the State of Western Australia in mineral royalties and A$17 million per year is paid to the Commonwealth of Australia in taxation (MGX 2013). Specifically, during the 2014/2015 Financial Year the approved mine operations (EPBC 2005/2381) at Extension Hill continued to perform strongly despite volatility in the export price of iron ore. During the 2014/2015 Financial Year Extension Hill generated positive pre-tax cashflow of A$34.9 million, paid approximately A$16.1, to the State of Western Australia in royalties and A$18.8 million to the Commonwealth of Australia in taxation (MGX 2015). During operations the Extension Hill mine has maintained employment at approximately 110 MGM staff and the road haulage contractor employing approximately 45 staff.

While local employment numbers are comparatively low, they are highly significant to the regional economy that benefits from new projects to secure economic and population status or growth. This is especially so in Perenjori, which is undergoing negative population growth of an estimated -22% from 2001 to 2008, with associated loss of services. The Shire of Perenjori is of the view that, because of the rail activity at Perenjori Siding, current operations offer Perenjori and other communities in the north Midlands and the Midwest the opportunity to sustain their population and to remain sustainable into the future.

MGM has also agreed to provide employment opportunities for the local indigenous population with a target of 9% of the workforce consisting of indigenous workers.

The Extension Hill operations of Mt Gibson Iron Ore Mine have resulted in significant public benefit through the substantial expenditure on environmental offsets, regional development and employment opportunities. Table 2 lists certain regional benefits associated with current operations.

Table 2: A selection of public benefits from the Mount Gibson Iron Ore Mine to date.

Offset/Benefit
– ***Environmental offset via MS753::***
o On ground conservation works on three surrounding pastoral stations o $50,000 per station per annum($150,000 pa funding)
o Regional Conservation Association: for environmental works on public and private land within 150km radius ($100,000pa)
o Rare plant species *Darwinia masonii* and *Lepidosperma gibsonii* research and recovery programs
o Research and rehabilitation of regional floristic communities
o Malleefowl Management Plan (wider than just Mt Gibson iron ore mine)

Offset/Benefit
o Contribution to regional feral animal control
o Regional Fire Control
– ***Aboriginal Communities:***
o Commitment for life of mine
– ***Revenue to government and GOCs:***
o Government: royalties and taxation

3 Community Consultation

MGM undertook an extensive consultation program with all government and community stakeholders as part of the EIA-Public Environmental Review (PER) process for the Project. Full detail of the program to date is provided within Appendix 4.

The program aims to enable communications with all key stakeholders. The consultation process allows stakeholders to raise issues prior to planning and design stages of the project. Where practical, the project design was changed to accommodate the issues raised.

Consultation has included presentations, one-on-one discussions and written correspondence with EHPL, landholders, environmental groups, community groups, local members of Parliament, government departments, local government authorities and members of local Aboriginal communities.

Government departments and community groups were consulted in relation to the Project, surveys undertaken and planned, key environmental effects of the proposal, approval requirements and processes and stakeholder consultation. The government departments included;

- Environmental Protection Authority and Office of the Environmental Protection Authority
- Department of the Environment
- Department of Parks and Wildlife
- Department of Mines and Petroleum
- Department of Water
- Department of Aboriginal Affairs
- Shire of Yalgoo
- Shire of Perenjori
- City of Greater Geraldton
- Mid-West Ports Authority
- Department of Lands

The key outcomes of the consultation with government departments was the necessary approval pathways and requirements.

The groups consulted include:

- Extension Hill Pty Ltd
- Badimia People
- Australian Wildlife Conservancy / Mt Gibson Pastoral Lease
- Pindiddy Aboriginal Corporation / Ninghan Pastoral Lease
- Bush Heritage Australia / White Wells Pastoral Lease
- Wanarra Pastoral Lease
- North Central Malleefowl Preservation Group
- Western Australia Naturalists Club
- Conservation Council of Western Australia
- Wildflower Society of Western Australia

There were no outcomes from community consultation which required a reconsideration or alteration of Project aspects.

The Badimia People are considered a key group due to traditional owner interests potentially coinciding with certain land within the Project area. The Badimia People, EHPL and MGM have a confidential agreement, effective since 2001, covering the area of the Mt Gibson Ranges. The heritage agreement outlines agreed protocols for heritage surveys, protection of heritage areas, mining, environmental matters, financial contributions, employment and education. The Badimia People, EHPL and MGM continue to operate in accordance with the agreement. The Badimia People, EHPL and MGM also maintain a Monitoring and Liaison Committee (MLC). The MLC meets each 6 months to discuss matters including the status of the mining operations, employment opportunities, cultural awareness, and the operation of the confidential heritage agreement.

In May 2013, the Badimia People (via the Badimia Land Aboriginal Corporation) advised that no additional heritage surveys were required and wished MGM well with the proposed works. In January 2015, a meeting was held with representatives of the Badimia People and the Badimia People confirmed their view that there are no places or objects of Aboriginal heritage within the Proposal Area.

Further community consultation has also been undertaken through MGM's website and media releases since 2012. This consultation has included identification of the mineral resource within the Project area, the intention to undertake further mineral exploration to define the mineral resource, and the intention for future mine development.

4 *Darwinia masonii*

4.1 Background

Darwinia masonii (Mason's Darwinia) is a medium-sized erect shrub growing up to three metres in height with characteristic grey-green foliage and numerous spreading pinkish pendulous bracts. The leaves are small, narrow and near-triangular in cross-section, crowded towards the ends of branchlets. The inflorescences are comprised of numerous small tubular flowers. *Darwinia masonii* generally flowers between April and November (Brown et al. 1998 in MGM & EHPL 2014a).

Darwinia masonii has been recorded only from the Mt Gibson Ranges, where it occurs at elevations above 330mAHD on skeletal or very shallow soils and shallow pockets associated with ironstone, granite, lateritic breakaway formation and creeks (Eco Logical 2015a; MGM & EHPL 2014a). A total of 62% of *Darwinia masonii* records are associated with geology types that typically comprise what is known as banded ironstone formations (BIF). The distribution of *Darwinia masonii* relative to BIF is displayed in Figure 7 and Figure 8. The recorded locations of *Darwinia masonii* within the area of the Mt Gibson Ranges and the Proposal are also identified by Figure 7 and Figure 8. The regional distribution and images of *Darwinia masonii* are presented in Figure 4.

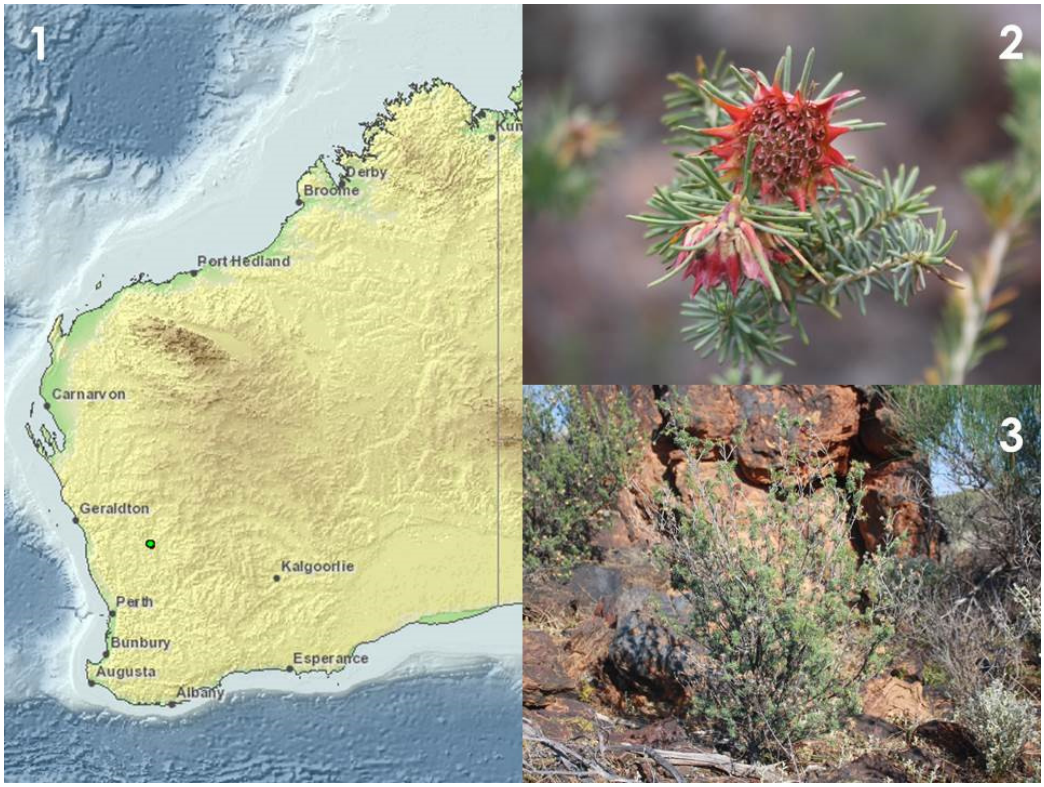


Figure 4: *Darwinia masonii* Distribution and Images.

(1. Regional distribution of *Darwinia masonii* ● (adapted from DPaW 2014b). 2. Flower and leaves of *Darwinia masonii* (Globe Environments 2014 unpublished). 3. Growth form of *Darwinia masonii* (Globe Environments 2014 unpublished). Notes: 1. Consistent with the results of Maia (2014), the erroneous *Darwinia masonii* record approximately 20km east of the Mt Gibson Ranges has been removed from Image 1).

Darwinia masonii was listed as a 'Threatened Species' of flora under the EPBC Act in year 2000 (DEC 2008b). *Darwinia masonii* is one of more than 50 Western Australian species of the genus *Darwinia*, with this genus comprising of a number of taxa considered to be naturally constrained in distributions

due to limiting factors such as certain substrate requirements and/or breeding biology constraints (MGM & EHPL 2013).

Over the past decade, the research and monitoring done because of the approval of the existing mine, the ecology of *Darwinia masonii* has been subject to extensive research as outlined within BGPA (2010). Key findings and outcomes are:

a) Germination of fresh *Darwinia masonii* seed is naturally low. The results of seed bank trials indicate a complex germination/dormancy strategy combining a requirement for physical seed coat degradation, environmental (seasonal temperature) curing with cycling in-and-out of dormancy, and heat/smoke-related physiological responses. Fire results in high post-fire seedling recruitment from long-lived soil-stored seed of *Darwinia masonii*, with only limited recruitment between fires within older populations. Seedling survival during the first summer has been recorded at approximately 10%.
b) Reproduction (i.e. flowering, fruiting) commences in *Darwinia masonii* from approximately six years of age, with flowering and seed production taking place over an extended period during spring and early summer. Seed production varies, with between approximately 10-60 seeds produced by each mature individual per year. Observations have identified *Darwinia masonii* to be pollinated by at least one bird species, the White-fronted Honeyeater (*Phylidonyris albifrons*), with seed dispersal by ants.
c) *Darwinia masonii* enter a period of physical dormancy during summer drought by reducing transpiration and photosynthetic function, with the capacity to restore tissues following rainfall. Roots of *Darwinia masonii* have the capacity to enter large cracks, pores and fissures in the regolith and may achieve considerable root depth (up to 10m). Whilst mortality is rare amongst mature *Darwinia masonii* (with this taxon being long-lived, to approximately 100 years), drought has been observed to contribute to mortality in both mature individuals and juveniles.
d) Genetic structuring between groups of *Darwinia masonii* is low; however some groups do not mate randomly, suggesting some weak barriers to gene flow between some groups. Analysis of molecular variance of seven groups across the Mt Gibson Ranges partitioned approximately 94% of variation within groups, and 6% between groups; indicating weak population structure. Groups sampled in areas referred to as Extension Hill South and Mt Gibson South were statistically identified as being significantly different; in that the *Darwinia masonii* in these groups do not appear to mate randomly with the other groups across the Mt Gibson Ranges, with possible explanations for this result including the sampling of different generations (due to differing fire histories between the sampled groups).
e) Successful propagation of *Darwinia masonii* has been demonstrated using green-stock production from cuttings, with field translocation of the nursery-raised individuals undertaken during 2005. Survival of *Darwinia masonii* green-stock cuttings transplanted to field sites averaged approximately 10% after five years in unwatered plots, with cuttings in plots that were irrigated for the first two years (but not after) indicating a survival rate of approximately 89% after five years. Cuttings that were irrigated were recorded as commencing flowering in the first year after translocation.

An image identifying some of the translocated *Darwinia masonii* referred to by BGPA (2010) is identified by Figure 5. The survival rate after approximately nine years (2005 to 2014) is currently approximately 81% within irrigated plots (irrigated for the first two years, but not after), with approximately 90% of measured individuals recorded as reproductive during the 2013 year (pers. com. J Sackmann of MGM, March 2014). Numerous seedlings recorded immediately surrounding the translocation plots, as also identified by Figure 5, additionally assist to confirm the translocated individuals have reached reproductive maturity and produce viable seed.

Individuals of *Darwinia masonii* have also been identified as colonising exploration access tracks and drilling pads at various locations across the Mt Gibson Ranges. These records indicate *Darwinia masonii* can grow from soil-stored seed following land disturbance. Images identifying a mature

individual and a seedling of *Darwinia masonii* recorded within an exploration access track are provided in Figure 6.

Furthermore, individuals of *Darwinia masonii* have also been recorded as germinating within topsoil stockpiles (pers. com. J Sackmann of MGM, November 2014).



Figure 5: Translocated *Darwinia masonii* from green-stock cuttings, and seedlings at a trial plot.

(1. Translocated *Darwinia masonii* from green-stock cuttings established in 2005, as at September 2014, with the individuals recorded as healthy and flowering. 2. *Darwinia masonii* seedlings recorded directly outside of the translocation plot fence. 3. *Darwinia masonii* seedling recorded directly outside of the translocation plot. Images: Globe Environments (2014 unpublished)).



Figure 6: Colonisation of *Darwinia masonii* within historical exploration disturbance areas.

(1. *Darwinia masonii* mature individual (flowering) within an exploration access track. 2. *Darwinia masonii* seedling within an exploration access track. Images: Globe Environments (2014 unpublished)).

4.2 Species Abundance and Distribution

In 2004, a census of the *Darwinia masonii* population initially recorded 16,573 individuals, comprising 14,307 mature individuals (86%), 1,725 seedlings (10%) and 541 senescent (dead) individuals (3%) (ATA 2004)[1]. That census formed the basis for the original environmental assessment for the approved mine operations at the Mt Gibson Ranges (EPBC 2005/2381) (ATA 2006a; EPA 2006a; WA Minister for Environment 2007), for which approximately 15%[2] of the total *Darwinia masonii* population were approved for removal; equating to approximately 17%[3] of mature *Darwinia masonii* *(EPBC 2005/2381).

Since the initial ATA (2004) census, additional surveys by Coffey (2008), MBS (2013) and Maia (2014) have improved the knowledge on *Darwinia masonii* abundance at Mt Gibson Ranges, with the population records subsequently increased prior to 2014 to 17,818 *Darwinia masonii* individuals (DPAW 2014a). Based on the survey data of ATA (2004) and Coffey (2008) which coincide with the approved mine operations (EPBC 2005/2381), a total of 1,702 individuals of *Darwinia masonii* have been removed to date (MGM & EHPL 2014a).

The most up to date census for *Darwinia masonii* individuals was undertaken during 2014 to provide a contemporary record of the *Darwinia masonii* population. The census recorded 20,965 extant *Darwinia masonii* individuals, comprising 19,132 mature individuals (91%), 1,580 juveniles (8%), 188 seedlings (less than 1%) and 65 senescent individuals (less than 1%) (Eco Logical 2015a).

Based on Eco Logical (2015a), *Darwinia masonii* census data of 20,965 individuals, together with the 1,702 individuals removed to date as part of the existing approved Mount Gibson Iron Ore Mine development (EPBC 2005/2381) (MGM & EHPL 2014a), the total pre-disturbance *Darwinia masonii* population abundance on the Ranges is estimated at 22,667 individuals. This revised *Darwinia masonii* population is more than 6,000 individuals greater than the 16,573 individuals originally reported ten years before by ATA (2004); these were the data used in the environmental assessment of EPBC 2005/2381. The distribution of the specimens on the Ranges is shown in Figure 7.

The notable increase in the total number of records for *Darwinia masonii* between the ATA (2004) and Eco Logical (2015a) census is considered largely a result of the greater survey effort (intensity and search area) undertaken by Eco Logical (2015a), rather than an increase in the population numbers over time (noting there were no environmental factors (e.g. fire) between the census periods which could have resulted in such an increase). The vast majority of the *Darwinia masonii* records occur on ironstone ridges and slopes, parts of mining tenement M59/338-I, where there is no approved or proposed future development (Figure 7).

The revised *Darwinia masonii* census data also results in a revision to the effect of the existing approved mine operations (EPBC 2005/2381). Based on the Eco Logical (2015a), *Darwinia masonii* census data, a total of 2,061 *Darwinia masonii* individuals occur within the currently undeveloped areas of the existing approved mine development footprint (EPBC 2005/2381), comprising 1,929 mature individuals, 107 juveniles, 13 seedlings and 12 senescent individuals. With the addition of the 1,702 *Darwinia masonii* individuals removed to date, the existing approved mine operations (EPBC 2005/2381) coincides with 3,763 individuals (17%) of the total *Darwinia masonii* records of 22,667 individuals.

[1] Percentages adjusted for rounding.

[2] 15% being 2,530 *Darwinia masonii* individuals of the ATA (2004) recorded population of 16,573 individuals, comprising 2,469 mature individuals and 24 seedlings within the approval area as identified by Figure 16a in ATA (2006a) and Figure 6 in EPA (2006a), and 37 senescent individuals within the approval area as identified by Figure 2 in ATA (2004). Reference to 14% within the text of ATA (2006a) appears to be erroneous.

[3] 17% being 2,469 mature *Darwinia masonii* individuals of the recorded 14,307 mature *Darwinia masonii* individuals as identified by Figure 16a in ATA (2006a). Reference to 14% of mature *Darwinia masonii* individuals within the text of ATA (2006a) and 15% of mature *Darwinia masonii* individuals within the text of EPA (2006a) both appear to be erroneous.

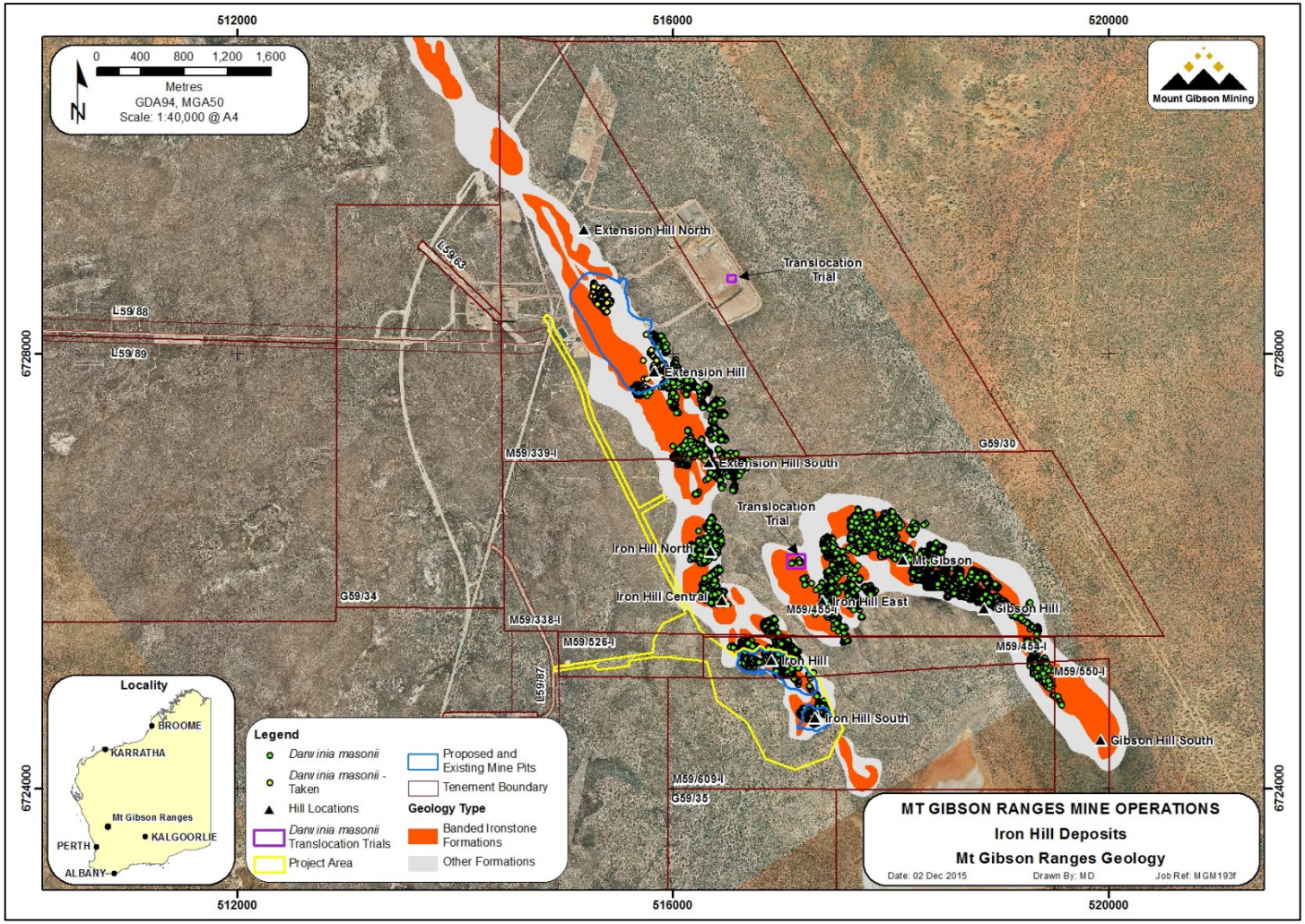


Figure 7: Location of known *Darwinia masonii* plants in relation to surface geology in the Mt Gibson Ranges.

(*D. masonii* plants that have been cleared due to the existing mine operations in the Mt Gibson Ranges are yellow. The Development Envelope is outlined in yellow and the existing and proposed mine pits are outlined in blue. Data sources: ATA (2004), Coffey (2008), MBS (2013), Maia (2014), Eco Logical (2015a). Sites of existing translocation trials are shown also.)

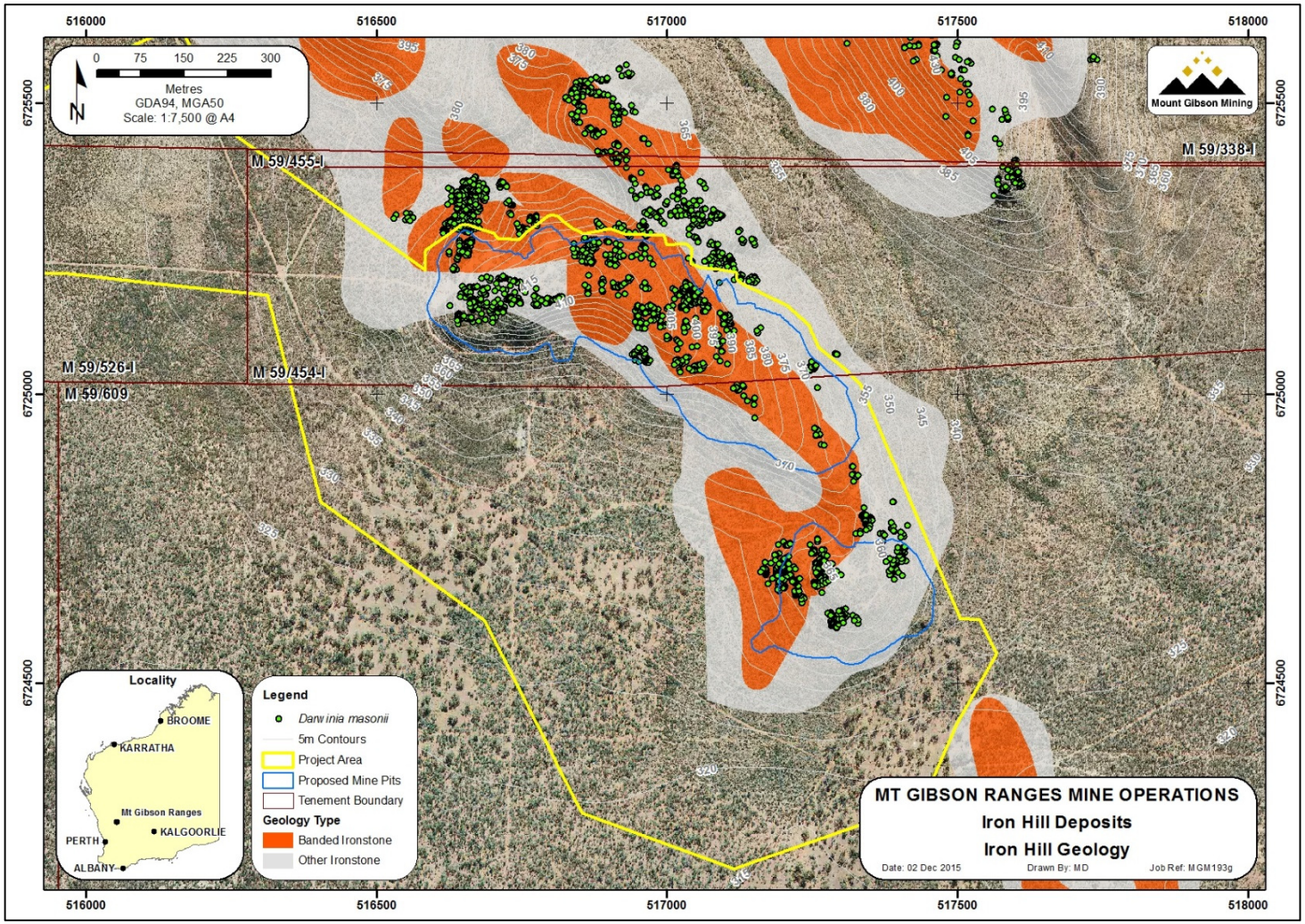


Figure 8: Location of known *Darwinia masonii* plants in relation to ironstone surface geology types in the vicinity of the Development Envelope**.**

(The Development Envelope is outlined in yellow and the proposed mine pits are outlined in blue. The 5m contour lines are shown in white. Data sources: ATA (2004), Coffey (2008), MBS (2013), Maia (2014), Eco Logical (2015a)).

4.3 Species Impact Assessment

The Proposal coincides with records of 1,327 individuals (6%) of the *Darwinia masonii* population of 22,667 individuals, comprising 1,135 mature individuals, 173 juveniles, 18 seedlings and 1 senescent individual. The Proposal, upon implementation, would increase the cumulative effect through removal of *Darwinia masonii* from 3,763 individuals (17%) to 5,090 individuals (22%[4]) of the total population. In terms of hematite mining operations currently approved (EPBC 2005/2381) or proposed by MGM, this would result in a cumulative reduction of only 13% of the total *Darwinia masonii* population being:

- 1,702 individuals taken at the existing Extension Hill / Extension Hill North mine as part of the hematite component pf Mount Gibson Iron Ore Mine Project; and,
- 1,327 proposed at Iron Hill deposits in this Proposal.

A summary of the *Darwinia masonii* population and the cumulative effect of the existing approved Extension Hill mine operations (EPBC 2005/2381), and the Proposal is provided in Table 3.

Table 3: *Darwinia masonii* Population Records

(The total recorded population for *Darwinia masonii* is identified, including the proportional distribution between the areas of the existing approved Extension Hill mine operations, the Proposal, and other areas of the Mt Gibson Ranges.)

	Darwinia masonii Population		*Darwinia masonii* Population Cumulative Effect	
	No. Individuals	% Individuals	No. Individuals	% Individuals
Approved Mine Operations at Extension Hill	3,763 (3,582 mature, 107 juvenile, 35 seedling, 39 senescent)	17%	5,090	22%[1]
Iron Hill Deposits Proposal	1,327 (1,135 mature, 173 juvenile, 18 seedling, 1 senescent)	6%		
Other areas of the Mt Gibson Ranges	17,577 (16,068 mature, 1,300 juvenile, 157 seedling, 52 senescent)	78%	17,577	78%
Total	22,667	100%[1]	22,667	100%

Removal of *Darwinia masonii* by development of the Proposal is unavoidable as this taxon coincides with the mineral resource (i.e. within the area of the mine pits), which is in a fixed location on Iron Hill and Iron Hill South. As a result of not being able to relocate the mine pits, an active program to relocate the plant material has been commenced, as described in Section 5.

The potential for indirect effects to *Darwinia masonii* has also been considered by routine monitoring of *Darwinia masonii.* Permanent plots were established in proximity to the approved mine operations and control sites (EPBC 2005/2381) and monitoring has been undertaken since 2007 (i.e. prior to the approved mine development) to assess ongoing health of the *Darwinia masonii* population over time at varying distances from the existing mining operations at the Mt Gibson Ranges. The potential indirect environmental effects of the approved mine operations (EPBC 2005/2381) to the *Darwinia masonii* population could potentially arise from aspects that include changes in dust, microclimate, hydrology, ecosystem processes, pollinators, reproductive success, fragmentation, introduced flora or disease, grazing pressure or seed dispersal. As outlined by Ecologia (2014), Astron (2014) and MBS (2014b, 2015) upon analysis, the monitoring results to date have not detected a significant indirect environmental effect to *Darwinia masonii* in proximity to the approved mine operations (EPBC 2005/2381). Similarly, it can be expected that the Proposal will also not result in a significant indirect effect to *Darwinia masonii* outside the Development Envelope in proximity to the Proposal. Monitoring

[4] Percentages adjusted for rounding

of the health of *Darwinia masonii* in proximity to the Proposal will also be undertaken to continue the routine monitoring program already undertaken at site.

Analysis by Astron (2014) showed that plant mortality evidently occurred sometime between July 2009 and 2010 and generally right across monitored plants on the Mt Gibson Ranges, health condition ratings also worsened between 2012 and April 2013. These temporal changes were observed across most monitoring sites on the Ranges and, by statistical analysis, were shown not likely related to distance from the mine pit or mining activity, but likely related to a factor or factors that affected the whole region, such as low rainfall and hot conditions. The conclusion was that there was no evidence showing that health condition or survivorship of *Darwinia masonii* was impacted by vicinity to mining activity or infrastructure (such as roads, waste rock landform or mine pits).

The hydrology of the surrounding area is unlikely to be affected due to implementation of the proposal as there are no drainage lines running through or in the immediate vicinity of Iron Hill deposits and dewatering of groundwater for Iron Hill development is not required (Eco Logical 2015b). The Proposal is unlikely to result in unstable landforms and/or soils or lead to erosion within rehabilitated areas (Eco Logical 2015b). The surface soils are typically shallow and dominated by a high coarse fragment content. The soils and subsoils of the Proposal area have been determined as generally having a low inherent erodibility in terms of suitability for rehabilitation and there is a low risk of acidic, metalliferous drainage from waste rock (Eco Logical 2015b). With time, ongoing rehabilitation of the Waste Rock Landform would allow for the regrowth of native vegetation for habitat for *Darwinia masonii* (Eco Logical 2015b).

As outlined by BGPA (2010), genetic structuring between groups of *Darwinia masonii* is low, with analysis of molecular variance of seven groups across the Mt Gibson Ranges partitioning approximately 94% of variation within groups. Whilst BGPA (2010) noted this finding indicated some groups do not mate randomly (suggesting weak barriers to gene flow may exist), the group of *Darwinia masonii* at Iron Hill coinciding with the Proposal was not identified as genetically isolated (i.e. not genetically different), with the *Darwinia masonii* within the area of Iron Hill being genetically linked to *Darwinia masonii* within the areas referred to as Extension Hill and Iron Hill East. A review of the BGPA (2010) genetic assessment results by Verterra Ecological Engineering (2015) has been undertaken to inform the restoration of *Darwinia masonii* through the *Darwinia masonii* Recovery Plan (MGM & EHPL 2014a). As *Darwinia masonii* exhibits weak genetic divergence, akin to genetic drift effects, the recommended conservation strategy is to capture a large number of plants for one or two populations, rather than collecting plants from a number of different populations. It was suggested by Verterra (2015) that maximising population genetic diversity is beneficial to the species, by sampling germplasm from populations across the Mt Gibson Range (thereby capturing broad representative samples of both nuclear allelic and chloroplast haplotype variants) and by promoting inter-breeding of genotypes to facilitate intermixing of the available pool of common and rare alleles. This will increase the ability of *Darwinia masonii* to adapt to changing environmental, climatic, biological and anthropogenic conditions.

As gene flow between *Darwinia masonii* populations is unrestricted, the removal of some sub-populations of *Darwinia masonii* as a result of the Proposal is not expected to detrimentally affect the genetic diversity or structuring of the *Darwinia masonii* population across the Mt Gibson Ranges. Any potential for a genetic effect to the *Darwinia masonii* population is reduced through a combination of:

a) The Proposal removing only a proportion of the total number of individuals occurring within the area of Iron Hill and Iron Hill South; and
b) Pre-development collection of seeds and plant tissue (cuttings) for use in restoration programs and rehabilitation works to retain genes and green stock of individuals proposed to be removed.

The long-term effect to *Darwinia masonii* from the existing mine operations at the Mt Gibson Ranges and the Proposal can be reduced through the implementation of works that seek to re-establish and

aid in the recovery of the taxon. As outlined by BGPA (2010) and depicted at areas in Figure 5, *Darwinia masonii* have been successfully re-established within the Mt Gibson Ranges through rehabilitation trials using green-stock cuttings at a rate exceeding 80%. Additional studies by Ruoss (2013) at site have confirmed both the presence of viable *Darwinia masonii* seed within the soil-stored seedbank, and of the ability to successfully translocate *Darwinia masonii* from green-stock cuttings into suitable substrates with approximately 30% survival. Further, the ability of *Darwinia masonii* to re-establish from soil-stored seed within disturbed areas has also been demonstrated within exploration access tracks and drilling pads, and within topsoil storage areas. Whilst the likelihood of re-establishing many Rare Flora taxa may generally be low, by contrast, the evidence available to date shows the likelihood of re-establishing *Darwinia masonii* to be good. MGM proposes to undertake further ongoing recovery actions at the Mt Gibson Ranges, including translocation of cuttings; however seeding is considered the most appropriate approach for broad-scale regrowth and rehabilitation.

A photo of a current example of a growing translocated *Darwinia masonii* individual (September 2015) is shown in Figure 9. At that time, two dozen plants were transplanted under *Wildlife Conservation Act* licence as germinants from topsoil stockpiles at Extension Hill onto the Extension Hill waste rock landform.

Since the approval of mining at the Mt Gibson Ranges, the species has specifically been managed by Interim Recovery Plan No. 282. Knowledge has improved about species abundance, health and restoration techniques by virtue of actions adopted as part of the Plan and research and recovery work by the proponents and Department of Parks & Wildlife (DPaW). The objective of the Recovery Plan, prepared to address condition 6-3 of Ministerial Statement 753 (*Environmental Protection Act 1986*, WA), is to "….*maintain, and ultimately improve, the conservation status of D. masonii such that its conservation status is more secure in the Mt Gibson area*". Key actions, promoted by the plans and implemented by proponent and DPaW work programs, are to:

a) Develop and implement the restoration strategy;
b) Maintain and use seed/germplasm collections with a broad genetic base for conservation;
c) Promote awareness of *Darwinia masonii*;
d) Implement *Darwinia masonii* condition monitoring program;
e) Implement fire management strategy;
f) Manage threatening processes of mining;
g) Protect plants from herbivory; and
h) Report new occurrences of the species.



Figure 9: Example of a transplanted *Darwinia masonii* individual.

(Located at Extension Hill waste rock landform rehabilitation trial plot (September 2015); see Figure 7)

Based on the above information, MGM can and would manage the risks of the Proposal associated with impacts to *Darwinia masonii* through measures to mitigate and offset those impacts. These have been established and proven by actions implemented as part of the approved Mt Gibson Iron Ore Mine project (EPBC 2005/2381).

5 Measures to Avoid, Mitigate and Offset

5.1 Avoidance

Avoidance measures seek to prevent or change the potential environmental effects of an action before they occur. As an example, avoidance measures may include adjusting the location, scope and/or timing of an action.

During mine planning, MGM has considered various mine planning layouts that seek to minimise the environmental effect of the Project. Firstly, MGM has modified the Project area to restrict the spatial extent necessary for Project implementation, including a modification to the spatial area of the Mine Pit which, by alignment of the pit boundary would minimise the environmental effect to the listed threatened Species *Darwinia masonii*. Secondly, MGM has modified the Project by seeking to utilise existing infrastructure and facilities at the approved mine operations (EPBC 2005/2381) as far as practicable to minimise the spatial area required for the Project.

However, the direct impacts of the proposal associated with the removal of 1,327 *Darwinia masonii* individuals cannot be avoided as those individuals coincide with the iron ore in the Iron Hill deposits. As *Darwinia masonii* occurs broadly across the Mt Gibson Ranges, it is not possible to reduce this direct impact further, with mitigation and offsets then becoming key measures for species management and recovery.

5.2 Mitigation

Mitigation measures seek to reduce the duration, intensity, extent and/or likelihood of environmental effect of an action where such values cannot be completely avoided. As an example, mitigation measures may include adjusting the location, scope or timing of an action so as to result in a reduction in the environmental effect.

Mitigation measures for this proposal relate to the potential indirect effects. Indirect risks associated with mining operations include dust emissions, inadvertent disturbance, weed invasion, negative effects on pollinator activity, fire (eg, cigarette butts) or other effects on reproductive biology that may lead to a decline in recruitment rate.

As described in section 2, monitoring results to date have not detected indirect effects to *Darwinia masonii* in proximity to the approved and operational mine (EPBC 2005/2381). The approved mining operations have been and are undertaken in accordance with an Environmental Management Plan (EMP) (MGM & EHPL 2008), which outlines the detailed management of key environmental aspects. The EMP has been subject to previous review and approval by the Western Australian Environmental Protection Authority under the *Environmental Protection Act 1986* (WA) to provide appropriate industry standards for environmental protection.

The EMP includes a risk assessment of the potential environmental effects of the mine operations. Following from the risk assessment, environmental management actions and controls are identified so potential environmental effects are minimised and controlled to an acceptable level. The EMP forms an integral management component of MGM's mine operations. Implementation of the EMP is regularly audited both internally and by external consultants for compliance and to identify any changes necessary to achieve improved environmental outcomes. The regular auditing of the EMP is consistent with MGM's Environmental Policy (MGX 2012) to develop, implement and monitor environmental management plans to achieve environmental targets.

For consistency in environmental protection of the mining operations, MGM proposes that a revised version of the approved EMP, specifically applicable to development and operations at Iron Hill deposits, is also implemented for the Project. A draft version of the *Iron Hill Deposits Environmental Management Plan* is attached in Appendix 3. This is considered to be appropriate for application to the Project due to the environmental and operational similarities to the approved mine operations (EPBC 2005/2381).

For the listed threatened species *Darwinia masonii*, the approved mine operations are also subject to a *Darwinia masonii* Management and Monitoring Plan (the 'Plan') (MGM & EHPL 2013) (EPBC 2005/2381). The Plan has been prepared and implemented consistent with the requirements of the EPBC Decision 2005/2381 approval (DoE 2007) and has been approved by DoE. The Plan includes monitoring of *Darwinia masonii* to determine any indirect effects of the mine operations to the taxon, and proposed management measures in the event that indirect effects are identified. For consistency in environmental monitoring of the *Darwinia masonii* population across the Ranges, MGM proposes that a revised version of the *Darwinia masonii* Management and Monitoring Plan is also implemented specifically relating to the Project. The Plan is appropriate for application to the Project due to the environmental and operational similarities to the approved mine operations (EPBC 2005/2381). A proposed *Darwinia masonii* Management and Monitoring Plan for this project is included within Appendix 2.

There are several monitoring sites which would be removed as a result of implementing the proposal; including D4, D5, D6, D7, D8 and D24 as indicated by Figure 10. Whilst these monitoring locations would be removed, the remaining monitoring locations are numerous and adequate to monitor the potential indirect effects of the proposal on the health and survivorship of *Darwinia masonii* (Figure 10). Six alternate monitoring locations within the Mt Gibson Ranges would be identified and sited on nearby hills, containing a cross-section of *Darwinia masonii.*

The key protocols to be implemented due to both the EMP and the Management and Monitoring Plan to mitigate potential indirect effects of mining operations on *Darwinia masonii* include:

- A dust management procedure including dust suppression and dust deposition monitoring in close proximity to mining operations;
- A site clearance protocol including requirements for the issue of internal ground disturbance permits prior to vegetation clearing and training of personnel;
- A weed management procedure including vehicle hygiene, targeted weed spraying and restricting access to weed infested areas;
- A fire management procedure including management of potential fire risks, fire management and response;
- Training and awareness for personnel on the importance of *Darwinia masonii* and the management of potential risks associated with their activities; and
- A monitoring program aimed at assessing the indirect effects of mining operations on representative portions of the *Darwinia masonii* population located in close proximity to the Project.

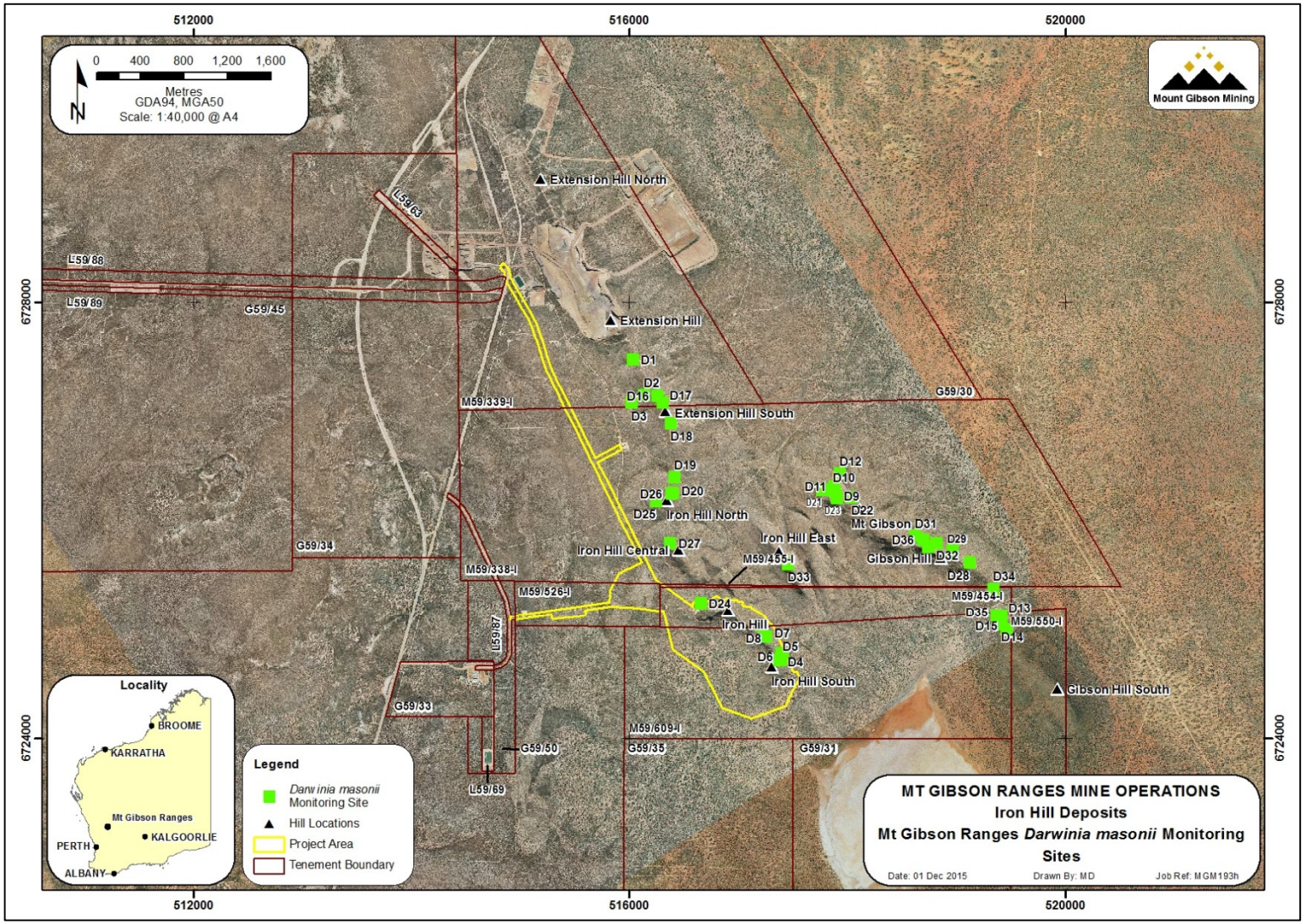


Figure 10: Current *Darwinia masonii* plant condition monitoring sites

5.3 Offsets

5.3.1 Current Situation

Environmental offsets counterbalance significant residual environmental effects which may arise from an action, after appropriate avoidance, minimisation and rehabilitation measures have been taken. In principle, an environmental offset should be related to the significant residual environmental effect, and should seek to achieve a measurable conservation outcome. As an example, where a significant residual environmental effect relates to a flora or fauna taxon, an environmental offset should seek to achieve a measurable conservation outcome for that taxon.

The most appropriate 'benchmark' for *Darwinia masonii* is by review of performance at the existing Extension Hill mine operations at the Mt Gibson Ranges as it is subject to an existing environmental offsets framework for *Darwinia masonii* established through MS753 (WA Minister for Environment 2007) and EPBC 2005/2381. Conditions require contributions towards the preparation and implementation of research and recovery plans for *Darwinia masonii*. Condition 16 of MS753 requires contributions towards research and management of *Darwinia masonii* and the implementation of funding as indirect offsets during mining.

Consistent with Policy Statement 44 *Wildlife Management Programs* (CALM 1992), the management of *Darwinia masonii* is coordinated through species recovery plans. A *Darwinia masonii* Interim Recovery Plan (DEC 2008) has previously been prepared and implemented, with this document to be superseded by the *Darwinia masonii* Recovery Plan (MGM & EHPL 2014a). Upon approval in accordance with condition 6-3, implementation of the *Darwinia masonii* Recovery Plan will continue to be coordinated by DPaW (in accordance with CALM 1992 and associated responsibilities under the *Wildlife Conservation Act 1950* (WA)), with MGM and EHPL making both operational and financial contributions towards its implementation (such as on-site environmental monitoring, land management and species restoration actions).

Conditions 6 and 7 of Ministerial Statement 753 (MS753) for the existing approved mine operations at the Mt Gibson Ranges require the continued implementation of an offsets program involving extensive research of *Darwinia masonii*. The existing offsets program which would continue during the life of the project compliments the management and monitoring plan required by EPBC 2005/2381. The outcomes of management, rehabilitation and restoration of *Darwinia masonii* are outlined within various reports, including EnPeritus (2014, 2015), BGPA (2010), DPaW (2014a), Verterra Ecological Engineering (2015) and Ruoss (2013) (Appendix 5).

EnPeritus (2014) completed an audit of the *Darwinia masonii* research program (BGPA 2010), comparing it against the original program implemented to address certain requirements of MS753. The independent audit report showed significant compliance and aspects of the research program that might be further applied to the practical application of techniques to *Darwinia masonii* in ongoing restoration or translocation programs.

EnPeritus (2015) also undertook an analysis of the overall offsets program. The independent review of BGPA (2010), DEC (2008) and Ruoss (2013) was completed to extract information to inform applications for managing future *Darwinia masonii* recovery. The analysis by EnPeritus (2015) informed the content of the *Darwinia masonii* recovery plan and restoration program (MGM and EHPL 2014a) and recommended *Darwinia masonii* plant husbandry actions necessary to accomplish research outcomes to maintain or optimise the species abundance and genetic diversity. Specifically, the analysis included:

- An assessment of the practical implications of outcomes from the research program (BGPA 2010), with the information used to inform the restoration program;

- Identification of propagation methods and factors influencing the identification of areas of suitable habitat and long term establishment success;
- Recommendations for a short-term and long-term restoration program, with a priority rating assigned to each recommendation; and
- These recommendations ensured compliance in part or in full with the *Darwinia masonii* conditions of MS 753 and EPBC 2005/2381.

