ANNUAL COMPLIANCE REPORT
Iron Hill Deposit Mining Project,
Mt Gibson Ranges, WA
(EPBC 2015/7514)
10 February 2018 – 9 February 2019
Document Title: Annual Compliance Report – Iron Hill Deposit Mining Project

Revision Date: 8 May 2019

Authorisation:

Peter Kerr  
*Chief Executive Officer*  
Mount Gibson Mining Limited

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Cover photo: Translocation Trial Plot (August 2018)
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1. INTRODUCTION

The Iron Hill Deposits Project (the Project) was approved by the Department of the Environment and Energy under the Environment Protection and Biodiversity Conservation Act 1999 on 8 February 2017. The Project involves development within an area of 90.2 ha to ‘undertake mine development of the Iron Hill deposits, located within the Mt Gibson Range approximately 270 km east-south-east of Geraldton, in the Shire of Yalgoo, Western Australia.’ For the purposes of this approval, the Project includes the mine pit, waste rock landform, topsoil stockpile areas and some haul roads.

Approximately 40 ha of the development envelope included in the original referral for the Project was explicitly excluded from the Project in a subsequent variation. These areas contained infrastructure and haul roads, however they were excluded from the EPBC approved Project area because they did not contain any listed species which resulted in the Project being a ‘controlled action’. In the absence of any matters of national environmental significance, it was concluded that approval under the Environment Protection and Biodiversity Conservation Act 1999 was not required for these areas so they were excluded from the Project area of EPBC approval 2015/7514.

Other pre-existing infrastructure utilised to support the Project was previously approved and constructed as part of the Mt Gibson Iron Ore Project (EPBC approval 2005/2381). This includes areas such as the crushing and screening facility, mine site village and maintenance workshops.

Pursuant to condition 7 of EPBC approval 2015/7514, this report addresses compliance of the Project with each condition of this approval for the period from 10 February 2018 to 9 February 2019.

1.1. Project Status

Development within the Project area commenced on 10 February 2017. At the time of this submission, mining had ceased and the area had been rehabilitated. The total area of native vegetation clearing for completion of the Project was 44.76 ha (including 2.65 ha of pre-existing tracks). The Project Layout and all required vegetation clearing is shown in Figure 1. Only a portion of that land cleared of vegetation contained records of Darwinia masonii (Figure 2).

During the reporting period a total of 3,357,329 tonnes of ore and 299,790 bcm of waste rock was mined from the Project area. The ore was transported to the Extension Hill Hematite Operations processing facilities for crushing and transport, and the waste rock placed at the waste rock landform or used to construct access roads inside the development area.

Mining of the Iron Hill Deposits ceased in mid-December 2018 and implementation of the Mine Closure Plan (MGM 2017) had commenced. The abandonment bund was constructed, as per the Iron Hill Deposits Hematite Operation Mine Closure Plan (MGM 2017) for both the North and the South Pit.

Other key activities completed for mine closure during the reporting period included:

- Decommissioning and removal of adjacent support infrastructure associated with the administration building and heavy vehicle parking area; and
- Rehabilitation of areas within the Development Envelope (Figure 1) as per the Mine Closure Plan (MGM 2017) including mine roads, the waste rock landform and topsoil stockpile areas. Rehabilitation involved shaping the waste rock landform to design criteria, haulage and spreading and ripping of topsoil, followed by spreading native seed collected from the local area.
Figure 1 Site Layout and Vegetation Clearing at the end of the Reporting Period
Figure 2 *Darwinia masonii* records within and adjacent the area approved for the Controlled Action.
2. COMPLIANCE

2.1. Condition 1 (Compliant)

The person taking the action must not clear more than 1,327 individuals of Mason’s Darwinia (Darwinia masonii) within the controlled action area shown in Attachment A.

A total of 44.76 ha (including 2.65 ha of pre-existing tracks) of vegetation was cleared within the Project area (Figure 1). This included 1,105 recorded individuals of Darwinia masonii.

2.2. Condition 2 (Compliant)

For the protection of Mason’s Darwinia, the person taking the action must comply with Condition 6 (Flora and Vegetation - Outcome-based Condition Environmental Management Plan) of the Western Australian Approval.

Note that for the purposes of this approval, compliance is discussed only as it relates to Darwinia masonii.

2.2.1. Ministerial Statement 1045 – Condition 6-1

Prior to the commencement of ground disturbing activities, or as otherwise agreed in writing by the CEO, the proponent shall prepare and submit a Condition Environmental Management Plan to the satisfaction of the CEO on advice of Parks and Wildlife to demonstrate that the following environmental outcome will be met: (1) no adverse effects on native vegetation on the Mt Gibson Range, including the Rare Flora species, outside the development envelope shown in Schedule 1.

The Flora and Vegetation Management and Monitoring Plan (Version 5, 25 January 2017) (FVMMP) was approved by the Western Australian Office of the Environmental Protection Authority on 8 February 2017. This approval acknowledged that the requirements of conditions 6-1, 6-2 and 6-3 of Ministerial Statement 1045 have been met.

2.2.2. Ministerial Statement 1045 – Condition 6-2

The plan required by condition 6-1 shall include provisions required by condition 6-3 to address indirect impacts on Rare Flora (Darwinia masonii and Lepidosperma gibsonii) and vegetation health including from, but not limited to dust, weeds and fire as a result of implementation of the proposal.

The FVMMP was approved by the Western Australian Office of the Environmental Protection Authority on 8 February 2017. This approval acknowledged that the requirements of conditions 6-1, 6-2 and 6-3 of Ministerial Statement 1045 have been met.

2.2.3. Ministerial Statement 1045 – Condition 6-3

The Condition Environmental Management Plan shall:

1) specify trigger criteria that will trigger the implementation of trigger level actions if exceeded;

2) specify threshold criteria that:
   a) provides a limit, which the proponent must not exceed, beyond which the environmental outcome identified in condition 6-1 is not achieved; and
   b) will trigger the implementation of threshold contingency actions if exceeded.

3) specify monitoring to determine if trigger criteria and threshold criteria are exceeded;
4) specify trigger level actions to be implemented in the event that trigger criteria have been exceeded;

5) specify threshold contingency actions to be implemented in the event that threshold criteria are exceeded;

6) provide the format and timing for the reporting of monitoring results and analysis against threshold criteria to demonstrate that condition 6-1 has been met over the reporting period in the Compliance Assessment Report required by condition 4; and

7) provide for reporting of exceedances of the threshold criteria.

The FVMMP was approved by the Western Australian Office of the Environmental Protection Authority on 8 February 2017. This approval acknowledged that the requirements of conditions 6-1, 6-2 and 6-3 of Ministerial Statement 1045 have been met. Note that neither trigger nor threshold levels (nor their respective contingency actions) were met in relation to Darwinia masonii in accordance with the approved plan during the reporting period.

2.2.4. Ministerial Statement 1045 – Condition 6-4

After receiving notice in writing from the CEO that the Condition Environmental Management Plan satisfies the requirements of condition 6-3 for condition 6-1, the proponent shall, prior to the commencement of ground disturbing activities:

1) commence implementation of the provisions of the Condition Environmental Management Plan; and

2) continue to implement the Condition Environmental Management Plan until the CEO has confirmed by notice in writing that the proponent has demonstrated the outcome specified in condition 6-