The *Darwinia masonii* Interim Recovery Plan (DEC 2008) and the *Darwinia masonii* Recovery Plan (MGM & EHPL 2014a) include the key components of:

(a) Research on *Darwinia masonii*, including population genetics, population structure, and restoration ecology;
(b) Monitoring the number of individuals, health and reproductive success of *Darwinia masonii*;
(c) Management of the factors that may affect the health of the *Darwinia masonii* population, such as fire and grazing; and
(d) Re-establishment and/or translocation of *Darwinia masonii* individuals within the Mt Gibson Ranges.

To date, a significant proportion of the research component of offsets funding has been completed (BGPA 2010). The site operational species monitoring component is ongoing (MBS 2014a, 2014b, 2015; Astron 2014). The management component also remains ongoing in accordance with the management actions outlined within the EMP (MGX and EHPL 2008). For the translocation/restoration component, small-scale translocation trials have demonstrated successful establishment of *Darwinia masonii* from either transplanted seedlings or translocated green stock (see Section 2).

The work of EnPeritus (2015) provides an independent report that outlines key actions and informs plans for species restoration and rehabilitation at the Mt Gibson Ranges mining operations in the future. The next key actions for implementation of *Darwinia masonii* recovery plans are to continue establishing new individuals and genetic diversity of *Darwinia masonii* from both seed re-establishment and/or greenstock cuttings translocations. The success of the previous *Darwinia masonii* translocation trials (BGPA 2010), together with the records of *Darwinia masonii* colonising disturbance areas, provides high confidence as to the ability to recover *Darwinia masonii* at the Mt Gibson Ranges. To support further progress with key actions, in August 2015, DPaW issued MGM with a Permit (No. 28-1516) to take plant material for propagation purposes in order to continue the species recovery program and implement specific actions. Notably, greenstock material from the species at Mt Gibson Ranges was collected in September and October 2015.



Figure 11: Greenstock ('cuttings') of *Darwinia masonii* collected from Mt Gibson Ranges September and October 2015.

(Note: Selection of *Darwinia masonii* taken from the wild by DPaW permit from Iron Hill and Iron Hill South stock (TPFL#1 & 8). Specimens held at Nuts about Natives nursery as of 8 October 2015. Photo: B.Croxford 2015)



Figure 12: Successfully cloned and propagated tubestock of *Darwinia masonii* collected previously from Mt Gibson Ranges.

(Note: Selection of *Darwinia masonii* specimens taken from the wild under DPaW permit from Extension Hill stock (TPFL#2). Note growth and flowering states of specimens. Held at Nuts about Natives nursery. Photo: B.Croxford 2015)

5.3.2 Offsets Suited to Iron Hill Deposits

For consistency, it is appropriate to offset the residual effect of the Proposal consistent with the environmental offsets framework already established for *Darwinia masonii*. In this context, the agreed environmental offsets framework could continue[5] in an advanced form and include a combination of direct and other compensatory measures (DoE 2012) as a result of the Proposal extending the operational-life of the hematite ore mining operations by approximately two years.

The implementation of environmental offsets for the Proposal can be expected to further the previous contributions toward the research, monitoring, management and recovery of *Darwinia masonii* at the Mt Gibson Ranges. The environmental offsets for the Proposal would be in addition to the environmental offsets contemplated by the Statement 753 approval, as it would be a separate approval.

The Project is currently being assessed by the Environmental Protection Authority under the *Environment Protection Act 1986* (WA). The proposed offsets described have been developed in accordance with *Environment Protection & Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DoE 2012). As the proposed offsets would form a continuation of the existing offsets under MS753 (Section 5.3.1), it is more appropriate to regulate the implementation of the proposed offsets through an approval instrument under the *Environmental Protection Act 1986*. This is considered to be in accordance with DoE (2012).

Specifically, the environmental offsets relevant to the effect of the Proposal to *Darwinia masonii* to be made by MGM, under the *Environmental Protection Act 1986,* would comprise:

(a) Re-establishment and/or translocation of *Darwinia masonii* at relevant sites across the Mt Gibson Ranges, anticipated to be within or adjacent to the proposed development envelope (Figure 7) ($300,000 in total, over the period of mining and then post-mining for a total of five years) (Direct offset, DoE 2012);
(b) Ongoing financial contribution to WA Department of Parks & Wildlife to coordinate the management of *Darwinia masonii* and contribute towards the implementation of the *Darwinia masonii* Recovery Plan across the Mt Gibson Ranges ($220,000 in total, over two years of mining) (Other compensatory measure, DoE 2012); and
(c) Annual monitoring of health and reproductive success, of certain *Darwinia masonii* individuals at select monitoring sites (Figure 10), across the Mt Gibson Ranges ($50,000 in total, over two years of mining[6]) (Other compensatory measure, DoE 2012);

An appropriate framework already exists to build upon the previous research and management of *Darwinia masonii* and this has influenced the content of the proposed offsets based on practicality, attainability, funding base and ecological benefit. The next phase of implementation will continue to establish genetic stock of *Darwinia masonii* to offset the individuals removed by the approved (EPBC 2005/2381) and proposed mining operations. The proposed environmental direct offsets will counterbalance the residual environmental effect of the Proposal to the *Darwinia masonii* taxon, and the other compensatory measures will make the contribution a positive one. To demonstrate this and consistency with the DoE (2012), the Commonwealth's policy and offsets calculator has been applied.

[5] It is anticipated that, following the completion of the approved hematite ore mining operations under MS753 approval (EPBC 2005/2381), the environmental offsets required by the Statement 753 approval would be suspended until such time as the approved magnetite ore mining operations under the Statement 753 approval commence (EPBC 2005/2381). This Proposal will have the effect of extending the immediate term of the financial contribution by 2 years, and will be in addition to the financial contributions prescribed under MS753.

[6] If an indirect effect to *Darwinia masonii* by the Proposal is detected, the monitoring of the affected *Darwinia masonii* in the vicinity of the Proposal would continue post-mining.

Table 4 details the offset calculators input figures and provides justification for their application and details:

- the extent to which the offsets adequately compensate for residual effects to *Darwinia masonii* (% of residual impact offset = 102.7%);
- the management strategy to avert future loss of *Darwinia masonii* (a minimum of 1,700 translocated *Darwinia masonii* sourced from genetic stock taken from Iron Hill and Iron Hill South);
- the time it will take to achieve the conservation gain (five years); and
- the level of certainty that the proposed offset will be successful (81%).

The aim of the offsets program will be to re-establish taken *Darwinia masonii* due to implementation of the Proposal within the Mt Gibson Ranges and/or within or adjacent to the Development Envelope making this a suitable location as the species would be replaced within the same known area of occupancy and habitat from which it was removed (Figure 13 and Figure 14). Such locations are also considered suitable as the knowledge gained through the translocation trials and habitat modelling conducted by BGPA (2010) has assisted in identifying suitable habitat for *Darwinia masonii* translocations, in suitable areas of the Mt Gibson Ranges, other suitable habitat, and in the rehabilitation areas disturbed by mining (MGX and EHPL 2014) (see Section 4).

The most suitable areas identified by BGPA (2010) research are shown in Figure 13. BGPA (2010) identified the most suitable habitat for *Darwinia masonii* to be ridges and slopes, with the following physical characteristics, each showing a probability of 50-60% when considered on its own:

- slope of >7-8°;
- elevation >380m; and
- all geology types except those outside the range.

However, ex-situ culture at licensed nursery (some 400km from mining tenements) demonstrates that plant will survive, grow, flower and seed in non-typical conditions. The species cultivates well and has demonstrated high survivorship when returned to field conditions on rehabilitated lands.

Furthermore, the re-establishment of *Darwinia masonii* would be proposed to occur entirely within the Department of Parks and Wildlife (DPaAW, WA) Priority 1 ecological community (PEC) '*Mt Gibson Range vegetation complexes (banded ironstone formation)* (DPaW 2014d) (Figure 14), or as agreed by DPaW. *Darwinia masonii* is one of the factors or keystone species in the PEC, as its area of occupancy follows the formation of the Mt Gibson ranges.

The tenure held over the land is regulated under the *Mining Act 1978* (WA) and is in the form of mining leases (Figure 2). The mining leases identified by Figure 2 are held by Extension Hill Propriety Ltd (EHPL) and access by MGM through agreements made between MGM and EHPL. As per Table 4, it is anticipated that this tenure will be held for at least the period of five years, after implementation of the Proposal and for three years after the cessation of mining. This is considered adequate based on the trials and research conducted (Table 4 and DEC 2008; MGX and EHPL 2014) to offset the potential residual effect of the controlled action.

Table 4: Offset calculator input figures and justification for *Darwinia masonii*

OFFSET CALCULATOR ATTRIBUTE	OFFSET CALCULATOR INPUT	JUSTIFICATION
Time horizon (years)	5	In a previous preliminary planting trial of translocated plants (propagated from cuttings in nursery conditions, watered over their first two summers post-translocation and fenced), 50% of the plants reached sexual maturity after 18 months (DEC 2008) and all had tripled in size in the first 18 months after they were planted (MGX and EHPL 2014). Translocations will occur within the first year of project implementation and continue post mining for the mining operations rehabilitation period. Five years is considered a reasonable time period in which the benefits to the species from the recovery program (translocation and/or seedings) will be positively recognised, or be continued in time should results not demonstrate meeting closure criteria targets.
Start habitat quality value (%)	0	No *D. masonii* individuals will be present in the area prior to translocation or seeding, giving a start habitat quality value of 0%. The sites chosen for translocation will meet the habitat requirements determined by the distribution modelling undertaken by BGPA (2010). This model indicates a broad habitat preference for iron rich gravelly loams situated on ridges and slopes (BGPA 2010). Sites with these characteristics had a higher success rate during a previous translocation trial (EnPeritus 2014).
Future habitat quality value without offset (%)	0	*D. masonii* is unlikely to naturally rapidly recolonise large areas of cleared land; although natural recruitment observed post-fire resulted in up to 3.2 seedlings per pre-fire adult, 90% of seedlings died over their first summer (DEC 2008). Inter-fire seedling recruitment is rare (DEC 2008). *D. masonii* is unlikely to naturally colonise areas where the plant has not been previously located.
Future habitat quality value with offset (%)	1,700	A minimum of 1,700 plants will be directly translocated as an offset. These will be derived from greenstock collected from Iron Hill and Iron Hill South parents prior to clearing. Additionally, seeds from parent plants within the Proposal area will be collected prior to clearing (the rate of seed strike, germination and seedling/juvenile survival is not well known; however many thousands of flowering individuals may arise)
Raw gain	1,700	
Confidence in result (%)	81	In a previous study of water-supplemented translocated plants (propagated from cuttings in nursery conditions, returned to field; watered over first two summers post-translocation) had resulted in a survival rate of over 81% after nine years post translocation (MGX and EHPL 2014). The knowledge gained from the habitat modelling and translocation trials (BGPA 2010) will assist in identifying suitable habitat and increasing the survival rates of the translocated *D. masonii* (MGX and EHPL 2014).
Adjusted gain	1,377	
Net Present Value	1,363	The number of individuals that grow to flower and produce seed in the field can be routinely supplemented if needed by additional greenstock cuttings held at nursery ie. should monitoring show less than 80% survival additional genetic stock can be recovered into other translocated plots (which may potentially require additional time to meet the time horizon for closure)
% of Residual Impact offset	102.7	Agreement may be made to attain a much higher % offset by increasing the number of 'clones' produced at nursery and recovered into the field upon translocation. In addition, this number will only increase upon re-establishment of specimens from seeding on associated rehabilitated lands during mining and waste rock landforms upon mine closure.

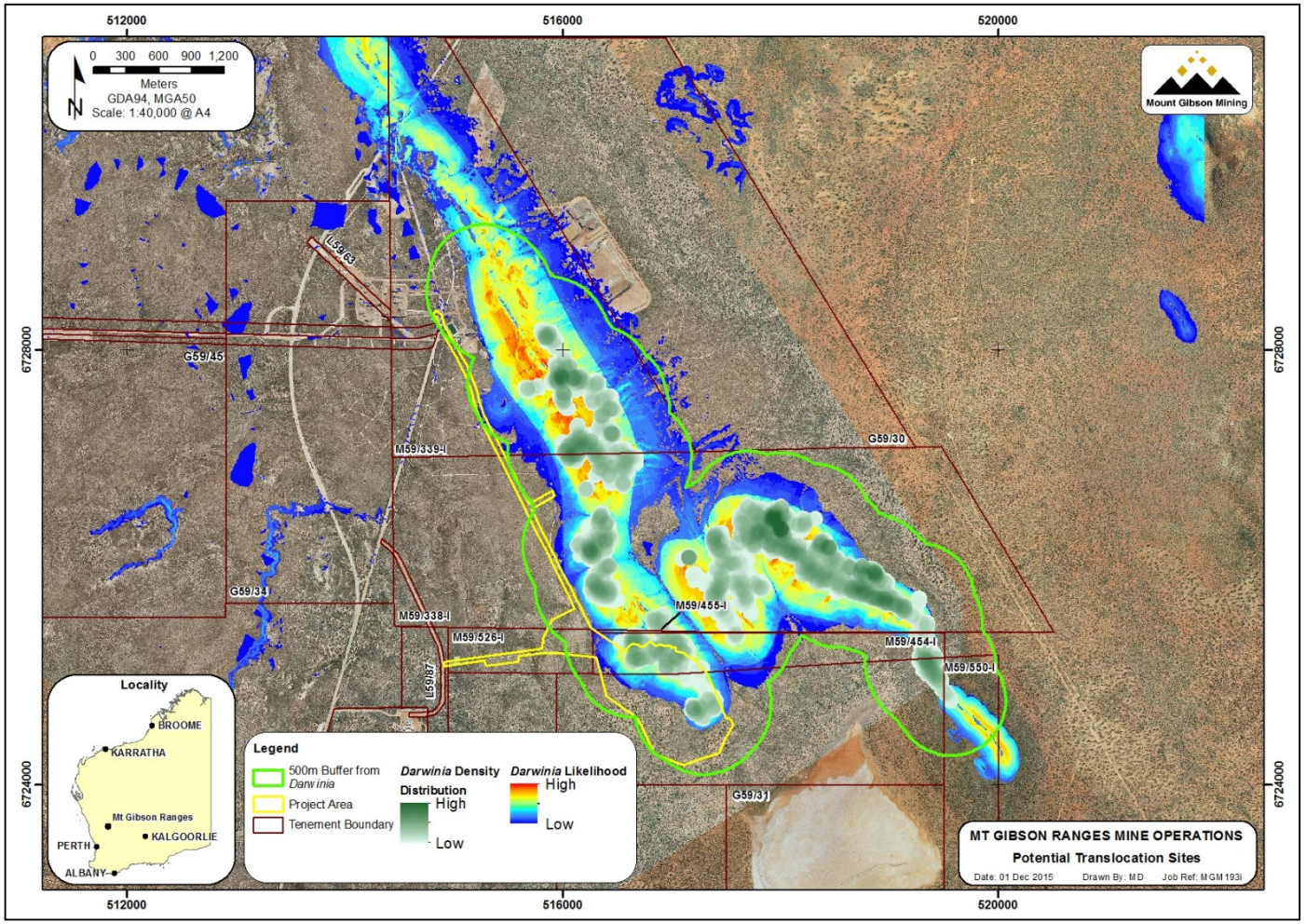


Figure 13: *Darwinia masonii* distribution mapping (green shading; Eco Logical 2015a) and nominal 500m buffer from known area of occupancy with predicted habitat (BGPA 2010) with correlation evident between actual records and predicted habitat.

(Note: most red areas cannot be seen as 'actual' records (green) occur at those points).

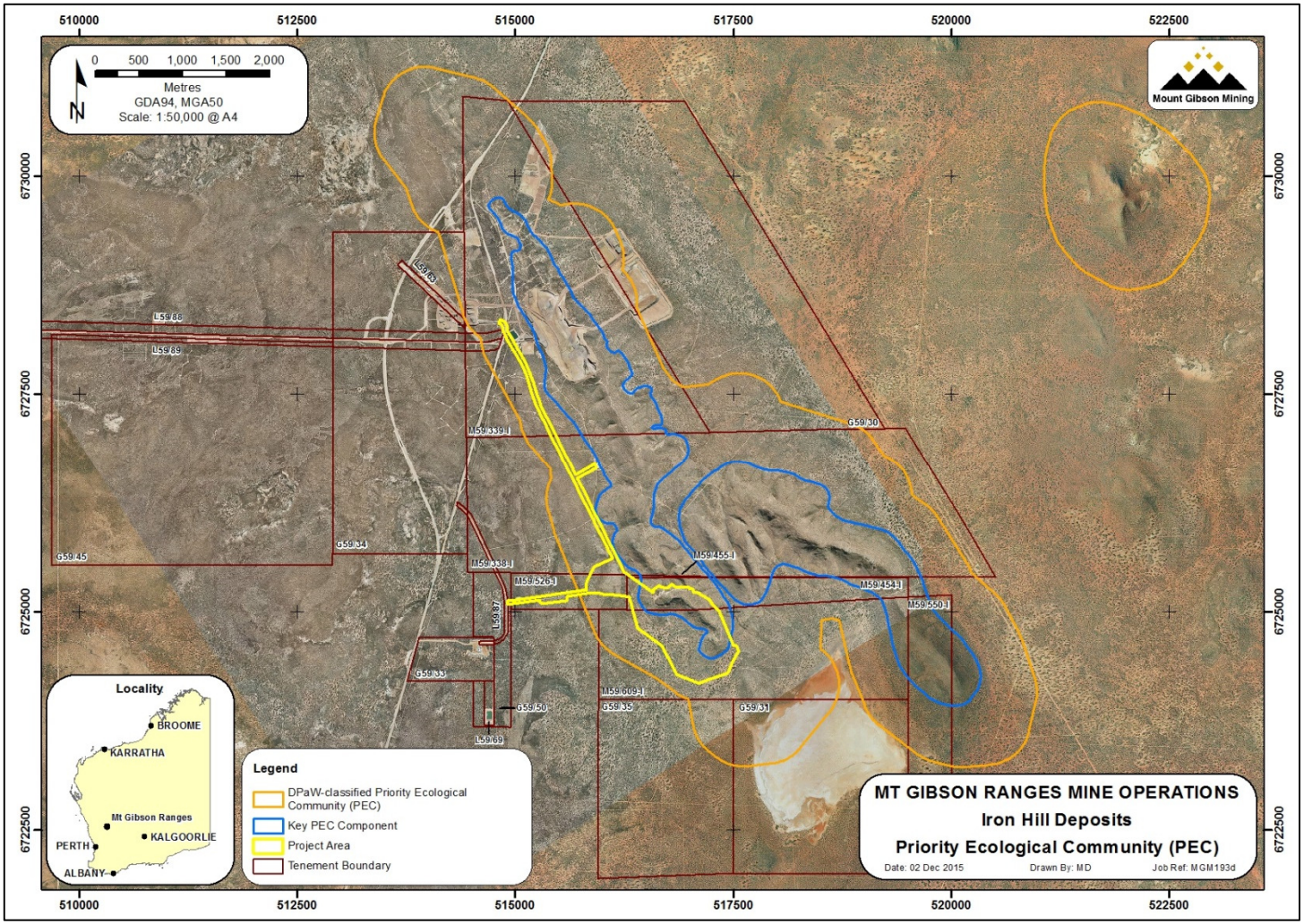


Figure 14: DPaW Priority Ecological Community (PEC).

(‘*Mt Gibson Range vegetation complexes (banded ironstone formation)’* is outlined in orange (DPaW 2014d). The key component of the PEC vegetation is shown in blue (Engenium 2015)

6 Summary and Commitments

In summary, the anticipated direct impacts to *Darwinia masonii* individuals as a result of the proposal and within the development envelope and any potential indirect effects to *Darwinia masonii* outside of the development envelope can be managed through measures to avoid, mitigate and offset those risks. As has been demonstrated by the approved existing operations (EPBC 2005/2381), potential indirect effects can be managed and eliminated through a variety of management measures and monitoring (Section 2 and 3).

The direct impacts associated with the removal of 1,327 individuals at Iron Hill deposits can be managed through the re-establishment of *Darwinia masonii* in moderately disturbed areas through either natural colonisation, replacement of natural soil-stored seed banks, active seeding programs, and by transplanting individuals derived from cuttings and seedlings from parent stock. Further research and trials associated with commitments made by MGM previously, along with this proposal, will increase the body of knowledge to re-establish the species into rehabilitated disturbed areas. The aim is to re-establish in the field in excess of the total number of individual plants removed.

MGM proposes a set of commitments to mitigate and offset the potential impacts of the proposal to address requirements of the *Environmental Protection Act 1986* (WA) and the *Environment Protection & Biodiversity Conservation Act 1999*, as follows:

Environmental Protection Act 1986 (WA)
These items summarise the key environmental management measures to be considered for conditioning of any approval by WA Ministerial Statement:

a. Commitment S1: MGM will implement an Environmental Management Plan applicable to the proposed Iron Hill mining operations based on the principles, management and mitigations for the existing approved operations at the Mt Gibson Iron Ore Mine (EPBC 2005/2381) (Appendix 3);
b. Commitment S2: Develop and implement a Mine Closure Plan in accordance with WA's Department of Mines and Petroleum and Environmental Protection Authority *Guidelines for Preparing Mine Closure Plans, 2015.*
c. Commitment S3: *Darwinia masonii* Environmental Offsets. MGM will complete direct and indirect environmental offsets for *Darwinia masonii* in accordance with the environmental offsets framework to be agreed for the Project under the *Environmental Protection Act 1986* (WA).

Environment Protection & Biodiversity Conservation Act 1999.
Commitments made by MGM may be considered for any future approval and may involve a combination of prescriptive and outcomes based conditions; commitment C1 is prescriptive, whilst commitment C2 has been developed by following the *Department of the Environment Outcomes Based Conditions Policy* (DoE 2015a) and the *Department of the Environment Outcomes Based Conditions Guidance* (DoE 2015b).

d. Commitment C1: Implement a *Darwinia masonii* Management and Monitoring Plan to the Iron Hill Deposits proposal based on that currently applied for the approved mining operations and required by EPBC 2005/2381 (Appendix 2).

e. Commitment C2: *Darwinia masonii* from the development envelope are re-established within areas subjected to rehabilitation and revegetation by the proponent within the Mt Gibson Ranges. The recovered plants should:

iv. originate from *Darwinia masonii* 'parents' collected at Iron Hill and Iron Hill South;
v. represent more than 100% or greater the number of individuals of plants actually taken from the development envelope;
vi. produce flowers and viable seeds on or before the time of mine closure.

Further prescriptive conditions may be applied to cover aspects such as monitoring, record keeping, publication and reporting. In this instance, monitoring would be undertaken on an annual basis to determine and report on the number of healthy and viable *Darwinia masonii* individuals re-established within the Mt Gibson Ranges. This would also form the basis of measuring performance whereby the aim will be for the number of individuals replaced to correlate to the number of individuals removed. The health of *Darwinia masonii* would be determined through processes established under the *Darwinia masonii* Management and Monitoring Plan. An annual monitoring and reporting process would also enable adaptive management approaches through the continued collection of valuable information for the revegetation of *Darwinia masonii*.

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Appendix 1 – Referral of Proposed Action – Mt Gibson Ranges, Iron Hill Deposits

Mount Gibson Mining Limited
ABN 32 074 575 885

Level 1
2 Kings Park Road
WEST PERTH 6005
Western Australia

PO Box 55
WEST PERTH 6872
Western Australia

Telephone: 61-8-9426 7500
Facsimile: 61-8-9485 2305
E-mail: admin@mtgibsoniron.com.au

26th June 2015

Referrals Gateway
Environment Assessment Branch
Department of Environment
GPO Box 787
CANBERRA ACT 2601

By email: epbc.referrals@environment.gov.au

Dear Sir/Madam

***ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999* (C'TH) REFERRAL OF A PROPOSED ACTION UNDER SECTION 68(2): MT GIBSON RANGES - IRON HILL DEPOSIT.**

Mount Gibson Mining Ltd (MGM), a wholly-owned subsidiary of Mount Gibson Iron Limited (MGX), undertakes iron ore mining operations at the Mt Gibson Ranges, located approximately 270km east-south-east of the City of Geraldton in Western Australia. The iron ore mining operations at the Mt Gibson Ranges were previously approved under Section 133 of the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) in 2007 (EPBC Decision 2005/2381).

MGX now seeks to extend its hematite ore mining operations to include development of the Iron Hill Deposit (the "Project"), positioned immediately south of the approved mine operations. Development of the Project is expected to yield an estimated 5-7 million tonnes of high-grade hematite ore having a conservative gross economic value of approximately A$370million.

In accordance with Section 68(2) of the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), MGM hereby refers the Project to the Minister for Environment for consideration. This referral is made under Section 68(2), in that MGM does not consider the Project to be a controlled action as the Project is not expected to result in a significant impact to matters of National Environmental Significance (NES).

As outlined by the completed referral form appended to this letter, the Project coincides with records of the following matters of NES:

Threatened Species:

(a) *Darwinia masonii* (Mason's Darwinia, a plant);

(b) *Leipoa ocellata* (Malleefowl, a bird); and

(c) *Idiosoma nigrum* (Shield-backed Trapdoor Spider, a spider).

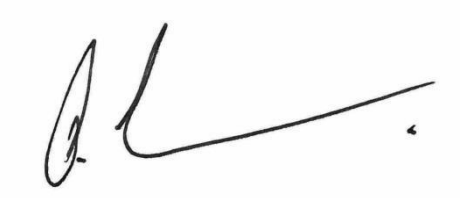
Whilst the Project coincides with records of individuals and/or habitat of the above listed taxa, it is not expected to result in a significant environmental effect to the representation, diversity, viability or ecological function of these taxa. Accordingly, MGM does not consider the proposed action to be a controlled action.

I look forward to receiving the Minister's decision on this matter.

For your information, the Project will be subject to environmental assessments by the State of Western Australia under the provisions of each of the *Wildlife Conservation Act 1950* (WA), *Environmental Protection Act 1986* (WA) and the *Mining Act 1978* (WA) (i.e. three separate State Government environmental assessments dealing with these taxa).

If you have any questions on the Project, or require further information to assist with your consideration, I encourage you to contact Mr Troy Collie, Project Director Environmental Approvals, by telephone on (08) 9426 7500 / 0437 816 209 or by email at Troy.Collie@MtGibsonIron.com.au.

Yours faithfully
MOUNT GIBSON MINING LIMITED



ANDREW THOMSON
Chief Operating Officer

Attachments:

1. EPBC Referral Document

Copy to:

1. Ben McLernon
   Manager Environment & Community
   Extension Hill Pty Ltd
   Level 1, 66 Kings Park Road
   WEST PERTH WA 6005

Australian Government
Department of the Environment

Referral of proposed action

What is a referral?

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) provides for the protection of the environment, especially matters of national environmental significance (NES). Under the EPBC Act, a person must not take an action that has, will have, or is likely to have a significant impact on any of the matters of NES without approval from the Australian Government Environment Minister or the Minister's delegate. (Further references to 'the Minister' in this form include references to the Minister's delegate.) To obtain approval from the Environment Minister, a proposed action should be referred. The purpose of a referral is to obtain a decision on whether your proposed action will need formal assessment and approval under the EPBC Act.

Your referral will be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be undertaken. These decisions are made within 20 business days, provided sufficient information is provided in the referral.

Who can make a referral?

Referrals may be made by or on behalf of a person proposing to take an action, the Commonwealth or a Commonwealth agency, a state or territory government, or agency, provided that the relevant government or agency has administrative responsibilities relating to the action.

When do I need to make a referral?

A referral must be made for actions that are likely to have a significant impact on the following matters protected by Part 3 of the EPBC Act:

- World Heritage properties (sections 12 and 15A)
- National Heritage places (sections 15B and 15C)
- Wetlands of international importance (sections 16 and 17B)
- Listed threatened species and communities (sections 18 and 18A)
- Listed migratory species (sections 20 and 20A)
- Protection of the environment from nuclear actions (sections 21 and 22A)
- Commonwealth marine environment (sections 23 and 24A)
- Great Barrier Reef Marine Park (sections 24B and 24C)
- A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
- The environment, if the action involves Commonwealth land (sections 26 and 27A), including:
    - actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land);
    - actions taken on Commonwealth land that may have a significant impact on the environment generally;
- The environment, if the action is taken by the Commonwealth (section 28)
- Commonwealth Heritage places outside the Australian jurisdiction (sections 27B and 27C)

You may still make a referral if you believe your action is not going to have a significant impact, or if you are unsure. This will provide a greater level of certainty that Commonwealth assessment requirements have been met.

To help you decide whether or not your proposed action requires approval (and therefore, if you should make a referral), the following guidance is available from the Department's website:

- the Policy Statement titled Significant Impact Guidelines 1.1 – Matters of National Environmental Significance. Additional sectoral guidelines are also available.

- the Policy Statement titled Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies.
- the Policy Statement titled Significant Impact Guidelines: Coal seam gas and large coal mining developments—Impacts on water resources.
- the interactive map tool (enter a location to obtain a report on what matters of NES may occur in that location).

Can I refer part of a larger action?

In certain circumstances, **the Minister may not accept a referral for an action that is a component of a larger action and may request the person proposing to take the action to refer the larger action for consideration under the EPBC Act (Section 74A, EPBC Act).** If you wish to make a referral for a staged or component referral, read 'Fact Sheet 6 Staged Developments/Split Referrals' and contact the Referrals Gateway (1800 803 772).

Do I need a permit?

Some activities may also require a permit under other sections of the EPBC Act or another law of the Commonwealth. Information is available on the Department's web site.

Is your action in the Great Barrier Reef Marine Park?

If your action is in the Great Barrier Reef Marine Park it may require permission under the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act). If a permission is required, referral of the action under the EPBC Act is deemed to be an application under the GBRMP Act (see section 37AB, GBRMP Act). This referral will be forwarded to the Great Barrier Reef Marine Park Authority (the Authority) for the Authority to commence its permit processes as required under the Great Barrier Reef Marine Park Regulations 1983. If a permission is not required under the GBRMP Act, no approval under the EPBC Act is required (see section 43, EPBC Act). The Authority can provide advice on relevant permission requirements applying to activities in the Marine Park.

The Authority is responsible for assessing applications for permissions under the GBRMP Act, GBRMP Regulations and Zoning Plan. Where assessment and approval is also required under the EPBC Act, a single integrated assessment for the purposes of both Acts will apply in most cases. Further information on environmental approval requirements applying to actions in the Great Barrier Reef Marine Park is available from http://www.gbrmpa.gov.au/ or by contacting GBRMPA's Environmental Assessment and Management Section on (07) 4750 0700.

The Authority may require a permit application assessment fee to be paid in relation to the assessment of applications for permissions required under the GBRMP Act, even if the permission is made as a referral under the EPBC Act. Further information on this is available from the Authority:

Great Barrier Reef Marine Park Authority

2-68 Flinders Street PO Box 1379
Townsville QLD 4810
AUSTRALIA

Phone: + 61 7 4750 0700
Fax: + 61 7 4772 6093

www.gbrmpa.gov.au

What information do I need to provide?

Completing all parts of this form will ensure that you submit the required information and will also assist the Department to process your referral efficiently. If a section of the referral document is not applicable to your proposal enter N/A.

You can complete your referral by entering your information into this Word file.

Instructions

Instructions are provided in blue text throughout the form.

Attachments/supporting information

The referral form should contain sufficient information to provide an adequate basis for a decision on the likely impacts of the proposed action. You should also provide supporting documentation, such as environmental reports or surveys, as attachments.

Coloured maps, figures or photographs to help explain the project and its location should also be submitted with your referral. Aerial photographs, in particular, can provide a useful perspective and context. Figures should be good quality as they may be scanned and viewed electronically as black and white documents. Maps should be of a scale that clearly shows the location of the proposed action and any environmental aspects of interest.

Please ensure any attachments are below three megabytes (3mb) as they will be published on the Department's website for public comment. To minimise file size, enclose maps and figures as separate files if necessary. If unsure, contact the Referrals Gateway (email address below) for advice. Attachments larger than three megabytes (3mb) may delay processing of your referral.

Note: the Minister may decide not to publish information that the Minister is satisfied is commercial-in-confidence.

How do I pay for my referral?

From 1 October 2014 the Australian Government commenced cost recovery arrangements for environmental assessments and some strategic assessments under the EPBC Act. If an action is referred on or after 1 October 2014, then cost recovery will apply to both the referral and any assessment activities undertaken. Further information regarding cost recovery can be found on the Department's website.

Payment of the referral fee can be made using one of the following methods:

- **EFT Payments can be made to:**

  BSB: 092-009
  Bank Account No. 115859
  Amount: $7352
  Account Name: Department of the Environment.
  Bank: Reserve Bank of Australia
  Bank Address: 20-22 London Circuit Canberra ACT 2601
  Description: The reference number provided (see note below)

- **Cheque** - Payable to "Department of the Environment". Include the reference number provided (see note below), and if posted, address:

  The Referrals Gateway
  Environment Assessment Branch
  Department of the Environment
  GPO Box 787
  Canberra ACT 2601

- **Credit Card**

  Please contact the Collector of Public Money (CPM) directly (call (02) 6274 2930 or 6274 20260 and provide the reference number (see note below).

Note: in order to receive a reference number, submit your referral and the Referrals Gateway will email you the reference number.

How do I submit a referral?

Referrals may be submitted by mail or email.

Mail to:

Referrals Gateway
Environment Assessment Branch
Department of Environment
GPO Box 787
CANBERRA ACT 2601

- If submitting via mail, electronic copies of documentation (on CD/DVD or by email) are required.

Email to: epbc.referrals@environment.gov.au

- Clearly mark the email as a 'Referral under the EPBC Act'.
- Attach the referral as a Microsoft Word file and, if possible, a PDF file.
- **Follow up with a mailed hardcopy including copies of any attachments or supporting reports.**

What happens next?

Following receipt of a valid referral (containing all required information) you will be advised of the next steps in the process, and the referral and attachments will be published on the Department's web site for public comment.

The Department will write to you within 20 business days to advise you of the outcome of your referral and whether or not formal assessment and approval under the EPBC Act is required. There are a number of possible decisions regarding your referral:

The proposed action is NOT LIKELY to have a significant impact and does NOT NEED approval

No further consideration is required under the environmental assessment provisions of the EPBC Act and the action can proceed (subject to any other Commonwealth, state or local government requirements).

The proposed action is NOT LIKELY to have a significant impact IF undertaken in a particular manner

The action can proceed if undertaken in a particular manner (subject to any other Commonwealth, state or local government requirements). The particular manner in which you must carry out the action will be identified as part of the final decision. You must report your compliance with the particular manner to the Department.

The proposed action is LIKELY to have a significant impact and does NEED approval

If the action is likely to have a significant impact a decision will be made that it is a *controlled action*. The particular matters upon which the action may have a significant impact (such as World Heritage values or threatened species) are known as the *controlling provisions*.

The controlled action is subject to a public assessment process before a final decision can be made about whether to approve it. The assessment approach will usually be decided at the same time as the controlled action decision. (Further information about the levels of assessment and basis for deciding the approach are available on the Department's web site.)

The proposed action would have UNACCEPTABLE impacts and CANNOT proceed

The Minister may decide, on the basis of the information in the referral, that a referred action would have clearly unacceptable impacts on a protected matter and cannot proceed.

Compliance audits

If a decision is made to approve a project, the Department may audit it at any time to ensure that it is completed in accordance with the approval decision or the information provided in the referral. If the project changes, such that the likelihood of significant impacts could vary, you should write to the Department to advise of the changes. If your project is in the Great Barrier Reef Marine Park and a decision is made to approve it, the Authority may also audit it. (See "*Is your action in the Great Barrier Reef Marine Park,"* p.2, for more details).

For more information

- call the Department of the Environment Community Information Unit on 1800 803 772 or
- visit the web site http://www.environment.gov.au/topics/about-us/legislation/environment-protection-and-biodiversity-conservation-act-1999

All the information you need to make a referral, including documents referenced in this form, can be accessed from the above web site.

Referral of proposed action

Project title: Mt Gibson Ranges – Iron Hill Deposit

1 Summary of proposed action

1.1 Short description

The Project is for mine development of the Iron Hill Deposit, located within the Mt Gibson Ranges in the Shire of Yalgoo, Western Australia. The Project area of 126 hectares (ha) will comprise Mine Pits, a Waste Rock Landform and Support Infrastructure.

The Proponent for the Project is Mount Gibson Mining Limited (MGM), a wholly-owned subsidiary of Mount Gibson Iron Limited (MGX).

1.2 Latitude and longitude

Maps identifying the Project location and area are provided in Figures 1 to 3 (below).

The Project is encompassed within the coordinate points provided in Table 1 (below).

	Latitude			Longitude		
location point	degrees	minutes	seconds	degrees	minutes	seconds
1	-29	36	29.99	117	10	55.13
2	-29	36	40.25	117	10	48.59
3	-29	36	45.89	117	10	30.96
4	-29	36	14.37	117	9	13.78
5	-29	34	33.87	117	9	25.72

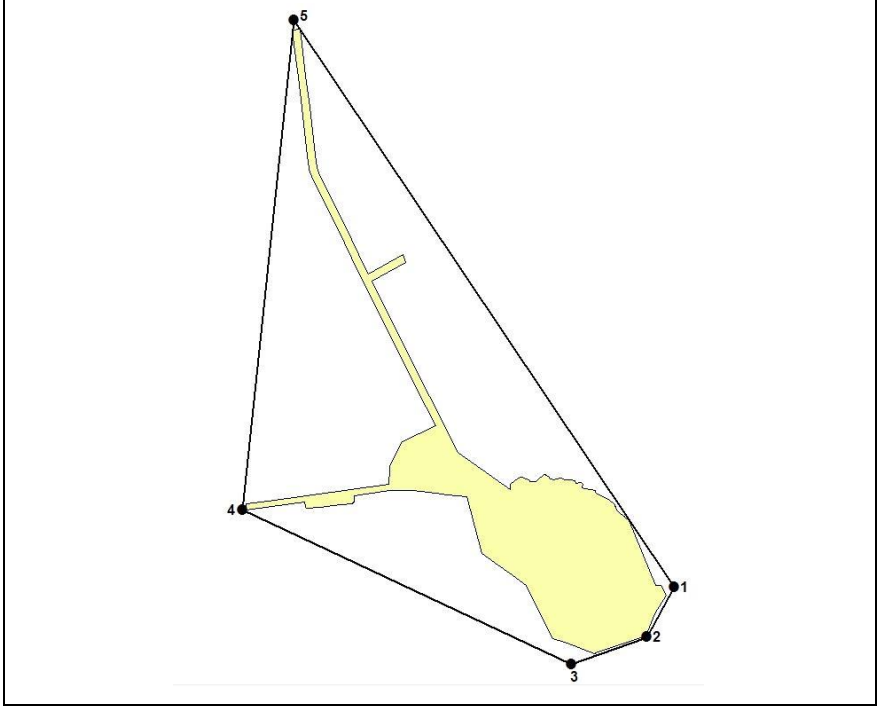


Table 1 Project Coordinates

1.3 **Locality and property description**

The Project is located at the Mt Gibson Ranges, approximately 270km east-south-east of Geraldton, in the Shire of Yalgoo, Western Australia.

The regional location of the Mt Gibson Ranges is identified by Figure 1. The location of the Project at the Mt Gibson Ranges is identified by Figure 2. The location and area of the infrastructure components for the Project area is identified by Figure 3.

1.4	**Size of the development footprint or work area (hectares)**	The Project will occur within a spatial area totalling 126ha, as identified by Figure 3.
1.5	**Street address of the site**	Not applicable

1.6 **Lot description**

The Project is located within land areas defined by Tenements M59/338, M59/339, M59/454, M59/455, M59/526, M59/609 and G59/609, as identified by Figures 2 and 3. The Tenements have been granted to Extension Hill Pty Ltd (EHPL) under the *Mining Act 1978* (WA). MGM has a commercial agreement with EHPL to access the land for the purpose of the Project.

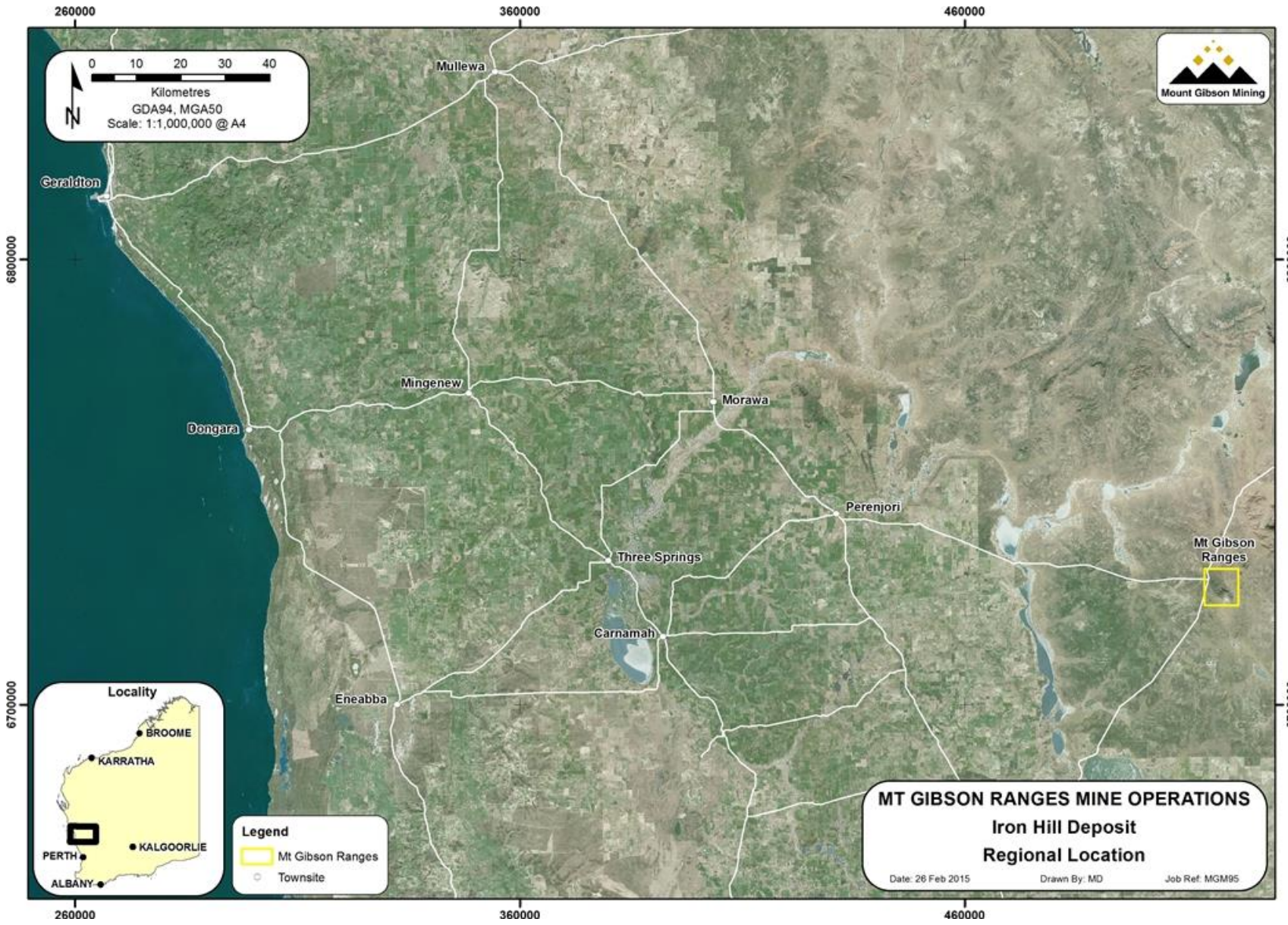


Figure 1 Regional Location of the Mt Gibson Ranges. The regional location of the Mt Gibson Ranges is identified.

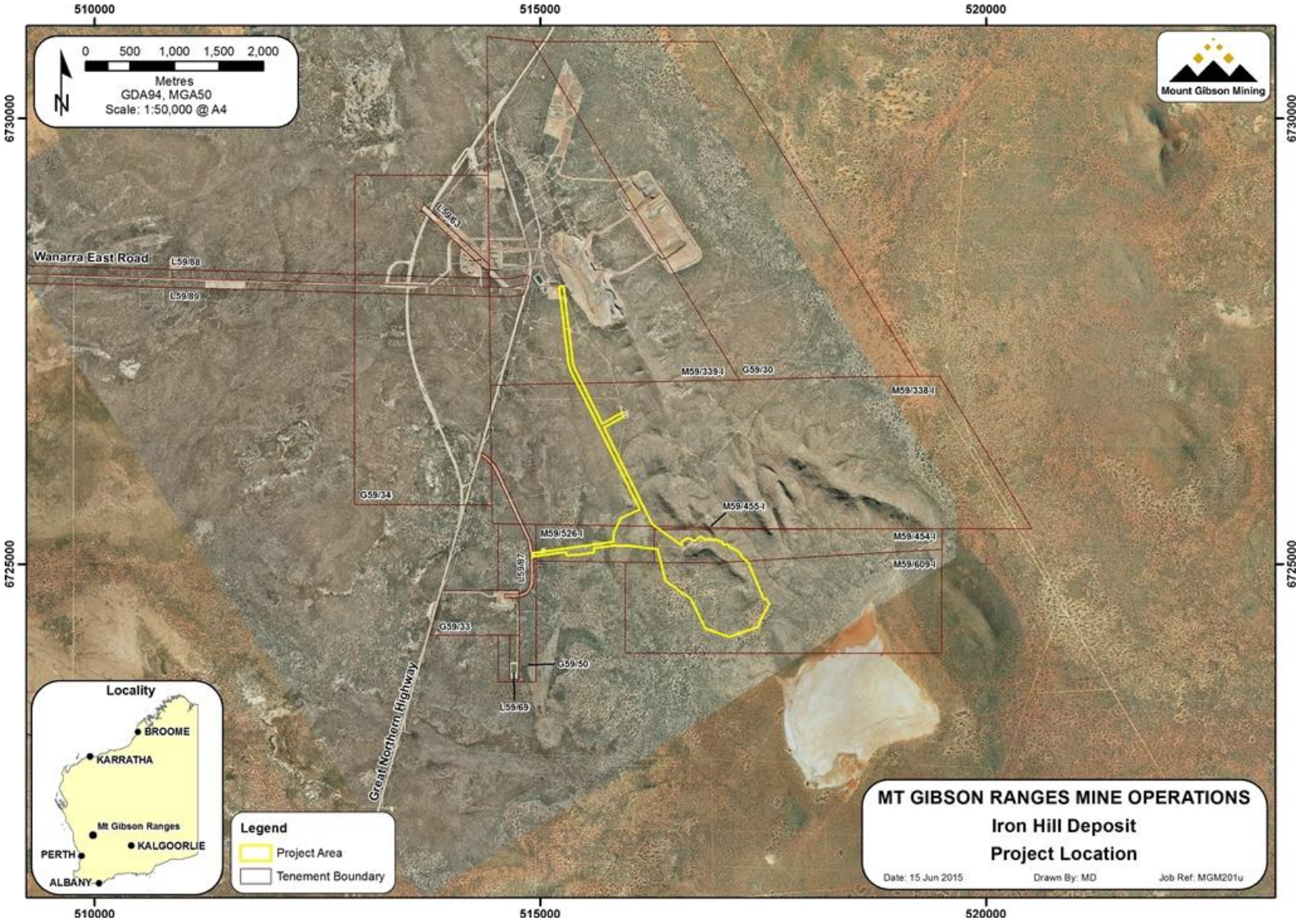


Figure 2 Project Location. The area of the Project is identified by the yellow boundary. The current extent of development for the approved mine operations at the Mt Gibson Ranges is visible in the underlying aerial imagery.

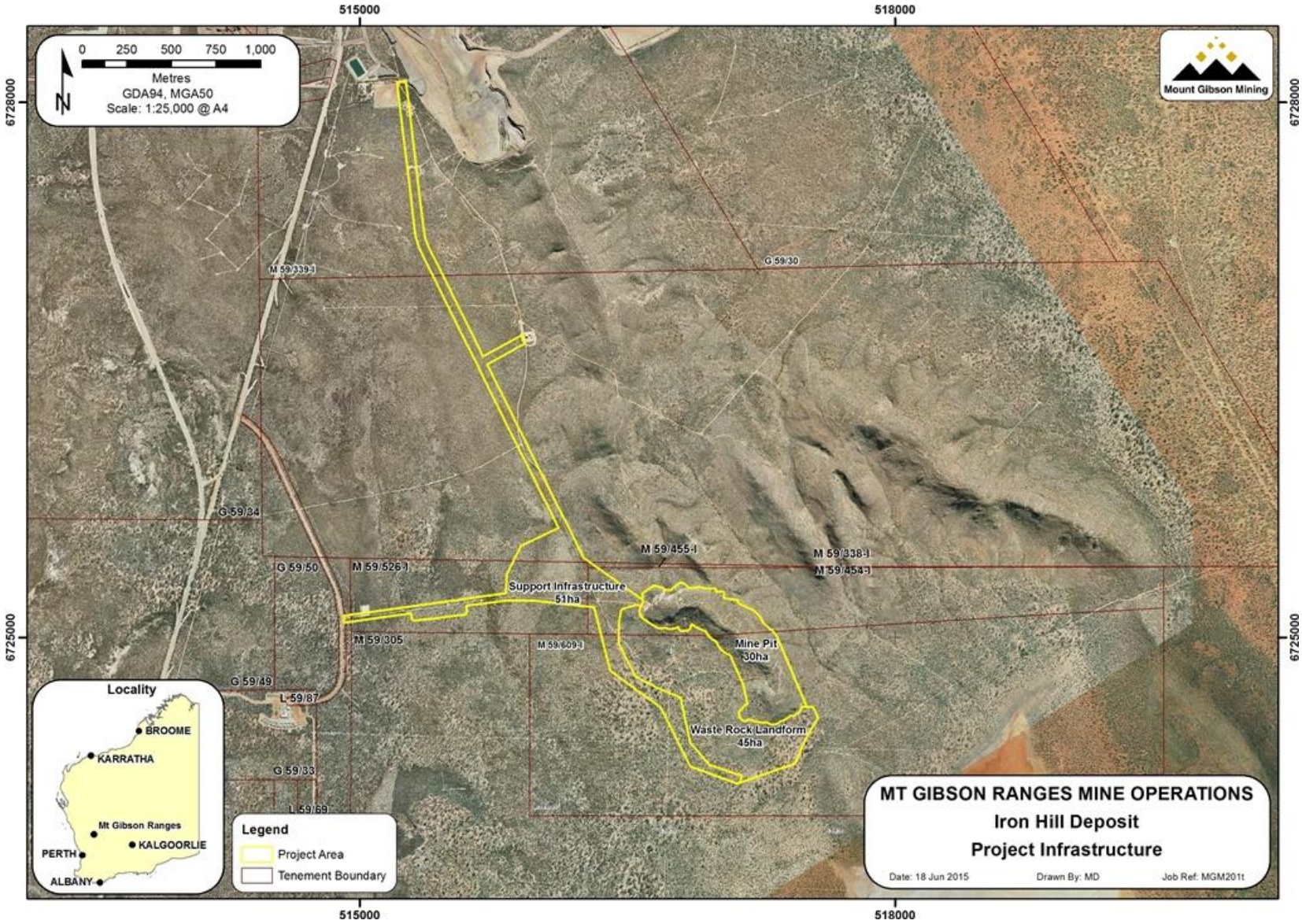


Figure 3 Project Infrastructure. The location and area of the Project infrastructure components are identified by the yellow boundaries.

1.7 **Local Government Area and Council contact (if known)**

The Project does not require Local Government approval.

The contact details for the Shire of Yalgoo are:

Chief Executive Officer
Shire of Yalgoo
PO Box 40
YALGOO WA 6635
Telephone: (08) 9962 8042
E-mail: ceo@yalgoo.wa.gov.au

1.8 **Time frame**

The Project is currently scheduled to commence development from 2016, with mining expected to occur to 2019.

1.9	**Alternatives to proposed action**	✓	No
			Yes, you must also complete section 2.2
1.10	**Alternative time frames etc**	✓	No
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	**State assessment**		No
		✓	Yes, you must also complete Section 2.5
1.12	**Component of larger action**		No
		✓	Yes, you must also complete Section 2.7
1.13	**Related actions/proposals**		No
		✓	Yes, provide details: Please refer to Section 2.7
1.14	**Australian Government funding**	✓	No
			Yes, provide details:
1.15	**Great Barrier Reef Marine Park**	✓	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

The Project is for mine development of the Iron Hill Deposit, located at the Mt Gibson Ranges, in the Shire of Yalgoo, approximately 270km east-south-east of Geraldton, Western Australia.

The Project will operate as an operational extension to MGM's approved mine operations at the Mt Gibson Ranges. The approved mine operations were previously assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), and approved under the EPBC Decision 2005/2381 in 2007 (DoE 2007).

The Project will allow access to an estimated 5-7 million tonnes (Mt) of high-grade hematite iron ore having a conservative gross economic value in mid-2015 of approximately A$370million.

The ore resource will be mined through the conventional open-pit mining techniques of drilling, blasting, loading and transport.

The Project includes the following mine infrastructure components, positioned within a development envelope of 126ha:

(a) Mine Pits for the excavation of the iron ore resource;

(b) Waste Rock Landform for the disposal of the excavated waste rock; and

(c) Support Infrastructure including rehabilitation stockpiles (vegetation, topsoil and subsoil for post-mining rehabilitation), internal mine roads, water storage dams, administration facilities, fuel storage, and workshop and maintenance facilities.

Development of the Project has been scheduled to commence from 2016, with mining expected to occur to 2019.

The regional location of the Mt Gibson Ranges is identified by Figure 1. The location of the Project at the Mt Gibson Ranges is identified by Figure 2. The location and area of the infrastructure components for the Project area is identified by Figure 3.

To avoid doubt, the following matters do not form part of the Project (i.e. exclusions):

(a) the components of the approved mine operations under the EPBC Decision 2005/2381 approval;

(b) any survey and/or investigation of a geological or geotechnical or environmental or hydrological or planning or heritage nature (including any potential environmental effects associated with such surveys and/or investigations);

(c) changes in asset ownership or land tenure; and

(d) approval or consent or agreement associated with the components of the approved mine operations or surveys or investigations or ownership or tenure.

2.2 Alternatives to taking the proposed action

Not applicable

2.3 Alternative locations, time frames or activities that form part of the referred action

Not applicable

2.4 Context, planning framework and state/local government requirements

Table 2 (below) identifies the legislation of the State of Western Australia under which the Project will be assessed, the responsible authority for the legislation, and the anticipated schedule for commencing each assessment and approval process.

LEGISLATION	RESPONSIBLE AUTHORITY	ASSESSMENT/APPROVAL TYPE	SCHEDULE
Environmental Protection Act 1986 (WA)	Environmental Protection Authority	Environmental Approval	Q3 2014
Aboriginal Heritage Act 1972 (WA)	Department of Aboriginal Affairs	Consent to Use Land	Q1 2015
Mining Act 1978 (WA)	Department of Mines and Petroleum	Mining Approval	Q3 2015
Wildlife Conservation Act 1950 (WA)	Department of Parks and Wildlife	Licence to Take Rare Flora and Specially Protected Fauna	Q3 2015
Rights in Water and Irrigation Act 1914 (WA)	Department of Water	Groundwater Licence (Amendment)	Q3 2015
Environmental Protection Regulations 1987 (WA)	Department of Environmental Regulation	Environmental Licence (Amendment)	Q3 2015

Table 2 State Government Approvals

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

The Project will be assessed by the State of Western Australia through the legislation identified in Table 2 (above). The assessment and approval processes listed by Table 2 will include an assessment of the environmental effect of the Project to:

(a) Flora and vegetation, including the listed Threatened Species *Darwinia masonii*;

(b) Fauna, including the listed Threatened Species *Leipoa ocellata* and *Idiosoma nigrum*; and

(c) Mine closure and rehabilitation.

For the listed Threatened Species identified above, the environmental effect of the Project to these taxa will be assessed under the provisions of each of the *Wildlife Conservation Act 1950* (WA), *Environmental Protection Act 1986* (WA) and the *Mining Act 1978* (WA) (i.e. three separate State Government assessments dealing with these taxa).

The above assessments will include consideration of the potential environmental effects, and systems to be implemented, to ensure that any potential environmental effects are minimised and/or managed to an acceptable standard.

The State Government assessment and approval processes include periods for stakeholder consultation with both community stakeholders and Government agencies.

2.6 Public consultation (including with Indigenous stakeholders)

MGM has consulted with a range of community stakeholders and Government agencies on the Project, with the consultation to date including:

Government:

(a) Department of the Environment (May/July/October 2014);

(b) Environmental Protection Authority (December 2013, May/June/August 2014, January/February/March/April 2015);

(c) Department of Parks and Wildlife (June/December 2013, January/May/June/July/August 2014, March/May 2015);

(d) Department of Mines and Petroleum (November 2013, May/June/August 2014);

(e) Department of Water (May/June 2014);

(f) Department of Aboriginal Affairs (May/June 2014, March 2015);
(g) Department of Environmental Regulation (May 2014);
(h) Shire of Yalgoo (June 2013, May/October 2014, May 2015);
(i) Shire of Perenjori (June 2013, May 2014);
(j) City of Greater Geraldton (May 2014);
(k) Mid-West Ports Authority (May 2014);
(l) Department of Lands (April/May 2014);

Community:

(m) Extension Hill Pty Ltd (monthly since start 2013);
(n) Badimia People (May/October 2013, April/May/October 2014, January/May 2015);
(o) Australian Wildlife Conservancy (for the Mt Gibson Pastoral Lease) (May 2014, May 2015);
(p) Pindiddy Aboriginal Corporation (for the Ninghan Pastoral Lease) (June 2013, May 2014, May 2015);
(q) Bush Heritage Australia (for the White Wells Pastoral Lease) (May 2014, June 2014, May 2015);
(r) Wanarra Pastoral Lease (June 2013);
(s) North Central Malleefowl Preservation Group (June 2013, May 2014);
(t) Western Australian Naturalists Club (May 2014, June 2014);
(u) Conservation Council of Western Australia (May 2014); and
(v) Wildflower Society of Western Australia (May 2014).

Consultation has been undertaken in the form of meetings and written correspondence (as appropriate), covering both the environmental surveys proposed/undertaken, and the applicable Government assessment and approvals processes.

The State Government assessment and approval processes (Table 2) include further periods for stakeholder consultation with both community stakeholders and Government agencies.

2.7 A staged development or component of a larger project

The Project will operate as an extension of MGM's approved mine operations at the Mt Gibson Ranges (refer to Figure 2). As outlined by Section 1.1, the Proponent for the Project is MGM.

The existing mine operations were approved through EPBC Decision 2005/2381 approval under the *Environment Protection and Biodiversity Act 1999* (C'th) in 2007 (DoE 2007) and commenced in 2010. The EPBC Decision 2005/2381 approval is held jointly by MGM and EHPL.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

No World Heritage Properties occur in the vicinity of the Project.

Nature and extent of likely impact

Not Applicable – No World Heritage Properties occur in the vicinity of the Project.

3.1 (b) National Heritage Places

Description

No National Heritage Places occur in the vicinity of the Project.

Nature and extent of likely impact

Not Applicable – No National Heritage Places occur in the vicinity of the Project.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

No Wetlands of International Importance occur in the vicinity of the Project.

Nature and extent of likely impact

Not Applicable – No Wetlands of International Importance occur in the vicinity of the Project.

3.1 (d) Listed threatened species and ecological communities

Description

The EPBC Act Protected Matters Report (DoE 2015, Attachment 1) identifies the following listed "Threatened Species" may potentially occur in the vicinity of the Project (in alphabetical order):

(a) *Acacia imitans* (Gibson Wattle, a plant);
(b) *Darwinia masonii* (Mason's Darwinia, a plant);
(c) *Dasymalla axillaris* (Native Foxglove, a plant);
(d) *Dasyurus geoffroii* (Chuditch, a mammal);
(e) *Egernia stokesii aethiops* (a reptile);
(f) *Egernia stokesii badia* (Western Spiny-tailed Skink, a reptile);
(g) *Eremophila viscida* (Varnish Bush, a plant);
(h) *Eucalyptus synandra* (Jingymia Mallee, a plant);
(i) *Gyrostemon reticulatus* (Net-veined Gyrostemon, a plant);
(j) *Hybanthus cymulosus* (Ninghan Violet, a plant);
(k) *Idiosoma nigrum* (Shield-backed Trapdoor Spider, a spider);
(l) *Leipoa ocellata* (Malleefowl, a bird);
(m) *Rostratula australis* (Australian Painted Snipe, a bird); and
(n) *Roycea pycnophylloides* (Saltmat, a plant).

The EPBC Act Protected Matters Report (DoE 2015, Attachment 1) does not identify any listed "Threatened Ecological Communities" in the vicinity of the Project.

Flora and fauna surveys of the Mt Gibson Ranges have been undertaken over a period of nearly two decades (Flora: Muir 1995; Bennett 2000; Paul Armstrong & Assoc. 2004; ATA 2004, 2006a, 2006b, 2006c; Coffey 2008a, 2008b, 2008c; DPaW 2008a; Borger & Nicholls 2013; MBS 2013, 2014, 2015; EcoLogical 2014; Maia 2014) (Fauna: Hart Simpson & Assoc. 2000; ATA 2005a, 2005b; UWA 2005; WAM 2005, 2006; Rockwater 2008, 2012; MGM 2011, 2012; Terrestrial Ecosystems 2012, 2014; Bennelongia 2014; Biologic 2015a, 2015b; Ecologia 2014a; Engenium 2015). The flora and fauna surveys are considered to be both extensive and comprehensive; such that they provide a sound basis on which to consider the potential environmental effects of the Project. Copies of the flora and fauna survey reports are provided on the compact disc at Attachment 2.

Based on the completed flora and fauna surveys, the following listed Threatened Species have been recorded in the vicinity of the Mt Gibson Ranges:

(a) *Darwinia masonii* (Mason's Darwinia, a plant);
(b) *Egernia stokesii badia* (Western Spiny-tailed Skink, a reptile);
(c) *Eucalyptus synandra* (Jingymia Mallee, a plant);
(d) *Idiosoma nigrum* (Shield-backed Trapdoor Spider, a spider); and
(e) *Leipoa ocellata* (Malleefowl, a bird).

The recorded locations of the above listed Threatened Species are identified by Figure 4.

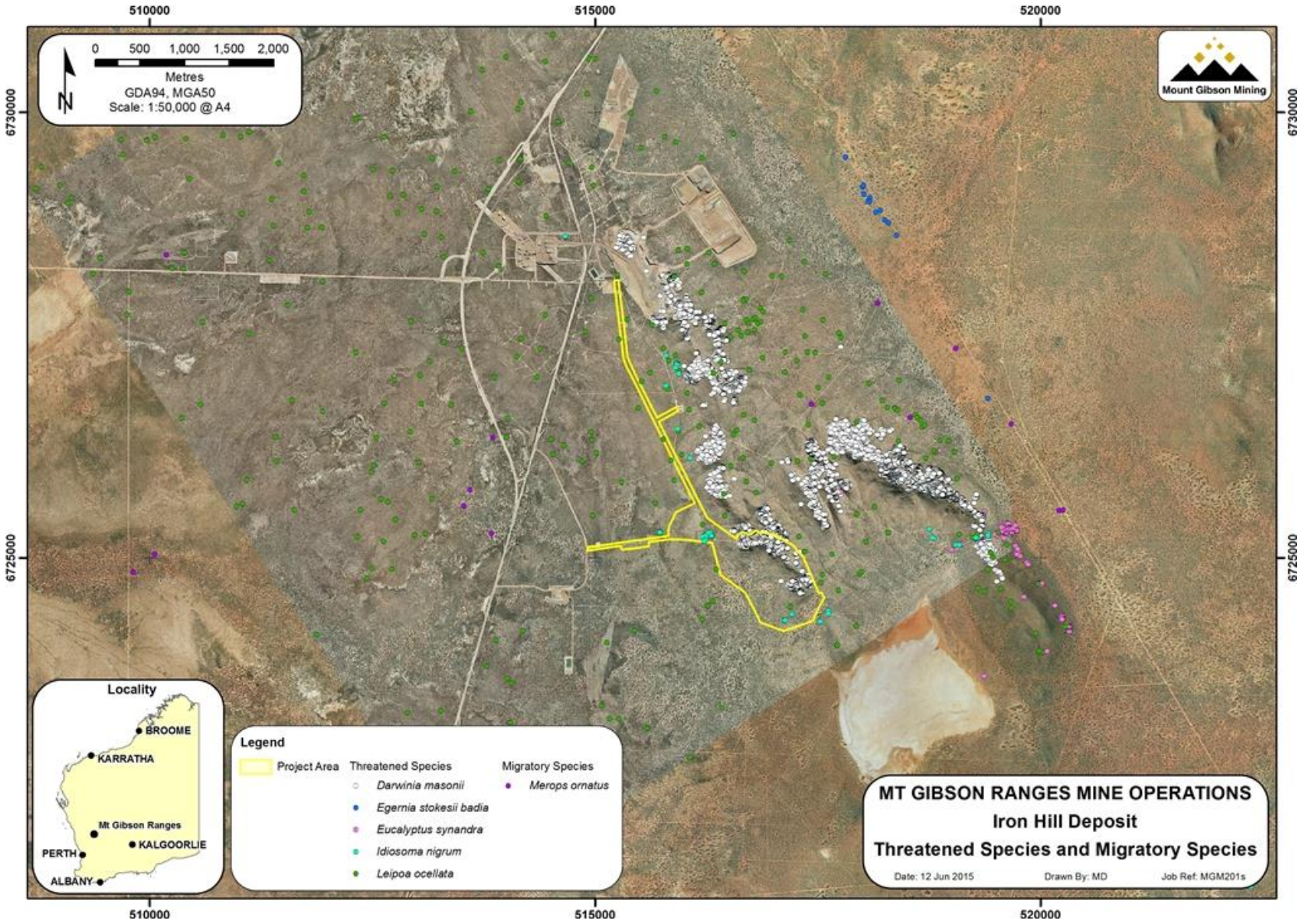


Figure 4 Recorded Locations of Threatened Species and Migratory Species. The location of the Project is identified by the yellow boundary. The recorded locations of listed Threatened Species and Migratory Species under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) are identified. Data Sources: ATA 2005a, 2005b, 2006a; Biologic 2015a, 2015b; EcoLogical 2014; Ecologia 2014; MBS 2013, 2014, 2015; Terrestrial Ecosystems 2012, 2014.

Of the listed Threatened Species recorded in the vicinity of the Mt Gibson Ranges, the Project coincides with records of:

(a) *Darwinia masonii* (Mason's Darwinia, a plant);

(b) *Idiosoma nigrum* (Shield-backed Trapdoor Spider, a spider); and

(c) *Leipoa ocellata* (Malleefowl, a bird).

A description of *Darwinia masonii*, *Leipoa ocellata* and *Idiosoma nigrum*, and their population distribution, is provided below:

Darwinia masonii

Darwinia masonii (Mason's Darwinia) is a medium sized erect shrub to 3m height with characteristic grey-green foliage and numerous spreading pinkish pendulous bracts. The leaves are small, narrow and near-triangular in cross-section, crowded towards the ends of branchlets. The inflorescences are comprised of numerous small tubular flowers. *Darwinia masonii* has been recorded only from the area of the Mt Gibson Ranges, where it occurs at elevations >330mAHD on skeletal or shallow clay soils and shallow pockets associated with ironstone, granite, lateritic breakaways and creeks (Brown *et al.* 1998 and DPaW 2008 in EcoLogical 2014; EcoLogical 2014; MGM & EHPL 2014a). *Darwinia masonii* generally flowers between April and November (Brown *et al.* 1998 in MGM & EHPL 2014a).

The regional distribution and images of *Darwinia masonii* are identified by Figure 5 (below). The recorded locations of *Darwinia masonii* at the Mt Gibson Ranges and in the vicinity of the Project are identified by Figure 4 (above).

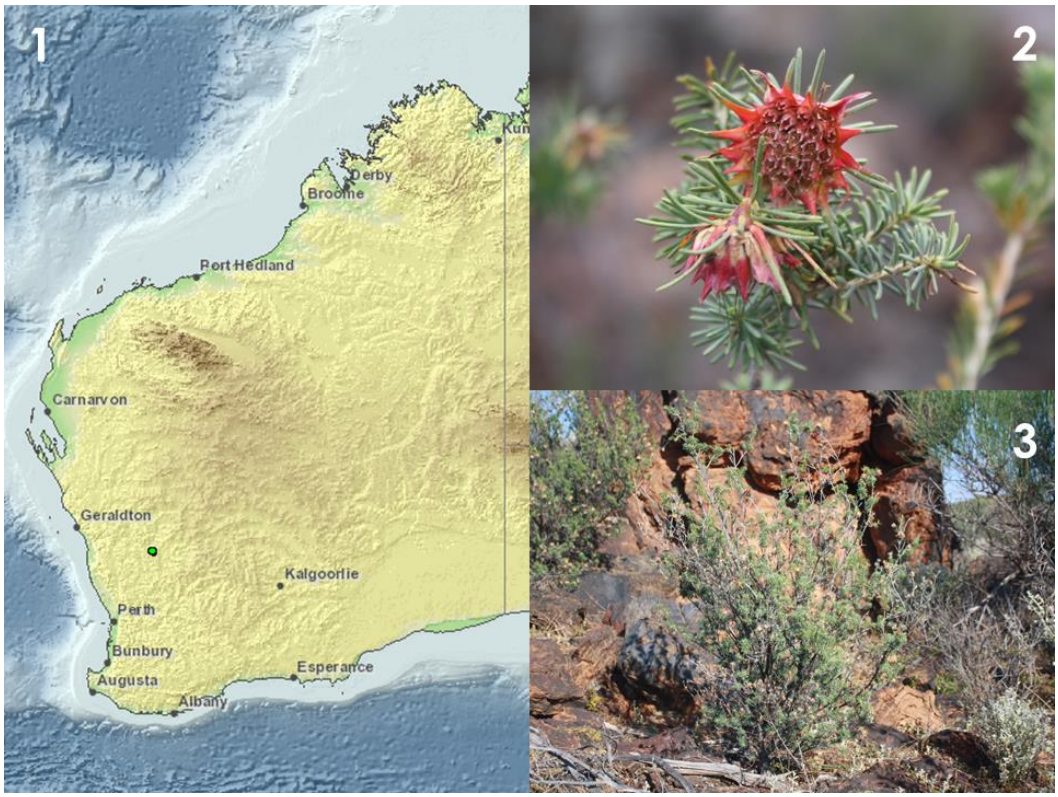


Figure 5 *Darwinia masonii* Distribution and Images. 1. Regional distribution of *Darwinia masonii* (adapted[1] from DPaW 2014a). 2. Flower and leaves of *Darwinia masonii* (Globe Environments 2014 unpublished). 3. Growth form of *Darwinia masonii* (Globe Environments 2014 unpublished).

[1] Note: Consistent with the results of Maia (2014), the erroneous record of *Darwinia masonii* positioned approximately 20km east of the Mt Gibson Ranges has been removed from Image 1 of Figure 5.

Darwinia masonii is one of more than 50 Western Australian species of the genus *Darwinia*, with this genus comprising of a number of taxa considered to be naturally rare due to limiting factors such as substrate preferences and/or breeding biology constraints (MGM & EHPL 2013).

As outlined by DPaW (2008b), a previous assessment using the IUCN (2001) criteria identified *Darwinia masonii* as meeting the category of "Vulnerable" under "Criteria D2". The Criteria D2 Vulnerable category applies to taxa with an area of occupancy of <20km^2 and/or occurs at ≤5 locations, and with a plausible future threat that could drive the taxon to the categories of "Critically Endangered" or "Extinct" in a very short period of time (IUCN 2012, 2014). The basis for the Criteria D2 determination outlined by DPaW (2008b) resulted from *Darwinia masonii* having a restricted area of occupancy (<6km^2 and 1 location) and with mining considered to be a plausible future threat. As identified by DoE (2008a, 2013a), the DPaW (2008b) assessment has also been considered under the *Environment Protection and Biodiversity Conservation Act 1999 (*C'th).

The ecology of *Darwinia masonii* has been subject to extensive research as outlined within BGPA (2010), with the key outcomes being:

(a) Germination of fresh *Darwinia masonii* seed is naturally low. Results of seed bank trials indicate a complex germination/dormancy strategy combining a requirement for physical seed coat degradation, environmental (seasonal temperature) curing with cycling in-and-out of dormancy, and heat/smoke-related physiological responses. Fire results in high post-fire seedling recruitment from long-lived soil-stored seed of *Darwinia masonii*, with only limited recruitment between fires within older populations. Seedling survival during the first summer has been recorded at approximately 10%.

(b) Reproduction (i.e. flowering, fruiting) commences in *Darwinia masonii* from approximately six years of age, with flowering and seed production taking place over an extended period during spring and early summer. Seed production varies, with between approximately 10 to 60 seeds per plant per year. Pollination of *Darwinia masonii* is believed to be by a species of Honeyeater (a bird), with seed dispersal predominantly by ants.

(c) *Darwinia masonii* enter a period of physical dormancy during summer drought by reducing transpiration and photosynthetic function, with the capacity to restore tissues following rainfall. The roots of *Darwinia masonii* have the capacity to enter large cracks, pores and fissures in the regolith and may achieve considerable root depth (up to 10m). Whilst mortality is rare amongst mature *Darwinia masonii* (with this taxon being long-lived, to approximately 100 years), drought has been observed to contribute to mortality in both mature individuals and juveniles.

(d) Successful propagation of *Darwinia masonii* has been demonstrated using green-stock production from cuttings, with this translocation undertaken during 2005. Survival of *Darwinia masonii* green-stock cuttings transplanted to field sites averaged approximately 10% after five years in unwatered plots, with cuttings in plots that were irrigated for the first two years (but not after) indicated a survival rate of approximately 90% after five years. Cuttings that were irrigated were recorded as commencing flowering in the first year.

An image identifying the translocated *Darwinia masonii* referred to by BGPA (2010) is identified by Figure 6. The survival rate after approximately nine years (2005 to 2014) is currently approximately 80% within irrigated plots (irrigated for the first two years, but not after), with approximately 90% of measured individuals recorded as reproductive during the 2013 year (pers. com. J Sackmann of MGM, March 2014). Numerous seedlings recorded immediately surrounding the translocation plots, as also identified by Figure 6, confirm the translocated individuals have reached reproductive maturity.

Darwinia masonii has also been recorded as colonising exploration access tracks and drilling pads at various locations across the Mt Gibson Ranges. These records indicate *Darwinia masonii* respond favourably following land disturbance. Images identifying a mature individual and a seedling of *Darwinia masonii* recorded within an exploration access track are identified by Figure 7. Furthermore, individuals of *Darwinia masonii* have also been recorded as germinating within topsoil stockpiles at the approved mine operations (pers. com. J Sackmann of MGM, November 2014).

In 2004, an initial census of the *Darwinia masonii* population recorded 16,573 individuals, comprising 14,307 mature individuals (86%), 1,725 seedlings (10%) and 541 senescent (dead) individuals (3%) (ATA 2004)[1]. This

[1] Percentages adjusted for rounding.

census formed the basis for the environmental assessment for the approved mine operations under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) (ATA 2006d; DoE 2007) and the *Environmental Protection Act 1986* (WA) (ATA 2006d; EPA 2006; WA Minister for Environment 2007). The approved mine operations coincided with approximately 15%[1] of the recorded total *Darwinia masonii* population, which equated to approximately 17%[2] of the total mature *Darwinia masonii* population.

Based on the survey data of ATA (2004) and subsequent survey by Coffey (2008a), a total of 1,702 individuals of *Darwinia masonii* have been removed by the approved mine operations to date (MGM & EHPL 2014a).

In 2014, a census for extant *Darwinia masonii* individuals was undertaken to provide a contemporary record of the *Darwinia masonii* population. The census recorded 20,965 extant *Darwinia masonii* individuals, comprising 19,132 mature individuals (91%), 1,580 juveniles (8%), 188 seedlings (<1%) and 65 senescent individuals (<1%) (EcoLogical 2014).

Based on the recent *Darwinia masonii* census population data of 20,965 individuals (EcoLogical 2014), plus noting the 1,702 individuals removed to date (MGM & EHPL 2014a), the total pre-disturbance *Darwinia masonii* population is considered to comprise approximately 22,667 individuals. This revised *Darwinia masonii* population of 22,667 individuals is more than 6,000 individuals greater than the 16,573 individuals originally reported by ATA (2004) that was used in the environmental assessment of the approved mine operations.

The increase in the total population records for *Darwinia masonii* between the ATA (2004) and EcoLogical (2014) census records is considered largely a result of the greater survey intensity undertaken by EcoLogical (2014), rather than a significant fluctuation in the number of individuals in the population over time; noting there has been no environmental factors (i.e. fire) between the census periods which could have resulted in the greater number of individuals recorded.

The revised total population records for *Darwinia masonii* also result in a revision to the effect of the approved mine operations. Based on the EcoLogical (2014) *Darwinia masonii* census data, a total of 2,061 *Darwinia masonii* individuals occur within the currently undeveloped areas of the approved mine operations, comprising 1,929 mature individuals, 107 juveniles, 13 seedlings and 12 senescent individuals. With the addition of the 1,702 *Darwinia masonii* individuals removed to date, the approved mine operations coincide with 3,763 individuals (17%) of the total *Darwinia masonii* population of 22,667 individuals.

The Project coincides with records of 1,327 individuals (6%) of the *Darwinia masonii* population of 22,667 individuals. An assessment of the environmental effect of the Project to the *Darwinia masonii* taxon is provided below (under *Nature and extent of likely impact*).

[1] 15% being 2,530 *Darwinia masonii* individuals of the ATA (2004) recorded population of 16,573 individuals, comprising 2,469 mature individuals and 24 seedlings within the approval area as identified by Figure 16a in ATA (2006d) and Figure 6 in EPA (2006), and 37 senescent individuals within the approval area as identified by Figure 2 in ATA (2004). Reference to 14% within the text of ATA (2006) appears to be erroneous.

[2] 17% being 2,469 mature *Darwinia masonii* individuals of the recorded 14,307 mature *Darwinia* masonii individuals as identified by Figure 16a in ATA (2006d). Reference to 14% of mature *Darwinia masonii* individuals within the text of ATA (2006d) and 15% of mature *Darwinia masonii* individuals within the text of EPA (2006) both appear to be erroneous.



Figure 6 Translocated *Darwinia masonii* from green-stock cuttings, and seedlings. 1. Translocated *Darwinia masonii* from green-stock cuttings established in 2005, as at September 2014, with the individuals recorded as healthy and flowering. 2. *Darwinia masonii* seedlings recorded outside of the translocation plot. 3. *Darwinia masonii* seedling recorded outside of the translocation plot. Images: Globe Environments (2014 unpublished).



Figure 7 Colonisation of *Darwinia masonii* within disturbance areas. 1. *Darwinia masonii* mature individual (flowering) within an exploration access track. 2. *Darwinia masonii* seedling within an exploration access track. Images: Globe Environments (2014 unpublished).

Idiosoma nigrum

Idiosoma nigrum (Shield-backed Trapdoor Spider) is a large trapdoor spider, dark brown to black in colour, with a distinctive thick and hard shield-like abdomen, with its sides deeply grooved giving them a rugose, corrugated appearance (DoE 2010 cited in DoE 2013b). *Idiosoma nigrum* occupies semi-arid habitats and lives in tubular burrows approximately 20-30cm deep (Main 1992 cited in DoE 2013b), with a fan of leaf and twig trip-lines attached to the burrow rim which alerts the spider to the movement of prey (ants, beetles, cockroaches, millipedes and moths) outside of the burrow entrance (Clark and Spier 2003 and DoE 2010 both cited in DoE 2013b). Dispersal of *Idiosoma nigrum* is estimated to be <500m (Main unpublished in DoE 2013b), resulting in a spatial clustering of burrows.

DPaW (2014b) identifies *Idiosoma nigrum* as having a recorded linear distribution of approximately 750km, extending from near Pinjarra in the south and towards Meekatharra in the north. The regional distribution and images of an *Idiosoma nigrum* individual and burrow are presented in Figure 8.

Idiosoma nigrum has been recorded in low numbers across the Mt Gibson Ranges, both within and outside of the Project area (Biologic 2015a). A total of 92 active *Idiosoma nigrum* burrows have been recorded at the Mt Gibson Ranges through targeted searches, however, this taxon is undoubtedly more abundant across the Mt Gibson Ranges beyond the targeted search areas.

As outlined by Biologic (2015a), the density of *Idiosoma nigrum* burrows recorded at the Mt Gibson Ranges is low compared to populations studied at areas such as the Blue Hills (approximately 60km north-north-west), Weld Range (300km north) and Jack Hills (390km north); indicating the Mt Gibson Ranges is not a key habitat for this taxon. The density of *Idiosoma nigrum* burrows at the Mt Gibson Ranges also appears low compared to other nearby areas, such as at the Mummaloo Deposit (10km south-east) (Bennelongia 2012) and the Shine Deposit (85km north) (BCE 2012).

The Project coincides with records of 22 *Idiosoma nigrum* burrows. An assessment of the environmental effect of the Project to the *Idiosoma nigrum* taxon is provided below (under *Nature and extent of likely impact*).

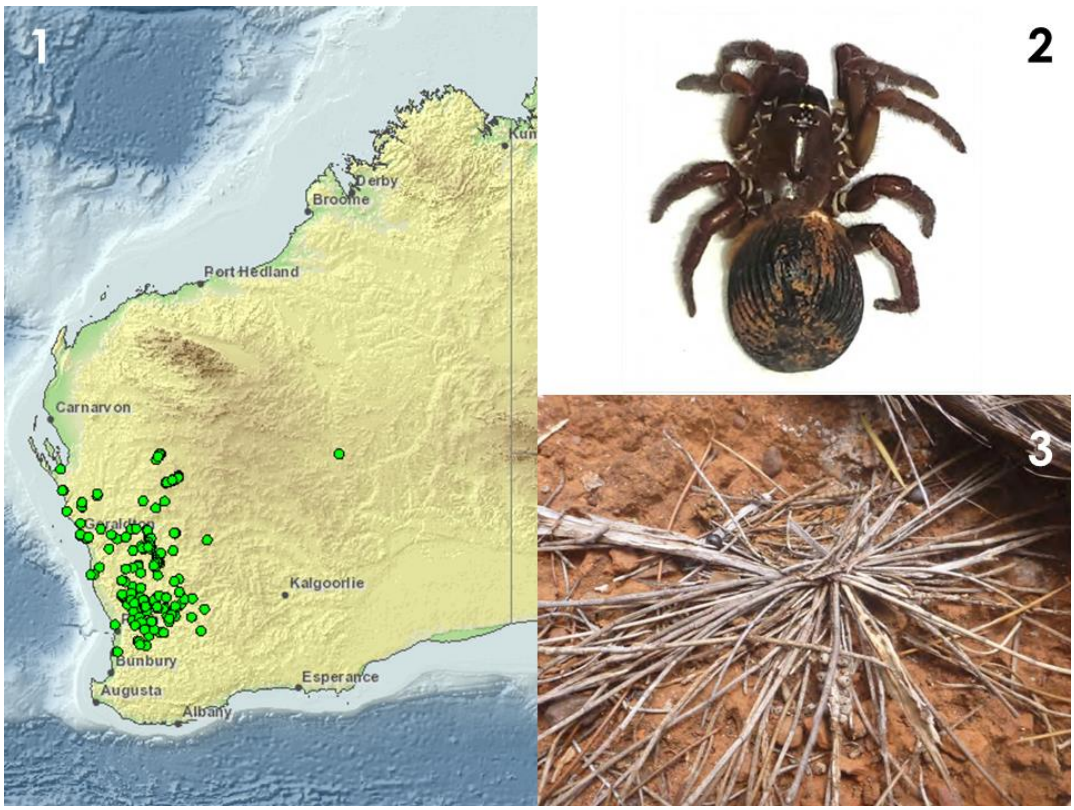


Figure 8 ***Idiosoma nigrum*** **Regional Distribution and Images.** Image 1: The regional distribution of *Idiosoma nigrum* is identified by green circles (adapted from DPaW 2014b). Image 2: *Idiosoma nigrum* individual (Biologic 2015a). Image 3: *Idiosoma nigrum* burrow with twig lining (Biologic 2015a).

Leipoa ocellata

Leipoa ocellata (Malleefowl) is a large and distinctive ground-dwelling bird which builds large nest-mounds on the ground made of leaf litter and soil materials (DoE 2014a). The upper body of *Leipoa ocellata* is boldly barred with grey, white, black and rufous, with a cream-white breast and belly (DPaW 2012).

Leipoa ocellata has been recorded across all mainland states of Australia except Queensland, with an estimated 100,000 breeding individuals (Garnett & Crowley 2000 cited in DoE 2014a). *Leipoa ocellata* has been assessed as meeting the "Vulnerable" category using the IUCN (2001) criteria due to a population size reduction (DEHSA 2007). Within Western Australia, DPaW (2014c) identifies *Leipoa ocellata* as having a linear distribution of approximately 1,400km, extending from Albany in the south to Shark Bay in the north, and eastwards to the border of South Australia. The regional distribution and images of a *Leipoa ocellata* individual and a nest mound are presented in Figure 9.

A total of 332 *Leipoa ocellata* nest mounds have been recorded across the Mt Gibson Ranges and its surrounds, comprising 24 recently active[1] nest mounds and 308 inactive[2] nest mounds (ATA 2005b; Biologic 2015b; MGM 2011, 2012).

One recently active *Leipoa ocellata* nest mound and five inactive *Leipoa ocellata* nest mounds occur within the Project area. An assessment of the environmental effect of the Project to *Leipoa ocellata* is provided below (under *Nature and extent of likely impact*).

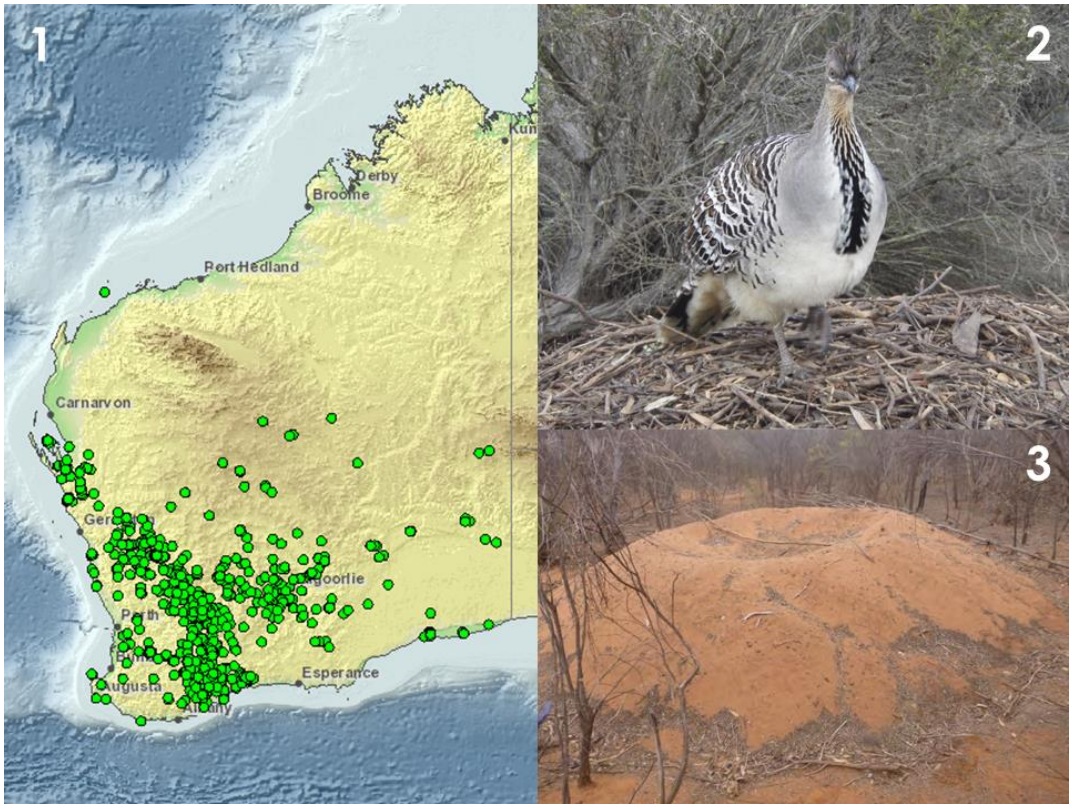


Figure 9 ***Leipoa ocellata*** **Regional Distribution and Images.** Image 1: The regional distribution of *Leipoa ocellata* is identified by green circles (adapted from DPaW 2014c). Image 2: *Leipoa ocellata* individual (Globe Environments unpublished 2008). Image 3: *Leipoa ocellata* nest mound (Biologic 2015b)

[1] "active" is the term used to describe *Leipoa ocellata* nest mounds that exhibit characteristics associated with normal nesting activity (i.e. nest mounded up, litter trails leading to mound, extensive soil and litter disturbance, and/or birds seen actively digging) (Natural Heritage Trust c.2007).

[2] "inactive" is the term used to describe *Leipoa ocellata* nest mounds that do not exhibit characteristics associated with normal nesting activity.

Nature and extent of likely impact

An assessment of the environmental effect of the Project to listed Threatened Species is provided below:

Darwinia masonii

The Project coincides with records of 1,327 individuals (6%) of the *Darwinia masonii* population of 22,667 individuals, comprising 1,135 mature individuals, 173 juveniles, 18 seedlings and one senescent individual. The Project will increase the removal of *Darwinia masonii* by approximately 6%, from 3,763 individuals (17%) to 5,090 individuals (22%[1]) of the *Darwinia masonii* population of 22,667 individuals.

Removal of *Darwinia masonii* by the Project is unavoidable as this flora taxon coincides with mineral resource (within the area of the Mine Pit), which is in a fixed location.

Whilst the Project will increase the removal of *Darwinia masonii*, as outlined by Globe Environments (2015), the effect of the Project is not expected to be significant to an extent that it will not change the threat category of "Vulnerable" currently applying to *Darwinia masonii* under the IUCN (2012) criteria. Accordingly, relative to the assessment using the IUCN (2012) criteria, the Project is not expected to have a significant environmental effect to the *Darwinia masonii* taxon.

The potential for indirect effects of the proposed mine operations to *Darwinia masonii* has also been considered. Monitoring of *Darwinia masonii* at permanent plots established in proximity to the approved mine operations has been undertaken since 2007 (i.e. prior to mine development). As outlined by Ecologia (2014b) and Astron (2014), the monitoring results do not indicate a significant effect to health condition of *Darwinia masonii* in proximity to the approved mine operations. Similarly, it can be expected that the Project will also not result in a significant indirect effect to the *Darwinia masonii* retained in proximity to the Project. Monitoring of the health of the *Darwinia masonii* population across the Mt Gibson Ranges will continue to be undertaken during implementation of the Project to confirm this.

The long-term effect to *Darwinia masonii* from the approved mine operations and the Project can be reduced through the implementation of rehabilitation works that seek to re-establish this taxon. As outlined by BGPA (2010) and identified by Figure 6, *Darwinia masonii* have been successfully re-established within the Mt Gibson Ranges through rehabilitation trials using green-stock cuttings. Additional studies by Ruoss (2013) have confirmed both the presence of viable *Darwinia masonii* seed within the soil-stored seedbank, and of the ability to successfully translocate *Darwinia masonii* from green-stock cuttings into suitable substrates with approximately 30% survival. Further, the ability of *Darwinia masonii* to re-establish from soil-stored seed within disturbed areas has also been demonstrated within exploration access tracks and drilling pads (as identified by Figure 7), and within topsoil storage areas. Whilst the likelihood of re-establishing many Threatened Species may generally be considered low, by contrast, the evidence available to date suggests the likelihood of re-establishing the *Darwinia masonii* taxon to be good. MGM proposes to undertake further trials at the Mt Gibson Ranges, with seeding considered the most appropriate approach for large-scale rehabilitation works. Rehabilitation works for the area of the Project, including a specific emphasis on the rehabilitation of *Darwinia masonii*, can be readily incorporated within a future revision of the Mine Closure Plan applying to the approved mine operations (MGM 2015).

Based on the assessment information above, MGM considers that the Project is unlikely to result in a significant detrimental environmental effect to the representation, diversity, viability or ecological function of the *Darwinia masonii* taxon.

Whilst the Project is not expected to increase the threatened taxa category ranking for *Darwinia masonii* under the IUCN (2012) criteria (as assessed within Globe Environments 2014), the removal of a proportion of the individuals of the *Darwinia masonii* taxon may lead to a consideration of the applicability of environmental offsets as prescribed within relevant Government guidance documents (DoE 2012; Government of Western Australia 2011, 2014; EPA 2014; DPaW 2014d). Consideration of environmental offsets is outlined by Section 4 *Measures to avoid or reduce impacts* (below).

[1] Percentages adjusted for rounding

Idiosoma nigrum

The Project coincides with records of 22 *Idiosoma nigrum* burrows.

Whilst the Project will remove individuals of *Idiosoma nigrum* and their habitat, this is likely to represent only a small proportion of the individuals and habitat available to *Idiosoma nigrum* across the Mt Gibson Ranges and the broader region.

As outlined by Biologic (2015a), the density of *Idiosoma nigrum* burrows recorded at the Mt Gibson Ranges is low compared to populations studied at areas such as the Blue Hills (approximately 60km north-north-west), Weld Range (300km north) and Jack Hills (390km north); indicating the Mt Gibson Ranges is not a key habitat for this taxon. The density of *Idiosoma nigrum* burrows at the Mt Gibson Ranges also appears low compared to other nearby areas, such as at the Mummaloo Deposit (10km south-east) (Bennelongia 2012) and the Shine Deposit (85km north) (BCE 2012).

To provide context, more than 50,000 individuals of *Idiosoma nigrum* have been approved by the Western Australian Government for removal through various mineral resource developments in Western Australia (pers. com. B Durrant of Biologic, February 2015). Further, a recent decision under the E*nvironment Protection and Biodiversity Conservation Act 1999* (C'th) determined a proposed action to remove several thousand *Idiosoma nigrum* individuals was not a controlled action requiring assessment (Refer EPBC Reference 2013/7090 as outlined within DoE 2014 and KML 2013). In this context, the effect of the Project to 22 individuals of *Idiosoma nigrum* is not environmentally significant on the basis of its abundance.

In consideration of the environmental effect of the Project to *Idiosoma nigrum* (22 individuals), the confined spatial extent of the Project, the distribution of this taxon across the Mt Gibson Ranges and the broader region, and that the Mt Gibson Ranges is not a key habitat for this taxon, the effect of the Project to the *Idiosoma nigrum* taxon is not considered to be environmentally significant. Accordingly, MGM considers that the Project is unlikely to result in a significant detrimental environmental effect to the representation, diversity, viability or ecological function of the *Idiosoma nigrum* taxon.

Leipoa ocellata

The Project coincides with one recently active *Leipoa ocellata* nest mound and five inactive *Leipoa ocellata* nest mounds.

Whilst the Project coincides with one recently active *Leipoa ocellata* nest mound, no impact to any live individuals of *Leipoa ocellata* is expected. During mine development, the resident *Leipoa ocellata* can be expected to move into the adjacent areas of native vegetation containing numerous inactive nest mounds.

The records of six nest mounds within the Project area indicates habitat potentially suitable for *Leipoa ocellata* foraging and nesting. As identified by the distribution of *Leipoa ocellata* nest mounds in Figure 4, such habitat occurs broadly across the Mt Gibson Ranges and its surrounds. The Project area represents only a small proportion of the available habitat for *Leipoa ocellata* across the Mt Gibson Ranges and the broader region. To provide further context, EnviroWorks (2013) estimated that within a 15km buffer area (including the Mt Gibson Ranges) there is greater than 13,000ha of habitat potentially suitable for *Leipoa ocellata*.

The effect of the Project to the *Leipoa ocellata* taxon would not be environmentally significant because of the broad extent of *Leipoa ocellata* habitat across the Mt Gibson Ranges and surrounds, the confined spatial area of the Project, and the expectation of no effect to any live individuals of *Leipoa ocellata*. Accordingly, MGM considers that the Project is unlikely to result in a significant detrimental environmental effect to the representation, diversity, viability or ecological function of the *Leipoa ocellata* taxon.

3.1 (e) Listed migratory species

Description

The EPBC Act Protected Matters Report (DoE 2015; Attachment 1) identifies the following listed "Migratory Species" may potentially occur in the vicinity of the Project (in alphabetical order):

(a) *Apus pacificus* (Fork-tailed Swift, a bird);

(b) *Ardea alba* (Great Egret, a bird);

(c) *Ardea ibis* (Cattle Egret, a bird);

(d) *Merops ornatus* (Rainbow Bee-eater, a bird); and

(e) *Rostratula benghalensis* (Australian Painted Snipe, a bird).

Fauna surveys of the Mt Gibson Ranges have been undertaken over a period of more than a decade (Hart Simpson & Assoc. 2000; ATA 2005a, 2005b; UWA 2005; WAM 2005, 2006; Rockwater 2008, 2012; MGM 2011, 2012; Terrestrial Ecosystems 2012, 2014; Bennelongia 2014; Biologic 2015a, 2015b; Ecologia 2014a). The fauna surveys are considered to be both extensive and comprehensive; such that they provide a sound basis on which to consider the potential environmental effects of the Project. Copies of the fauna surveys reports are provided on the compact disc at Attachment 2.

Based on the completed fauna surveys, the following listed Migratory Species have been recorded in the vicinity of the Mt Gibson Ranges:

(a) *Merops ornatus* (Rainbow Bee-eater, a bird).

The recorded locations of the above listed Migratory Species are identified by Figure 4.

The Project does not coincide with records of any listed Migratory Species.

Nature and extent of likely impact

The Project does not coincide with any records of listed Migratory Species.

Accordingly, the Project is not expected to result in a significant detrimental environmental effect to any listed Migratory Species.

3.1 (f) Commonwealth marine area

(If the action is in the Commonwealth marine area, complete 3.2(c) instead. This section is for actions taken outside the Commonwealth marine area that may have impacts on that area.)

Description

No Commonwealth Marine Areas occur in the vicinity of the Project.

Nature and extent of likely impact

Not Applicable – No Commonwealth Marine Areas occur in the vicinity of the Project.

3.1 (g) Commonwealth land
(If the action is on Commonwealth land, complete 3.2(d) instead. This section is for actions taken outside Commonwealth land that may have impacts on that land.)

Description

No Commonwealth Lands occur in the vicinity of the Project.

Nature and extent of likely impact

Not Applicable – No Commonwealth Lands occur in the vicinity of the Project.

3.1 (h) The Great Barrier Reef Marine Park

Description

The Great Barrier Reef Marine Park does not occur in the vicinity of the Project.

Nature and extent of likely impact

Not Applicable – The Great Barrier Reef Marine Park does not occur in the vicinity of the Project.

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

The Project does not involve coal seam gas development or large coal mining development.

Nature and extent of likely impact

Not Applicable – The Project does not involve coal seam gas development or large coal mining development.

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	**Is the proposed action a nuclear action?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (b)	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (c)	**Is the proposed action to be taken in a Commonwealth marine area?**	✓	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))		
3.2 (d)	**Is the proposed action to be taken on Commonwealth land?**	✓	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))		

3.2 (e)	**Is the proposed action to be taken in the Great Barrier Reef Marine Park?**	✓	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))		

3.3 Other important features of the environment

3.3 (a) Flora and fauna

Flora and fauna surveys of the Mt Gibson Ranges have been undertaken over a period of nearly two decades (Flora: Muir 1995; Bennett 2000; Paul Armstrong & Assoc. 2004; ATA 2004, 2006a, 2006b, 2006c; Coffey 2008a, 2008b, 2008c; DPaW 2008a; Borger & Nicholls 2013; MBS 2013, 2014, 2015; EcoLogical 2014; Maia 2014) (Fauna: Hart Simpson & Assoc. 2000; ATA 2005a, 2005b; UWA 2005; WAM 2005, 2006; Rockwater 2008, 2012; MGM 2011, 2012; Terrestrial Ecosystems 2012, 2014; Bennelongia 2014; Biologic 2015a, 2015b; Ecologia 2014a; Engenium 2015). The flora and fauna surveys are considered to be both extensive and comprehensive; such that they provide a sound basis on which to consider the potential environmental effects of the Project. Copies of the environmental survey reports are provided on the compact disc at Attachment 2.

As outlined in Section 3.1 (above), the flora and fauna survey records identify the Project coincides with the following listed Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th):

(a) *Darwinia masonii* (Mason's Darwinia, a plant);

(b) *Idiosoma nigrum* (Shield-backed Trapdoor Spider, a spider); and

(c) *Leipoa ocellata* (Malleefowl, a bird).

As outlined by Section 3.1, whilst the above taxa are of listed conservation significance, the environmental effect of the Project to these taxa is not expected to be significant. The Project is not expected to result in a significant detrimental environmental effect to the representation, diversity, viability or ecological function for any of these taxa.

To additionally note, as outlined by Sections 2.4 and 2.5, the environmental effect of the Project to *Darwinia masonii*, *Idiosoma nigrum* and *Leipoa ocellata* will be subject to separate environmental assessments by the responsible authorities of the State of Western Australia under the provisions of the *Wildlife Conservation Act 1950* (WA), *Environmental Protection Act 1986* (WA) and the *Mining Act 1978* (WA) (i.e. three separate State Government assessments dealing within these taxa).

3.3 (b) Hydrology, including water flows

Surface water drainage at the Mt Gibson Ranges is primarily characterised by ephemeral flows following rainfall, with drainage towards salt lakes. These salt lakes are typically dry, containing surface water only following significant rainfall events. The larger salt lakes of the region include Lake Moore and Mongers Lake, located approximately 25km east and 40km west of the Project, respectively. A small unnamed salt lake occurs approximately 650m south-east of the Project. The Project is not expected to have any environmental effect to any salt lakes.

Groundwater at the Mt Gibson Ranges is of low salinity at up to 10,000mg/L total dissolved salts (brackish) (Rockwater 2005), with the groundwater level recorded at an elevation of approximately 310mAHD. The current beneficial use of the groundwater resource is for mineral exploration and mining operations.

The approved mine operations include the abstraction of groundwater for use in dust suppression and other mining activities (e.g. water treatment for potable water supply), with the groundwater temporarily stored in a surface water dam. Groundwater abstraction for the approved mine operations is undertaken in accordance with Groundwater Licence GWL166067 (DoW 2013) granted by the Department of Water under the *Rights in Water and Irrigation Act 1914* (WA).

Similarly to the approved mine operations, the abstracted groundwater will be used in dust suppression and associated mining activities. Limited groundwater recovery may be required to enable dry-floor mining within the Mine Pits, with the volume of groundwater dewatering expected to be minimal and towards the end of mine life.

3.3 (c) Soil and Vegetation characteristics

Soil surveys in the vicinity of the Project have identified five soil units defined as ridgeline, scree slopes, lower slopes, undulating hills and flats (Outback Ecology 2014). The soils and subsoils of the Project area have been identified as valuable rehabilitation materials, with a sufficient volume of soil and subsoil materials available for progressive and post-mining rehabilitation works.

Flora surveys of the Mt Gibson Ranges have identified a total of 59 vegetation units across the Mt Gibson Ranges and surrounds, broadly categorised into woodlands, thickets, shrublands and heaths (Bennett 2000; ATA 2006a). The Project coincides with four vegetation units comprising woodlands and thickets; each having a distribution across the Mt Gibson Ranges beyond the Project area. The vegetation of the Mt Gibson Ranges does not include any Threatened Ecological Communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th).

3.3 (d) Outstanding natural features

The Mt Gibson Ranges extend approximately 13km in length (8km linear) with height elevations between approximately 350m Australian Height Datum (AHD) to 445mAHD. Surrounding the Mt Gibson Ranges are extensive plains varying in elevation between approximately 310mAHD to 340mAHD.

The Project coincides with part of the Mt Gibson Ranges and surrounds of elevation between approximately 320mAHD to 420mAHD. The Project area does not contain any outstanding or unique natural features.

The Mt Gibson Ranges is one of many ranges across the broader region; many of which are of greater elevation. For contextual purposes, in the vicinity of the Project (within 100km), these ranges include:

(a) Mt Singleton (660mAHD);
(b) Warriedar Hill (545mAHD);
(c) Wylacoopin Hill (540mAHD);
(d) Windaning Hill (510mAHD);
(e) Chulaar Hill (495mAHD);
(f) Pinyalling Hill (490mAHD);
(g) Watheragabbing Hill (475mAHD);
(h) Yadhanoo Hill (470mAHD);
(i) Mougooderra Hill (470mAHD)
(j) *Mount Gibson Ranges* (445mAHD);
(k) Koolanooka Hill (445mAHD);
(l) Walgnumming Hill (430mAHD);
(m) Beeringgnurding Hill (430mAHD); and
(n) Mt Harry (420mAHD).

3.3 (e) Remnant native vegetation

Flora surveys of the Mt Gibson Ranges have identified a total of 59 vegetation units across the Mt Gibson Ranges and surrounds, broadly categorised into woodlands, thickets, shrublands and heaths (Bennett 2000; ATA 2006a). The area of the Mt Gibson Ranges comprise more than 2,500ha of native vegetation covering the ridges, slopes and the adjacent plains.

The Project covers a spatial area of 126ha, of which approximately 116ha contains native vegetation. The remaining 10ha of the Project area has previously been cleared by a combination of both historical and recent mineral exploration. The 116ha of native vegetation will require removal to allow for development of the Project.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

As outlined by Section 3.3(d) (above), the Mt Gibson Ranges extend approximately 13km in length (8km linear) with elevations between approximately 350mAHD to 445mAHD. The extensive plains surrounding the Mt Gibson Ranges lie at elevations between approximately 310mAHD to 340mAHD.

The Project coincides with part of the Mt Gibson Ranges and surrounds of elevations between approximately 320mAHD to 420mAHD.

The Mt Gibson Ranges is one of many ranges across the broader region; many of which are of greater elevation as described in Section 3.3(d).

3.3 (g) Current state of the environment

As identified by the flora reports provided on the compact disc at Attachment 2, the Project area includes vegetation in an "excellent" condition, which provides habitat to native flora and fauna taxa. As identified by the aerial imagery provided at Figure 2, part of the Mt Gibson Ranges has been cleared for mining and mineral exploration purposes.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

The Project does not coincide with any Commonwealth Heritage Place or other places recognised as having heritage value.

3.3 (i) Indigenous heritage values

The Project does not coincide with any site of Aboriginal Heritage registered under the *Aboriginal Heritage Act 1978* (WA).

The Project coincides with a record held by the Department of Aboriginal Affairs (DAA) which covers the extent of the Mt Gibson Ranges. Discussions with DAA will be undertaken to determine any significance of this record, any effect of the Project to that record, and whether consent under s18 of the *Aboriginal Heritage Act 1972* (WA) is necessary (refer to section 2.4, above).

The Project occurs in proximity to a record held by DAA for an artefact/scatter, with the boundary of this record positioned approximately 2m from the boundary of the Project. Due to the separation of the Project and this record, no effect to this record is expected. Further consultation with DAA on this record may also be undertaken.

3.3 (j) Other important or unique values of the environment

There are no other important or unique values of the environment in the Project area.

Whilst the Project coincides with part of the Mt Gibson Ranges, the Mt Gibson Ranges is one of many ranges across the broader region (refer to Section 3.3d, above). Similarly, the unnamed salt lake located approximately 650m south-east of the Project is one of many salt lakes occurring across the broader region.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

The tenure of the land area covered by the Project is a combination of Tenements granted to Extension Hill Pty Ltd under the *Mining Act 1978* (WA) overlying a Crown Reserve (Common), Unallocated Crown Land and Pastoral Leases under the *Land Administration Act 1997* (WA). The Project can be implemented under these land tenures.

3.3 (l) Existing land/marine uses of area

The existing land use for the Project area and surrounds is mineral exploration and mine operations. There are no marine uses applicable to the Project area.

3.3 (m) Any proposed land/marine uses of area

The proposed land use for the Project area is for continued mineral exploration and mine operations (as outlined by this referral). There are no proposed marine uses applicable to the Project area.

4 Measures to avoid or reduce impacts

Project Planning and Design

During planning and design for the Project, MGM has sought to minimise the environmental effect through avoidance, minimisation and rehabilitation, as outlined below:

(a) Avoidance

Avoidance measures seek to prevent or change the potential environmental effects of an action before they occur. As an example, avoidance measures may include adjusting the location, scope and/or timing of an action.

As many of the recorded environmental values occur broadly across the Mt Gibson Ranges, there has been limited availability to actively avoid certain environmental values, with minimisation then being the key measure (refer to *Minimise*, below). Whilst noting this, the Project design results in avoidance of a variety of recorded environmental values of the Mt Gibson Ranges, including:

(i) Threatened Species *Eucalyptus synandra* and *Egernia stokesii badia* (refer to Section 3.1(d), above);

(ii) Migratory Species *Merops ornatus* (refer to Section 3.1(e), above);

(iii) A range of other native flora taxa, vegetation units and fauna taxa (which are not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th)).

(b) Minimise

Minimisation measures seek to reduce the duration, intensity, extent and/or likelihood of environmental effect of an action where such values cannot be completely avoided. As an example, minimisation measures may include adjusting the location, scope or timing of an action so as to result in a reduction in the environmental effect.

During mine planning, MGM has considered various mine planning layouts that seek to minimise the environmental effect of the Project. Firstly, MGM has modified the Project area to restrict the spatial extent necessary for Project implementation, including optimisation of the Mine Pits to minimise the environmental effect to the listed Threatened Species *Darwinia masonii*. Secondly, MGM has modified the Project by seeking to utilise existing infrastructure and facilities at the approved mine operations as far as practicable to minimise the spatial area required for the Project.

(c) Rehabilitate

Rehabilitation measures seek to restore environmental values following an action. As an example, rehabilitation measures may include restoration of flora and vegetation on disturbed land.

At mine closure, following the removal of all above-ground mine infrastructure, the areas of the Waste Rock Landform and the Support Infrastructure (refer to Figure 3) will be rehabilitated with native vegetation of local provenance. The rehabilitation works will include on-contour ripping of compacted areas and the respreading of stockpiled rehabilitation materials (vegetation, topsoil and subsoil). The rehabilitation works will be undertaken to meet rehabilitation completion criteria consistent with that applying to the approved mine operations under the Mine Closure Plan (MGM 2015).

Environmental Management

The approved mine operations at the Mt Gibson Ranges are undertaken in accordance with MGM's Environmental Policy (MGX 2012). The Environmental Policy outlines MGM's overarching objectives for environmental protection and continual improvement in environmental performance.

The Environmental Policy is implemented through an Environmental Management Plan (EMP) (MGM & EHPL 2008), which outlines the detailed management of key environmental aspects. The EMP has been subject to previous review and approval by the Western Australian Environmental Protection Authority under the *Environmental Protection Act 1986* (WA).

The EMP includes a risk assessment of the potential environmental effects of the mine operations. Following from the risk assessment, environmental management actions and controls are identified to ensure the potential environmental effects are minimised and controlled to an acceptable level.

The EMP forms an integral management component of MGM's mine operations. Implementation of the EMP is audited both internally and by external consultants for compliance and to identify any changes necessary to achieve improved environmental outcomes. The auditing of the EMP is consistent with MGM's Environmental Policy (MGX 2012) to develop, implement and monitor environmental management plans to achieve environmental targets.

Implementation of the Environmental Policy and the Environmental Management Plan is supported by an environmental team consisting of both corporate and site-based environmental managers and advisors.

To ensure consistency in environmental protection of the mining operations, MGM proposes that the approved EMP is also implemented for the Project. The EMP is considered to be appropriate for application to the Project due to the environmental and operational similarities to the approved mine operations. The EMP can be readily amended to include the Project area within its scope, if required.

MGM makes the following environmental commitment for the management of the environmental effects of the Project:

(1) Commitment 1: Environmental Management Plan

MGM will implement the Project in accordance with the Environmental Management Plan (MGM & EHPL 2008).

For the listed Threatened Species *Darwinia masonii*, the approved mine operations are also subject to a *Darwinia masonii* Management and Monitoring Plan (MGM & EHPL 2013). The *Darwinia masonii* Management and Monitoring Plan has been prepared and implemented consistent with the requirements of the EPBC Decision 2005/2381 approval (DoE 2007) and has been approved by DoE (2008b).

The *Darwinia masonii* Management and Monitoring Plan includes the monitoring of the *Darwinia masonii* population to determine any significant indirect effects of the mine operations to this taxon, and proposed management measures in the event that indirect effects are identified. As outlined by Astron (2014) and Ecologia (2014b), the monitoring results to date identify that the approved mine operations have not had a significant detrimental environmental effect to the health condition of *Darwinia masonii*.

For consistency in environmental monitoring of the *Darwinia masonii* population, MGM proposes that the approved *Darwinia masonii* Management and Monitoring Plan is also implemented for the Project. The *Darwinia masonii* Management and Monitoring Plan is appropriate for application to the Project due to the environmental and operational similarities to the approved mine operations.

MGM makes the following environmental commitment for the continued monitoring of the *Darwinia masonii* population:

(2) Commitment 2: *Darwinia masonii* Management and Monitoring Plan

MGM will implement the Project in accordance with the *Darwinia masonii* Management and Monitoring Plan (MGM & EHPL 2013).

Environmental Offsets

Environmental offsets are measures that seek to counterbalance any significant residual environmental effects which may arise from an action, after appropriate avoidance, minimisation and rehabilitation measures have been taken (as addressed under *Project Planning and Design*, above). In principle, an environmental offset should be related to the significant residual environmental effect, and should seek to achieve a measurable conservation outcome. As an example, where a significant residual environmental effect relates to a flora or fauna taxon, an environmental offset should seek to achieve a measurable conservation outcome for that taxon.

As outlined above by Sections 3.1(d), whilst the effect to the *Darwinia masonii* taxon is not expected to change the threat category under the IUCN (2012) criteria, the proposed removal of a proportion of the *Darwinia masonii* population by the Project may require the consideration of environmental offsets.

The approved mine operations at the Mt Gibson Ranges are subject to an existing environmental offsets framework for *Darwinia masonii* agreed through the Statement 753 approval under the *Environmental Protection Act 1986* (WA) (WA Minister for Environment 2007). Condition 6 of the Statement 753 approval requires the preparation and implementation of research and recovery plans for *Darwinia masonii*. Condition 16 of the Statement 753 approval requires contributions towards offsets for research and management of the *Darwinia masonii* taxon.

For consistency, it is considered appropriate for MGM to offset the effect of the Project within the existing environmental offsets framework established for *Darwinia masonii* under the *Environmental Protection Act 1986* (WA). In this context, the existing environmental offsets framework could continue as a result of the Project extending the operational-life of the hematite ore mining operations by approximately two years.

The proposed environmental offsets are considered to align with the relevant environmental offset policies of the Western Australian Government and its agencies (Government of Western Australia 2011, 2014; EPA 2014; DPaW 2014d). It is considered that the proposed environmental offsets can be appropriately regulated in accordance with the provisions of the *Environmental Protection Act 1986* (WA).

MGM makes the following environmental commitment for offsetting the environmental effect of the Project to *Darwinia masonii*:

(3) Commitment 3: *Darwinia masonii* Environmental Offsets

MGM will implement environmental offsets for *Darwinia masonii* in accordance with the environmental offsets framework to be agreed for the Project under the *Environmental Protection Act 1986* (WA).

5 Conclusion on the likelihood of significant impacts

5.1 Do you THINK your proposed action is a controlled action?

X	No, complete section 5.2
	Yes, complete section 5.3

5.2 Proposed action IS NOT a controlled action.

As outlined by Section 3.1 (above), the Project coincides with records of the following listed Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th):

(a) *Darwinia masonii* (Mason's Darwinia, a plant);

(b) *Idiosoma nigrum* (Shield-backed Trapdoor Spider, a spider); and

(c) *Leipoa ocellata* (Malleefowl, a bird).

Whilst the Project can be expected to affect a number of individuals and/or part of the available habitat for the above taxa, the Project is unlikely to result in a significant detrimental environmental effect to the representation, diversity, viability or ecological function for any of these taxa.

This referral is made under s68(2) of the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) as MGM considers the Project is not a controlled action as it will not result in a significant impact to matters of National Environmental Significance.

5.3 Proposed action IS a controlled action

	Matters likely to be impacted
	World Heritage values (sections 12 and 15A)
	National Heritage places (sections 15B and 15C)
	Wetlands of international importance (sections 16 and 17B)
	Listed threatened species and communities (sections 18 and 18A)
	Listed migratory species (sections 20 and 20A)
	Protection of the environment from nuclear actions (sections 21 and 22A)
	Commonwealth marine environment (sections 23 and 24A)
	Great Barrier Reef Marine Park (sections 24B and 24C)
	A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

6 Environmental record of the responsible party

		Yes	No
6.1	**Does the party taking the action have a satisfactory record of responsible environmental management?** **Provide details** MGM is in substantial compliance with the conditions of environmental approvals and the provisions of all environmental legislation administered by both the Commonwealth and the State of Western Australia, as outlined by the 2014 Annual Environmental Report for the approved mine operations at the Mt Gibson Ranges (MGM & EHPL 2014b).	✓	
6.2	**Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?** **If yes, provide details**		✓
6.3	**If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?** **If yes, provide details of environmental policy and planning framework** The approved mine operations at the Mt Gibson Ranges are undertaken in accordance with MGM's Environmental Policy (MGX 2012). The Environmental Policy outlines MGM's overarching objectives for environmental protection and continual improvement in environmental performance. The Environmental Policy is implemented through an Environmental Management Plan (EMP) (MGM & EHPL 2008), which outlines the detailed management of key environmental aspects. The EMP has been subject to previous review and approval by the Environmental Protection Authority under the *Environmental Protection Act 1986* (WA) to ensure appropriate industry standards for environmental protection are achieved. The EMP includes a risk assessment of the potential environmental effects of the mine operations. Following from the risk assessment, environmental management actions and controls are identified to minimise and control risks to an acceptable level. The EMP forms an integral management component of MGM's mine operations. Implementation of the EMP is audited both internally and by external consultants for compliance and to identify any changes necessary to achieve improved environmental outcomes. The auditing of the EMP is consistent with MGM's Environmental Policy (MGX 2012) to develop, implement and monitor environmental management plans to achieve environmental targets. To ensure consistency with the environmental management of the approved mine operations, MGM proposes that the approved EMP is also implemented for the Project. The EMP is considered to be appropriate for application to the Project due to the environmental and operational similarities to the approved mine operations. The EMP can readily be amended to include the Project area within its scope (if required). Implementation of the Environmental Policy and the Environmental Management Plan is supported by an environmental team consisting of both corporate and site-based environmental managers and advisors.	✓	

6.4	**Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?** **Provide name of proposal and EPBC reference number (if known)** (a) EPBC 2005/2381: Mt Gibson Iron Ore Project Proponent: Mount Gibson Mining Limited and Extension Hill Pty Ltd Status: Approved in 2007, implementation commenced in 2010 (b) EPBC 2006/2522: Koolan Island Iron Ore Mine and Port Facility Proponent: Koolan Iron Ore Pty Ltd (a subsidiary of Mount Gibson Mining Limited) Status: Approved in 2007, implementation commenced in 2007 (c) EPBC 2013/6752: Acacia East Pit Cutback Proponent: Mount Gibson Iron Limited Status: Approval Not Required, implementation commenced in 2013.	✓	

7 Information sources and attachments

(For the information provided above)

7.1 References

References cited within this document are identified below. Where an organisational name has changed since the original date of publication, the new organisational name has been used and the former organisational name noted.

Subject to the provisions of the *Copyright Act 1968* (C'th), a copy of each reference to which MGM has authority to reproduce is provided on the compact disc at Attachment 2.

Western Australian legislation cited in this document can be obtained from the State Law Publisher at http://www.slp.wa.gov.au. Commonwealth legislation cited in this document can be obtained from the Australasian Legal Information Institute at http://www.austlii.edu.au/au/legis/cth/consol_act/.

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7.2 Reliability and date of information

The information contained in this referral document is considered reliable for the purposes of assessment of the potential environmental effects of the Project to matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th).

The information has been obtained from flora and fauna surveys undertaken in the vicinity of the Project and surrounds by appropriately qualified and recognised professionals in their fields over a period of more than 10 years; the combination of which provide a sound basis on which to consider the potential environmental effects of the Project. Contextual information sourced from other published scientific reports and expert opinion has also been used where appropriate. There are no known uncertainties with the information provided.

7.3 Attachments

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	Figures identifying the Project location are provided at Figures 1 to 3. GIS files for the Project area are provided on the compact disc at Attachment 2.
	GIS file delineating the boundary of the referral area (section 1)		
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	The location of the Project and the recorded locations of listed Threatened Species and Migratory Species is provided at Figure 4.
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)	×	Refer to Table 2 in Section 2.4 – State Government approvals have yet to be obtained.
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)	×	Refer to Table 2 in Section 2.4 – State Government approvals have yet to be obtained. Refer to Section 2.6 – Consultation has been undertaken with a range of community stakeholders and Government agencies, and is ongoing.
	copies of any flora and fauna investigations and surveys (section 3)	✓	Flora and fauna survey reports are provided on the compact disc at Attachment 2.

technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)	✓	Flora and fauna survey reports are provided on the compact disc at Attachment 2.
report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)	✗	Refer to Section 2.6 – Consultation has been undertaken with a range of community stakeholders and Government agencies, and is ongoing.

8 Contacts, signatures and declarations

Project title:

8.1 Person proposing to take action

1. Name and Title:	Mount Gibson Mining Limited
2. Organisation:	Mount Gibson Mining Limited
3. EPBC Referral Number:	-
4: ACN / ABN:	074 575 885
5. Postal address:	Troy Collie Project Director – Environmental Approvals Mount Gibson Mining Limited PO Box 55 WEST PERTH WA 6872
6. Telephone:	(08) 9426 7500 / 0437 816 209
7. Email:	Troy.Collie@MtGibsonIron.com.au
8. Name of designated proponent (if not the same person at item 1 above and if applicable):	As above
9. ACN/ABN of designated proponent (if not the same person named at item 1 above):	As above
I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:	□ an individual; OR □ a small business entity (within the meaning given by section 328-110 (other than subsection 328-119(4)) of the *Income Tax Assessment Act 1997*); OR ☑ not applicable.
If you are small business entity you must provide the Date/Income Year that you became a small business entity:	
I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations. Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made:	☑ not applicable.

Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence. I agree to be the proponent for this action. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature  Date

Andrew Thomson
Chief Operating Officer
Mount Gibson Mining Limited 26th June 2015

8.2 Person preparing the referral information (if different from 8.1)

Name	Stuart Hawkins
Title	Director / Consulting Scientist
Organisation	Globe Environments Australia Pty Ltd
ACN / ABN (if applicable)	133 300 222
Postal address	Stuart Hawkins Director / Consulting Scientist Globe Environments Australia Pty Ltd C/o- Project Director – Environmental Approvals Mount Gibson Mining Limited PO Box 55 WEST PERTH WA 6872
Telephone	0400 455 554
Email	Stuart.Hawkins@GlobeEnvironments.com.au
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.



Signature Stuart Hawkins
Director / Consulting Scientist
Globe Environments Australia Pty Ltd

for and on behalf of

Mount Gibson Mining Limited Date 26th June 2015

REFERRAL CHECKLIST

HAVE YOU:

- ☑ Completed all required sections of the referral form?
- ☑ Included accurate coordinates (to allow the location of the proposed action to be mapped)?
- ☑ Provided a map showing the location and approximate boundaries of the project area?
- ☑ Provided a map/plan showing the location of the action in relation to any matters of NES?
- ☑ Provided a digital file (preferably ArcGIS shapefile, refer to guidelines at Attachment A) delineating the boundaries of the referral area?
- ☑ Provided complete contact details and signed the form?
- ☑ Provided copies of any documents referenced in the referral form?
- ☑ Ensured that all attachments are less than three megabytes (3mb)?
- ☑ Sent the referral to the Department (electronic and hard copy preferred)?

Attachment A

Geographic Information System (GIS) data supply guidelines

If the area is less than 5 hectares, provide the location as a point layer. If the area greater than 5 hectares, please provide as a polygon layer. If the proposed action is linear (eg. a road or pipline) please provide a polyline layer.

GIS data needs to be provided to the Department in the following manner:

- Point, Line or Polygon data types: ESRI file geodatabase feature class (preferred) or as an ESRI shapefile (.shp) zipped and attached with appropriate title
- Raster data types: Raw satellite imagery should be supplied in the vendor specific format.
- Projection as GDA94 coordinate system.

Processed products should be provided as follows:

- For data, uncompressed or lossless compressed formats is required - GeoTIFF or Imagine IMG is the first preference, then JPEG2000 lossless and other simple binary+header formats (ERS, ENVI or BIL).
- For natural/false/pseudo colour RGB imagery:
    - If the imagery is already mosaiced and is ready for display then lossy compression is suitable (JPEG2000 lossy/ECW/MrSID). Prefer 10% compression, up to 20% is acceptable.
    - If the imagery requires any sort of processing prior to display (i.e. mosaicing/colour balancing/etc) then an uncompressed or lossless compressed format is required.

Metadata or 'information about data' will be produced for all spatial data and will be compliant with ANZLIC Metadata Profile. (http://www.anzlic.org.au/policies_guidelines#guidelines).

The Department's preferred method is using ANZMet Lite, however the Department's Service Provider may use any compliant system to generate metadata.

All data will be provide under a Creative Commons license (http://creativecommons.org/licenses/by/3.0/au/)

Attachment 1

EPBC Act Protected Matters Report (DoE 2015)

Australian Government
Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

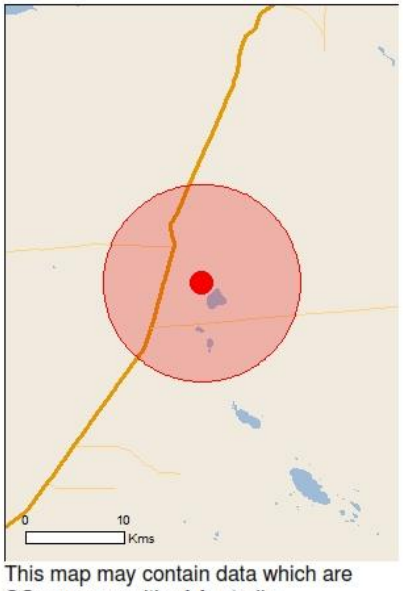
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 11/02/15 13:09:36

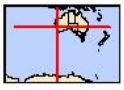
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	14
Listed Migratory Species:	5

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	6
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	None
State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	7
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Other		
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area
Plants		
Acacia imitans Gibson Wattle [65211]	Endangered	Species or species habitat likely to occur within area
Darwinia masonii Mason's Darwinia [18538]	Vulnerable	Species or species habitat likely to occur within area
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat likely to occur within area
Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat may occur within area
Eucalyptus synandra Jingymia Mallee [3753]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Gyrostemon reticulatus Net-veined Gyrostemon [8491]	Critically Endangered	Species or species habitat may occur within area
Hybanthus cymulosus Ninghan Violet [2803]	Critically Endangered	Species or species habitat known to occur within area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Egernia stokesii aethiops [26192]	Vulnerable	Species or species habitat known to occur within area
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Ninghan	WA
White Wells Reserve	WA

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area

Coordinates

-29.60591 117.1786

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

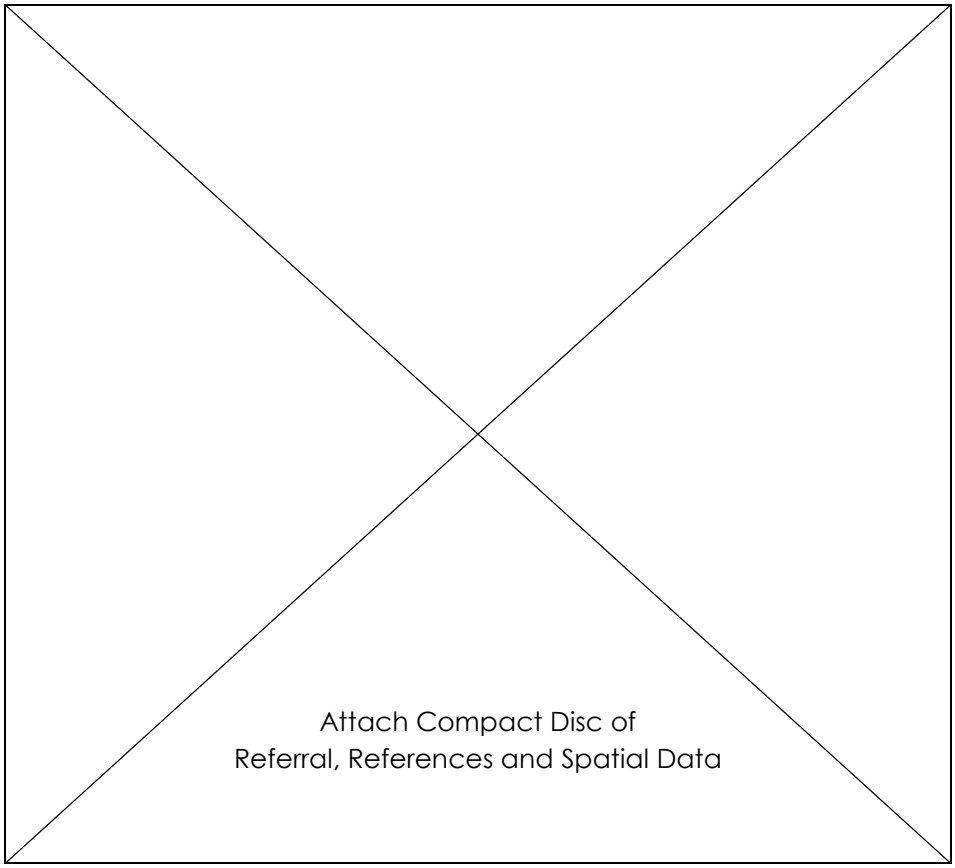
The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Attachment 2

Compact Disc (Reports and Data)



Appendix 2 – Iron Hill & Iron Hill South, *Darwinia masonii* Management and Monitoring Plan



Mount Gibson Ranges Iron Hill Deposit Mining Project

Iron Hill & Iron Hill South *Darwinia masonii* Management and Monitoring Plan

Mount Gibson Mining Limited

October 2015

Mount Gibson Iron

Darwinia masonii Management and Monitoring Plan

Mount Gibson Ranges Iron Hill Deposit Mining Project

Prepared by

Mount Gibson Mining Limited

Level 1, 2 Kings Park Road,
West Perth Western Australia, 6005

Cover photo – Darwinia masonii in a translocation setting on waste dump revegetation trial Philip Readhead. Esq, Mount Gibson Iron Ltd

October 2015

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Quality Information

Document	Mount Gibson Ranges Iron Hill Deposit Mining Project: *Darwinia masonii* Management and Monitoring Plan
Date	10 October 2015
Prepared for	Mount Gibson Mining Limited

Revision History

Revision	Revision Date	Details	Authorised
A	10/10/15	Draft for review	T. Collie
B			
0			
1			

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Executive Summary

Mount Gibson Mining is also the proponent of the **IRON HILL DEPOSIT MINING PROJECT** (EPBC 2015/7414). This Plan (the IH Plan) is to present the requirements of the Iron Hill *Darwinia masonii* Management and Monitoring Plan; in parts, it recognises the requirements in the EH Plan to present a coordinated approach to the management and monitoring of the species.

Darwinia masonii is a listed threatened flora species which is known to be located at the Mount Gibson Ranges in the Mid-west of Western Australia. The objective of this Plan is to maintain the abundance, diversity and productivity of *Darwinia masonii* in the vicinity of the Iron Hill mine (which is comprised of the Iron Hill and Iron Hill South pits and waste rock landforms) in the central part of the Mt Gibson Ranges.

The desired outcome of this Plan is that development and operation of the mine and associated infrastructure will control the risk of impact on the *Darwinia masonii* population over the life of the Project. Management activities target the prevention of significant reductions in the number and health of *Darwinia masonii* over the life of the mine in these areas. Management commitments include:

- Personnel at the mine will be made aware of the locations and importance of *Darwinia masonii* in the Project area
- Clearing of known *Darwinia masonii* habitat will be strictly imited to areas within the approved development envelope;
- Any clearing of *Darwinia masonii* will be strictly controlled and conducted in accordance with the relevant licence and approval conditions (ie *EPBC Act, 1999*, WA *Environmental Protection Act, 1986* and WA *Wildlife Conservation Act 1950* including the Permit to Take Declared Rare Flora under section 23F of the Act).
- A proportion of the known *Darwinia masonii* population on the Mount Gibson tenements will be monitored annually. Should the monitoring program indicate a decline in the health or number of plants, then every effort will be made to determine the cause of this decline and if it is mine related, remedial actions will be determined and implemented to address the root cause(s).

1.0 Introduction

1.1 Background

Darwinia masonii is found on the Mt Gibson Ranges (ATA Environmental, 2004; Eco Logical 2015) and protected under both Commonwealth and State legislation. *Darwinia masonii* is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* and is a gazetted (WA) rare flora species under the Western Australian *Wildlife Conservation (Rare Flora) Notice 2012*.

Mount Gibson Mining Limited (MGM) and Extension Hill Pty Ltd (EHPL) are joint proponents of the **MOUNT GIBSON IRON ORE MINE AND INFRASTRUCTURE PROJECT** that is currently implemented and was approved under the West Australian *Environmental Protection Act, 1986* (WA Ministerial Statement 753, 24 October 2008). That project is located at Extension Hill and Extension Hill North within the Mt Gibson Ranges, 350 km north-east of Perth , 87 km east of Perenjori and 71 km south and west of Paynes Find, Western Australia. Under the bilateral agreement with the State and Commonwealth, the Project impact assessment process also included assessment of controlled actions under the *Environment Protection & Biodiversity Conservation Act, 1999* specifically in regards to listed threatened species and communities (sections 18 and 18A) and listed migratory species (sections 20 and 20A) (EPBC 2005/2381). Approval for the original mining project was granted on 18 December 2007, subject to a series of conditions relating to the listed flora species *Darwinia masonii* and other matters. The *Darwinia masonii* Management and Monitoring Plan (the 'EH Plan') was prepared and implemented to comply with Condition 1 of EPBC 2005/2381 in relation to species management and monitoring.

The *Mount Gibson Iron Ore Mine & Infrastructure Project* was also the subject of a Public Environmental Review (PER), a report and recommendations by the WA Environmental Protection Authority, and conditions set by the West Australian Minister for the Environment in 2008 under Statement 753.

A new proposal is made for the **IRON HILL DEPOSIT MINING PROJECT**. This Plan (the 'IH Plan') relates to the management of the project in relation to the target species. The new proposal was determined to be a "Controlled Action" under the *EPBC 1999 Act* in September 2015 after referral of EPBC 2015/7414.

Figure 1 shows the known distribution of the species. **Figure 2** shows the Project layouts for:

- *Mount Gibson Iron Ore Mine and Infrastructure Project – Extension Hill and Extension Hill North mine* EPBC 2005/2381 – existing project
- *Iron Hill Deposit Mining Project* (EPBC 2015/7414) – proposed project.

1.2 Structure and Content of this Plan

The remainder of this Management Plan is structured as follows:

Section 2 - Potential Development Impact
Section 3 - Approval Conditions
Section 4 - Key Objectives and Targets
Section 5 - Management Strategies

1.3 Purpose of this Plan

This Plan addresses the management of *Darwinia masonii* in the vicinity of the Iron Hill deposit mining project (the Project) and the area covered by Darwinia, all of which is known to be on mining tenements. It addresses *Darwinia masonii* management and monitoring during the following phases:

- The construction phase of the Project which is likely to commence in late 2016 and last a minimum of one to two months;
- The mining operational phase, commencing in 2016 and likely to last a minimum of two years; and
- The post-mining phase, following completion of mining and rehabilitation.

1.4 Relevant Legislation

1.4.1 Environment Protection and Biodiversity Conservation Act 1999

Darwinia masonii is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*.

1.4.2 Wildlife Conservation Act 1950

Darwinia masonii is listed as a Schedule 1 species under the *Wildlife Conservation (Rare Flora) Notice 2012*.

1.5 Existing Environment

1.5.1 Bioregional Context

The Mt Gibson Ranges occur on the boundary of the Austin Botanical District of the Eremaean and the Avon Botanical District of the Southwest Botanical Provinces (Beard, 1990). The ranges are located in the Avon Wheatbelt bioregion (McKenzie *et al.,* 2003), but it is near the junction of both the Yalgoo and Coolgardie Interim Biogeographical Regional Assessment (IBRA) bioregions. The region has been recognised for its biological diversity (Vital Options Consulting, 2004). Figure 1 shows the layout of the Project.

Adjoining pastoral leases are managed by others, primarily for conservation purposes:

- *Australian Wildlife Conservancy* (AWC) manages the Mt Gibson pastoral lease with an emphasis on habitat recovery for fauna reintroduction.
- The *Australian Bush Heritage Fund* (ABHF) manages Charles Darwin Reserve (formerly White Wells pastoral lease).
- The *Pindiddy Aboriginal Corporation* (PAC) owns the Ninghan pastoral lease. A portion of Ninghan Station is an Indigenous Protection Area (IPA) with the management objective for the IPA area being income based on conservation rather than pastoral activities.

The DPaW (formerly DEC) has also purchased a number of stations in the general vicinity including Kadji Kadji, Karara, Lochada and Warriedar Stations to meet its objective for a comprehensive, adequate and representative reserve system in the bioregion.

1.6 Site Description

The work of Bennett (2000) and ATA (2006c) had originally broadly mapped a total of 59 vegetation units across the Mt Gibson Ranges and surrounds, which were categorised into woodlands, thickets, shrublands and heaths. The Iron Hill deposit mining project coincides with four mapped vegetation units (T3, T9, M1 and W4), comprising of thickets (T), mallees (M) and woodlands (W); these units are described in Table 1. Additionally, a total of 8.4ha of the Iron Hill development envelope has also been recorded as disturbed, due to previous vegetation clearing for tracks and approved exploration activities. The maps generated and used by Bennett (2000) and ATA (2006c) are replicated and updated in the latest analysis completed by Engenium (2015).

At Iron Hill, *Darwinia masonii* only occurs in the vegetation unit mapped as T3.

Table 1 Vegetation Units mapped within the project envelope.

VEGETATION UNIT 'NAME'	DESCRIPTION	AREA WITHIN PROJECT ENVELOPE (Percent of Area*)
T3 (Ironstone hills)	Dense **Thicket** of *Acacia assimilis*, *Allocasuarina acutivalvis* subsp. *prinsepiana* and *Melaleuca nematophylla* over Low Shrubland of *Hemigenia* sp. Paynes Find and *Hibbertia crassifolia* in loam pockets in jaspilite rocks.	52.8ha, 47%
T9 (Sandplain shrublands)	Dense **Thicket** of *Acacia* species, *Hakea* species, *Eucalyptus brachycorys* and *E. oldfieldii* with emergent *Callitris glaucophylla*, over Open Low Shrubland of mixed species on sand.	15.9ha, 14%
M1 (Foothills / plains woodland)	Open Tree **Mallee** of *Eucalyptus brachycorys*, *E. hypochlamydea* subsp. *hypochlamydea*, *E. loxophleba* subsp. *supralaevis* and *Callitris glaucophylla* over Thicket of *Acacia* species over Low Shrubland and Herbs on loam.	34.1ha, 31%
W4 (Sandplains woodland)	Very Open **Woodland** of *Callitris glaucophylla* and *Eucalyptus loxophleba* subsp. *supralaevis* over an Open Thicket of *Acacia acuminata* over a Herbland in sandy loam.	0.2ha, 0.1%
Disturbed	Previous **cleared vegetation** for the purposes of tracks and approved exploration activities.	8.4ha, 8%

*percentages rounded to 2 sig.figs

The area within the 'EH Plan' has a diverse range of vegetation communities comprising of six woodlands, four mallee, twelve thicket and two heath communities (Bennett Environmental Consulting, 2000). The ridges and slopes of the Mount Gibson Ranges have different vegetation communities than the plains and flats, with *Acacia* species, *Melaleuca* species and *Allocasuarina acutivalvis* subsp. *prinsepiana* as the dominant taxa.

The adjacent woodland plains typically consist of *Eucalyptus loxophleba* subsp. *supralaevis* or mallees of *E. brachycorys* and *E. hypochlamydea* subsp. *hypochlamydea*, which are often associated with *Callitris glaucophylla* and *E. loxophleba* subsp. *supralaevis*. There is an extensive area of sand plain to the west of the Mt Gibson Ranges, which supports a diverse suite of flora (Bennett Environmental Consulting, 2000; Engenium 2015).

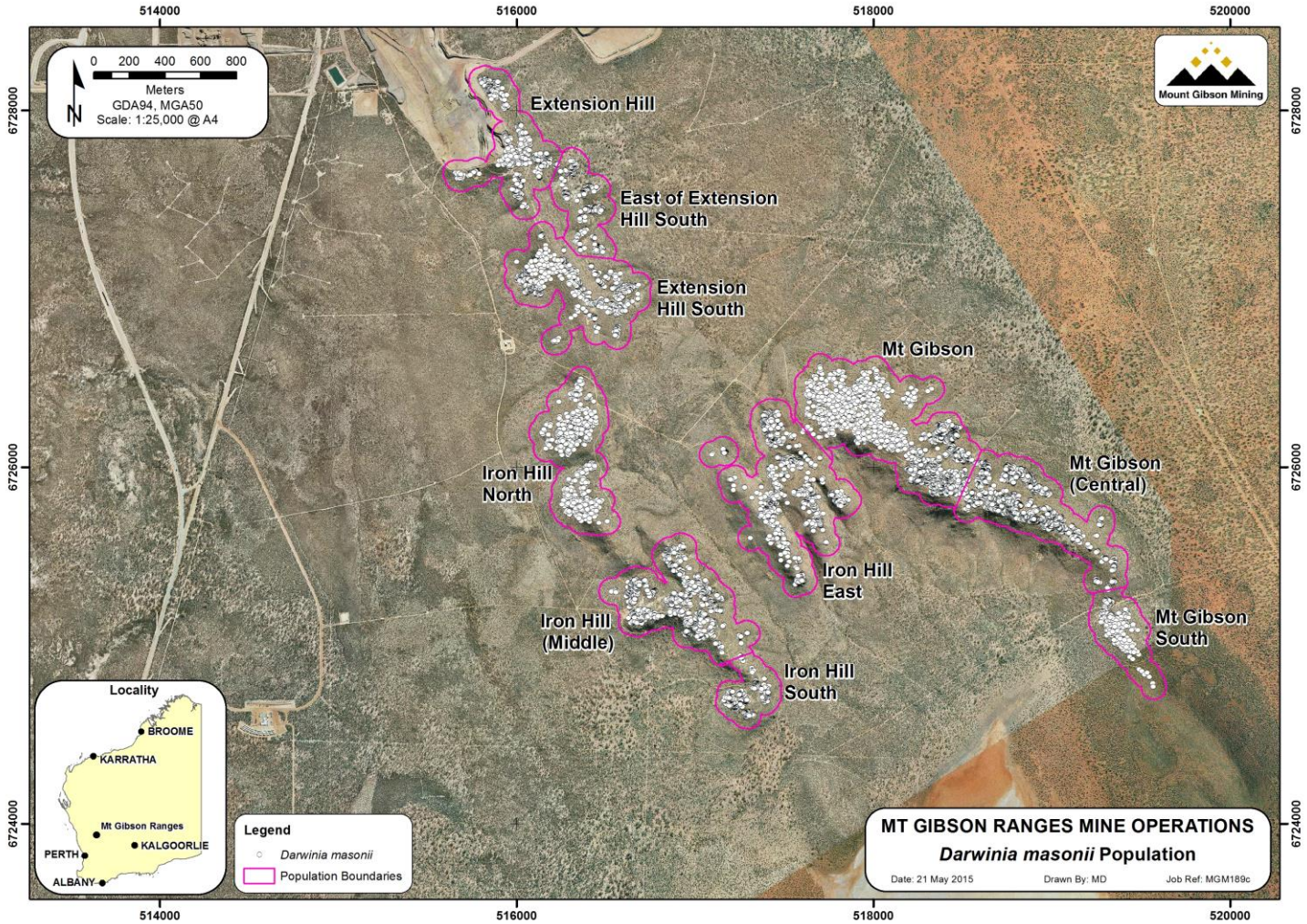


Figure 1. Current distribution of *Darwinia masonii* [based on data from Eco Logical 2015) – note Iron Hill is labelled "Iron Hill (Middle)"

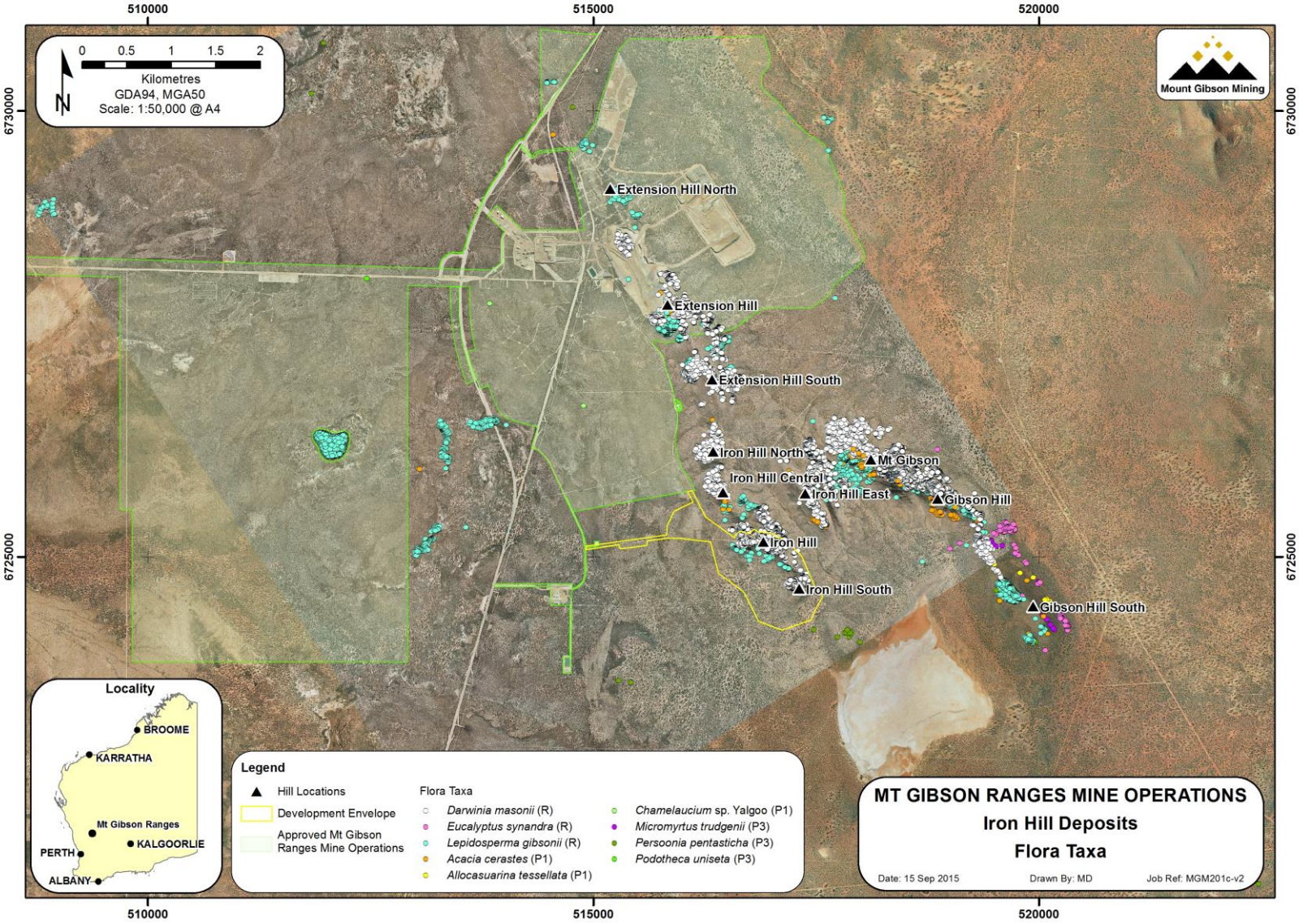


Figure 2. Distribution of *Darwinia masonii* (and other flora) and the layout of the approved mining infrastructure according to Statement 753 & EPBC 2005/2381 (green) for Extension Hill mine and proposed Iron Hill development envelope (yellow)

1.7 *Darwinia masonii* natural history and ecology

1.7.1 History

Charles Gardner described Mason's Darwinia in 1964 from specimens collected by D. Mason of White Wells Station in about 1960. The species was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* on 14th November 1980 and was ranked as Vulnerable under World Conservation Union (IUCN 2001) Red List criterion VU D2 as it is known from one location (9 populations, one genetic population) The species was listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in July 2000.

Muir Environmental (1995), Bennett Consulting (2000) and Paul Armstrong & Associates (2004) undertook previous surveys of the populations of Darwinia masonii within the Mt Gibson Ranges. Bennett Environmental Consulting (2000) reported on nine populations. Muir Environmental (2005) recorded ten populations, while Paul Armstrong and Associates (2004) recorded seven populations. ATA Environmental (2004) conducted the first extensive survey of the species occurrence on the Ranges.

An old record indicated that *Darwinia masonii* occurred on Mt Singleton, however this area has been extensively searched with no occurrences of this particular *Darwinia* recorded to date.

1.7.2 Description

Darwinia masonii is an erect shrub 1.5 to 3m tall, with narrow leaves approximately 1cm long, which are almost triangular in cross-section. These leaves are closely crowded towards the ends of the branchlets. The flowering inflorescences are approximately 3cm in diameter and are surrounded by numerous spreading pinkish bracts that are pendulus on the ends of small branchlets. The bracts are broad at the base but narrow to a pointed apex with a distinct midrib. Each bract is approximately 2cm in length and 5mm wide at the base. Each tubular flower is about 5mm long with a style approximately 1.5cm in length with hairs below the stigma (Brown *et al.,* 1998).

Darwinia masonii has a known flowering period from April to November (Brown *et al.,* 1998). As the rainfall in the region is unreliable, *Darwinia masonii* is likely to respond opportunistically to rainfall events (i.e. tropical cyclonic summer rainfall events and southern winter cold fronts). Strong vegetative growth (but not reproductive stages) has been observed following summer rainfall events.

1.7.3 Biology and Ecology

Darwinia masonii is one of 57 Western Australian species of *Darwinia.* The genus is highly unusual in having a high proportion of species that are considered rare and endangered because of intrinsic rarity – i.e. a species naturally limited due to limiting natural factors such as edaphic preference or breeding biology constraints. *Darwinia masonii* represents a case of an intrinsically rare species.

BGPA conducted investigations into pollination biology using cultivated plants to ensure accurate assessment of pollination success. Preliminary results suggest that there is little barrier to self pollination at least as far as fertilisation, and that self pollen grains typically germinate readily on the stigma and penetrate the full length of the style (BGPA, 2005b). Based on field observations and the fact that many bird species are attracted to colourful inflorescences with potential sources of nectar, *Darwinia masonii* is also considered likely to be pollinated by birds.

A comprehensive phylogeny of the related genera *Chamelaucium, Darwinia, Verticordia, Actinodium, Homoranthus* and *Pileanthus* has been completed to more accurately assess the taxonomic status and phylogenetic position of *Darwinia* (in particular *Darwinia masonii*). This complex of genera has been difficult taxonomically, and relationships between species, groups and genera are particularly poorly understood.

Key results of these investigations were:

- Generic status of *Chamelaucium,* and *Pileanthus* is confirmed (ie. they are monophyletic).
- Eastern and Western Australia *Darwinia* species belong in separate groups, the latter including *Actinodium*
- The genera *Chamelaucium*, *Pileanthus*, *Darwinia*, *Homoranthus* and *Actinodium* are nested within *Verticordia* as currently circumscribed.

- *Darwinia masonii* is very closely related to three other species, *Darwinia acerosa, Darwinia purpurea* and *Darwinia* sp. *Chiddarcooping*, rather than close to either *Darwinia leiostyla or Darwinia helichrysoides* as has been previously speculated. All four species have similar geographic distribution north and east of Perth, mostly in the drier Wheatbelt. An exact relationship between these four species is currently unresolved.

These findings provide insight into the origins of *Darwinia masonii* and allow selection of appropriate comparison species during further research, in particular comparing levels of genetic variation, root growth patterns and seed biology. As a side benefit, relationships between genera and some within-generic groups can now be accurately assessed (BGPA, 2005b).

Contrary to comments by Brown *et al.* (1998) that *Darwinia masonii* will re-sprout from rootstock following fire, there is no current evidence of this from the Mt Gibson Ranges (Armstrong and Associates, 2004). In fact the species appears to be fire sensitive. A wildfire burnt out a significant area in southern and eastern portions of the Ranges in January 2003. None of the *Darwinia masonii* plants burnt during this fire were observed to have survived during the spring of 2003 by Armstrong and Associates (2004). Regeneration is restricted exclusively to seed.

BGPA (2010) conducted a preliminary planting trial of *Darwinia masonii* in the Mt Gibson Ranges using a disused drill pad on Iron Hill East that had not been rehabilitated and was outside the proposed mining footprint. BGPA personnel propagated two hundred and twenty nine young plants from a cross-section of genotypes from cuttings and planted them at the trial site in June 2005. A fence was erected around the plants (except for 20 controls to examine the effect of excluding herbivores and regular watering). A tank was installed at the site to allow drip irrigation of the plants during dry periods. Until December 2005 only four plants died, despite the highly rocky and inhospitable nature of the transplant site and very dry mid-winter period following planting (BGPA, 2005b). The survival rate as at February 2007 was 89% within the enclosure. The survival rate after approximately nine years (2005 to 2014) is currently approximately 81% within irrigated plots (irrigated for the first two years, but not after), with approximately 90% of measured individuals recorded as reproductive during the 2013 year (pers. com. J Sackmann of MGM, March 2014). Growth rates for these watered translocated plants were much faster than observed in existing stands, and faster than non watered plants, suggesting that growth of *Darwinia masonii* is substantially water dependent, and that *Darwinia masonii* may be accessing pooled water in the fine cracks within the rocky substrate. Translocated plants that were not watered showed only 20% survival (in a very dry season) and a greatly reduced growth rate consistent with wild plants.

1.7.4 Distribution and abundance

Darwinia masonii is found within the Mt Gibson Ranges, 350km north-east of Perth. *Darwinia masonii* is predominantly restricted in its distribution to the upper slopes, crests and ridges of the eleven major hills that comprise the 6km range. The current distribution of *D. masonii* is mapped in **Figure 1** which represents the findings of Eco Logical (2015).

Authors suggest (Muir, 1995, Bennett, 2000, Paul Armstrong and Associates, 2004 and ATA Environmental, 2005) that D. masonii is restricted in distribution to the Mt Gibson Ranges. Areas with similar geology (banded ironstone formation or chert) and vegetation to that at the Mt Gibson Ranges were surveyed by Paul Armstrong & Associates (2004), ATA Environmental (2004), BGPA (2008) and Maia Environmental Consultancy (2014), however no additional records have been located to date during these surveys in places other than Mt Gibson Ranges (Figure 2). There is anecdotal evidence (Muir, 1995) that *D. masonii* may have been previously recorded from Mt Singleton, although brief later examinations of the site by Paul Armstrong and Associates (2004) and ATA Environmental (2004) did not identify the species at this location.

The most recent and comprehensive survey was undertaken by Eco Logical (2015) was completed during 2014 (four trips between May and October 2014). The census recorded 20,965 individuals of *D. masonii*, comprised of 19,132 mature individuals, 1,580 juveniles, 188 seedlings and 65 senescent individuals. This census presents a significant increase to the recorded abundance of D. masonii at the Mt Gibson Ranges. The basis for the significant increase in the population records, on the balance of probabilities, was considered more likely to be the result of differences in the survey methodology, and to a lesser degree due to an increase to the D. masonii population through recruitment over the intervening time period. Whilst this census extended the recorded spatial extent of the D. masonii population, accounting for an additional 954 individuals within previously unrecorded areas, those records in additional areas accounted for a proportion (<25%) of the additional 4,587 individuals recorded by this survey. The census number does not account for

the removal of 1,702 individuals to date for the current mining operation. The census results are shown in **Table 2**.

Earlier work by ATA (2004) was defined using the Parks and Wildlife's definition to delineate populations (i.e. 500m separation between populations). Using that criterion, nine populations were recorded from the Mt Gibson study area during the ATA Environmental June and July 2004 field surveys. One more population has brought the total number of *D. masonii* to ten (Table 2). That tenth population (TPFL 10) was mentioned in the IRP (DEC, 2008) and first recorded in February 2008 on a BIF breakaway to the East of Extension Hill and on the lower eastern slopes of Extension Hill, but was not listed as a population at that time. It has not been fully surveyed. The ATA (2004) census recorded a total of 16,578 individuals, comprised of 14,315 mature plants, 1,723 seedlings and 540 senescent plants.

Key details of abundance are, since 2008:

- Approximately 1,702 whole plants have been taken from TPFL populations 2 and 3 for the approved MGIOIP hematite mine (under Permit to take number 70b-0809). This comprises all of TPFL population 3 and part of TPFL population 2.
- TPFL population 10, which was not listed in the IRP (2008), was partially surveyed in 2013 and 43 mature plants were recorded. Many additional records now exist as a result of the Eco Logical census (2014);
- TPFL population 7 on Mt Gibson South was surveyed in detail in December 2013, and the number of mature plants recorded was 837, which is 513 plants more that when it was surveyed in 2004 (Maia, 2014a). Further records were also made in that area by Eco Logical (2014);
- Many additional records exist in TPFL population 5A, 5B on Iron Hill East;
- The highest density and occurrence of records occurs on the northern part of Mount Gibson;
- There are only a small number of records (being 16) that are not situated in one of the ten TPFL numbers;
- A historical record of D. masonii in NatureMap lies on Mt Gibson Station towards Mt Singleton, although no detailed survey record exists. Maia (2014a) searched an area of 25.1 ha for this record and did not find evidence of *D. masonii* within the area searched.

The revised population of the 2014 census (Eco Logical 2014) indicates that there were more than 6,000 extra records when compared to ATA (2004).

Since the records made prior to 2013, which gave the sense of discrete groups on and around ridgetops, there is a 'blending' of records through certain TPFL Population Numbers being:

- The southern part of Extension Hill and the northern part of Extension Hill South;
- The eastern part of Iron Hill East with the western part of Mount Gibson; and
- The southern part of Mt Gibson with the northern part of Mt Gibson South.

Table 2. Summary of population history and records prior to 2013 and after extensive survey by Eco Logical (2014)

TPFL Pop No.	IRP Pop No.	Date of first database record (database)	Broad location description	Take status	WA Herbarium Sheet (PERTH No.)	Quadrat monitoring site	Date of most accurate monitoring record (method)	Number of plants (IRP) Pre-2013	Number of plants Eco Logical (2014)	Comment
1	6	01/01/1994 (TPFL)	Iron Hill South	Extant	06874460	D4, D5, D6, D7, D8, D24	19/07/2004 (estimate) 11-17/06/2014 (actual)	1,601 (970) [133]	494	Majority of area was burnt in Jan 2003 wildfire. Last census in 2014.
2	2	11/05/1995 (TPFL)	Extension Hill	Partially taken - hematite pit	07356595	D1	19/07/2004 (estimate) 11-17/06/2014 (actual)	1,924 (12) [25]	1,876	Last census in 2014.
3	1	11/05/1995 (TPFL)	Extension Hill North	Taken	05313368; 06874495		19/07/2004 (estimate) Present	545 (12) [12] 0 (0) [0]	0	TPFL 3 has been taken.
4	3	01/10/2003 (TPFL)	Extension Hill South	Extant		D2, D3, D16, D17, D18	19/07/2004 (estimate) 11-17/06/2014 (actual)	1,874 (26) [32]	2,082	Last census in 2014.
5A, 5B	7	10/1950 (WA Herb)	Iron Hill East	Extant	01005820; 01005382; 01005790; 01005367; 01005812; 01005359; 01005804; 01005855; 01005375; 01005839; 01005340; 01005847; 00137626; 00719536; 02521741; 02521733; 06796680; 01000691		19/07/2004 (estimate) 11-17/06/2014 (actual)	70 (11) [8]	1,692	Did not survey areas (majority) burnt by Jan 2003 wildfire during census in 2004. Last census in 2014.

TPFL Pop No.	IRP Pop No.	Date of first database record (database)	Broad location description	Take status	WA Herbarium Sheet (PERTH No.)	Quadrat monitoring site	Date of most accurate monitoring record (method)	Number of plants (IRP) Pre-2013	Number of plants Eco Logical (2014)	Comment
6A, 6B, 6C	8	28/07/1986 (WA Herb)	Mt Gibson	Extant	07290810 04977025 (no det)	D9, D10, D11, D12, D21, D22, D23	19/07/2004 (estimate) 11-17/06/2014 (actual)	7,021 (61) [278]	9743	July 2004 survey area did not include area burnt in Jan 2003 wildfire. Census in 2014 over Mt Gibson (6,226) and Mt Gibson (central) (3,517).
7	9	01/01/1994 (TPFL)	Mt Gibson South	Extant		D13, D14, D15	19/07/2004 (estimate) 11-17/06/2014 (actual)	324 (1)	883	Eco Logical (2014) recorded additional specimens further south from those of Maia (2014).
8	5	11/05/1995 (TPFL)	Iron Hill Middle	Extant	06874509		19/07/2004 (estimate) 11-17/06/2014 (actual)	370 (597) [18]	1,657	Majority of area was burnt in Jan 2003 wildfire. Last census in 2014.
9	4	11/05/1995 (TPFL)	Iron Hill North	Extant		D19	19/07/2004 (estimate) 11-17/06/2014 (actual)	586 (33) [34]	1,951	Majority of area was burnt in Jan 2003 wildfire. Last census in 2004.
10	Not listed	12/2/2008 (TPFL)	E of Extension Hill South (~450m SE of TPFL pop 2)	Not taken			24/09/2013 (Partial survey, low quality) 12/02/2008 (estimate) 11-17/06/2014 (actual)	43 (0) [0] Several hundred	587	Partial survey, low quality in 2013. Last census in 2014.

* This population has been partially taken. Approximately 1,702 plants have been removed for the hematite mine, which infers that the number of plants remaining may be 767.

() = number of seedlings/juveniles; [] = number of dead

Plants related to past planting trials are not recorded in the above table. These may account for in the order of 200 plants.

1.7.5 General habitat and areas of occurrence

Brown *et al.* (1998) described the habitat where *Darwinia masonii* grows as tall shrublands on yellow-brown clay loams on the Banded Ironstone Formations or granite breakaway. The ATA Environmental (2004) targeted survey recorded *Darwinia masonii* from eight vegetation communities. These were previously identified and mapped by Bennett Environmental Consulting (2000) and included one mallee, six thicket and one heath community:

T1 Dense Thicket of mixed species dominated by *Acacia* species, *Allocasuarina acutivalvis* subsp. *prinsepiana, Calycopeplus paucifolius* and *Melaleuca nematophylla* over Low Shrubland in jaspilite rocks and pockets of loam.

T2 Dense Thicket dominated by *Acacia assimilis, A. stereophylla* var. *stereophylla, A. ramulosa* and *Allocasuarina acutivalvis* subsp. *prinsepiana* over Low Shrubland of *Acacia acuaria, Hemigenia* sp. Paynes Find and *Baeckea* aff. c*ryptandroides* in loam with scattered rocks on the surface.

T3 Dense Thicket dominated by *Acacia assimilis, Allocasuarina acutivalvis* subsp. *prinsepiana* and *Melaleuca nematophylla* over Low Shrubland of *Hemigenia* sp. Paynes Find and *Hibbertia crassifolia* in loam pockets in jaspilite rocks.

T4 Dense Thicket of *Allocasuarina acutivalvis* subsp. *prinsepiana* with occassional *Eucalyptus oldfieldii* over an Open Scrub of *Acacia* species over Open Shrubland of *Hemigenia* sp. Paynes Find or Open Herbs of *Xanthosia bungei.*

T5 Thicket of *Allocasuarina acutivalvis* subsp. *prinsepiana* and *Grevillea obliquistigma* with emergent *Callitris glaucophylla* over Low Shrubland dominated by *D. masonii, Hibbertia crassifolia, Melaleuca radula,* and *Philotheca brucei* over Herbs of *Xanthosia brucei* in loam pockets in dense jaspilite rocks.

T6 Thicket of *Acacia acuaria* and *Acacia stowardii* over Low Shrubland of mixed species with large numbers of *D. masonii* in loam with abundant rocks on the surface.

M4 Very Low Open Shrub Mallee of *Eucalyptus leptopoda* with emergent *Eucalyptus loxophleba* subsp. *supralaevis* over Thicket of *Acacia ramulosa* over herbland of Asteraceae in loam.

HS1 Low Heath of *Ptilotus obovatus* with emergent shrubs of *Acacia stowardii* and *Calycopeplus paucifolius* over Herbs in loamy clay large amongst large boulders.

1.7.6 Habitat critical to the survival of the species, and important populations

Darwinia masonii is ranked as Vulnerable and is only known from Mt Gibson Ranges. Consequently, it is considered that known habitat for wild populations is critical to the survival of the species and that representations of wild stock are important.

Habitat critical to the survival of *Darwinia masonii* includes:

- the area of occupancy of known populations,
- areas of similar habitat surrounding and linking populations (providing potential habitat for population expansion and for pollinators),
- additional occurrences of similar habitat that may contain undiscovered populations or a dormant seed bank of the species or be suitable for future translocations, and
- any local surface water drainage and infiltration that may affect the habitat of the species.

BGPA's (2010) modelled distribution of *D. masonii* against spatially mapped environmental data is the best information available on the habitat critical to survival of the species (**Figure 3**). This mapping can be considered in the context of the research findings:

- The modelling predicted *D. masonii* to potentially occur broadly across the Mt Gibson Ranges with a high probability (60-75 %) of occurrence (BGPA, 2010; Section **Error! Reference source not found.**). However, there were many areas in the Mt Gibson Ranges where *D. masonii* plants were most highly predicted to occur by the modelling, but do not support *D. masonii*. This has since, in part, been rectified with recent surveys (Eco Logical Australia 2014, Maia 2014) finding plants in some locations of predicted suitable habitat. BGPA (2010) also speculated that the distribution of *D. masonii* may have an association with unmapped sub-surface features such as regolith (soil depth, underlying rock structure) and longer-term fire history patterns. This information may further inform the habitat requirements of this species.

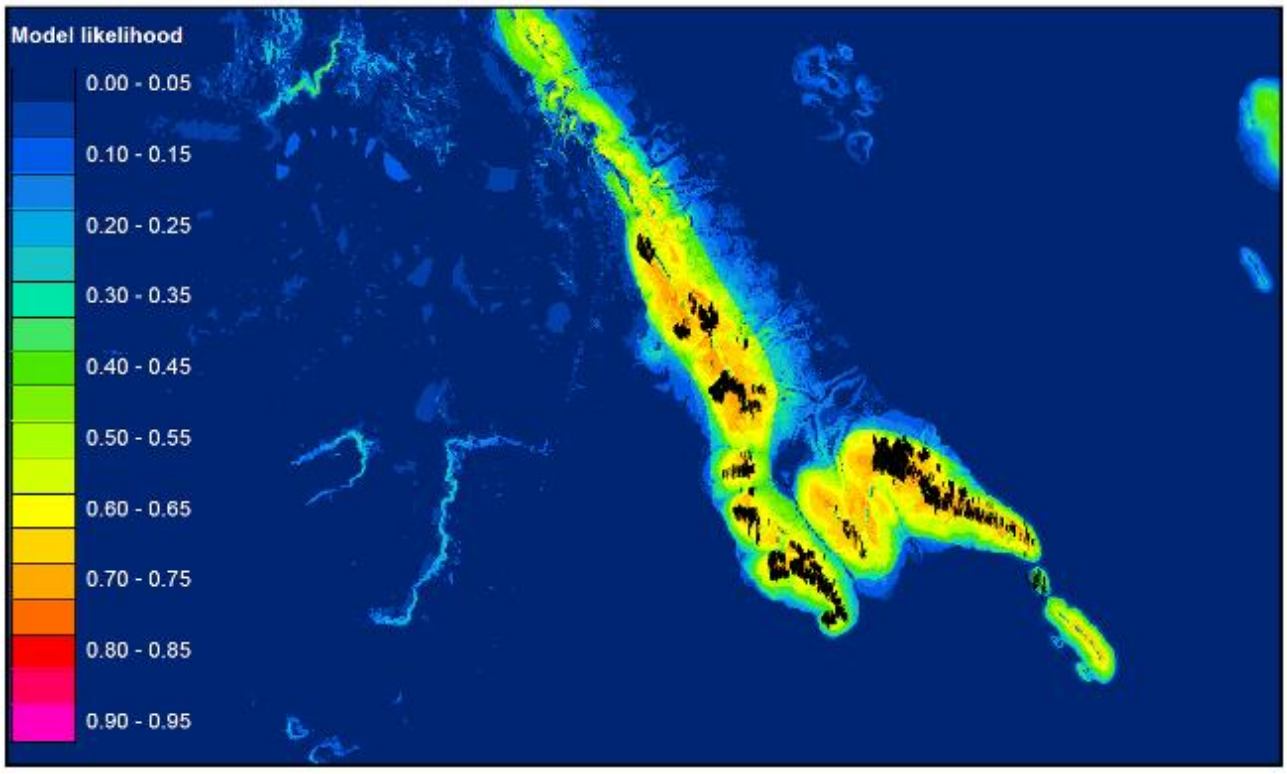


Figure 3. Modelled distribution of *Darwinia masonii* habitat across the Mt Gibson Ranges (source: BGPA, 2010)

Note that there are areas to the north, south and east of the known distribution that were predicted by BGPA with a likelihood as species habitat.

2.0 Potential Development Impacts

The main threat to *Darwinia masonii* is direct removal, loss of habitat by mining and fire with possible secondary threats associated with nearby mining operations, grazing by herbivores and other natural environmental factors.

Threats include:

- **Mining (direct removal):** *Darwinia masonii* occur within the Project footprint. Environmental approval has been provided for the removal of all plants of the pre-disturbance population within the approved mine footprint (approximately 2100 adult plants, roughly 14% of the total known population).

- **Mining (secondary threats):** Mining activity also presents potential secondary threats, for example through dust, inadvertent disturbance, introduction of weeds, negative effects on pollinator activity or other effects on reproductive biology that may lead to a decline in recruitment rate.

- **Weed Invasion**: No significant weed invasion has been observed to date. Weed invasion is a potential threat to *Darwinia masonii.*

- **Grazing:** Evidence of *Darwinia masonii* grazing has been observed. Domestic stock generally do not occur in the area being kept well within adjacent pastoral properties.

- **Fire:** Frequent fires represent the greatest threat to the long term survival of the species as it has the potential to result in the local extinction of the species which in turn may lead to a reduction in species viability and loss of genetic diversity.

3.0 Approval Conditions

Because the direct removal and indirect threats from Iron Hill deposit mining project are similar to those for Extension Hill, MGM proposes to implement the same requirements for the IH Plan.

Condition 1 of approval EPBC 2005/2381 to develop the *Mount Gibson Iron Ore Mine and Infrastructure Project* required that a management plan (the EH Plan) be prepared and implemented, including a monitoring program for *Darwinia masonii*, thus:

1 The person taking the Action must prepare a management plan (or plans) including a monitoring program for Darwinia masonii. The plan(s) must take into account the advice of DEWHA, the Western Australian Department of Environment and Conservation and the Environmental Protection Authority.

a) The aim of the plan(s) is to manage the impacts of the Action on Darwinia masonii and its habitat.
b) The plan shall be implemented and reviewed throughout the life of the Action.
c) The plan shall:
i) Establish baseline information on the populations of Darwinia masonii within the Mt Gibson Ranges;
ii) Establish a monitoring program to identify significant impacts and monitor the numbers of individuals and areas of suitable habitat for Darwinia masonii;
iii) Define the scope of studies aimed at understanding the ecology of Darwinia masonii;
iv) Specify design features, management measures and operating controls to minimise adverse impacts to Darwinia masonii within the Mt Gibson Ranges; and
v) Identify potential response and mitigation measures in the event that monitoring detects Action-attributable change in the abundance, distribution or reproductive success that is likely to cause significant impact to the viability of Darwinia masonii within the Mt Gibson Ranges.
d) The management plan(s) for Darwinia masonii (including the monitoring program) must be approved by the Minister prior to the commencement of ground disturbing activities.
e) The approved plan(s) must be implemented.

4.0 Key Objectives and Targets

4.1 Management Objectives

The Proponent's objectives for the management of *Darwinia masonii* in the vicinity of the mine site are:

1. To meet the legislative requirements and commitments relevant to *Darwinia masonii*; and
2. To maintain (or improve) the conservation status of *Darwinia masonii* by managing or avoiding adverse impacts of the project (other than those approved by legislative instrument).

Table 2 Key Objective and Targets Related to *Darwinia masonii* Management

Objective	Performance Indicators	Data Source	Target
Legislative Compliance	Compliance with conditions/commitments for project approval and Commonwealth and State legislation relating to *Darwinia masonii*	Compliance audits	100% Compliance
To maintain (or improve) the conservation status of *Darwinia masonii* by managing or avoiding adverse impacts of the project (other than that within the approved area of impact	Number and health of *Darwinia masonii* in areas monitored	Baseline data Monitoring results Compliance audits	No decline in population of *Darwinia masonii* outside approved areas.

4.2 Management Principles

The following principles guide the implementation of this management plan:

- Personnel at the mine will be made aware of the presence and importance of *Darwinia masonii* in the Project area
- Clearing of known *Darwinia masonii* habitat will be limited to areas within the approved development envelope;
- Regular monitoring of proportions of the known populations of *Darwinia masonii* will be conducted to identify mining related impacts and enable rapid response should such impacts occur;
- Inclusion of *Darwinia masonii* as one component of the key species in restoration works when looking at the re-development of suitable landscapes and substrates in the mine rehabilitation works.

5.0 Management Strategies

The following management strategies will be implemented to minimise the risk of adverse effects on *Darwinia masonii*. These actions and strategies are those proposed in the Species Recovery Plan (draft) for *Darwinia masonii* (MGM & EHPL, 2015):

1. *Coordinate species recovery actions and liaise with stakeholders;*
2. *Develop and implement a species restoration strategy*
3. *Maintain and use seed/germplasm collections to ensure material with a broad genetic base is available for conservation*
4. *Promote awareness of Darwinia masonii*
5. *Implement Darwinia masonii condition monitoring program*
6. *Implement fire management strategy*
7. *Manage threatening processes of mining*
8. *Protect plants from herbivory*
9. *Report any new occurrences of Darwinia masonii*
10. *Review conservation status of the species*
11. *Review the recovery plan*

5.1 Management of Direct Impacts

Implementation of the Project requires that a proportion of the *Darwinia masonii* be removed as approved at Iron Hill per EPBC Ref 2015/7414.

The clearing of vegetation is controlled on site through a Ground Disturbance Permitting system. This system will allow *Darwinia masonii* to be avoided where practicable and required in the field.

Access to areas containing *Darwinia masonii* outside of the approved area of impact will be restricted, with access permits required prior to entry. Personnel will be advised of the importance of this species during the site inductions.

5.2 Management of Indirect Threats

5.2.1 Fire Management

Frequent fires represent the greatest threat to the long term survival of the species as it has the potential to result in the local extinction of the species. Fire management actions include:

- no smoking within 10 metres of bushland rules;
- hot work permit system;
- dangerous goods handling and storage practises;
- housekeeping practices and regular inspections to prevent build-up of rubbish or flammable materials;
- training of emergency response personnel in fire fighting;
- procurement of site based fire fighting equipment;
- vehicle maintenance safety check to reduce fire hazards,
- fire suppression systems on selected plant and equipment;
- regular fire break maintenance; and

- liaison with neighbours and DFES with regard to bushfires.

5.2.2 Weed Management

Weed invasion is a potential threat to *Darwinia masonii*. Weed management actions include:

- restricted access to areas with weed infestations of high biodiversity impact rating;
- consideration will be given to the use of manual and/or hand control methods for weeds in close proximity to *Darwinia masonii*; and
- in the event that weed control activities do impact on the health of *Darwinia masonii,* the DPaW will be consulted immediately to determine the appropriate course of action.

5.2.3 Dust

Excessive fugitive dust deposition on plants may impact on the condition of *Darwinia masonii*. Dust management actions include:

- dust suppression equipment will be included in the design of fixed plant where appropriate;
- mobile dust suppression equipment (ie water carts) will be available on site;
- in the event that a decrease in the condition of *Darwinia masonii* correlates with the results of dust deposition, the dust control procedures will be reviewed and DPaW will be consulted to determine the appropriate course of action. Water carts will be available, should DPaW advise that the plants require washing down.

5.2.4 Grazing

Evidence of *Darwinia masonii* grazing has been observed in certain locations. Should monitoring indicate that an increase in feral goats and rabbits has significantly impacted *Darwinia masonii*, eradication programs will be implemented on the feral fauna and/or access to affected plants will be restricted.

5.3 *Darwinia masonii Condition* Monitoring Program

The condition of the *Darwinia masonii* population not directly impacted by mining will be monitored for any indirect impacts from mining, such as excessive dust deposition, grazing, weeds or fire that may impact on plant condition. A representative subset of the population will be monitored in detail annually. In addition, dust monitoring will be undertaken on a monthly basis to assess dust deposition on *Darwinia masonii* adjacent to active mining areas. Plant records closest to the mines (eg Extension Hill and Extension Hill South; and, Iron Hill and Iron Hill North) will be routinely inspected to assess any changes in plant condition prior to evidence of acute stress or mortality. Plant records located further away from the mine will be inspected annually. The results of the monitoring program will be used to guide subsequent management of the species.

5.4 Review of the Plan

The Proponents will review this Management Plan biennially during operation. In the event that *Darwinia masonii* numbers decline significantly within the development envelope (ie mine and adjacent areas), but not in the control sites due to general environmental conditions (e.g. prolonged period of drying), the Proponents will review the Plan immediately in tandem with an investigation action plan. The Proponents will review the plan in consultation with DoE. The Proponents will seek final approval for any changes to the plan from the Commonwealth Minister for the Environment.

Actions

- A compliance audit of the plan and actions performed under the plan will be undertaken prior to the 31st July each year as part of the certification process required by the Commonwealth and the Proponents will submit the certificate to DoE as appropriate. The Proponents will review the plan every two years and any amendments will be sought through application of the amendd plan to the Minister.

6.0 References

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APPENDIX A

EPBC Act Ref 2005/2381 Approval

Australian Government

Department of the Environment, Water, Heritage and the Arts

Mr Luke Tonkin
Managing Director
Mount Gibson Mining Limited
Level 1, 7 Havelock St
WEST PERTH WA 6005

Date: 13 June 2008
EPBC Ref: 2005/2381
EPBC contact: Neisha Burton
02 6274 2147
Neisha.Burton@environment.gov.au

19 JUN

Dear Mr Tonkin

Consent to transfer of approval
Mount Gibson Iron Ore Project (EPBC 2005/2381)

I refer to your letter of 22 May 2008 which requests consent to the transfer of approval for mining and processing iron ore from Extension Hill and Extension Hill North within the Mt Gibson Ranges.

I have considered the request in accordance with section 145B of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and have decided to consent to the transfer of approval to Mount Gibson Mining Limited and Extension Hill Pty Ltd. The details of my decision are attached. The proposal must be undertaken in accordance with the conditions specified in the original approval. Copies of the approval dated 18 December 2007 are attached for your convenience.

The Department has an active audit program for proposals that have been referred or approved under the EPBC Act. The audit program aims to ensure that proposals are implemented as planned and that there is a high degree of compliance with any associated conditions. You should be aware that your project may be selected for audit by the Department at any time and all related records and documents may be subject to scrutiny. Information about the Department's Audit Strategy is enclosed.

If you have any questions about this decision, please contact the project manager and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

Vicki Middleton

Ms Vicki Middleton
Assistant Secretary
Environment Assessment Branch

Australian Government

Department of the Environment, Water, Heritage and the Arts

CONSENT TO TRANSFER OF APPROVAL

Mount Gibson Iron Ore Project – EPBC No 2005/2381

This consent is given under (Section 145B) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Proposed transfer of approval

Transferor (holder of approval)	Mount Gibson Mining Limited
Transferee (person accepting the transfer of approval)	Mount Gibson Mining Limited; and Extension Hill Pty Ltd
proposed action	To mine and process iron ore from Extension Hill and Extension Hill North within the Mt Gibson Ranges; the construction and operation of infrastructure associated with the processing and transport of ore, including a pipeline to transport slurry to Geraldton Port and associated port infrastructure.

Person authorised to make decision

name and position	Ms Vicki Middleton Assistant Secretary Environment Assessment Branch
signature	Vicki Middleton
date of decision	13 June 2008

APPROVAL

Mt Gibson Iron Ore Project (EPBC 2005/2381)

This decision is made under (Section 133) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Proposed action	
person to whom the approval is granted	Mount Gibson Mining Ltd
proposed action	To mine and process iron ore from Extension Hill and Extension Hill North within the Mt Gibson Ranges; the construction and operation of infrastructure associated with the processing and transport of ore, including a pipeline to transport slurry to Geraldton Port and associated port infrastructure.

Approval decision	
relevant controlling provisions	The approval has effect for: • Listed threatened species and communities (sections 18 & 18A) • Listed migratory species (sections 20 & 20A)
conditions of approval	This approval is subject to the conditions specified below.
expiry date of approval	This approval has effect until 1 January 2030.

Person authorised to make decision	
name and position	Ms Vicki Middleton Assistant Secretary Environment Assessment Branch
signature	Vicki Middleton
date of decision	18 December 2007

Conditions
The following conditions apply to the approval of the proposed action:

Darwinia masonii

1. The person taking the Action must prepare a management plan (or plans) including a monitoring program for *Darwinia masonii*. The plan(s) must take into account the advice of the Department of the Environment, Water, Heritage and the Arts (DEWHA), the Western Australian Department of Environment and Conservation and the Environmental Protection Authority.

   a) The aim of the plan(s) is to manage the impacts of the Action on *Darwinia masonii* and its habitat.

   b) The plan shall be implemented and reviewed throughout the life of the Action.

   c) The plan shall:

      i) Establish baseline information on the populations of Darwinia masonii within the Mt Gibson Ranges;

      ii) Establish a monitoring program to identify significant impacts and monitor the numbers of individuals and areas of suitable habitat for *Darwinia masonii*;

      iii) Define the scope of studies aimed at understanding the ecology of *Darwinia masonii*;

      iv) Specify design features, management measures and operating controls to minimise adverse impacts to *Darwinia masonii* within the Mt Gibson Ranges; and

      v) Identify potential response and mitigation measures in the event that monitoring detects Action-attributable change in the abundance, distribution or reproductive success that is likely to cause significant impact to the viability of *Darwinia masonii* within the Mt Gibson Ranges.

   d) The management plan(s) for *Darwinia masonii* (including the monitoring program) must be approved by the Minister prior to the commencement of ground disturbing activities.

   e) The approved plan(s) must be implemented.

Malleefowl *(Leipoa ocellata)*

2. The person taking the Action must prepare a management plan (or plans) including a monitoring program for the Malleefowl (*Leipoa ocellata*). The plan must take into account the advice of DEWHA, the Western Australian Department of Environment and Conservation and the Environmental Protection Authority.

   a) The aim of the plan(s) is to manage the impacts of the Action on the Malleefowl and its habitat.

   b) The plan(s) shall be implemented and reviewed throughout the life of the Action.

   c) The plan(s) shall:

      i) Establish baseline information on the populations of the Malleefowl in and around the project area, including the services corridor;

      ii) Establish a monitoring program to detect significant impacts and monitor the numbers of individuals and suitable habitat for the Malleefowl in and around the project area, including the services corridor;

      iii) Specify design features, management measures and operating controls to minimise adverse impacts; and

      iv) Identify potential response and mitigation measures in the event that monitoring detects Action-attributable change in the abundance, distribution or reproductive success that is likely to cause significant impact to the viability of the Malleefowl in and around the project area, including the services corridor.

   d) The management plan(s) for the Malleefowl (including the monitoring program) must be approved by the Minister prior to the commencement of ground disturbing activities.

   e) The approved plan(s) must be implemented.

3. An Environmental Performance Report shall be submitted to DEWHA within 15 months from the date of approval of the Action and each subsequent report 12 months from the date of the previous report. This report shall contain the results of, and the state of implementation of the *Darwinia masonii* and *Leipoa ocellata* (malleefowl) management plan(s) and monitoring programs (Conditions 1 and 2) and advice as to whether there have been revisions to previously approved plans.

4. If the person taking the Action wishes to carry out any activity otherwise than in accordance with a plan, program or system referred to in this Approval, the person taking the Action must submit for the Minister's approval a revised version of any such plan, program or system. If the Minister approves a revised plan, program or system so submitted, the person taking the Action must implement that plan, program or system instead of the plan, program or system as originally approved.

5. Within 18 months of the commencement of ground disturbing activities, the person taking the Action must ensure than an independent audit of compliance with the Conditions of this Approval is conducted. The independent auditor must be approved by the Minister. The audit criteria must be agreed by the Minister and the audit report must address the criteria to the satisfaction of the Minister.

6. By 31 July of each year of the development, the Project Manager, Mt Gibson Iron Ore Project, of the person taking the Action (Mount Gibson Mining Ltd), must provide a certificate to the Department indicating whether the person taking the Action has complied with the conditions of this Approval.

7. If the Minister believes that it is necessary or desirable for the better protection of the environment to do so, the Minister may request the person taking the Action to make specified revisions to a plan or program approved pursuant to the Conditions and to submit the revised plan or program for the Minister's approval. The person taking the Action must comply with any such request. If the Minister approves a revised plan or program pursuant to this condition, the person taking the Action must implement that plan or program instead of the plan or program as originally approved.

8. Within five years of the date of this approval, the person taking the Action must, to the satisfaction of DEWHA, provide evidence that the Action has been substantially commenced. If DEWHA is not satisfied that there has been substantial commencement of the Action, the Action must not thereafter be commenced without the prior approval of the Minister.

Definitions

DEWHA – Commonwealth Department of Environment, Water, Heritage and the Arts.

Ground disturbing activities – any action related construction or commissioning activities within the areas to be disturbed by construction or operation activities associated with the Action, excluding investigatory works such as, but not limited to geotechnical, biological and cultural heritage surveys, baseline monitoring surveys and technology trials.

Minister – Commonwealth Minister for the Environment, Heritage and the Arts.

Significant impact(s) – an impact that is important, notable or of consequence having regard to its context or intensity.

APPENDIX B

EPBC Act Ref 2015/7414 Decision Notice

Australian Government
Department of the Environment

EPBC Ref: 2015/7514

Mr Troy Collie
Project Director – Environmental Approvals
Mount Gibson Mining Limited
PO Box 55
WEST PERTH WA

Dear Mr Collie

Additional information required for preliminary documentation
Iron Hill Deposit Mining Project, Mt Gibson Ranges, WA

I am writing to you in relation to your proposal to undertake mine development of the Iron Hill deposit, located within the Mt Gibson Range approximately 270 km east-south-east of Geraldton, in the Shire of Yalgoo, Western Australia.

On 11 September 2015, I decided that the the proposed action is a controlled action and that it will be assessed by preliminary documentation. Further information will be required to be able to assess the relevant impacts of the proposed action.

Details outlining the further information required are at Attachment A.

In the letter of 11 September 2015, you were informed that your project is likely to be suitable for the application of outcomes-based conditions in the event that your action is approved with conditions. The requirements of the draft *Outcomes-based Conditions Policy 2015* are reflected in Attachment A, and you will need to provide the required information if you wish to have outcomes-based conditions fully considered for your proposal.

Details on the assessment process and the responsibilities of the proponent are set out in the enclosed fact sheet. Further information is available from the Department's website at http://www.environment.gov.au/epbc.

If you have any questions about the assessment process, the draft *Outcomes-based Conditions Policy 2015* or the further information required, please contact Dionne Cassanell project manager, by email to dionne.cassanell@environment.gov.au, or telephone 02 6274 2114 and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

Bruce Edwards
Assistant Secretary
Assessments (WA, SA, NT) and Air Branch
6 October 2015

Listed threatened species and ecological communities

- The Department notes that Mount Gibson Mining Ltd propose to implement the approved (3 October 2008) *Darwinia masonii* Management and Monitoring Plan (Plan) required of the EPBC Act approval 2005/2381 for the current proposal. Please provide further details of any proposed amendments to the Plan. Please clarify whether any existing monitoring plots fall within the current proposal site.

- Please provide details on the measures to be implemented to minimise indirect impacts on the Mason's Darwinia (*Darwinia masonii*), population adjacent to the proposal site, including fragmentation, altered hydrology, dust and weeds/disease.

- The Department notes the commitment by Mount Gibson Mining Ltd to implement offsets to compensate for any residual significant impacts on Mason's Darwinia. Please provide further details including the:

    - Type of offset/s proposed;
    - Extent to which the proposed offset actions correlate to, and adequately compensate for, the residual significant impacts on Mason's Darwinia;
    - Suitability of the location of any proposed offset site for the Mason's Darwinia;
    - Conservation gain to be achieved by the offset i.e. positive management strategies that improve the site or averting the future loss, degradation or damage of the protected matter;
    - Time it will take to achieve the proposed conservation gain;
    - Level of certainty that the proposed offset will be successful; and
    - Current land tenure of any proposed offset and the method of securing and managing the offset for the life of the impact.

- Demonstrate how the proposed offset(s) are consistent with the *Environmental Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy (October 2012).

Economic and Social matters

Please provide further detail on the social and economic costs and/or benefits of undertaking the proposed action, including the:

- Basis for any estimations of costs and/or benefits;
- Potential employment opportunities expected to be generated at each phase of the proposed action; and
- Details of any public and stakeholder consultation activities, including the outcomes.

Outcomes-based Conditions

If you wish to have outcomes-based conditions fully considered for your proposal the Preliminary Documentation should provide information on the outcomes that the proponent will achieve for matters of national environmental significance. Outcomes need to be specific, measurable and achievable, and should be based on robust baseline data. Outcomes should be developed in consideration of the draft *Outcomes-based Conditions Policy 2015* and draft *Outcomes-based Conditions Guidance 2015*, with suitable justification for considerations identified in the policy and guidance.

To allow application of outcomes-based conditions, the Preliminary Documentation should include:

(a) The specific environmental outcomes to be achieved, and reasoning for these in reference to relevant Recovery Plans, Conservation Advices, Threat Abatement Plans, Heritage values statements, Ramsar information sheets etc.

(b) For each proposed outcome:

a. The risks associated with achieving the outcome;
b. The measurability of the outcome, including all suitable performance measures;
c. Appropriate baseline data upon which the outcome has been defined and justified;
d. The likely impacts that the proposed outcome will address;
e. Demonstrated willingness and capability of achieving the outcome;
f. The level of knowledge about the protected matter or its surrogate, upon which outcomes were based;
g. Commitments to independent and periodic audits of performance towards achieving outcomes;
h. Assessment of the likely level of control that the proponent will have over achieving the outcome;
i. Discussion of the appropriateness of any surrogates for protected matter outcomes;
j. Details of proposed management to achieve the outcome, including, but not limited to performance indicators, periodic milestones, proposed monitoring and adaptive management, and record keeping, publication and reporting processes.

Appendix 3 – Iron Hill Deposits, *Environmental Management Plan (Draft)*

Mt Gibson Iron Ore Mine and Infrastructure Project

Iron Hill Deposits Environmental Management Plan (DRAFT)

Mount Gibson Mining Limited

November 2015

Mount Gibson Iron

EMP

Mt Gibson Iron Ore Mine and Infrastructure Project

IRON HILL DEPOSITS

Prepared by

Mt Gibson Mining Limited

First Floor, 7 Havelock Street
West Perth, Western Australia, 6005

November 2015

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Quality Information

Document Mt Gibson Iron Ore Mine and Infrastructure Project – Iron Hill Deposits

Date 05 November 2015

Prepared for Mt Gibson Mining Limited

ISO 9001 Document History

Revision	Date	Details	Author	Reviewer	Authorised
0	3/09/2015	Draft for information	Matt Hamilton	Troy Collie	
0.1	5/11/2015	Review	Matt Hamilton	Troy Collie	

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Executive Summary

Implementation of the Mt Gibson Iron Ore Mine and Infrastructure Project – Iron Hill (**Project**), is currently subjected to assessment by the Environmental Protection Authority (**EPA**) under the authority of Part IV of the *Environmental Protection Act 1986*.

The Project is also subject to assessment by the Department of the Environment (**DoE**) under the authority of the *Environment Protection and Biodiversity Conservation Act 1999* (C'wth).

The Iron Hill Environmental Management Plan (**EMP**) is designed to meet the key environmental factors of assessment by both EPA and DoE. The EMP adopts a risk based approach to environmental management, and has been modelled on the approved, implemented compliant EMP required by Ministerial Statement 753 for the Extension Hill and Extension Hill North mining operation which was developed in consultation with the EPA and Department of Environment and Conservation (now Department of Parks and Wildlife – **DPaW** - and Department of Environment Regulation - **DER**).

The objectives of the EMP are to:

- demonstrate that Mount Gibson Mining Limited (**MGM**) have a high level corporate commitment to protect the environment which will ensure that the environmental management of the Project meets the objectives of the EPA and is consistent with practices of other similar iron ore mining activities;
- demonstrate that the key environmental factors identified in the assessment of the Project under Part IV *Environmental Protection Act 1986,* namely the introduction and spread of weeds, altered fire regimes, altered hydrology and deposition of dust on declared rare flora and floristic communities can be managed at an acceptable level of risk;
- provide appropriate environmental management objectives, performance standards and measurement criteria;
- provide an appropriate management strategy; and
- provide environmental management actions, which will be incorporated into the site Environmental Management System (**EMS**) and continuously improved as the Project develops.

The environmental risk management method employed in the development of this EMP was aligned with internal MGX (Mount Gibson Iron) policies, standards and procedures for risk management which are aligned with AS/NZS ISO 31000:2009 risk management standard.

The key environmental factors of the Project include landforms, flora and vegetation, terrestrial fauna and subterranean fauna. The key integrating factors include rehabilitation and decommissioning and offsets. Other related factors also subject to assessment include hydrological processes and heritage.

This EMP specifically addresses the management of these factors within the risk framework and methodology referred to above, allowing the EPAs objectives to be met.

For this purpose, environmental performance objectives have been used in the EMP. Environmental performance standards and measurements have been defined for each performance objective, providing an effective and practical framework for environmental monitoring.

An environmental risk assessment was conducted through workshops involving executive management, mine managers and operators, environmental managers and advisors, and legal advisors. This risk assessment has subsequently been updated to reflect site based knowledge from the Extension Hill operations.

The sources of environmental risks associated with the Project and the likely effects have been identified. Evaluation of the likelihood and consequence of the risk takes into account the control measures in place to manage the risk.

This EMP identifies the key control measures and the necessary management actions to allow for sources of risk to be maintained at the moderate or low level during the development and operation of the Project. Procedures for implementing the management actions to achieve this outcome are contained in the environmental management systems for the Project. These procedures and the management actions identified in the EMP will be reviewed and, as appropriate, adapted to achieve a high level of environmental management consistent with EPA objectives.

1.0 Introduction

1.1 Background

Implementation of the Mt Gibson Iron Ore Mine and Infrastructure Project – Iron Hill (**Project**), is currently subjected to assessment by the Environmental Protection Authority (**EPA**) under the authority of Part IV of the *Environmental Protection Act 1986*.

The Project is also subject to assessment by the Department of the Environment (**DoE**) under the authority of the *Environment Protection and Biodiversity Conservation Act 1999* (C'wth).

The Iron Hill Environmental Management Plan (**EMP**) is designed to meet the key environmental factors of assessment by both EPA and DoE. The EMP adopts a risk based approach to environmental management, and has been modelled on the approved, implemented and compliant EMP required by Ministerial Statement 753 for the Extension Hill and Extension Hill North mining operation which was developed in consultation with the EPA and Department of Environment and Conservation (now Department of Parks and Wildlife – **DPaW** - and Department of Environment Regulation - **DER**).

Mount Gibson Mining Limited (**MGM**) propose to mine iron ore at Iron Hill in the Mt Gibson Ranges, approximately 270km east-south-east of Geraldton in Western Australia (Section 2.0). The proposed mining operations will involve mine pits, waste rock landform, and support infrastructure (rehabilitation stockpiles, internal mine roads, water storage dams, administration facilities, fuel storage and workshop and maintenance facilities). All other necessary infrastructure (such as a crusher, accommodation village and airstrip) will utilise infrastructure associated with the approved and operated Extension Hill mine site under the relevant environmental approvals (Ministerial Statement 753) associated with this operation.

1.2 This document

This EMP addresses the environmental management of the Project, using a risk based approach. This approach was promoted to allow greater flexibility and adaptability in specific management procedures to ensure procedures are modified to keep pace with changing environmental conditions and new data availability, while focussing attention on higher risk areas to achieve high level environmental outcomes and performance. Specific procedures are contained in the site Environmental Management System (EMS) and managed by the proponents internally with regular reporting to the relevant regulators.

This document has been developed in accordance with internal MGX (Mount Gibson Iron) policies, standards and procedures for risk management which are aligned with AS/NZS ISO 31000:2009 risk management standard. Figure 1 outlines the risk based approach adopted for the development of this document. The document addresses all of the key environmental factors that require management measures. Research and Recovery Plans for *Darwinia masonii* and *Lepidosperma gibsonii*, are separate documents.

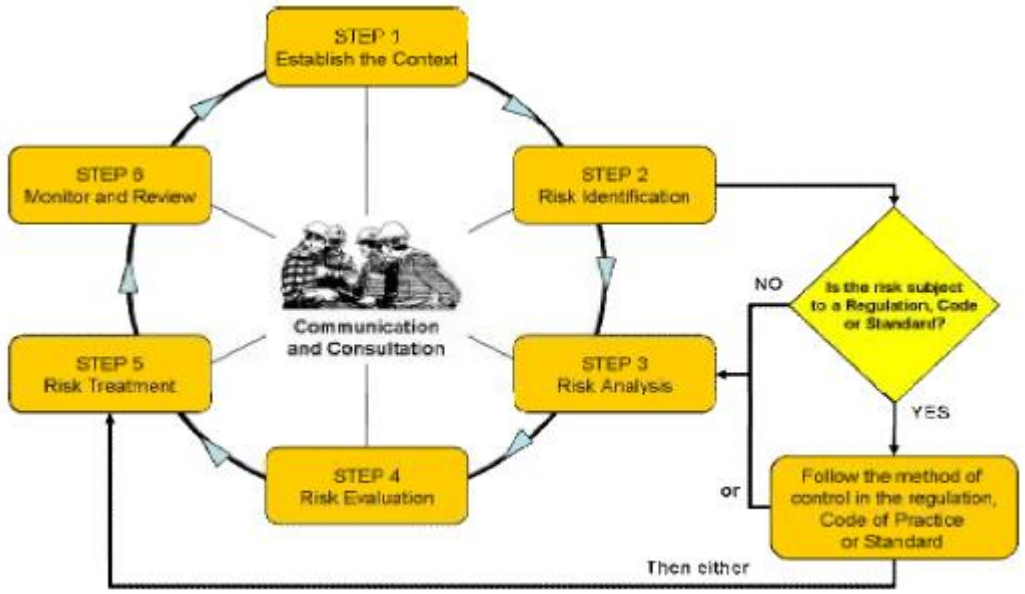


Figure 2 The Risk Management Process applied in accordance with MGX risk management policies, standards and procedures and aligned with AS/NZS ISO 31000:2009.

A description of the Project environment is presented in Section 3.0. Two species of declared rare flora have been identified in the Project Area. The Project coincides with 5 floristic units and 4 fauna species of significance have been recorded in the Project area.

The environmental risk assessment of Project activities is presented in Section 4.0. The risk model used in this EMP is presented in Section 4.4. The risk assessment methodology, including consequence and likelihood tables, is outlined in Section 4.5. Environmental aspects of the mining activities are discussed in Section 4.7.

Definitions of the performance objectives, standards and measurement are discussed in Section 5.0. This section defines the framework for environmental monitoring.

The management strategy forms part of the MGM Environmental Management System (**EMS**), which is outlined in Section 6.0. The strategy includes systems, practices, procedures, roles and responsibilities, training, monitoring, audit and management of non-conformance and review, emergency response and incident reporting, record keeping and reporting. In addition provision has been made for consultation with stakeholders in Section 6.7.

Section 7.0 presents the environmental management actions based on the identified environmental risks.

Section 8.0 outlines the reporting framework.

MGM has consulted with relevant organisations during the drafting of the EMP.

1.3 Project proponents

The proponents for the Mt Gibson Iron Ore Mine and Infrastructure Project are:

Mount Gibson Mining Limited
Level 1, 2 Kings Park Road
West Perth WA 6005
PO Box 82
Perenjori WA 6620

The contact personnel for the Project are:

Reece Olney
Resident Manager Extension Hill
Mount Gibson Mining Limited
Tel: (08) 6314 0214
Email: Reece.Olney@mtgibsoniron.com.au

Scott De Kruijff
General Manager Operations
Mount Gibson Iron Limited
Tel: (08) 9426 7500
E-mail: Scott.DeKruijff@mtgibsoniron.com.au

2.0 Mt Gibson Iron Ore Mine and Infrastructure Project

2.1 Project description

The Iron Hill Deposit is located immediately south of the approved and operated Extension Hill mine operations at the Mt Gibson Ranges. The Project will extend the mine operations at Extension Hill by approximately 2 – 3 years and existing operational infrastructure at Extension Hill will support this expansion.

The key characteristics of the Project are located within three mining domains being:

- Mine Pit approximately 30ha;
- Waste Rock Landform approximately 45ha; and
- Support Infrastructure approximately 37ha.

Mining will be undertaken by the standard open-pit mining methods of drilling, blasting and excavation, with mining occurring within two mine pits. The mine pits are expected to yield an estimated 5-7Mt of high-grade hematite ore grading 60% Fe.

Waste rock excavated from the mine pits will be placed within a dedicated a waste rock landform. The waste rock landform will be of approximate dimensions of 1,300m in length and 450m in width. The waste rock landform will be constructed to an elevation of approximately 370mAHD. The waste rock landform design is based upon 10-20m lifts, 15^0 angle batters and 10m berms, achieving an overall design angle of approximately 13^0. For comparison, the elevation and slope will be less than the 460mAHD and 18^0 waste rock landform design for the approved mine operations. The 370mAHD elevation of the waste rock landform will be less than the 445mAHD elevation peak of the other ridges of the Mt Gibson Ranges.

Support infrastructure will include rehabilitation stockpiles, internal mine roads, water storage dams, administration facilities, fuel storage and workshop and maintenance facilities. All other necessary infrastructure; such as a crusher, accommodation village and airstrip will utilise infrastructure associated with the approved and operated Extension Hill mine site.

2.2 Project area covered by this EMP

The Project area for the purposes of the EMP is defined as the area of the mining tenements associated with the Project.

The Project coincides with land tenures of Mining Tenements M59/338, M59/4545, M59/455, M59/526, M59/609 and G59/50 granted to EHPL, overlying Crown Reserve 17367 (Common) managed by DoL. The Project can be appropriately implemented under these land tenures.

3.0 Description of Environment

The existing environment is described in detail in the Public Environmental Review (PER), and relevant factors and updated data are summarised below.

3.1 Climate

The climate of the Project Area is characterised by hot, dry summers and mild, wet winters. Maximum temperature peaks (greater than 30^{o}C) occur between November and March. Rainfall occurs throughout the year with approximately 290mm of rainfall annually, occurring within approximately 40 rainfall days (Bureau of Meteorology 2015).

3.2 Winds

Winds in the Midwest region have a distinct seasonal and diurnal pattern. Winds at Paynes Find in spring and summer are dominated by light to moderate easterlies in the mornings with weak southerlies to south westerlies in the late afternoons. The wind pattern in the autumn and winter months is dominated by light winds from the northwest, typically in the afternoons. Winds in spring are typically moderate to strong westerly winds in the afternoons (Bureau of Meteorology 2015).

3.3 Ambient dust

The Midwest region of WA is known to have high ambient dust levels due to climatic conditions (Payne *et al.* 1998). Significant uncertainty currently exists with regard to the ambient level of total suspended particles (TSP).

The average dust deposition data recorded on site between October 2010 and December 2014 shows an average insoluble solids deposition of 0.8g/m^2/month site wide. The control site located greater than 4km from the mining operation recorded an average of 0.5g/m^2/month insoluble solids over this period and the closest site to the mine pit averaged 1.1g/m^2/month. A gauge located near the Great Northern Highway, installed in January 2014, had the highest average of 1.7g/m^2/month. Gauge DM4, located approximately 750m south of the mine pit averaged 0.7g/m^2/month, which was similar to the control site.

The current location of the dust deposition gauges installed and monitored for fugitive dust emissions associated with the Extension Hill mining operations is shown in **Figure 2**, however this is subject to change, as the monitoring program may be adjusted where required. Additional dust deposition gauges will be installed and monitored for the management of fugitive dust emissions associated with the proposed Iron Hill mining operations. Monitoring locations will be based on prevailing weather conditions and accessible areas with established tracks.

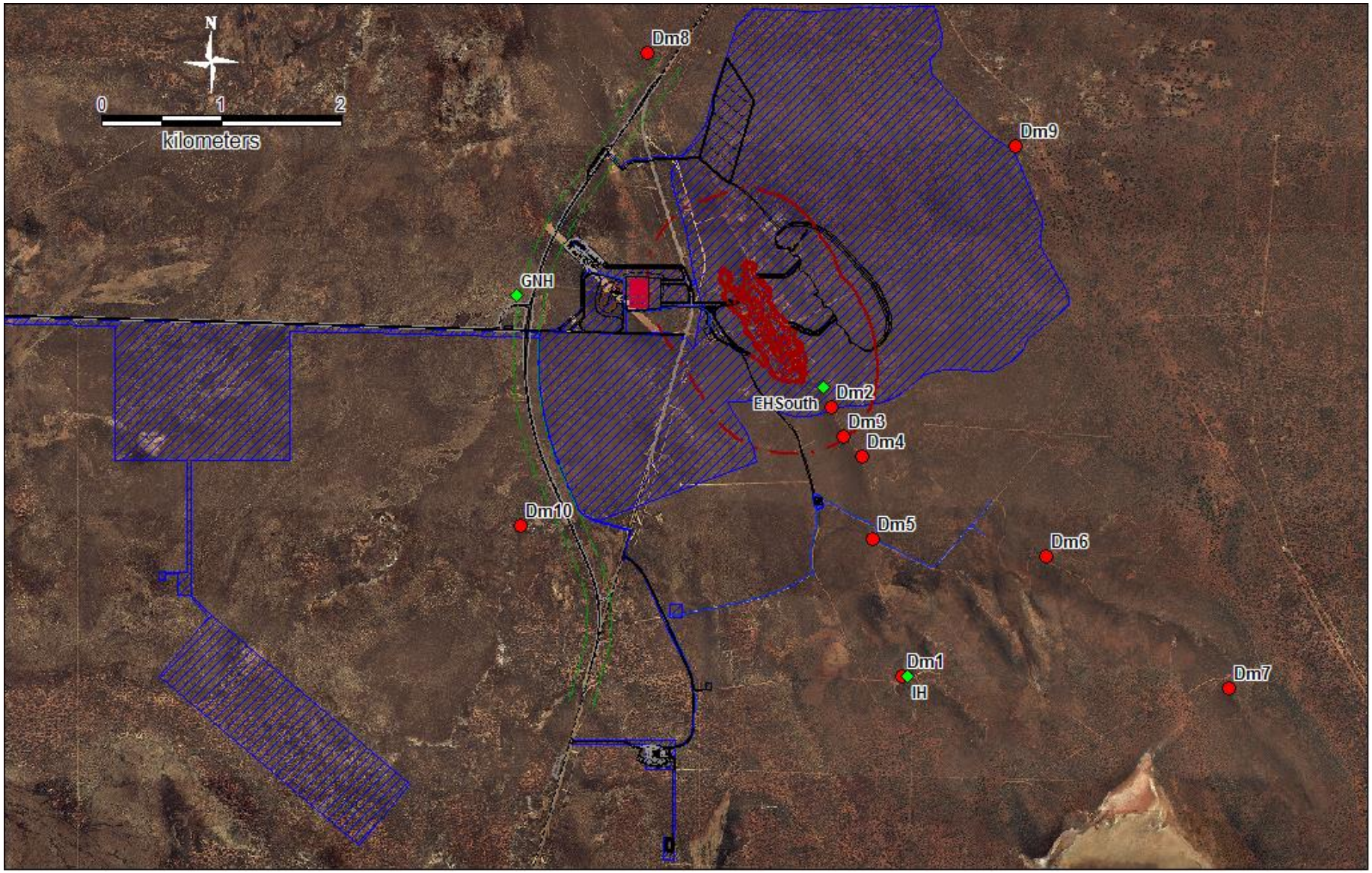


Figure 2 Arrangement of MGX dust gauges at Mt Gibson ranges mine operations (Dm1 at Iron Hill would be relocated to Iron Hill North)

3.4 Hydrology

Surface drainage in the Mt Gibson Ranges area is primarily characterised by ephemeral flows. An ephemeral drainage line flows intermittently from Iron Hill North in a south easterly direction to a claypan located 4km south-southeast of the mine site. Two smaller salt lakes are located approximately 2km to the south of the claypan. A second ephemeral drainage line flows intermittently in a north easterly direction from Iron Hill East while a third drainage line also flows intermittently in a north easterly direction from Extension Hill South. Both of the latter drainage lines result in sheet flow across the plain after periods of heavy rain, with the drainage leading to the Lake Monger paleo-drainage system, 30km to the north of Extension Hill.

3.5 Bioregions

The Mt Gibson Ranges occurs on the boundary of the Austin Botanical District of the Eremaean and the Avon Botanical District of the Southwest Botanical Provinces (Beard 1990). They are located in the Avon Wheatbelt bioregion (McKenzie *et al*. 2003) but it is near the junction of the Yalgoo and Coolgardie Interim Biogeographical Regional Assessment (IBRA) bioregions. As a consequence, the floristic composition of the area is considered to be representative of all three Bioregions. The area has been recognised for its biological diversity (Vital Options Consulting 2004).

3.6 Vegetation

The Mt Gibson Ranges contain diverse vegetation communities including woodland, Mallee, thicket and heath associations. Originally about sixty vegetation associations were identified across the tenements across the Ranges (ATA Environmental 2005a, 2006b; Bennett Environmental Consulting 2000). More recently, in 2015 using the same data sets and after adding additional vegetation data from the Iron Hill Deposits development envelope, Ecologia mapped the distribution of vegetation groups based on floristic composition. This is shown in **Figure 5**. The effect of the co-occurrence of the Iron Hill Deposits mine and infrastructure and the native vegetation is described in Ecologia (2015) and the PER (MGM 2015).

The ridges of the Mt Gibson Ranges support flora of conservation significance and a variety of vegetation communities, with Acacia species, Melaleuca species and *Allocasuarina acutivalvis* subsp. *prinsepiana* being the dominant taxa. The woodland plains typically consist of *Eucalyptus loxophleba* subsp. *supralaevis* or mallees of *E. brachycorys* and *E. hypochlamydea* subsp. *hypochlamydea*, which are often associated with *Callitris collumellaris* and *Eucalyptus loxophleba* subsp. *supralaevis*.

Bennett (2000) and ATA (2006c) mapped a total of 59 vegetation units across the Mt Gibson Ranges and surrounds, broadly categorised into woodlands, thickets, shrublands and heaths. Based on that mapping the Project coincided with only four of fifty-nine vegetation units (T3, T9, M1 and W4), comprising of woodlands, mallees and thickets.

3.7 Flora

Flora surveys undertaken across the Mt Gibson Ranges and surrounds have identified more than 250 native flora taxa (ATA 2006a; Meissner & Caruso 2008). In the recent Ecologia (2015) survey, a total of 116 vascular flora taxa were recorded in the Project area and immediate vicinity. Aside from *Darwinia masonii* and *Lepidosperma gibsonii*, no other conservation significant flora species have been recorded within the Project Area.

3.8 Significant flora species of the Project Area

Two rare flora *Darwinia masonii and Lepidosperma gibsonii* have been recorded in the Project area. *Darwinia masonii* was declared as ‘Rare Flora’ under the *Wildlife Conservation Act 1950* (WA) in 1980, and listed as a ‘Threatened Species’ of flora under the *Environment Protection and Biodiversity Conservation Act 1999* in 2000 (DPaW 2008b). *Lepidosperma gibsonii* was declared as ‘Rare Flora’ under the *Wildlife Conservation Act 1950* (WA) in 2006 (DPaW 2008a). *Lepidosperma gibsonii* is not listed as a ‘Threatened Species’ of flora under the *Environment Protection and Biodiversity*

Conservation Act 1999 (C'th). The potential direct and indirect impacts to *Darwinia masonii* and *Lepidosperma gibsonii* are described within *Mt Gibson Range Mine Operations - Iron Hill Deposits Environmental Protection Act 1986 (WA) Environmental Impact Assessment (Public Environmental Review)* (MGM 2015).

Darwinia masonii

Darwinia masonii (Mason's Darwinia) is a medium-sized erect shrub to three metres in height with characteristic grey-green foliage and numerous spreading pinkish pendulous bracts. The leaves are small, narrow and near-triangular in cross-section, crowded towards the ends of branchlets. The inflorescences are comprised of numerous small tubular flowers. Darwinia masonii generally flowers between April and November (Brown et al. 1998). Darwinia masonii has been recorded only from the area of the Mt Gibson Ranges, where it occurs at elevations above 330mAHD on skeletal or shallow clay soils and shallow pockets associated with ironstone, granite, lateritic breakaway formation and creeks (Brown et al. 1998; Eco Logical 2015a; MGM & EHPL 2014a). A total of 62% of Darwinia masonii records are associated with ironstone ridges.

An image identifying some of the translocated *Darwinia masonii* referred to by BGPA (2010) is identified by **Figure 3**. The survival rate after approximately nine years (2005 to 2014) is currently approximately 80% within irrigated plots (irrigated for the first two years, but not after), with approximately 90% of measured individuals recorded as reproductive during the 2013 year (pers. com. J Sackmann of MGM, March 2014). Numerous seedlings recorded immediately surrounding the translocation plots, as also identified depicted by **Figure 3**, additionally assist to confirm the translocated individuals have reached reproductive maturity and produce viable seed.
Individuals of *Darwinia masonii* have also been identified as colonising exploration access tracks and drilling pads at various locations across the Mt Gibson Ranges. These records indicate *Darwinia masonii* can grow from soil-stored seed following land disturbance.



Figure 3 Translocated Darwinia masonii from green-stock cuttings, and seedlings.

1. Translocated *Darwinia masonii* from green-stock cuttings established in 2005, as at September 2014, with the individuals recorded as healthy and flowering. 2. *Darwinia masonii* seedlings recorded directly outside of the translocation plot fence. 3. *Darwinia masonii* seedling recorded directly outside of the translocation plot.

Furthermore, individuals of *Darwinia masonii* have also been recorded as germinating within topsoil stockpiles (pers. com. J Sackmann of MGM, November 2014). The distribution and abundance records of the two rare flora species on the ranges are shown in **Figure 4.**

Lepidosperma gibsonii
Lepidosperma gibsonii is a fine-leaved herb (sedge) to 0.6m height with angular and distinctly diamond-shaped pale green leaves. *Lepidosperma gibsonii* has been recorded only from the area of the Mt Gibson Ranges and its surrounds, where it occupies ridge habitats on steep slopes or gullies, and beyond ridges occupies granite outcrops and breakaways (and associated drainage lines down-slope) and loamy flats. *Lepidosperma gibsonii* generally flowers between May and June (DPaW 2008a).

An early census of the *Lepidosperma gibsonii* population in 2006 (ATA 2006d) recorded approximately 17,600 individuals across the Mt Gibson Ranges and surrounds. Subsequent surveys during 2007 and 2008 (Coffey 2008b, 2008c) recorded further individuals of *Lepidosperma gibsonii*, increasing the recorded population to approximately 45,000 individuals. More recent data from DPaW (2014e) estimates the *Lepidosperma gibsonii* population at between approximately 60,000 to 70,000 individuals;

Within the Mt Gibson Ranges, the species prefers steep slopes or gullies that provide increased water availability from the Ranges. The populations occurring outside of the ranges are associated with low granite outcrops and breakaways, flow lines downslope of granite outcrops and breakaways, and loamy flats in close proximity to the breakaways. The species appear to prefer steep slopes, gullies or flow lines that provide increased water availability.

Lepidosperma gibsonii has been recorded from a number of vegetation communities including three thicket and one heath community (identified as T1, T3, T6 and HS1; ATA Environmental 2006b) within the Mt Gibson Ranges, and low woodland and thicket communities for the populations located outside of the ranges (Coffey Environments 2008a, 2008b).

Although other areas of ironstone formations were surveyed, to date, the species appears to be restricted to the slopes or breakaways / flow lines in the general vicinity of the Mt Gibson Ranges (ATA Environmental 2006b; Coffey Environments 2008a, 2008b).

3.9 Significant vegetation communities

The ironstone ridges within the Mt Gibson Ranges contains floristic communities that are recognised as distinct from the floristic communities on other areas within the Yilgarn Craton. The floristic communities in the Mt Gibson Ranges have been assessed at a number of levels and geographical areas, all of which meet the EPA's definition of significance, i.e. a geographically restricted community. A number of botanists in both government and private organisations undertook this work.

The subtleties in the differences between the communities, when assessed at different levels, have made the floristic communities a complex environmental factor with technical uncertainty.

Accordingly, the various assessments were reviewed to determine the appropriate definition of significant floristic community for management and rehabilitation purposes. The most current work on floristics was produced by Ecologia (2015).

The Project coincides with five floristic units (termed A, B, C, E and K – Table 1); all of which have distributions across the Mt Gibson Ranges beyond the area of the Project (and noting Floristic Group E was also represented further afield by surveyed quadrats such as at Yandhanoo Hill). Groups A, B and C are found in the shrublands and woodlands on the plains, and Groups K is located extensively across the ironstone ridges and slopes (**Figure 5**).

Table 1 Floristic units related to the Project

Floristic Group	Description (dominant and characterising species)	Bennett (2000) Vegetation Unit Equivalent Within Project Area
A	*Eucalyptus kochii* sparse woodland over *Melaleuca hamata*, *Acacia anthochaera* and *Acacia ramulosa* shrubland over *Dianella revoluta* herbs and *Amphipogon caricinus* var. *caricinus* tussock grasses	T9 and near T9/M1 boundary
B	*Eucalyptus horistes* open woodland over *Acacia ramulosa* and *Cryptandra apetala* shrubland over *Triodia scariosa* open hummock grassland	M1, near M1/T3 boundary, T9
C	*Eucalyptus loxophleba* subsp. *supralaevis* woodland over *Acacia anthochaera, Eremophila clarkei*, and *Ptilotus obovatus* shrubland over *Austrostipa elegantissima* tussock grasses	M1 entirely
E	*Calycopeplus paucifolius*, *Acacia tetragonophylla* and *Ptilotus obovatus* open shrubland over *Cheilanthes adiantoides* ferns and *Austrostipa elegantissima* tussock grasses	T3 entirely
K	*Allocasuarina acutivalvis, Melaleauca nematophylla* and *Grevillea obliquistigma* shrubland over *Cheilanthes adiantoides* ferns	T3, near T1/T3 boundary

Priority Ecological Community

The Project coincides with the Priority 1 PEC '*Mount Gibson Range vegetation complexes (banded ironstone formation)*'. This PEC covers an area of approximately 2,732ha (DPaW 2014f), 106.8ha of which is within the Project Area (4% of the total extent of the PEC; includes 7.8ha that is currently disturbed, with 98.9ha of intact vegetation).

Ecological communities that are naturally rare or restricted may require substantially greater than 30% of their pre-European extent to be retained for effective representation and ecological viability (DER 2014b). A total of 76% of the mapped PEC will remain across the Mt Gibson Ranges upon implementation of the Project.

Because of its range, distribution and connectivity, the Project is not expected to have a significant impact to the representation or ecological function within the PEC (Eco Logical 2015b).

3.10 Environmental and declared weeds

Very few weeds occur within the tenements. The Environmental Weed Strategy (EWS) rates environmental weeds as high, moderate, mild or low based on their potential invasiveness, distribution and ability to change the structure, composition and function of ecosystems (CALM 1999). This rating provides the basis for identifying control priorities, with the highest rated species posing the greatest threat to conservation values. The weed species recorded at or within the vicinity of the Mt Gibson Ranges have been identified and their respective rating of potential impact on biodiversity is detailed in Table 2.

Of the species recorded at or in the vicinity of the Mt Gibson Ranges, Paterson's Curse (*Echium plantagineum*), Ruby Dock *(Rumex vesicarius*), Maltese Cockspur (*Centaurea melitensis),* Mediterranean Turnip (*Brassica tournifortii*) and Ward's Weed (*Carrichtera annua*) are highly invasive weeds (Bennett Environmental Consulting 2000). Paterson's Curse has been recorded at Paynes Find while Ruby Dock, Maltese Cockspur and Wards Weed are all common throughout the Goldfields. The population of these weeds at or within the vicinity of the Mt Gibson Ranges is currently small and isolated.

Table 2 Weeds recorded within or adjoining the Mt Gibson tenement area

Scientific name	Common name	Rating for impact on biodiversity1
Acetosa vesicaria (formerly *Rumex vesicaria*)	Ruby Dock	high
Anagallis arvensis	Scarlet Pimpernel	moderate
Artctotheca calendula	Capeweed	moderate
Brassica tournifortii	Mediterranean turnip	high
Bromus diandrus	Great Brome Grass, Brome Grass, Ripgut	high
Bromus rubens	Red Brome	moderate
Carrichtera annua	Ward's Weed	high
Centaurea melitensis	Maltese Cockspur	moderate
Echium plantagineum	Paterson's Curse	high
Ehrharta longiflora	Annual Veldtgrass	moderate
Emex Australis	Doublegee	low
Erodium botrys	Long Storksbill	low
Hedypnois rhagadiodes	Cretin Weed	mild
Hordeum leporinum	Barley Grass	moderate
Hypochaeris glabra	Smooth Catsear	moderate
Malva parviflora	Marshmallow	low
Medicago truncatula	Barrel Medic	mild
Mesembryanthemum crystallinum	Common Iceplant	moderate
Mesembryanthemum nodiflorum	Slender Iceplant	mild
Monoculus monstrosus (formerly *Osteospermum clandestinum)*	Stinking Roger	low
Pentaschistis airoides	False Hairgrass	moderate
Petrorhagia dubia (formerly *Petrorhagia velutina*)	Velvet Pink	mild
Polycarpon tetraphyllum	Four Leaf Allseed	low
Rostraria pumila	Tiny Bristle Grass	moderate
Sisymbrium orientale	Indian Hedge Mustard	moderate
Sonchus oleraceus	Common Sowthistle	moderate
Spergularia rubra	Sand Spurry	moderate
Trifolium tomentosum	Clover	low
Ursinia anthemoides	Ursinia	moderate
Verbesina enceliodes	Crown Beard	low

[1] after CALM (1999)

3.11 Fire

Bushfires occur naturally and frequently in this region, mostly started by lightning strikes or human activities. Bushfires may occur in any month of the year, but generally will not run through the night during the cooler winter months. Fires in the ranges historically occur at an interval of 15-35 years, although they have occurred more frequently in recent times (ICS Group 2006).

A preliminary fire history about the mine site was compiled using aerial photography and satellite imagery (**Figure 6**). A large fire in approximately 1969 appears to have started near the Great Northern Highway rest area and burnt about half of the central and eastern parts of the Mt Gibson Ranges including the west slope of Extension Hill, all of Extension Hill South and Mt Gibson, and the hills between Iron Hill and Mt Gibson. Some parts of Extension Hill North may also have been burnt but have not been mapped.

An extensive fire occurred around 1973 on the sand plain to the west of the range, and burnt the hill south of Extension Hill South.

A large fire in February 2003 burnt approximately one third of the range – between the eastern slope of Iron Hill and the western slope of Mt Gibson. The eastern half of this fire was previously burnt in the 1969 fire.

A small fire in December 2005 burnt a small area on the western slope of Extension Hill North. This area was last burnt around 1969.

Anecdotal observations by geologists and botanists (Muir Environmental 1995) suggest that a fire occurred somewhere in the Ranges in 1992-1993 and in the northern part (at least) of Extension Hill between 1983 and 1990. These observations do not agree with the air photos from 1990 and 1996 or medium quality satellite imagery from 1989 and 2000, which show no other fire scars. It appears that casual observations of the fire intervals are unreliable.

A small trial burn was conducted at the northern end of Extension Hill South in May 2009 by Botanic Gardens and Parks Authority, and DEC as part of a research Project. There have been no significant fires since the commencement of hematite operations in 2010.

Considering the fire history, it appears that weather conditions, vegetation and topography have a bigger influence on fire behaviour than fuel age.

From a bushfire perspective, the vegetation in the Mt Gibson Ranges area is of four main types, two of which are fire-prone:

1. Open eucalypt woodland, dominated by York gum and Salmon gum, with flat to gently undulating topography and an open shrub understorey. This landscape will not support a running fire, except when seasonal conditions (especially winter rainfall) promotes the development of fields of annuals (“everlastings”) which cure and become a continuous fire fuel in the subsequent summer. These areas will burn every two years if there is sufficient winter rainfall to germinate the fields of annuals, but the fires are generally patchy, leaving unburnt rocky areas and eucalypt thickets without an understorey or grass;
2. Sandplains, comprising dense woody shrublands mostly undifferentiated into an over- and understorey. These areas will burn *en masse* under hot windy conditions, and the fires are usually very intense and widespread, leaving nothing unburnt in their path. Burnt areas are rendered relatively “fire-proof” for the subsequent 5-8 years;
3. Salt lake verges, comprising cypress pine and scattered shrubby eucalypts with a sparse understorey. These areas generally do not carry a fire except after an exceptionally wet winter; and
4. The rocky slopes and ironstone uplands of the ranges, which carry a heath-like low woody shrub cover and a few low trees, mostly wattles or she-oaks. These areas are highly flammable and will

burn fiercely, but not generally more frequently than at 5-year intervals. Fires are wind-driven, and burn in tongues, leaving unburnt strips.

The bushland in the immediate vicinity of the mine site is open eucalypt woodlands or rocky uplands. The dry tailings and waste dump will be located in an area of sandplain. There is a small area of salt lake country on the mining lease located to the south of the ironstone ranges.

3.12 Fauna

The Mt Gibson area contains diverse fauna assemblages representing 112 species including 64 species of birds, 38 species of reptiles and 10 species of mammals, of which five have been introduced (ATA Environmental 2005b). Three broad fauna habitats have been identified within the Project Area (Terrestrial Ecosystems 2012, 2014):

(a) Flat Sand Plains;
(b) Flat Eucalypt Woodlands; and
(c) Ironstone Ridges.

3.13 Significant fauna species

Four conservation listed fauna taxa have been recorded within the Project Area:

(a) *Idiosoma nigrum,* Shield-backed Trapdoor Spider;
(b) *Leipoa ocellata*, Malleefowl;
(c) *Cacatua leadbeateri*, Major Mitchell's Cockatoo; and
(d) *Falco peregrinus*, Peregrine Falcon.

***Idiosoma nigrum*, Shield-backed Trapdoor Spider (Schedule 1/Vulnerable)**
Idiosoma nigrum (Shield-backed Trapdoor Spider) is a large trapdoor spider, dark brown to black in colour, with a distinctive thick and hard shield-like abdomen, with its sides deeply grooved giving a rugose, corrugated appearance (DoE 2010 cited in DoE 2013b). *Idiosoma nigrum* occupies semi-arid habitats and lives in tubular burrows approximately 20-30cm deep (Main 1992 cited in DoE 2013b), with a fan of leaf and twig trip-lines attached to the burrow rim which alerts the spider to the movement of prey (ants, beetles, cockroaches, millipedes and moths) outside of the burrow entrance (Clark and Spier 2003 and DoE 2010 both cited in DoE 2013b). Dispersal of *Idiosoma nigrum* is estimated to be less than 500m (Main unpublished in DoE 2013b), resulting in a spatial clustering of burrows.

DPaW (2014j) identifies *Idiosoma nigrum* as having a recorded linear distribution of approximately 750km, extending from near Pinjarra in the south and towards Meekatharra in the north. *Idiosoma nigrum* has been recorded in low numbers across the length of the Mt Gibson Ranges (Biologic 2015a). A total of 92 active *Idiosoma nigrum* burrows have been recorded at the Mt Gibson Ranges through targeted searches, however, this taxon is undoubtedly more abundant across the Mt Gibson Ranges beyond the targeted search areas. The Project coincides with 22 known records of *Idiosoma nigrum* burrows. All burrows of this species were recorded on the gentler lower slopes and the adjacent plains, primarily in *Acacia* thickets on loam and clay-loam soils. Habitat presence is thought to be influenced by the survivability of individuals both in burrows and on the surface (Biologic 2015a).

***Leipoa ocellata*, Malleefowl (Schedule 1/Vulnerable)**
Leipoa ocellata (Malleefowl) is a large and distinctive ground-dwelling bird which builds large nest-mounds on the ground made of leaf litter and soil materials (sand or loam) (DoE 2014e). The upper body of *Leipoa ocellata* is boldly barred with grey, white, black and rufous, with a cream-white breast and belly (DPaW 2012). *Leipoa ocellata* rarely flies; if disturbed, it will usually run away to escape the intrusion (DoE 2014e).

Leipoa ocellata has been recorded across all mainland states of Australia except Queensland, with an estimated 100,000 breeding individuals (Garnett and Crowley 2000 cited in DoE 2014e). *Leipoa ocellata* has been assessed as meeting the 'Vulnerable' category using the IUCN (2001) criteria due to a population size reduction. Within Western Australia, DPaW (2014k) identifies *Leipoa ocellata* as having a linear distribution of approximately 1,400km, extending from Albany in the south and Shark Bay in the north, and east to the border of South Australia.

Leipoa ocellata occurs in dense to medium-dense scrubs and thickets of *Eucalyptus, Melaleuca*, and *Acacia* on flat lower slopes. A total of 332 *Leipoa ocellata* nest mounds have been recorded across the Mt Gibson Ranges and its surrounds, comprising 24 recently active[2] nest mounds and 308 inactive[3] nest mounds (ATA 2005b; Biologic 2015b; MGM 2011, 2012). The Project coincides with five inactive *Leipoa ocellata* nest mounds; with these records indicating the presence of habitat suitable for *Leipoa ocellata* foraging and nesting. While the Project Area does not coincide with any known recently active *Leipoa ocellata* nest mound, this species is known to reuse inactive mounds, years after they were last utilised, rather than constructing new mounds (NHT 2007 in Biologic 2015b).

***Cacatua leadbeateri*, Major Mitchell's Cockatoo (Schedule 4)**

Cacatua leadbeateri (Major Mitchell's Cockatoo) is a small cockatoo with a salmon-pink face and underparts, and with a white and scarlet (red-pink) forward curving crest (WAZA 2014). This species is found in the semi-arid and arid zone throughout much of Australia. DPaW (2014l) identifies *Cacatua leadbeateri* as having a linear distribution of approximately 1,500km, extending from the western coast of Western Australia to the border of South Australia. The broader distribution of *Cacatua leadbeateri* includes South Australia, Northern Territory, Queensland, New South Wales and Victoria (IUCN 2014b). They nest in large tree hollows, usually Eucalypts, ideally close to water sources. The conservation status of *Cacatua leadbeateri* has been assessed as of 'Least Concern' (i.e. not threatened) (Birdlife International 2012 cited in IUCN 2012b), however this species is listed under Schedule 4 (Other Specially Protected Fauna) of the *Wildlife Conservation Act 1950* (**WC Act**).

Cacatua leadbeateri has been recorded across the length of the Mt Gibson Ranges (Biologic 2015b; Ecologia 2014b; Terrestrial Ecosystems 2012, 2014), with most records from the plains to the east of the Mt Gibson Ranges. They have been observed foraging in the *Eucalyptus* spp. and understorey shrubs in the vicinity of the Project Area; Flat Eucalyptus Woodlands within the Development Area may provide suitable nesting and foraging habitat (Ecologia 2014), while there is a record of this species feeding on *Acacia murrayana* seed pods within Flat Sandy Plains habitat north of the Project Area (Ecologia 2014). A record of a pair of birds observed multiple times in the vicinity of Flat Eucalyptus Woodlands habitat less than 3km from the Project Area during 2011 and 2013, suggested that they were a breeding pair with a nest and chicks in the area (Terrestrial Ecosystems 2014). The Project Area coincides with two records of *Cacatua leadbeateri*.

***Falco peregrinus*, Peregrine Falcon (Schedule 4)**

Falco peregrinus (Peregrine Falcon) is a large bird of prey with a black crown and cheeks, blue-black upperparts with darker mottles and creamy white chin, throat and underparts, with numerous dark bars from the breast to the tail, with a yellow eye ring and upper parts of the beak (PaWST 2011). DPaW (2014m) identifies *Falco peregrinus* as occurring throughout Western Australia, with a linear distribution of approximately 2,500km extending from the south near Albany to the north near Kununurra. The broader distribution of *Falco peregrinus* includes all States and Territories of Australia, and globally occurs across all continents (PaWST 2011; IUCN 2014c). *Falco peregrinus* occupies a variety of habitats including inland cliffs, rocky outcrops and gorges, coastal cliffs and islands, open woodlands near water, and can also be found nesting on ledges of high city buildings (PaWST 2011). The conservation status of *Falco peregrinus* has been assessed as of 'Least Concern' (i.e. not threatened; Birdlife International 2014 cited in IUCN 2014c), however this species is listed under Schedule 4 (Other Specially Protected Fauna) of the WC Act.

Falco peregrinus was recorded at four locations in the vicinity of the Mt Gibson Ranges (Terrestrial Ecosystems 2014; Ecologia 2014b), with the majority of sightings from the plains to the east of the Mt Gibson Ranges. The Project coincides with one past record of *Falco peregrinus*, near the top of Iron Hill South within the Project Area (Terrestrial Ecosystems 2014).

[2] "active" is the term used to describe *Leipoa ocellata* nest mounds that exhibit characteristics associated with normal nesting activity (i.e. nest mounded up, litter trails leading to mound, extensive soil and litter disturbance, and/or birds seen actively digging) (Natural Heritage Trust c.2007).

[3] "inactive" is the term used to describe *Leipoa ocellata* nest mounds that do not exhibit characteristics associated with any nesting activity.

3.14 Social and Heritage matters

The Mid-west Region has a well-documented history of both Aboriginal and European heritage, with the heritage values identified by surveys documented on Commonwealth, State and local heritage registers. The Project does not coincide with any European heritage record on the State Register of Heritage Places maintained by the Heritage Council of Western Australia under the Heritage of Western Australia Act 1990 (WA) (HCWA 2014). While the Project Area does not overlap with any area of determined Native Title under the *Native Title Act 1993* (C'th) (NNTT 2014a), it coincides with a registered application for Native Title for the Badimia People (NNTT 2014a, 2014b) and an unregistered application for Native Title for Badimia #2 (NNTT 2014a, 2014c).

The Project does not coincide within any 'Registered Site' of Aboriginal Heritage under the *Aboriginal Heritage Act 1972* (WA) (DAA 2014a). However, DAA record 25293 'Extension Hill' is an 'Other Heritage Places' (ceremonial/mythological) record held by the Department of Aboriginal Affairs (DAA) (DAA 2014b, 2014c) that encompasses the Mt Gibson Ranges, including the Project Area. This record was submitted by the Widi Mob (Tehnas 2010) who have since reduced their area of Native Title claim to now exclude the Mt Gibson Ranges (NNTT 2014a).

The Project occurs in proximity to the DAA record 21626 'Iron Hill 1', which is for a small artefact/scatter. The DAA were notified of this record by the Badimia People (DAA 2014b, 2015). It is located beyond the boundary of the Project Area. DAA record 21626 is not considered to be significant in context with the regional archaeology of the central Murchison region (Tehnas 2010). DAA record 21626 will be demarcated to avoid inadvertent access to this area, and mitigations will be applied at the boundary of the Project Area.

The Project is located in proximity to a number of Pastoral Leases, being the Mt Gibson Pastoral Lease (approximately 1km north of the Project), Ninghan Pastoral Lease (3km north), White Wells Pastoral Lease (3km west) and the Wanarra Pastoral Lease (20km west).

The Mt Gibson Ranges are not located near any area of public occupation. The nearest occupied townsite to the Mt Gibson Ranges is Wubin, located approximately 75km south-west of the Mt Gibson Ranges. The nearest occupied residence is located greater than 10km west of the Mt Gibson Ranges.

The current land use of the Mt Gibson Ranges is for mineral exploration and mining operations; consistent with the purpose of the Mining Tenements. Mineral exploration and mining operations at the Mt Gibson Ranges has a history spanning approximately 50 years, with mineral exploration commencing in the 1960's, and mining operations commencing in 2010.

4.0 Risk Assessment

4.1 Environmental risk management

The environmental risk management method of this report is aligned with internal MGX policies, standards and procedures for risk management which are aligned with the AS/NZS ISO 31000:2009 risk management standard.

Benefits and special considerations of the risk assessment are discussed in Sections 4.2 and 4.3. The environmental risk model (Section 4.4) and method (Section 4.5) were developed during a series of workshops between senior management, mine managers and operators, environmental managers, legal and environmental advisors, and has taken an adaptive management approach by incorporating operational site knowledge gained through mining operations at Extension Hill.

Section 4.7 identifies potential sources of environmental risk associated with the Project.

Aspects of the mine operation, sources of risks and risk events likely to have an environmental impact are discussed in Sections 4.8, 4.9 and 4.10, respectively. The risk assessment and inherent risk severity and rating are listed in Table 7.

4.2 Benefits

Key benefits of the risk based environmental assessment (Standards Australia HB 203:2006) are to:

- prioritise environmental risks and manage those risks effectively;
- make compliance with relevant legislation easier to demonstrate;
- combine the protection of significant environmental factors and day to day mine management;
- improve environmental accountability;
- achieve informed decision making and greater transparency in decision making processes;
- reduce the organisations exposure to risk;
- provide effective strategic planning as a result of increased knowledge of environmental risks;
- better prepare and facilitate positive outcomes;
- improve audit processes; and
- provide better outcomes in terms of effectiveness, efficiency and appropriateness of programs.

4.3 Special features

Environmental risk assessment differs from other types of risk assessment because of the complexity of the environment (Standards Australia handbook HB 203:2006). The interactions occurring between different environmental factors within the ecosystems create a high degree of complexity and introduce significant uncertainty. In addition, the environmental effects are very difficult to predict and must often be made when there is still significant scientific uncertainty about potential outcomes.

Factors that affect the assessment process (Standards Australia HB 203:2006) include:

- lack of data and the need to make assumptions;
- natural variability;
- application of immature sciences with large differences of opinion at a scientific level;
- long time spans in which ecological change may occur, and the differentiation between natural or man-made causes;
- potential effects on the environment and economic welfare at different geographic levels (i.e. local, regional, national, international and global scales); and
- the complex and extensive web of stakeholders.

4.4 Model

The environmental risk model is defined by the following:

- consequence of an event (Table 3);

- likelihood of an event occurring (Table 4); and
- consequence, likelihood and risk severity matrix (Table 5);

Table 3 was developed to address the specific risks of the Project. The site specific levels contained in Table 3 were developed during internal risk assessment workshops attended by senior management, mine managers and operators, environmental managers, legal and environmental advisors. These consequence ratings were based on the ecosystem level of effect of each element and the potential for ecosystem recovery following an incident. The risk elements are interconnected and the consequence rating is triggered by that aspect defining the highest level of severity. These levels and ratings have been developed and revised following technical meetings and discussions with DEC.

The general environmental consequence column has been included in this revision to cover any eventualities not addressed by the more specific consequences and to enable complete integration with the corporate risk management procedure. This removes the requirement for a secondary risk and incident assessment system for all environmental risks.

A key management objective is to undertake mining operations in a manner which seeks to avoid any of the potential events referred to in Table 3. The importance of Table 3 is that it governs what responses will be made by management if one of the events occurs. The range of responses, depending on the consequence of the event, are provided in Table 9. Table 3 in no way implies that this EMP is authorising, or providing a defence to, the activity under the *Wildlife Conservation Act 1950* or the *Environmental Protection Act 1986*.

Significant flora and floristic communities' consequences
Significant flora and floristic communities' consequences are shown in Table 3.

Identification and monitoring of significant floristic communities is complex (Section 3.9). Accordingly, whilst significant floristic communities will be monitored, it is proposed that *Darwinia masonii* or *Lepidosperma gibsonii* (or both as applicable) shall serve as a proxy for significant flora and floristic communities about the mine site.

The term of the environmental effect, such as dust or fire, on *Darwinia masonii* or *Lepidosperma gibsonii* resulting from mining activities have been categorised as follows:

- Short term – less than 1 year duration;
- Medium term – between 1 year and 5 years; and
- Long term – greater than 5 years.

Fugitive dust consequences
Consequence definitions for fugitive dust are reliant on the number of measurements which exceed the threshold criteria per annum as a result of mining activities.

Bush fire
Consequence definitions for bush fire are reliant on the number of bush fires affecting native vegetation per annum as a result of mining activities.

Weed consequences
Consequence definitions for weeds rely on:

- biodiversity rating; and
- percentage of total tenement area effected.

Responsibility for weeds about the mine site shall extend for the life of the mine until lease relinquishment.

Fauna consequences
Consequence definitions for fauna rely on a specified number of deaths per incident of significant fauna as proxies for general fauna.

Risk model development
The environmental risk model was developed during workshops between senior management, mine managers and operators, environmental managers, legal and environmental advisors.

Table 3 Consequence of actual or potential event, reference text for definitions and proxies

Reference	Descriptor	Significant Flora and Floristic Communities	Fugitive Dust	Bush Fire	Weeds (relative to baseline data)	Malleefowl	Fauna
1	**Catastrophic**	Short to medium-term severe damage of greater than 30% or long-term damage to greater than 20% of the known populations of *Darwinia masonii* or *Lepidosperma gibsonii* as a result of mining activities.	More than six measurements per annum that exceed the settled fugitive dust standard.	Greater than 11 fires affecting native vegetation per annum as a result of mining activities.	Environmental weed species with a high biodiversity impact rating present in >2% of tenement area as a result of mining activities; or Environmental weed species with a moderate biodiversity impact rating present in >5% of tenement area as a result of mining activities; or Environmental weed species with a mild or lower biodiversity impact rating present in >10% of tenement area as a result of mining activities	Destruction of two or more active Malleefowl mounds from mining activities; or destruction of greater than three inactive Malleefowl mounds from mining activities; or death of greater than three adult birds from mining activities.	Death of greater than three individuals of species of conservation significance as a result of mining activities.
2	**Major**	Short to medium-term damage to 15 - 30% or long-term damage to 5-20% of the known populations of *Darwinia masonii* or *Lepidosperma gibsonii* as a result of mining activities.	Four to six measurements per annum that exceed the settled fugitive dust standard.	Six to ten fires affecting native vegetation per annum as a result of mining activities.	Environmental weed species with a high biodiversity impact rating present in 1-2% of tenement area as a result of mining activities; or Environmental weed species with a moderate biodiversity impact rating present in 2-5% of tenement area as a result of mining activities; or Environmental weed species with a mild or lower biodiversity impact rating present in 5-10% of tenement area as a result of mining activities.	Destruction of one active Malleefowl mound from mining activities; or destruction of three inactive Malleefowl mounds from mining activities; or death of 3 adult birds from mining activities.	Death of three individuals of species of conservation significance as a result of mining activities.
3	**Moderate**	Short to medium-term damage to 5-15% or long-term to less than 5% of the known populations of *Darwinia masonii* or *Lepidosperma gibsonii* as a result of mining activities.	Two to three measurements per annum that exceed the settled fugitive dust standard.	Four or five fires affecting native vegetation per annum as a result of mining activities.	Environmental weed species with a high biodiversity impact rating present in <1% of tenement area as a result of mining activities; or Environmental weed species with a moderate biodiversity impact rating present in 1-2% of tenement area as a result of mining activities; or Environmental weed species with a mild or lower biodiversity impact rating present in 2-5% of tenement area as a result of mining activities.	Damage to one active Malleefowl mound from mining activities; or destruction of two inactive Malleefowl mounds from mining activities; or death of two adult birds from mining activities.	Death of two individuals of species of conservation significance as a result of mining activities.
4	**Minor**	Short to medium-term damage to less than 5% of the known populations of *Darwinia masonii* or *Lepidosperma gibsonii* as a result of mining activities.	One measurement per annum that exceeds the settled fugitive dust standard.	Two or three fires affecting native vegetation per annum as a result of mining activities.	Environmental weed species with a moderate biodiversity impact rating present in <1% of tenement area as a result of mining activities; or Environmental weed species with a mild or lower biodiversity impact rating present in 1-2% of tenement area as a result of mining activities.	Destruction of one inactive Malleefowl mound from mining activities; or death of one adult bird from mining activities.	Death of one individual of species of conservation significance as a result of mining activities.
5	**Insignificant**	Short to medium-term damage to an insignificant proportion of the known populations of *Darwinia masonii* or *Lepidosperma gibsonii* as a result of mining activities.	No measurements exceeding the settled fugitive dust standard.	Less than two fires affecting native vegetation per annum as a result of mining activities.	Environmental weed species with a mild or lower biodiversity impact rating present in <1% of tenement area as a result of mining activities.	Damage to an inactive mound from mining activities.	No death of individual(s) of species of conservation significance as a result of mining activities.

Table 4 Likelihood of event occurring

REFERENCE	DESCRIPTOR	DESCRIPTION
A	Almost certain	Is expected to occur in most circumstances (e.g. once per week)
B	Likely	Will probably occur in most circumstances, to happen at some point (e.g. once per month but not daily)
C	Possible	Should occur at some time (e.g. once per year but not monthly)
D	Unlikely	Not likely to happen (e.g. less than one per year)
E	Rare	Practically impossible. May occur only in exceptional circumstances (e.g. unlikely to ever occur, greater than 30 years)

Table 5 Consequence, Likelihood and Risk Severity Matrix

LIKELIHOOD	CONSEQUENCE				
	1 - Catastrophic	2 - Major	3 - Moderate	4 - Minor	5 - Insignificant
A Almost Certain	1	3	6	10	15
B Likely	2	5	9	14	19
C Possible	4	8	13	18	22
D Unlikely	7	12	17	21	24
E Rare	11	16	20	23	25
RISK SEVERITY	Extreme (E): 1-8	High (H): 9-16	Moderate (M): 17-20	Low (L): 21-25	

4.5 Method

The environmental risk assessment method for the EMP was developed during workshops between senior management, mine managers and operators, environmental managers, legal and environmental advisors. The environmental risk management method is in accordance with MGX internal policies, standards and procedures for risk management which are aligned with AS/NZS ISO 31000:2009 risk management standard.

The main elements of the environmental risk assessment process used for this EMP involves:

- identification of the key *environmental aspects* of the Project (including those relating to its development, operation and closure;
- identification of the potential *sources of risk*, *risk events* and *potential impacts* for each of these environmental aspects;
- an estimation (assuming the listed controls are in place) of the *likelihood* of each risk event occurring, the potential environmental *consequences* if it did occur and the subsequent determination of a *residual risk* rating for each risk event.

The parameters used for the determination of risk event consequence, risk likelihood and risk level are set out in Tables 3, 4 and 5 respectively. Table 3 was reviewed in consultation with DEC technical officers in 2008. It has been reviewed and updated by site personnel based on operational knowledge. Table 7 shows the risk assessment for each environmental aspect of the Project.

Further details on the methodology used for the EMP are provided in the sections below.

4.6 Environmental considerations

In undertaking the risk assessment, members of the workshops gave particular consideration to:

- *Darwinia masonii* and *Lepidosperma gibsonii* population distribution;
- *Darwinia masonii* and *Lepidosperma gibsonii* genetics;
- *Darwinia masonii* and *Lepidosperma gibsonii* habitat;
- *Darwinia masonii* and *Lepidosperma gibsonii* morphologies;
- *Darwinia masonii* and *Lepidosperma gibsonii* pollinator characteristics;
- distances of *Darwinia masonii*, *Lepidosperma gibsonii* and *Acacia cerastes* populations from the mining activities;
- use of *Darwinia masonii* and *Lepidosperma gibsonii* as a proxy for the effect of dust deposition on significant floristic communities*;*
- significant flora;
- the relationship between plant mortality;
- ability to re-establish floristic communities;
- ability to re-establish *Darwinia masonii* and *Lepidosperma gibsonii* through research;
- proximity of Malleefowl mounds to the mining activities;
- Malleefowl ecology and population dynamics;
- significant fauna;
- faunal assemblages and habitats;
- presence and ecology of feral animals;
- topography;
- soils and mine waste rock and their physical, chemical and biological properties;
- climate;

- rainfall;
- surface water, including patterns of flow;
- groundwater, including depth to water table;
- plant re-growth or seed germination responses to fire;
- fire, including frequency and intensity;
- weed invasiveness and ecology;
- ambient airborne dust load of the region;
- annual and seasonal surface wind speed and direction; and
- dust dispersion.

4.7 Environmental aspects

The aspects of the Project which may result in environmental sources of risk were identified during the previously described risk workshops and are listed in Table 7.

4.8 Sources of risk

The *sources of risk* resulting from the mining activities, which may impact on the environment, were also identified during the risk workshops and are listed in Table 7.

The key sources of risk are described in more detail as follows:

Unauthorised clearing
Vegetation clearing can result in permanent changes to the topography and vegetation of the area. There is potential for unauthorised vegetation clearing to have an effect on significant flora (Section 3.8) or significant floristic communities.

Habitat reduction due to clearing can result in starvation of Malleefowl through a reduction in invertebrates, seeds, flowers and fruits (Benshemesh 2000). Malleefowl may also potentially be affected by unauthorised clearing through direct impacts on nesting mounds.

The loss of habitat will impact on fauna species living in the area. Most of the terrestrial species will be lost during the clearing process. Most birds will move to adjacent areas once clearing commences. This displacement alters the available habitat and will increase competition for resources in adjacent areas until a new balance develops.

Fire ignition
Fire ignition and subsequent spread may present a significant threat to the long term survival of *Darwinia masonii*, which is a re-seeder species. By contrast, *Lepidosperma gibsonii* and *Acacia cerastes* are re-sprouting species and, therefore capable of surviving fire to a greater extent than seeder species. Fire can cause large fluctuations in population size, age of plants and geographical distribution of re-seeder species.

There is no specific information on the impact of fire on significant floristic communities. However frequent or intense fires and the seasonal timing of these are likely to change the composition of the communities.

Fire can reduce the habitat available for terrestrial fauna and may cause competition for limited resources. Malleefowl mounds appear to be concentrated in areas of dense canopy, which historically has more than 20 years between fire occurrences.

Mining activity and the availability of rapid management response to fires may result in a reduction in the area burnt and the fire intensity for a given fire event either natural or mine related.

Weed infestation
Environmental weeds have potential to establish, reproduce and disperse and have a serious impact on natural systems and nature conservation values. Weeds can displace native plants by competing for resources (water, nutrients, light, etc.), and may alter fuel and fire dynamics. The introduction and/or spread of weeds as a result of human activities may result in the decline of significant flora and/or floristic communities. In addition, weeds can also have a significant adverse impact on fauna habitats.

An environmental weed species that is highly invasive will have a high rating for its potential to impact on the environment. Highly invasive weeds often spread rapidly. Species with a fast rate of spread will have a more extensive final distribution. Early action to remove these plants is highly effective in preventing serious weed problems.

No significant weed invasion has been observed to date in the vicinity of significant flora or significant floristic communities in the Project area, but is known to exist in the region (Bennett Environmental Consulting 2000; Paul Armstrong and Associates 2004).

Weeds can be locally prevalent along sections of the service corridor, particularly in the agricultural areas and stringent weed hygiene protocols will be implemented at the farm property level to prevent spread during construction and the rehabilitation process.

Feral fauna
An increase in human activity is often associated with an increase in the abundance of feral species such as the house mouse (*Mus musculus*), feral cat (*Felis catus*) and fox (*Vulpes vulpes*). This increase may be due to a decline in habitat health, creation of an environment that favours the species, increased road kills and poor putrescible waste disposal practices.

The house mouse, cat and fox were recorded in fauna surveys for the site and are well established in the area. Rabbits are also wide spread in the area, as evidenced by scats and diggings. Goats are known to be present in the area to the south of the Mt Gibson Ranges and on Charles Darwin Reserve (White Wells Station), and can cause considerable damage to the native habitat.

Fox (and feral dog) predation is one of the major threats to Malleefowl. Cats and raptors, which mostly prey on chicks, are considered another important threat, although of less importance than foxes and feral dogs. Foxes prey on eggs, chicks and adult birds (Benshemesh and Burton 1997; Benshemesh and Burton 1999; Booth 1987; Brickhill 1987; Frith 1962a; Harlen and Priddel 1992; Priddel and Wheeler 1994; Short 2004) and are probably the most significant threat after large scale vegetation clearing or burning (Short 2004). Discussion with landholders in the region suggests that destocking of the nearby pastoral properties has resulted in a reduction in predator control measures which has in turn resulted in increased numbers of feral dogs and dingoes being observed locally.

Breeding densities for Malleefowl may be reduced by up to 85-90% in areas grazed by herbivores compared to similar non-grazed habitats (Benshemesh 2000; Frith 1962a). Grazing is thought to open up habitats and increase predation. Conversely localised destocking may increase numbers.

Generation of fugitive dust
The impacts arising from deposition of dust generated from mining activities on the foliage of *Darwinia masonii* and *Lepidosperma gibsonii* and significant floristic communities is not apparent.

The approved EMP for mining operations at Extension Hill has involved implementation of a dust emission and vegetation health (plant height or length, reproductive status, plant age, plant condition and seedling recruitment and mortality) monitoring program for *Darwinia masonii*. Results to date have shown no detrimental impacts on the vegetation attributable to mining activities (such as dust deposition) (Astron 2014). This may be due to the successful implementation of adequate control measures to mitigate dust emissions associated with mining operations. However, the potential for cumulative settled dust on plant surfaces affecting the plant's ability to photosynthesise, reproduce or regulate water, is still a risk requiring evaluation and the continued implementation of control measures.

Dust is more likely to be a hazard close to the mine (e.g. less than 1000m) while away from the mine dispersion reduces this hazard for a given wind speed and direction (Astron 2014).

It appears that the impact of dust on a population of *Darwinia masonii* or *Lepidosperma gibsonii* is a function of a combination of at least the following variables:

- point source dust suppression success;
- rainfall or removal of dust;
- incident solar radiation;
- wind speed and direction;
- cumulative settled dust (g/m^2) on the plant surfaces;
- duration over which the dust has settled;
- inversely proportional to the distance from the source;
- atmospheric stability;
- vertical settling under gravity; and
- plant morphology and physiology.

The cumulative settled dust on the plant is dependent on the rate of settlement (g/m^2/unit time) and the length of time over which the settling occurs and will be subject to dust removal processes such as rainfall events.

Fauna may potentially move to adjacent habitats if excessive dust is generated (Benshemesh 2000).

Change to hydrology
Mine activities may affect the surface hydrology, which is characterised by intermittent ephemeral flows to which the plants have adapted. The specific mine activity may change the quantity or quality of water available to the significant floristic communities.

Darwinia masonii is restricted to the upper slopes, crests and ridges of the nearby hills and is, therefore, unlikely to be impacted by any changes in sheet flow resulting from the mine activity. *Lepidosperma gibsonii* is generally restricted to the steep slopes and gullies of the hills and to areas of breakaways and associated flow lines and is also therefore, unlikely to be impacted by any changes in sheet flow resulting from the Project. *Acacia cerastes* locations generally coincide with either *Darwinia masonii* or *Lepidosperma gibsonii* so are also unlikely to be impacted by changes in sheet flow resulting from the Project.

Groundwater levels in the Project area are naturally deep and do not support phreatophytic vegetation as the water table lies at 310mAHD (MGM 2015).

Changes to surface hydrology may modify the vegetation, which in turn may change the quality of fauna habitats, and the availability of water sources.

4.9 Potential impacts

During workshops between senior management, mine managers and operators, environmental managers, legal and environmental advisors, *potential impacts* arising from the Project were identified and are shown in Table 7.

4.10 Risk assessment

A workshop was conducted to examine the risks examined and known for key factors as part of the original and approved mining operations. There is a clear spatial and temporal association between the existing MGM operations at Extension Hill and the proposed Iron Hill operations. A summary of 'Aspects and Impacts' applicable to the Project from the approved MGX & EHPL (2008) *Environmental Management Plan Rev 2* are shown in Table 6.

The resultant management actions required for each event applicable to the Project and the likelihood (L) and consequence (C) of the event occurring were assessed. The assessment and the resulting risk rating (R) are outlined in Table 7.

Table 6 Aspects (LHS) and Potential Impacts (RHS) for key factors for the Project

Phase	Aspects	Key Factor	Threatening Processes and Potential Impacts (Environmental Effects*)
Construct and develop	Land disturbance including: - Stockpiles (topsoil, vegetation)	Flora and Vegetation	Direct removal of Darwinia masonii, Lepidosperma gibsonii and significant floristic communities; Fugitive dust deposition may impair health of Darwinia masonii, Lepidosperma gibsonii and significant floristic communities Weeds may outcompete native flora species; Weeds may change plant community composition and alter fire regime; Reduced availability or quality of water available to, or flooding of adjacent significant flora; Chemical effects from emissions causing death of flora and fauna; Poor establishment of native flora on adjacent rehabilitated areas; Loss of topsoil to re-establish suitable habitat during rehabilitation
	Earthworks & infrastructure construction activity	Fauna	Clearing of fauna habitat; Direct loss of Malleefowl and significant fauna; Weeds may modify fauna habitats; Changed availability or quality of water available to, or flooding of adjacent fauna habitat; Chemical effects from emissions causing death of flora and fauna; Poor establishment of native flora on adjacent rehabilitated areas as future fauna habitat.
Commission and operate	Site-wide operations including: - Processing plant infrastructure - Crushing & screening ore - ROM activity	Subterranean Fauna	Clearing / removal of fauna habitat; Changed availability or quality of water available to, or flooding of adjacent fauna habitat; Chemical effects from emissions causing death of fauna.

Phase	Aspects
	Mining of ore & waste - Removal of overburden & excavation of ore - Iron ore stockpile stacking & reclaiming
	Stockpiling & rehabilitation of waste
	Power transmission
Rehabilitate and Close	Rehabilitation of waste dumps including: - Rehabilitation of roads, tracks, storage facilities, processing plant areas
	Geotechnical stability of engineered structures

Key Factor	Threatening Processes and Potential Impacts (Environmental Effects*)
Landforms	Changed availability or quality of water available to, or flooding of land and habitat; Poor establishment of native flora on adjacent rehabilitated areas; Loss of topsoil to re-establish suitable habitat during rehabilitation; *Direct removal of land, terrain and associated flora, vegetation and habitat^;* *Altered ecosystem function post end land use^;* *Altered view shed and changed land relief^.*

Summary:

For the Project where the 'Aspect by Impact' inherent risk rating was 'High' or higher, it was assessed further in Table 7 below.

Potential impacts for the factor 'Landforms' were assessed as shown.

***Potential Environmental Effects are specified in Table 13 of the approved Extension Hill EMP.**

^ *Additional potential effects (in italics) pertain to the environmental factor 'Landforms'.*

Table 7 Risk assessment Iron Hill Project: Likelihood of event occurring (L), Consequence of event occurring (C) and Risk Rating (R), Inherent risk prior to mitigation (IR), Residual Risk after application of control measures.

ID	Environmental aspects	Sources of risk	Risk event	Potential Environmental Effects	L	C	R	IR	Key management actions (control measures)	L	C	R	RR
7	Land disturbance	Weed infestation	Vehicle movement; Clearing of land	Weeds may outcompete native flora species, change plant community composition and alter fire regime (possibly increase fuel load); Modification of fauna habitats	B	2	5	E	Weed management procedures; Site clearance protocol; Site access protocol; and Induction.	D	4	21	L
74	Site-wide operations	Fire ignition	Mine operations, maintenance or personnel activity (e.g. smoking, litter)	Direct removal of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities; Clearing of fauna habitat; Direct loss of Malleefowl and significant fauna	B	2	5	E	Fire management procedures; Site clearance protocol; Site access protocol; and Induction.	C	4	18	M
83	Rehabilitation of waste dumps	Weed infestation	Vehicle movement; Creation of potential habitat for weeds	Weeds may outcompete native flora, change plant community composition and alter fire regime (possibly increase fuel load); Modify fauna habitats	B	2	5	E	Weed management procedures; Site clearance protocol; Site access protocol; and Induction.	C	4	18	M
6	Land disturbance	Fire ignition	Personnel activity; Vehicle movement	Direct removal of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities; Clearing of fauna habitat; Direct loss of Malleefowl and significant fauna	C	2	8	E	Fire management procedures; Site clearance protocol; Site access protocol; and Induction.	D	4	21	L
10	Earthworks & infrastructure	Fire ignition	Transport and unloading of fill material from trucks	Direct loss of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities; Clearing of fauna habitat; Direct loss of Malleefowl and significant fauna	C	2	8	E	Fire management procedures; Site clearance protocol; Site access protocol; Induction	D	4	21	L
42	Stockpiling & rehabilitation of waste	Weed infestation	Soil disturbance may promote germination and establishment of weed species	Weeds may outcompete native flora, change plant community composition and alter fire regime (possibly increase fuel load); Modify fauna habitats	C	2	8	E	Weed management procedures; Site clearance protocol; Site access protocol; Induction	D	4	21	L
97 54	Power transmission	Fire ignition	Collapse of a transmission pole, pole top fire Generator operations	Direct loss of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities; Clearing of fauna habitat; Direct loss of Malleefowl and significant fauna	C	2	8	E	Fire management procedures; Site clearance protocol; Site access protocol; Induction	D	3	17	M
8	Earthworks & Infrastructure	Generation of fugitive dust	Transport and unloading of fill material from trucks	Fugitive dust deposition may impair health of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities	B	3	9	H	Dust management procedure; Vegetation management procedure; Site clearance protocol; Induction	D	4	21	L
30	Mining of ore & waste	Generation of fugitive dust	Blasting of ore blocks and pit mining causing the generation of dust particles in the air.	Fugitive dust deposition may impair health of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities	B	3	9	H	Dust management procedure; Vegetation management procedure; (*Plant health monitoring and reporting*)	B	4	14	H
33	Removal of overburden & excavation of ore	Generation of fugitive dust	Movement of dry soil	Fugitive dust deposition may impair health of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities	B	3	9	H	Dust management procedure; Vegetation management procedure; Site clearance protocol; Induction	D	4	21	L
1	Land disturbance	Unauthorised clearing	Removal of Darwinia masonii and Lepidosperma gibsonii	Direct loss of Darwinia masonii and Lepidosperma gibsonii)	A	4	10	H	Induction; Site access protocol; Site clearance protocol; Demarcation of clearing boundaries	D	4	21	L
61	Site-wide operations	Unauthorised clearing	Creation of unauthorised tracks	Direct loss of Darwinia masonii, Lepidosperma gibsonii and Malleefowl	A	4	10	H	Induction; Site access protocol; Site clearance protocol;	D	4	21	L
9	Earthworks & infrastructure	Weed infestation	Transport and unloading of fill material from trucks	Weeds may outcompete native flora, change plant community composition and alter fire regime (possibly increase fuel load); Modify fauna habitats	C	3	13	H	Weed management procedures; Site clearance protocol; Site access protocol; Induction	D	4	21	L

ID	Environmental aspects	Sources of risk	Risk event	Potential Environmental Effects	L	C	R	IR	Key management actions (control measures)	L	C	R	RR
12	Site-wide operations	Change to surface hydrology	Disturbance of soil materials and altered surface terrain	Reduced availability or quality of water available to, or flooding of adjacent flora;	C	3	13	H	Surface water management procedure; Vegetation management procedure;	D	3	17	M
21	Stockpiles (topsoil, vegetation)	Weed infestation	Vehicle movement; Creation of potential habitat for weeds	Weeds may outcompete native flora, change plant community composition and alter fire regime (possibly increase fuel load); Modify fauna habitats	C	3	13	H	Weed management procedures; Site clearance protocol; Site access protocol; Induction	D	4	21	L
24	Processing plant infrastructure	Hazardous materials (e.g. cement, paints, corrosion inhibitors)	Inappropriate management, storage and / or disposal or accidental spillage of hazardous materials	Chemical effects from emissions causing death of flora and fauna	C	4	18	M	Implement waste management procedures, implement fugitive dust management procedures	D	4	21	L
25	Processing plant infrastructure	Generation of fugitive dust	Transport and unloading of construction materials	Fugitive dust deposition may impair health of plants; reduce habitat.	C	3	13	H	Dust management procedure; Vegetation management procedure; Site clearance protocol; Induction	D	4	21	L
26	Processing plant infrastructure	Weed infestation	Vehicle movement; Transport and unloading of construction materials	Weeds may outcompete native flora, change plant community composition and alter fire regime (possibly increase fuel load); Modify fauna habitats	C	3	13	H	Weed management procedures; Site clearance protocol; Site access protocol; Induction	D	4	21	L
35, 41	Removal of overburden & excavation of ore	Change to surface hydrology	Altered surface terrain contours; Waste materials alter surface terrain	Reduced availability of water to adjacent flora; Clearing / removal of fauna habitat; • Changed availability or quality of water available to, or flooding of adjacent fauna habitat;	C	3	13	H	Surface water management procedure; Vegetation management procedure;	D	4	21	L
48	Crushing & screening ore	Generation of fugitive dust	Crushing and movement of dry soil	Fugitive dust deposition may impair health of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities	C	3	13	H	Dust management procedure; Vegetation management procedure; Site clearance protocol; Induction	D	4	21	L
55	Iron ore stockpile stacking & reclaiming	Generation of fugitive dust	Windblown advection of dry soil	Fugitive dust deposition may impair health of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities	C	3	13	H	Dust management procedure; Vegetation management procedure; Site clearance protocol; Induction	D	4	21	L
58	ROM activity	Generation of fugitive dust	Windblown advection of dry soil	Fugitive dust deposition may impair health of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities	C	3	13	H	Dust management procedure; Vegetation management procedure; Site clearance protocol; Induction	D	4	21	L
75	Site-wide operations	Weed infestation	Vehicle movement	Weeds may outcompete native flora, change plant community composition and alter fire regime (possibly increase fuel load); Modify fauna habitats	C	3	13	H	Weed management procedures; Site clearance protocol; Site access protocol; Induction	D	4	21	L
78	Rehabilitation of waste dumps	Rehabilitation	Poor site preparation (e.g. topsoil), topsoil management (e.g. storage application), species selection (e.g. seed quality, lack of seed, seed viability, seed mixes)	Poor establishment and/or regrowth of *Darwinia masonii*, *Lepidosperma gibsonii* and significant floristic communities	C	3	13	H	Rehabilitation management procedures; *Darwinia masonii* and *Lepidosperma gibsonii* research and recovery plans	D	4	21	L

ID	Environmental aspects	Sources of risk	Risk event	Potential Environmental Effects	L	C	R	IR	Key management actions (control measures)	L	C	R	RR
85	Rehabilitation of waste dumps	Site preparation for rehabilitation (i.e. topsoil application, contour ripping)	Generation of fugitive dust	Fugitive dust deposition may impair health of adjacent *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities	C	3	13	H	Dust management procedure; Vegetation management procedure; Site clearance protocol; Induction	D	4	21	L
86	Rehabilitation of roads, tracks, storage facilities, processing plant areas	Site preparation for rehabilitation (i.e. topsoil application, contour ripping)	Generation of fugitive dust	Poor establishment of native flora on adjacent rehabilitated areas	C	3	13	H	Rehabilitation management procedures; *Darwinia masonii* and *Lepidosperma gibsonii* research and recovery plan	D	4	21	L
87	Rehabilitation of roads, tracks, storage facilities, processing plant areas	Site preparation for rehabilitation (i.e. topsoil application, contour ripping)	Generation of fugitive dust	Fugitive dust deposition may impair health of adjacent *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities	C	3	13	H	Implement rehabilitation management procedures, *Darwinia masonii* and *Lepidosperma gibsonii* research and recovery plan	D	4	21	L
88	Rehabilitation of roads, tracks, storage facilities, processing plant areas	Weed infestation	Vehicle movement; Creation of potential habitat for weeds	Weeds may outcompete native flora, change plant community composition and alter fire regime (possibly increase fuel load); Modify fauna habitats	C	3	13	H	Weed management procedures; Site clearance protocol; Site access protocol; Induction	D	4	21	L
89	Rehabilitation of roads, tracks, storage facilities, processing plant areas	Fire ignition	Vehicle movement; Personnel activity	Direct loss of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities; Clearing of fauna habitat; Direct loss of Malleefowl and significant fauna	C	3	13	H	Fire management procedures; Site clearance protocol; Site access protocol; Induction	D	4	21	L
76	Geotechnical stability of engineered structures	Erosion	Slope gradient	Loss of topsoil causing poorly suitable habitat for rehabilitation	B	4	14	H	Rehabilitation management procedures	D	4	21	L
11	Earthworks & infrastructure	Fire ignition	Transport and unloading of fill material from trucks	Direct loss of *Darwinia masonii, Lepidosperma gibsonii* and significant floristic communities; Clearing of fauna habitat; Direct loss of Malleefowl and significant fauna	E	2	16	H	Fire management procedures; Site clearance protocol; Site access protocol; Induction	E	4	23	L
IH1	Removal of overburden & excavation of ore	Creation of a void	Pit excavation creates mined voids	• Direct removal of land, terrain and associated flora, vegetation and habitat; • Altered view shed and changed land relief	A	3	6	E	Mine Site EMP; Rehabilitation management procedures; Mining Proposal approval; Mine Closure Plan	B	3	9	H
IH2	Removal of overburden & excavation of ore	Change to surface hydrology	Rainfall runoff drains into pit void	Changed availability or quality of water available to undisturbed land and habitat down gradient	C	3	13	H	Site clearance protocol; Rehabilitation management procedures; Mine Closure Plan	C	4	18	M
IH3	Stockpiling & rehabilitation of land	Rehabilitation success	Poor site preparation (e.g. topsoil), topsoil management (e.g. storage application)	• Inadequate topsoil to re-establish suitable revegetation during rehabilitation •	C	3	13	H	Site clearance protocol; Rehabilitation management procedures; Fire management procedures; Mine Closure Plan	C	4	18	M

ID	Environmental aspects	Sources of risk	Risk event	Potential Environmental Effects	L	C	R	IR	Key management actions (control measures)	L	C	R	RR
IH4	Stockpiling & rehabilitation of land	Rehabilitation success	Poor site preparation and species selection (e.g. seed quality, lack of seed, seed viability, seed mixes)	• Poor establishment of native flora on adjacent rehabilitated areas; • Altered ecosystem function post end land use	B	3	9	H	Site clearance protocol; Rehabilitation management procedures; Seed collection protocols; *Darwinia masonii* and *Lepidosperma gibsonii* research and recovery plan; Mine Closure Plan	C	4	18	M
IH5	Geotechnical stability of engineered structures	Erosion	Slope gradient	• Land erosion or slippage causing unsuitable rehabilitation for habitat restoration •	D	3	17	M	Engineered design; Mine Closure Plan	E	3	20	L

5.0 Performance Objectives, Standards and Measurement Criteria

5.1 Performance objectives

The environmental performance objectives adopted for the EMP are shown in Table 8.

5.2 Performance standards

Performance standards are an essential requirement for the risk based environmental management approach used in the EMP. The environmental performance standards of Table 8 are derived from current practices elsewhere, site specific data and legislative standards (where available), and can be generally applied to environmental management of MGM mining operations. These performance standards have regard of the stated performance objectives.

In selecting the performance standards the following policies, standards and guidelines have been considered.

Policies, standards and guidelines and measurement of plant species and communities
The following publications were reviewed to find appropriate management performance standards and measurements for significant flora and communities:

- IUCN Guidelines for Using the Red List Categories and Criteria (IUCN 2000, 2005);
- Environmental Protection Authority, 2004. Guidance Statement 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia;
- Environmental Protection Authority, 2006. Guidance Statement 6 Rehabilitation of Terrestrial Ecosystems;
- Elzinga, C.L., D.W. Salzer and J.W. Willoughby, 1998. *Measuring and monitoring plant populations*. US Department of Interior, Bureau of Land Management, Technical Reference 1730-1 Denver, Colorado; and
- Keighery's Vegetation Condition Scale (Government of WA, 2000).

The review showed that:
- there is no particular standard or measurement of *Darwinia masonii* or *Lepidosperma gibsonii*;
- there is no particular standard or measurement of significant floristic communities; and
- defining floristic communities by species assemblages is complex and difficult to apply in the context of mining.

For the purposes of this EMP, the performance standards listed in Table 8 have been adopted.

***Darwinia masonii* and *Lepidosperma gibsonii* as a proxy for significant communities**
Darwinia masonii and *Lepidosperma gibsonii* have been chosen to act as a proxy for population health and dynamics and dust deposition on plant surfaces of significant floristic communities.
In choosing this proxy, the following were recognised:
- complexity of defining floristic communities (Section 3.9); and
- a lack of any evidence to date that mining activity has impacted on the *in-situ* survival or conservation status of significant floristic communities.

Policies, standards and guidelines concerning airborne dust concentrations
Fugitive dust (airborne and settled) management performance standards for the Project are based on a review of the following policies, standards and guidelines:

- *Environmental Protection (Kwinana) (Atmospheric Wastes) Regulations 1992* (Kwinana EPP) has specified levels of pollutants including airborne particles (dust) in defined zones about Kwinana industrial area, where TSP <260 μg/m^3;

- National Environmental Protection Council (NPEC 1998) set health based ambient air quality standards for six pollutants, including airborne particles less than PM_{10}< 50 μg/m^3 (*National Environment Protection (Ambient Air Quality) Measure*);

- National Pollution Inventory (NPI) emission estimation techniques provide a relationship between total suspended particles (TSP) and PM_{10} for fugitive dust emissions resulting from blasting and drilling; using the NPI factor PM_{10}=52% of TSP then the Kwinana EPP limit is PM_{10} <135 μg/m^3;

- Department of State Development *Port Hedland Air Quality and Noise Management Plan* (March 2010) interim target is PM10<70 μg/m^3. The increase on the NPEC 1998 guideline value is justified on the grounds that the Port Hedland dust is largely composed of 'particles rich in iron oxides and generated from mining related activities' as opposed to urban environments which 'typically consists of particulate matter from combustion sources such as road traffic'; and

- Department of Environment and Conservation (NSW) *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* sets the maximum total deposited dust concentration (assessed as insoluble solids as defined by AS 3580.10.1-1991) as 4g/m^2/month.

Each of the above guidelines are based on data averaged over a 24hr period.

The review shows that there are:

- no specific standards or limits applied to fugitive dust throughout Western Australia;
- a significant range of airborne dust standards or measurement criteria; and
- a significant variation of standards and measurement criteria, which are acceptable to both Commonwealth and State Agencies.

In the absence of a practical standard to measure the effect of settled dust on significant floristic communities, the *Darwinia masonii* and *Lepidosperma gibsonii* standard(s) will be used as a proxy.

For the purposes of this EMP, the performance standards listed in Table 8 have been adopted.

Ambient airborne dust concentrations
Ambient dust levels are those measured a long distance from the mine and other mine related activities which may cause airborne dust, although the area is known to have high ambient dust levels (Section 3.3).

Policies, standards and guidelines concerning fauna and significant fauna species
Fauna species and fauna assemblages' management performance standards for the Project are based on a review of the following policies, standards and guidelines:

- Environmental Protection Authority, 2004. Guidance Statement 56 Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia;
- Rehabilitation and Degradation Index (RDI) (Thompson *et al*. 2007); and
- Landscape Function Analysis / Ecological Function Analysis (LFA/EFA; Ludwig and Tongway, 1995 and 1997).

Policies, standards and guidelines concerning weeds
Weed management performance standards for the Project are based on a review of the following policies, standards and guidelines:

- Environmental Weed Strategy (CALM 1999);
- Western Australian Organism List (Department of Agriculture and Food); and
- A Field Manual for Surveying and Mapping Nationally Significant Weeds (McNaught *et al*. 2006).

Policies, standards and guidelines concerning fire
Fire management performance standards for the Project are based on a review of the following policies, standards and guidelines:

- IUCN Classification Criteria for Species and Communities (IUCN 2000, 2005).

5.3 Measurement criteria

The measurement criteria are shown in Table 8.

The measurement criteria have regard of performance objectives and standards and shall determine if the performance objectives and standards have been met. However, it is recognised that the measurement criteria may change subject to monitoring and research.

Table 8 Performance objectives, standards and measurement criteria

Performance objectives	Performance standards	Biophysical measurement criteria
To facilitate the continued *in situ* survival and improvement of the conservation status of *Darwinia masonii* and *Lepidosperma gibsonii*.	IUCN Classification Criteria for Species and Communities (IUCN 2000, 2005) EPA Guidance Statement No. 51 (EPA 2004a)	Measurement criteria are based on the annual monitoring survey. No significant decline in population as a result of mining activities, where a significant decline is such that the conservation status of the species would be reduced.
To maintain (or improve) the conservation status of significant native flora species and significant floristic communities.	IUCN Classification Criteria for Species and Communities (IUCN 2000, 2005) EPA Guidance Statement No. 51 (EPA 2004a) Keighery's Vegetation Condition Scale (Government of WA, 2000)	Measurement criteria includes: • presence or absence of weeds; and • loss of vegetation.
Ensure that mining and other activities of the mine, particularly the generation of dust, do not lead to a further decline in the local population of the species.	In the absence of a standards and adopting other practices, it is assumed a suitable standard for deposited dust on *Darwinia masonii* and *Lepidosperma gibsonii* in quadrats shall be <4 g/m^2/month.	Measurement criteria includes: • cumulative settled dust; • no measurable loss of *Darwinia masonii* or *Lepidosperma gibsonii* as a result of fugitive dust deposition in the fixed monitoring quadrats; and • no measurable change of health of *Darwinia masonii* and *Lepidosperma gibsonii* as a result of fugitive dust deposition in the fixed monitoring quadrats.
Prevent the spread of existing weeds within the mine site caused by the activities of the proponent.	Classification criteria of Environmental Weed Strategy (EWS) (CALM 1999)	Measurement criteria includes: • weed distribution; and • biodiversity impact rating of weed species in the Project tenements.
Prevent the establishment of new weeds within the mine site caused by the activities of the proponent.	Classification criteria of Environmental Weed Strategy (EWS) (CALM 1999)	Measurement criteria includes: • number of weed species; • weed distribution; and • biodiversity impact rating of weed species in the Project tenements.

Performance objectives	Performance standards	Biophysical measurement criteria
Control and/or eradicate weeds within the mine site.	Classification criteria of Environmental Weed Strategy (EWS) (CALM 1999)	Measurement criteria includes: • weed distribution; and • biodiversity impact rating of weed species in the Project tenements.
Minimise the potential for the impact of weeds and weed management on significant flora identified in Condition 8.	IUCN Classification Criteria for Species and Communities (IUCN 2000, 2005) Classification criteria of Environmental Weed Strategy (EWS) (CALM 1999) (Note: the standard for weeds on significant floristic communities is not established. It is assumed that *D. masonii* and *L. gibsonii* are a proxy for significant floristic communities in regard to weeds)	Measurement criteria includes: • distribution of weeds in proximity of *Darwinia masonii* and *Lepidosperma gibsonii*; • no measurable loss of *Darwinia masonii* and *Lepidosperma gibsonii* as a result of weed species in fixed monitoring quadrats; and • biodiversity impact rating of weed species in the Project tenements.
To reduce the risk of unplanned fires and provide contingency measures to minimise the impacts of fires on the local environment.	IUCN Classification Criteria for Species and Communities (IUCN 2000, 2005) (Note: Number of Malleefowl is measured by the proxy of number of active mounds) (Note: It is assumed that *D. masonii* and *L. gibsonii* are a proxy for significant floristic communities in regard to fire)	Measurement criteria includes: • number of active and inactive Malleefowl mounds lost due to fire as a result of mine operations; • direct loss of *Darwinia masonii* and *Lepidosperma gibsonii* due to fire as a result of mine operations; and • number of fires as a result of mine operations.
To maintain the abundance, diversity, geographic distribution and productivity of the Malleefowl (*Leipoa ocellata*) through mitigation of adverse impacts and improvements in knowledge.	IUCN Classification Criteria for Species and Communities (IUCN 2000, 2005) (Note: Number of Malleefowl is measured by the proxy of number of active mounds) No standard for noise or dust has been established for Malleefowl.	Measurement criteria includes: • number and activity status of Malleefowl mounds.
To maintain the abundance, diversity, geographic distribution and productivity of native fauna through mitigation of adverse impacts and improvements in knowledge.	EPA Guidance Statement No. 56 (EPA 2004b) (Note: significant fauna species known to be in the area are to be used as a proxy for general native fauna)	Measurement criteria includes: • presence / absence and abundance of significant species previously known to be in the area.

6.0 Management Strategy

6.1 Systems, practices and procedures

This document forms part of the site's broader Environmental Management System (EMS). Site specific internal procedures and work instructions have been developed and implemented to ensure good practice environmental management throughout the Project.

6.2 Roles and responsibilities

Responsibilities and accountabilities for the implementation of the management strategy are assigned to MGM CEO, Registered Mine Manager and HSEC Manager, as appropriate.

The Managing Director of MGM or authorised officers of MGM will be responsible for ensuring that the Project is developed and operated in accordance with this EMP.

6.3 Training and competencies

Subject to their roles and responsibilities, all personnel working on the Project shall be trained in the management of environmental impacts and risks.

6.4 Monitoring, audit, management of non conformance and review

Monitoring, audit, management of non conformance and review procedures are in place to improve the management of impacts and risks against the performance objectives, standards and measurement criteria.

Monitoring, auditing and review
Monitoring and auditing of the environmental performance of the activities in relation to the standards and measurement criteria of each objective shall be implemented.

Monitoring and measurement of environmental performance shall be systematically recorded as appropriate. For example this may include spot checks, agenda items, inspections, or audit reports and completion check list.

Environmental audits shall be used to identify if:

- all significant environmental impacts and risks are managed to meet the environmental objectives and standards;
- performance objectives are achieved by the application of performance standards and that performance objectives, performance standards and measurement are reviewed;
- non compliances occur and opportunities for improvement;
- timely reviews of monitoring and management data are undertaken; and
- all environmental completion criteria have been met before suspending or decommissioning the proposed mine operation.

Compliance reporting
Management of non conformance and review procedures are summarised in Section 7.4.

Any corrective or preventative actions taken shall be commensurate with the magnitude of the non conformances identified. Arrangements for the tracking and close out of action items are in the EMS.

Performance review
The environmental impacts and risks will be reviewed annually.

6.5 Emergency response and incident reporting

Emergency response, and incident assessment and reporting procedures are in the EMS.

6.6 Record keeping

Record keeping procedures are in the EMS.

6.7 Communication and consultation

Effective communication and consultation are important components of the risk management process. An on-going dialogue with internal and external stakeholders will ensure that those responsible for implementing risk management actions, and those with a vested interest, understand the basis on which decisions are made and why particular actions are taken.

MGM has undertaken an extensive consultation program with stakeholders as part of developing the Project, which is summarised in the PER (MGM, 2015). The views of the different stakeholders will vary due to differences in expertise, values, needs and concerns. These views will have a significant impact on how decisions are made and will be integrated into the decision making process. Communication and consultation processes are contained within the EMS.

7.0 Environmental Management Actions

7.1 Management actions

This section presents key management actions concerning environmental risk and preliminary mine closure.

These key management actions have, as far as practical, full regard of the following:

- applicable environmental legislation and regulatory requirements;
- both proponents' corporate policies, management and rehabilitation commitments;
- existing environment summarised in Section 3.0;
- potential environment impacts summarised in Section 4.9;
- risk assessment described in Section 4.10;
- relevant performance objectives, standards and measurement described in Section 5.0; and,
- management strategy described in Section 6.0.

The environmental risk assessment for the mine is discussed in Section 4.0, where Table 77 lists the aspect of the mine operations, sources of risk, key management actions, and the risk assessment, rating and severity. The risk severity varied from low to moderate. The key management actions required are summarised in Section 7.3.

Environmental incidents resulting from unplanned events are discussed in Section 7.4.

7.2 Management of risk events

Environmental aspects were classified according to risk rating and severity in Table 5. Key management actions undertaken to address the risks were identified. The risk rating fell within the range 9-23.

The risk assessment process identified that the generation of dust by blasting activities remained a high residual risk. Following best practice mining techniques there are no management actions that can be put in place to mitigate the generation of dust from blasting. The risk to the DRF is not the generation of dust from blasting but the effect that this fugitive dust has on the surrounding DRF. The result of identifying this high risk puts more emphasis on monitoring and managing settled dust to detect and minimise potential effects. Best intentions will be used to carry out blasting at times when the prevailing wind direction minimises dust fall out on DRF. Table 8 contains the performance objectives to be achieved for settled fugitive dust (which is inclusive of dust generated from blasting activities) and Table 9 sets out the consequence trigger levels for management actions.

Key management actions are summarised in Section 7.3.

As the mine plans are further developed, or the mine is in operation, these actions shall be reviewed, and as appropriate adapted throughout the lifecycle of the mine.

Moderate and low risk severity shall be managed by routine mining procedures.

7.3 Key management actions

The key management actions identified in Table 77 shall be implemented through the EMS. Various management actions are common to mitigating the risk concerning environmental aspect, source of risk and risk event. A selected combination of management actions have been used to mitigate a particular source of risk or risk event.

The following subheadings and list summarises the key management actions from procedures separate to this EMP under the applicable aspects:

Hydrocarbon and Waste Management

- Hydrocarbons and chemicals to be stored in appropriately bunded areas;
- Spill kits available;
- Vehicle maintenance to be undertaken;
- Reporting as per regulatory requirements, eg National Greenhouse and Energy Reporting;
- Landfill covered regularly with inert material; and
- Waste management hierarchy implemented.

Mine Closure and Rehabilitation

- Waste dump slope batter angle restricted to 15^0;
- Contour ripping of batter slopes;
- Fertilisation and seeding of rehabilitation areas, as required; and
- Active response to non-fixed dust sources.

Dust Management

- Depositional dust monitoring
- Dust control systems on fixed plant; and
- Incident response.

Fauna Management

- Monitoring of *Leipoa ocellata* (Malleefowl) and selected fauna species;
- Recording of animal deaths and significant species sightings;
- Fauna handling and translocation procedures, including protocol for injured wildlife;
- Traffic management including vehicle speed limits;
- Restrict fauna access to waste;
- Liaise with neighbours regarding introduced species monitoring and management; and
- Water dams to be fenced.

Fire Management

- Emergency response personnel to have fire fighter training and equipment;
- Fire suppression systems on selected plant and equipment;
- Cigarette butt bins provided;
- Fire breaks where required;
- Incident response;
- Hot works permit system;
- Vehicle maintenance to be undertaken; and
- Generator maintenance to be undertaken.

Flora and Vegetation Management

- Vegetation clearing permit system, including pre-clearing environmental checks;
- Visual inspection of Darwinia masonii;
- Assessment of the health of Darwinia masonii;
- Monitoring dust effects on populations of Darwinia masonii;
- Clear demarcation of areas to be cleared; and
- Restricted access areas.

Weed and Hygiene Management

- Weed identification charts available to personnel;
- Personnel required to report weed sightings;
- Weed hygiene processes for vehicles; and
- Annual weed survey.

Surface Water Management

- Drainage designed to minimise interruption to flow where possible.

This list identifies the key actions required to address the identified risks. Other environmental management and routine mining practices will be employed as appropriate through the site EMS.

7.4 Incidents and triggers

Incidents and triggers of unplanned environmental impacts are defined by the consequence classification of Table 8. The subsequent reporting and management action is set out against each consequence classification in Table 9.

Any potential unplanned impact (i.e. incident) identified through the environmental risk assessment process having a consequence level falling within the moderate to catastrophic category shall be a reportable incident.

Table 9 Management actions and reporting time for potential unplanned impacts based on environmental consequence

Consequence (Table 8)	Regulatory reporting	Reporting system	Management action
Catastrophic	Immediately or as soon as practicable	Resident or General Manager notified and immediately verbally notifies company CEO and CEO DEC followed by written report	Cease all affected work immediately; ICAM investigation; review risks and associated procedures; and implement crisis management system.
Major	Within 24 hours	Resident or General Manager notified and verbally notifies company CEO as soon as practical and CEO DEC followed by written report	Consider ceasing all affected work; ICAM investigation; review risks and associated procedures; review implementation of corrective actions and undertake additional follow up if required; and consider implementing emergency management team.
Moderate	Within 24 hours	Resident or General Manager notified and verbally notifies company CEO and local DEC followed by written report	ICAM recommended and to be considered; formal review of risks; manage by routine procedures; review implementation of corrective actions; and review associated procedures if necessary and site statistics.
Minor	Annually, or as per regulatory requirements, or in the case of	Reported to supervisor and site environmental department prior to end of shift, and if there is regulatory requirement to report, to the relevant	Site Incident report completed; recorded in site statistics which are to be reviewed periodically by

Consequence (Table 8)	Regulatory reporting	Reporting system	Management action
	DRF within 24 hrs	regulator and also to the local DEC. In the case of DRF, report to local DEC.	Departmental or Area Manager; review incident corrective actions; and manage by routine procedures. In the case of DRF, report to local DEC.
Insignificant	Annually, or as per regulatory requirements, or in the case of DRF within 24 hrs	Reported to Supervisor prior to end of shift, and if there is regulatory requirement to report, to the relevant regulator and also to the local DEC. In the case of DRF, report to local DEC.	Site incident report completed; recorded in site statistics; and manage by routine procedures. In the case of DRF, report to local DEC.

(ICAM Incident Causal Analysis Method – Incident investigation method)

8.0 Reporting

The CEO of MGM or an authorised officer will be responsible (respectively) for the reporting requirements of this EMP.

8.1 Regular reporting

Regular environmental reporting processes are in the EMS.

Appropriate environmental reports for environmental objectives, standards and measurement criteria, (Table 8) which relate to routine activities of significant importance, shall be made on a regular basis.

8.2 Reportable incidents

Any potential unplanned impact (that is accident or incident) identified through the environmental risk assessment process having a consequence level falling within either a major or catastrophic category shall be a reportable incident. An appropriate report shall be provided to the EPA and the DER, as required.

Refer to Section 7.4.

8.3 Annual reporting

An appropriate annual report shall be provided to the EPA. The annual report shall demonstrate that the performance objectives are being met. The CEO of MGM or an authorised officer will be responsible for producing an annual report against performance objectives, standards and measurement criteria of this EMP.

8.4 Publication of plans

This EMP shall be made publicly available.

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Figure 4 Location of significant flora species of Iron Hill Deposits on the Mount Gibson Ranges

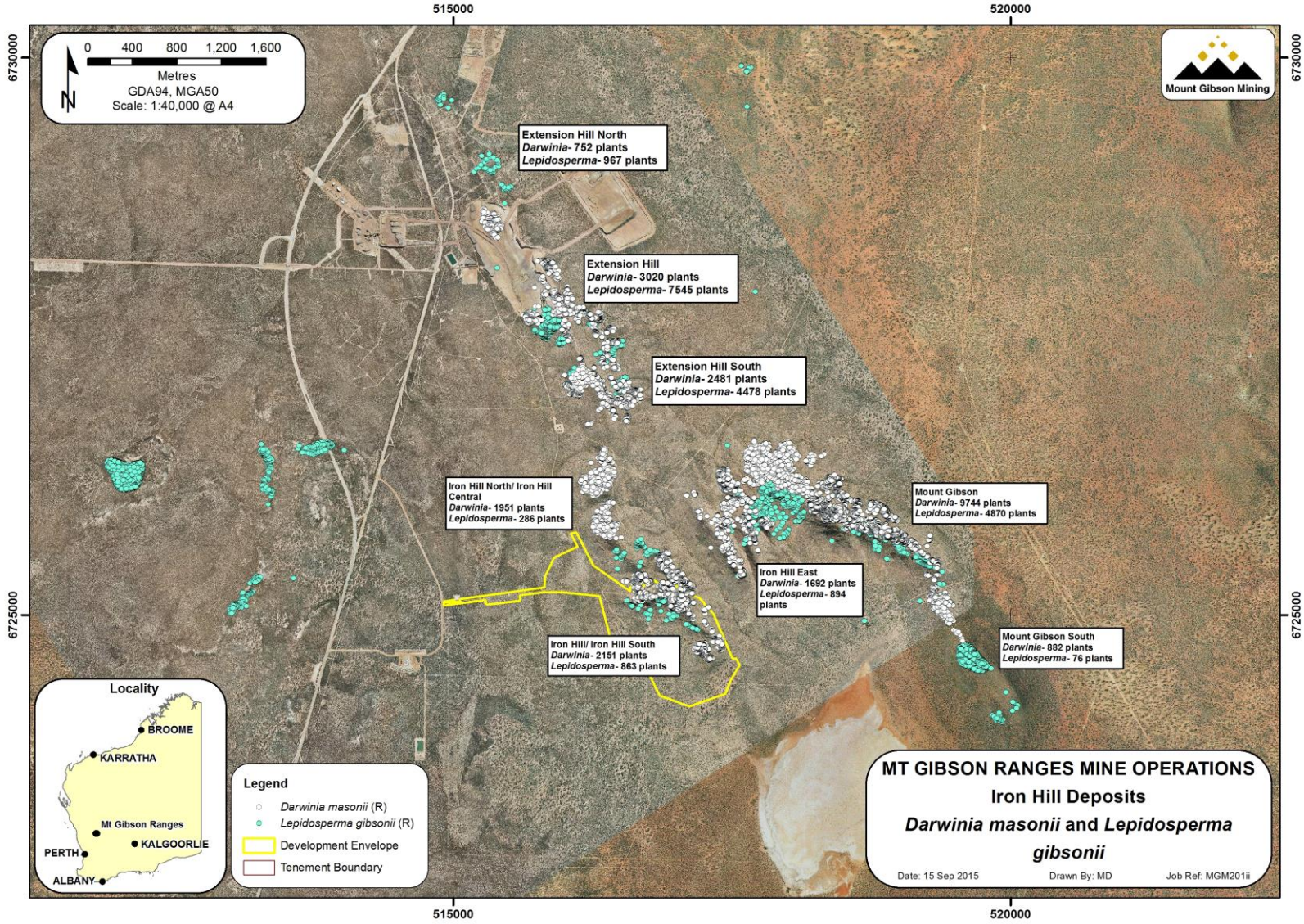


Figure 5 Significant floristic communities (key components of the PEC with the DPaW PEC) at the Mt Gibson Ranges in relation to the Iron Hill Deposits

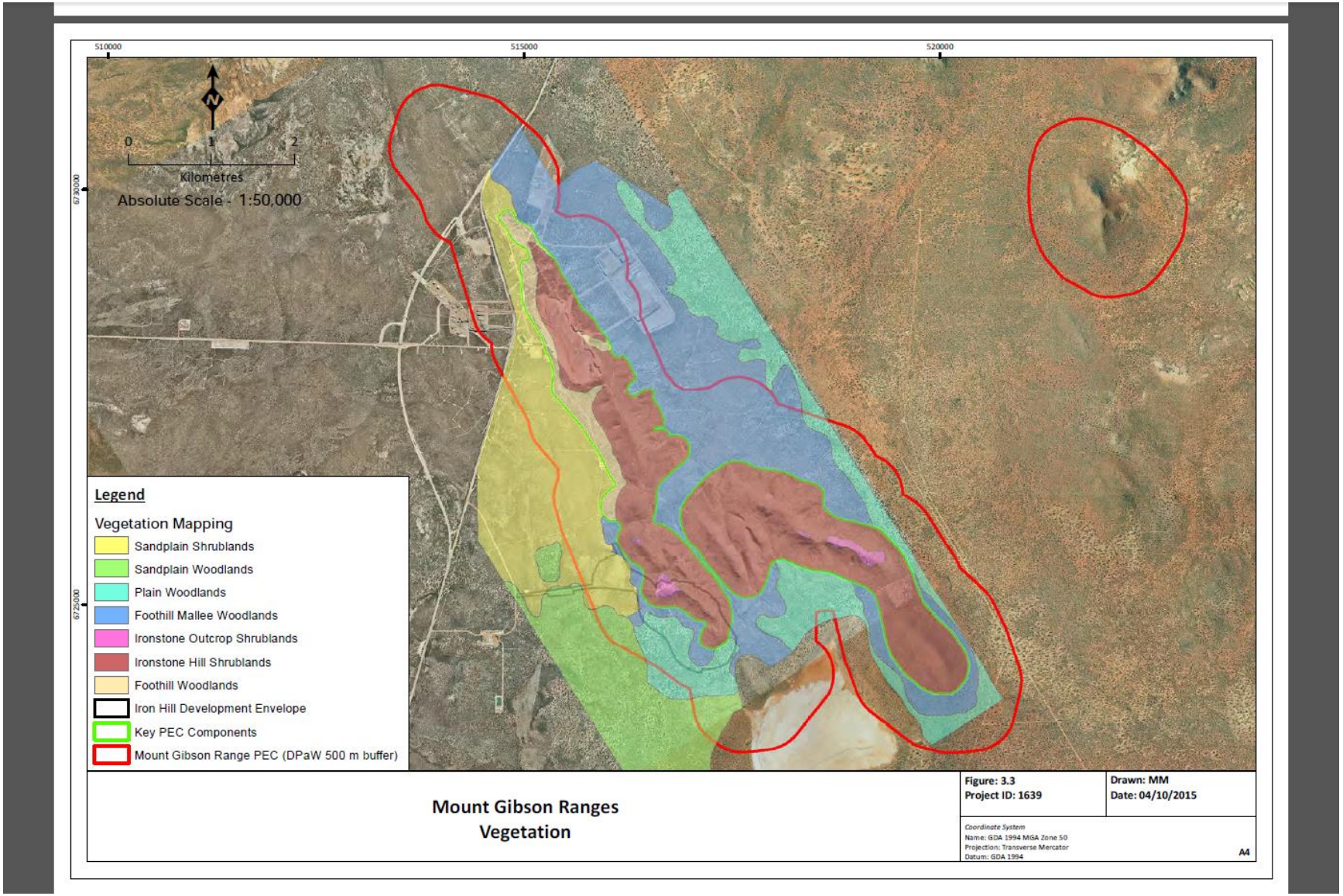
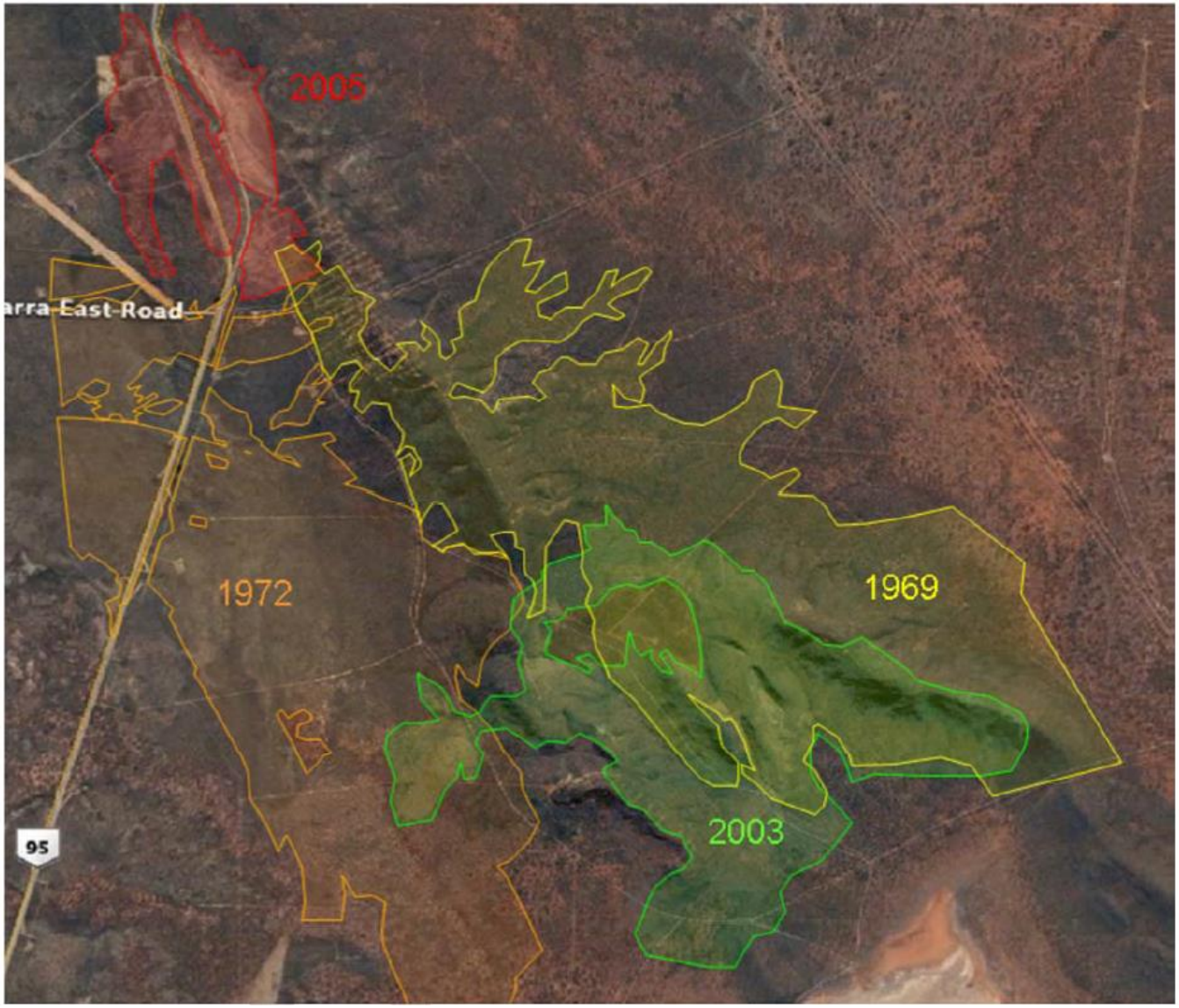


Figure 6 Fire history the Mt Gibson Ranges (1960 to present day)



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Appendix 4 – Community Consultation, EIA-PER Process Full Description

Consultation is considered by MGM to be a fundamental component of the environmental assessment process. Section 3 *Community Consultation* provides a summary of the consultation undertaken by MGM with Government and community stakeholders. The following is a full description of the community consultation undertaken for the EIA-PER process for the Proposal.

Government

Environmental Protection Authority (including Office of the EPA)

The Proposal will be subject to environmental assessment by EPA/OEPA under the *Environmental Protection Act 1986* (WA). Accordingly, EPA is a stakeholder for the Proposal.

In December 2013, a meeting was held with representatives for OEPA, MGM and EHPL to discuss the potential for mine development within the Development Envelope, existing environmental surveys/data (as previously used for the environmental assessment of the approved mine operations), proposed additional targeted surveys, potential environmental effects, Government assessment and approval processes, and stakeholder consultation.

In May 2014, written correspondence to EPA and OEPA by MGM identified the Proposal and its key environmental effects, with an invitation for EPA and OEPA to provide initial comment on the Proposal.

In June 2014, a meeting was held with representatives for OEPA, MGM and EHPL to discuss the Proposal. This consultation focussed on identification of the Proposal location, environmental surveys/data, key environmental effects, and proposed referral under the *Environmental Protection Act 1986* (WA).

In August 2014, MGM referred the Proposal to EPA under s38(1) of the *Environmental Protection Act 1986* (WA) (MGM 2014a). The Proposal referral information identified the location of the Proposal, environmental surveys/data (including copies of the survey reports to support the environmental assessment), identification key environmental effects, Government assessment and approval processes, proposed environmental management, and stakeholder consultation. As outlined by the referral submission, the preliminary key environmental factor of 'Flora and Vegetation' and the key integrating factor of 'Offsets' were considered by MGM to be relevant to the Proposal as a result of the environmental effect to the Rare Flora taxon *Darwinia masonii*.

The EPA subsequently made the referral document available for public comment for one week period during August-September 2014, during which 2 public comments were received.

In December 2014, EPA determined that the Proposal should be subject to an EIA at a Public Environmental Review (PER) level (EPA 2014a, 2014b). The EPA (2014a; 2015) has identified the preliminary key environmental factors and key integrating factors relevant to the assessment of the Proposal as:

(a) 'Flora and Vegetation' (key environmental factor);

(b) 'Terrestrial Fauna' (key environmental factor);

(c) 'Subterranean Fauna' (key environmental factor);

(d) 'Landforms' (key environmental factor);

(e) 'Rehabilitation and Decommissioning' (key integrating factor); and

(f) 'Offsets' (key integrating factor).

In January 2015, a meeting was held with representatives for OEPA and MGM to discuss EPA's preparation of the draft Environmental Scoping Document. The meeting also included discussions on the status of other Government approval processes, the agreed *Darwinia masonii* offsets framework and aligning offsets to that existing framework, consideration of the key integrating factor of 'Landforms', and the land tenure of the Development Envelope.

In April 2015, EPA provided its Environmental Scoping Document (EPA 2015) to outline the requirements for this EIA-PER document for the preliminary key environmental factors and key integrating factors.

In May 2015, MGM advised EPA of proposed changes to the Proposal, consistent with the approach described by s43A of the *Environmental Protection Act 1986* (WA). The advice provided by MGM identified an increase to the spatial area required for the Proposal from 75ha to 112ha as a result of an additional mine pit and an extension to the waste rock landform. EPA agreed to assess the change to the Proposal through the EIA-PER process that was currently underway, on the provision that the scope of works in the approved ESD was applied to the new Development Envelope.

Submission of this EIA-PER document to EPA/OEPA, and its subsequent assessment by EPA/OEPA, represents further consultation by MGM on the Proposal.

Consultation between EPA/OEPA and MGM on the Proposal will be ongoing through the continuation of the environmental assessment and approval processes under the *Environmental Protection Act 1986* (WA).

As an outcome of the assessment and approval processes under the *Environmental Protection Act 1986* (WA), subject to the Proposal being approved, it is anticipated that EPA/OEPA will also monitor the implementation of the Proposal, with MGM to prepare and submit to EPA/OEPA an annual environmental report outlining the implementation of the Proposal and its environmental effects.

Department of the Environment

The proposal is subject to environmental assessment by DoE under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th). Accordingly, DoE is a stakeholder for the Proposal.

In May 2014, written correspondence to DoE by MGM identified the Proposal and its key environmental effects, with an invitation for DoE to provide initial comment on the Proposal. In July 2014, DoE provided written advice to MGM acknowledging the Proposal and encouraging its referral under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) to enable an assessment of the potential environmental effects to *Darwinia masonii*. In October 2014, written correspondence to DoE by MGM provided an update on the Proposal and the schedule for referral by MGM to DoE under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th).

On the 26th of June 2015, MGM referred the Project to the Department of Environment (DoE) as per section 68(2) of the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act). The referral covered potential impacts to matters of national environmental significance including the following species:

a) *Darwinia masonii* (a plant);
b) *Leipo ocellata* (malleefowl, a bird); and
c) *Idiosoma nigrum* (shield-backed trapped door spider).

On the 18th of September 2015, MGM received correspondence from DoE advising that, under Section 75 of the EPBC Act, the proposal is a controlled action requiring assessment under the EPBC Act. Specifically, the controlled action is in relation to the listed threatened species *Darwinia masonii*.

DoE determined that the proposal would be assessed by preliminary documentation. On the 6th of October 2015, DoE provided detail of the information to be included within preliminary documentation.

As an outcome of the assessment and approval processes under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), it is anticipated that DoE will also monitor the implementation of the Proposal, with MGM to prepare and submit to DoE an annual environmental report outlining the implementation of the Proposal and its environmental effects.

Department of Parks and Wildlife

The Proposal will be subject to environmental assessment by DPaW under the *Wildlife Conservation Act 1950* (WA). Accordingly, DPaW is a stakeholder for the Proposal.

In June 2013, a meeting was held with representatives for DPaW and MGM to discuss the approved mine operations. This meeting included discussion on the potential for mine development within the Development Envelope, with a view that the Proposal would extend the operational life of the mine operations at the Mt Gibson Ranges.

In December 2013, a meeting was held with representatives for DPaW, MGM and EHPL to discuss the potential for mine development within the Development Envelope, existing environmental surveys/data, proposed additional targeted surveys, potential environmental effects, Government assessment and approval processes, and stakeholder consultation.

In January 2014, DPaW was provided by MGM copies of the environmental surveys/data that were expected to be used in environmental assessment of the Proposal, so as to allow DPaW review and comment on the existing environmental surveys/data.

In May 2014, written correspondence to DPaW by MGM identified the Proposal and its key environmental effects, with an invitation for DPaW to provide initial comment on the Proposal.

In June 2014, DPaW provided written advice to MGM acknowledging the Proposal, Government assessment and approval processes, the environmental effect to *Darwinia masonii* and *Lepidosperma gibsonii*, additional environmental surveys, and support for continued consultation between MGM and DPaW.

In July 2014, a meeting was held with representatives for DPaW and MGM to discuss the Proposal, including the Development Envelope and infrastructure, Government assessment and approval processes, environmental surveys, environmental effects (in particular, to Rare Flora and Specially Protected Fauna), conservation areas, mine closure, and stakeholder consultation.

In August 2014, DPaW were provided by MGM a copy of the Proposal referral documentation (including supporting documents) submitted to EPA under the *Environmental Protection Act 1986* (WA).

In August 2014, DPaW were requested by EPA to provide advice on the Proposal referral documentation. In October 2014, DPaW (2014) provided its advice to EPA on the Proposal addressing the assessment of the Rare Flora taxa *Darwinia masonii* and *Lepidosperma gibsonii*, vegetation units, the DPaW-classified PEC, and the Specially Protected Fauna taxa *Leipoa ocellata* and *Idiosoma nigrum*.

In March 2015, representatives for MGM provided an opportunity to DPaW to meet and discuss the proposed environmental offsets for *Darwinia masonii.* In April 2015, DPaW advised MGM that it would consider proposed environmental offsets for *Darwinia masonii* in parallel with the consideration of the environmental effects of the Proposal outlined within the EIA-PER document.

In May 2015, a meeting was held with representatives for DPaW and MGM to discuss the approved mine operations and the Proposal. This meeting included discussion on the proposed extension of the Proposal to incorporate the area of Iron Hill South following additional resource definition, the anticipated environmental effect of the Proposal to the flora and fauna taxa *Darwinia masonii* and *Leipoa ocellata* and *Idiosoma nigrum*, and the proposed schedule for the Government assessment and approval processes applicable to the Proposal. Representatives for the Shire of Yalgoo, EHPL, Pindiddy Aboriginal Corporation, Australian Wildlife Conservancy and Bush Heritage Australia were also in attendance at this meeting.

Applications to DPaW for a Licence to take individuals of the Rare Flora taxa *Darwinia masonii* and *Lepidosperma gibsonii*, and a Licence to take individuals of the Specially Protected Fauna taxon *Idiosoma nigrum*, both in accordance with s15(1) of the *Wildlife Conservation Act 1950* (WA), are scheduled to commence from Q3 2015. Submission of the applications will represent further consultation on the Proposal between DPaW and MGM. Consultation between DPaW and MGM on the Proposal will be ongoing throughout the environmental assessment and approval processes under the *Wildlife Conservation Act 1950* (WA).

As an outcome of the assessment and approval processes under the *Wildlife Conservation Act 1950* (WA), it is anticipated that DPaW will also monitor the implementation of the Proposal, with MGM to report to DPaW on the implementation of the Proposal and its environmental effects to *Darwinia masonii*, *Lepidosperma gibsonii* and *Idiosoma nigrum* in accordance with the Licences.

Further consultation with DPaW will also occur during the environmental assessment and approval processes under the *Environmental Protection Act 1986* (WA), with EPA expected to request advice from DPaW on this EIA-PER document for the Proposal.

Department of Mines and Petroleum

The Proposal will be subject to a mining and environmental assessment by DMP under the Mining Act 1978 (WA). Accordingly, DMP is a stakeholder for the Proposal.

In November 2013, a meeting was held with representatives for DMP, MGM and EHPL to discuss the Proposal, existing environmental surveys/data, proposed additional targeted surveys, potential environmental effects, Government assessment and approval processes, and stakeholder consultation.

In May 2014, written correspondence to DMP by MGM identified the Proposal and its key environmental effects, with an invitation for DMP to provide initial comment on the Proposal.

In June 2014, DMP provided written advice to MGM acknowledging the Proposal, acknowledging MGM's ongoing compliance for the approved mine operations, support for MGM's stakeholder consultation process, and support for continued consultation between DMP and MGM.

In June 2014, a meeting was held with representatives for DMP, MGM and EHPL to discuss the Development Envelope and infrastructure, Government assessment and approval processes, environmental surveys, environmental effects (in particular to Rare Flora and Specially Protected Fauna), land tenures, mine closure, and stakeholder consultation.

In August 2014, DMP was provided by MGM a copy of the Proposal referral documentation (including supporting documents) submitted to EPA under the *Environmental Protection Act 1986* (WA).

An application to DMP for Mining Proposal approval under s82A(2) of the *Mining Act 1978* (WA) is scheduled to commence from Q3 2015. Submission of the Mining Proposal application will represent further consultation on the Proposal between DMP and MGM. Consultation between DMP and MGM on the Proposal will be ongoing throughout the assessment and approval processes under the *Mining Act 1978* (WA).

As an outcome of the assessment and approval processes under the *Mining Act 1978* (WA), it is anticipated that DMP will also monitor the implementation of the Proposal, with MGM to prepare and submit to DMP an annual environmental report outlining the implementation of the Proposal and its environmental effects.

Further consultation with DMP will also occur during the environmental assessment and approval processes under the *Environmental Protection Act 1986* (WA), with EPA expected to request advice from DMP on this EIA-PER document for the Proposal.

Department of Water

The Proposal will require an amendment to Groundwater Licence GWL166067 (DoW 2013) by DoW under the *Rights in Water and Irrigation Act 1914* (WA). Groundwater Licence GWL166067 has been granted to EHPL, with MGM abstracting groundwater under the authorisation of EHPL. Accordingly, DoW is a stakeholder for the Proposal.

In May 2014, written correspondence to DoW by MGM identified Proposal and its environmental effects, with an invitation for DoW to provide initial comment on the Proposal.

In June 2014, DoW provided written advice to MGM acknowledging the Proposal, management of surface water drainage, existing groundwater licences held by EHPL, and projected groundwater abstraction requirements.

An application to DoW for amendment of Groundwater Licence GWL166067 under s5C of the *Rights in Water and Irrigation Act 1914* (WA), and an application under s26D for new groundwater well(s) (if required), is scheduled to

commence from Q3 2015. DoW has confirmed that the licensee is able to seek an amendment to GWL166067 to include the additional Iron Hill tenements. Such an amendment would only require addition of mining tenements for the activity of dust suppression from construction, earthworks and mining purposes. The items stated in Line 1 of the GWL would continue as existing infrastructure such as 'Camp' and 'Ore Processing' would continue to serve the Iron Hill pit in its current locational arrangement. Submission of the application(s) will represent further consultation on the Proposal between DoW, MGM and EHPL. Consultation between DoW, MGM and EHPL on the Proposal will be ongoing throughout the environmental assessment and approval processes under the *Rights in Water and Irrigation Act 1914* (WA).

As an outcome of the assessment and approval processes under the *Rights in Water and Irrigation Act 1914* (WA), it is anticipated that DoW will also monitor the implementation of the Proposal through a continued requirement for EHPL to prepare and submit to DoW an annual environmental report on the groundwater abstraction.

Department of Aboriginal Affairs

The Proposal will be subject to assessment by DAA under the *Aboriginal Heritage Act 1972* (WA). Accordingly, DAA is a stakeholder for the Proposal.

In May 2014, a meeting was held with representatives for DAA and MGM to discuss the Proposal, existing heritage surveys/data, Government assessment and approval processes, and stakeholder consultation.

In May 2014, written correspondence to DAA by MGM identified the Proposal and its key environmental effects, with an invitation for DAA to provide initial comment on the Proposal.

In June 2014, DAA provided written advice to MGM acknowledging the Proposal, identification of DAA record 25293 'Extension Hill' which may (or may not) be of Aboriginal significance, and stakeholder consultation.

In March 2015, MGM submitted an application to DAA for consent under s18 of the *Aboriginal Heritage Act 1972* (WA) for part of the Development Envelope (MGM 2015). Regular contact by MGM to DAA shows ongoing consultation on this matter. As of early September 2015, DAA advised MGM that MGM's s18 application and supporting documentation collated by DAA is likely to go before ACMC in October or November 2015. At that time based on its recommendation, the ACMC is able, through its advice or recommendation to Minister for consent, to advise on the heritage significance of record 25293.

As an outcome of the assessment and approval processes under the *Aboriginal Heritage Act 1972* (WA), it is anticipated that DAA will also monitor the implementation of the Proposal, with MGM to prepare and submit to DAA a report outlining the implementation of the Proposal and its effects to heritage values.

Department of Environmental Regulation

The Proposal may require an amendment to Licence 8495 granted by DER under the *Environmental Protection Act 1986* (WA). Accordingly, DER is a stakeholder for the Proposal.

In May 2014, written correspondence to DER by MGM identified the Proposal and its key environmental effects, with an invitation for DER to provide initial comment on the Proposal.

An application to DER for amendment of Licence 8495 under s59(1) of the *Environmental Protection Act 1986* (WA) may be required to include a landfill within the waste rock landform of the Proposal, with submission tentatively scheduled to commence from Q3 2015. Submission of the application will represent further consultation on the Proposal between DER and MGM. Consultation between DER and MGM on the Proposal will be ongoing throughout the environmental assessment and approval processes under the *Environmental Protection Act 1986* (WA), if required.

As an outcome of the assessment and approval processes under the *Environmental Protection Act 1986* (WA) (subject to a need to include a landfill), it is anticipated that DER may also monitor the implementation of the Proposal through a continued requirement to prepare and submit to DER an annual environmental report outlining the activities under the Licence 8495 approval.

Shire of Yalgoo

The Proposal is located within the Shire of Yalgoo. Accordingly, the Shire of Yalgoo is a stakeholder for the Proposal.

In June 2013, a meeting was held with representatives for the Shire of Yalgoo and MGM to discuss the approved mine operations. This meeting included discussion on the Proposal, with a view that the Proposal would extend the life of the approved mine operations.

In May 2014, written correspondence to the Shire of Yalgoo by MGM identified the Proposal and its key environmental effects, with an invitation for the Shire of Yalgoo to provide initial comment on the Proposal.

In October 2014, written correspondence between representatives for the Shire of Yalgoo and MGM confirmed that the Proposal did not require approval from the Shire of Yalgoo.

In May 2015, a meeting was held with representatives for the Shire of Yalgoo and MGM to discuss the approved mine operations and the Proposal. This meeting included discussion on the proposed extension of the Proposal to incorporate the area of Iron Hill South following additional resource definition, the anticipated environmental effect of the Proposal to the flora and fauna taxa *Darwinia masonii* and *Leipoa ocellata* and *Idiosoma nigrum*, and the proposed schedule for the Government assessment and approval processes applicable to the Proposal. Representatives for DPaW, EHPL, Pindiddy Aboriginal Corporation, Australian Wildlife Conservancy and Bush Heritage Australia were also in attendance at this meeting.

Further consultation between the Shire of Yalgoo and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Shire of Perenjori

Whilst the Proposal is not located within the Shire of Perenjori, the Shire of Perenjori is considered a stakeholder for the Proposal as the extracted ore will be transported via road and rail infrastructure located within the Shire of Perenjori. The Shire of Perenjori also provided a submission during the environmental assessment process for the approved mine operations.

In June 2013, a meeting was held with representatives for the Shire of Perenjori and MGM to discuss the approved mine operations. This meeting included discussion on the Proposal, with a view that the Proposal would extend the life of the approved mine operations.

In May 2014, written correspondence to the Shire of Perenjori by MGM identified the Proposal and its key environmental effects, with an invitation for the Shire of Perenjori to provide initial comment on the Proposal.

Further consultation between the Shire of Perenjori and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

City of Greater Geraldton

Whilst the Proposal is not located within the City of Greater Geraldton, the City of Greater Geraldton is considered a stakeholder for the Proposal as the extracted ore will be exported through the Port of Geraldton located within the City of Greater Geraldton. The City of Greater Geraldton also provided a submission during the environmental assessment process for the approved mine operations.

In May 2014, written correspondence to the City of Greater Geraldton by MGM identified the Proposal and its key environmental effects, with an invitation for the City of Greater Geraldton to provide initial comment on the Proposal.

Further consultation between the City of Greater Geraldton and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Mid-West Ports Authority

The Mid-West Ports Authority (previously known as the Geraldton Port Authority) is considered a stakeholder for the Proposal as the extracted ore will be exported through the Port of Geraldton. The Mid-West Ports Authority also provided a submission during the environmental assessment process for the approved mine operations.

In May 2014, written correspondence to the Mid-West Ports Authority by MGM identified the Proposal and its key environmental effects, with an invitation for the Mid-West Ports Authority to provide initial comment on the Proposal.

Further consultation between the Mid-West Ports Authority and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Department of Lands

The Proposal coincides with Crown Reserve 17367 vested with DoL. Accordingly, DoL is considered a stakeholder for the Proposal.

In April 2014, written correspondence to DoL by a representative for MGM identified the Proposal and its location coinciding with the Crown Reserve, with a request for DoL to identify any effect of the Crown Reserve to development of the Proposal. In April 2014, written correspondence from DoL to MGM explained that the existence of Crown Reserve would have no effect to the development of the Proposal. In May 2014, further written correspondence to DoL by MGM identified the Proposal and its key environmental effects, with an invitation for DoL to provide initial comment on the Proposal.

Further consultation between DoL and MGM is expected to be ongoing during implementation of the Proposal through MGM's established consultation and based on any status of DoL as a decision making authority.

Community

Extension Hill Pty Ltd

The Proposal is located on Tenements granted to EHPL under the *Mining Act 1978* (WA). A commercial agreement with EHPL provides MGM access to the Tenements for both mineral exploration and mining purposes. Accordingly, EHPL is considered a stakeholder for the Proposal.

Consultation on the Proposal with EHPL has been undertaken over many years, initially in relation to the additional mineral exploration required to define the mineral resource, and more recently regarding the development of the Proposal. Generally, consultation on the Proposal between EHPL and MGM occurs on a weekly or monthly basis, and has included many broad aspects including Proposal definition, environmental and heritage surveys, Government approval processes and stakeholder consultation. Specifically, consultation between EHPL and MGM on the Proposal has included assessment and agreement by EHPL of both the Proposal referral document (MGM 2014a) and this EIA-PER document. The Proposal has the full support of EHPL as the Tenement Holder.

Consultation between EHPL and MGM on the Proposal will be ongoing throughout the various environmental, mining, planning and heritage assessment and approval processes outlined above. As the Tenement Holder, it is anticipated that EHPL will also monitor the implementation of the Proposal in accordance with the provisions of the commercial agreement.

Badimia People

The Badimia People are considered a stakeholder as the Proposal coincides with a registered application for Native Title for the Badimia People and an unregistered application for Native Title under Badimia #2.

The Badimia People, EHPL and MGM have a confidential heritage agreement, effective since 2001, covering the area of the Mt Gibson Ranges. The heritage agreement outlines agreed protocols for heritage surveys, protection of heritage areas, mining, environmental matters, financial contributions, employment and education. The Badimia People, EHPL and MGM continue to operate in accordance with the agreement.

The Badimia People, EHPL and MGM also maintain a Monitoring and Liaison Committee (MLC). The MLC meets each 6 months to discuss matters including the status of the mining operations, employment opportunities, cultural awareness, and the operation of the confidential heritage agreement.

In May 2013, written correspondence from MGM to the Badimia People providing an outline of proposed mineral exploration works coinciding with the Development Envelope, and noting that area had been subject to previous Aboriginal heritage surveys (as outlined within Tehnas 2010). In May 2013, the Badimia People (via the Badimia

Land Aboriginal Corporation) advised that no additional heritage surveys were required and wished MGM well with the proposed works.

In October 2013, a meeting was held with representatives of the Badimia People (as part of the Badimia Working Group) regarding the approved mine operations and the Proposal.

In April 2014, representatives of the Badimia People attended a meeting of the MLC. Representatives of the Badimia People inspected the Development Envelope with representatives of MGM. The discussions held included Government assessment and approval processes, the effect of the Proposal to environmental values, and MGM's proposed environmental management through the continuation of the management procedures implemented at the approved mine operations.

In May 2014, written correspondence from MGM to the Badimia People provided an outline of the Proposal, including a map of the Development Envelope and describing its potential environmental effects. The Badimia People were invited to provide comment on the Proposal.

In May 2014, a meeting was held with representatives of the Badimia People (as part of the Badimia Working Group) regarding the approved mine operations and the Proposal. The location of the Proposal was identified through maps, and discussions were held regarding the previous heritage surveys within the Development Envelope (as outlined within Tehnas 2010). It was outlined by MGM that the Proposal would not affect any 'Registered Site' of Aboriginal heritage under the *Aboriginal Heritage Act 1972* (WA). Also discussed were environmental matters related to the Proposal (e.g. flora and fauna surveys, mine closure) and Government assessment and approval processes.

In October 2014, representatives of the Badimia People attended a meeting of the MLC. The Badimia People were informed by MGM that Government approval had been received for exploration drilling within the Development Envelope.

In January 2015, a meeting was held with representatives of the Badimia People. The Badimia People confirmed their view that there are no places or objects of Aboriginal heritage within the Development Envelope.

In April 2015, representatives of the Badimia People attended a meeting of the MLC. The Badimia People were provided an update of exploration drilling completed during 2014 within the Development Envelope and other parts of the Mt Gibson Ranges.

MGM remains committed to ongoing consultation with the Badimia People on all aspects of the Proposal. The next meeting of the MLC, in which representatives of the Badimia People will attend, is currently scheduled for October 2015.

Further consultation between the Badimia People and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Australian Wildlife Conservancy / Mt Gibson Pastoral Lease

The Proposal is positioned approximately 1km from the boundary of the Mt Gibson Pastoral Lease, which is managed by the Australian Wildlife Conservancy. The approved mine operations coincide with part of the Mt Gibson Pastoral Lease. The Australian Wildlife Conservancy also provided a submission during the environmental assessment process for the approved mine operations. Accordingly, the Australian Wildlife Conservancy is considered a stakeholder for the Proposal.

In May 2014, written correspondence to the Australian Wildlife Conservancy by MGM identified the Proposal and its key environmental effects, with an invitation for the Australian Wildlife Conservancy to provide initial comment on the Proposal.

In May 2015, a meeting was held with representatives for the Australian Wildlife Conservancy and MGM to discuss the approved mine operations and the Proposal. This meeting included discussion on the proposed extension of the Proposal to incorporate the area of Iron Hill South following additional resource definition, the anticipated environmental effect of the Proposal to the flora and fauna taxa *Darwinia masonii* and *Leipoa ocellata* and *Idiosoma nigrum*, and the proposed schedule for the Government assessment and approval processes applicable to the

Proposal. Representatives for DPaW, Shire of Yalgoo, EHPL, Pindiddy Aboriginal Corporation and Bush Heritage Australia were also in attendance at this meeting.

Further consultation between the Australian Wildlife Conservancy and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Pindiddy Aboriginal Corporation / Ninghan Pastoral Lease

The Proposal is positioned approximately 3km from the boundary of the Ninghan Pastoral Lease, which is managed by the Pindiddy Aboriginal Corporation. The approved mine operations coincide with part of the Ninghan Pastoral Lease. The Pindiddy Aboriginal Corporation also provided a submission during the environmental assessment process for the approved mine operations. Accordingly, the Pindiddy Aboriginal Corporation is considered a stakeholder for the Proposal.

In June 2013, a meeting was held with representatives for the Pindiddy Aboriginal Corporation and MGM to discuss the approved mine operations. This meeting included discussion on the Proposal, with a view that the Proposal would extend the operational life of the mine operations at the Mt Gibson Ranges.

In May 2014, written correspondence to the Pindiddy Aboriginal Corporation by MGM identified the Proposal and its key environmental effects, with an invitation for the Pindiddy Aboriginal Corporation to provide initial comment on the Proposal.

In May 2015, a meeting was held with representatives for the Pindiddy Aboriginal Corporation and MGM to discuss the approved mine operations and the Proposal. This meeting included discussion on the proposed extension of the Proposal to incorporate the area of Iron Hill South following additional resource definition, the anticipated environmental effect of the Proposal to the flora and fauna taxa *Darwinia masonii* and *Leipoa ocellata* and *Idiosoma nigrum*, and the proposed schedule for the Government assessment and approval processes applicable to the Proposal. Representatives for DPaW, Shire of Yalgoo, EHPL, Australian Wildlife Conservancy and Bush Heritage Australia were also in attendance at this meeting.

Further consultation between the Pindiddy Aboriginal Corporation and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Bush Heritage Australia / White Wells Pastoral Lease

The Proposal is positioned approximately 5km from the boundary of the White Wells Pastoral Lease, which is managed by Bush Heritage Australia. Bush Heritage Australia also provided a submission during the environmental assessment process for the approved mine operations. Accordingly, Bush Heritage Australia is considered a stakeholder for the Proposal.

In May 2014, written correspondence to Bush Heritage Australia by MGM identified the Proposal and its key environmental effects, with an invitation for Bush Heritage Australia to provide initial comment on the Proposal.

In June 2014, written correspondence from the Bush Heritage Australia to MGM identified that the Proposal could incorporate environmental offsets that seek regional environmental benefits through the Gunduwa Regional Conservation Association.

In May 2015, a meeting was held with representatives for the Bush Heritage Australia and MGM to discuss the approved mine operations and the Proposal. This meeting included discussion on the proposed extension of the Proposal to incorporate the area of Iron Hill South following additional resource definition, the anticipated environmental effect of the Proposal to the flora and fauna taxa *Darwinia masonii* and *Leipoa ocellata* and *Idiosoma nigrum*, and the proposed schedule for the Government assessment and approval processes applicable to the Proposal. Representatives for DPaW, Shire of Yalgoo, EHPL, Pindiddy Aboriginal Corporation and the Australian Wildlife Conservancy were also in attendance at this meeting.

Further consultation between Bush Heritage Australia and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Wanarra Pastoral Lease

The Proposal is approximately 20km east of the boundary of the Wanarra Pastoral Lease. The approved mine operations transport the extracted ore via road positioned within the Wanarra Pastoral Lease. Accordingly, the Wanarra Pastoral Lease is considered a stakeholder for the Proposal.

In June 2013, a meeting was held with representatives for the Wanarra Pastoral Lease and MGM to discuss the approved mine operations. This meeting included discussion on the Proposal, with a view that the Proposal would extend the operational life of the mine operations at the Mt Gibson Ranges.

Further consultation between the Wanarra Pastoral Lease and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

North Central Malleefowl Preservation Group

The North Central Malleefowl Preservation Group is considered a stakeholder for the Proposal as it provided a submission during the environmental assessment process for the approved mine operations.

In June 2013, a meeting was held with representatives for the North Central Malleefowl Preservation Group and MGM to discuss the approved mine operations. This meeting included discussion on the Proposal, with a view that the Proposal would extend the operational life of the mine operations at the Mt Gibson Ranges.

In May 2014, written correspondence to the North Central Malleefowl Preservation Group by MGM identified the Proposal and its key environmental effects, with an invitation for the North Central Malleefowl Preservation Group to provide initial comment on the Proposal.

Further consultation between the North Central Malleefowl Preservation Group and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Western Australian Naturalists Club

The Western Australian Naturalists Club is considered a stakeholder for the Proposal as it provided a submission during the environmental assessment process for the approved mine operations.

In May 2014, written correspondence to the Western Australian Naturalists Club by MGM identified the Proposal and its key environmental effects, with an invitation for the Western Australian Naturalists Club to provide initial comment on the Proposal.

In June 2014, written correspondence from the Western Australian Naturalists Club to MGM acknowledged the early consultation on the Proposal by MGM, identified an interest in the environmental assessment of the Proposal (including cumulative effects), and welcoming continued consultation between the Western Australian Naturalists Club and MGM.

Further consultation between the Western Australian Naturalists Club and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Conservation Council of Western Australia

The Conservation Council of Western Australia is considered a stakeholder for the Proposal as it provided a submission during the environmental assessment process for the approved mine operations.

In May 2014, written correspondence to the Conservation Council of Western Australia by MGM identified the Proposal and its key environmental effects, with an invitation for the Conservation Council of Western Australia to provide initial comment on the Proposal.

Further consultation between the Conservation Council of Western Australia and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Wildflower Society of Western Australia

The Wildflower Society of Western Australia is considered a stakeholder for the Proposal as it provided a submission during the environmental assessment process for the approved mine operations.

In May 2014, written correspondence to the Wildflower Society of Western Australia by MGM identified the Proposal and its key environmental effects, with an invitation for the Wildflower Society of Western Australia to provide initial comment on the Proposal.

Further consultation between the Wildflower Society of Western Australia and MGM is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Community Consultation

General consultation with the community on the potential for development within the Development Envelope has been undertaken through MGM's website and media releases since 2012. This consultation has included identification of the mineral resource within the Development Envelope, the intention to undertake further mineral exploration to define the mineral resource, and the intention for future mine development.

Having regard to the list of both Government and community stakeholders identified above, additional general community consultation on the Proposal (in addition to the website and media releases) has not been considered necessary.

The public release of this EIA-PER document will represent additional consultation with the broader community on the Proposal.

Further consultation between the general community and MGM (as may be required) is expected to be ongoing during implementation of the Proposal through MGM's established community consultation processes.

Consultation Outcomes

Government agencies and the community have provided a variety of views on the Proposal. These stakeholder views have been considered by MGM in the development of the Proposal, and in the information presented in the EIA-PER document. Whilst the stakeholder views have not resulted in any changes for the Proposal itself, the stakeholder views have informed the type and detail of the environmental assessment information presented within the EIA-PER document.

Appendix 5 – Management Plans and Technical Reports

The set of applicable management plans and technical reports are provided separately and electronically to DoE.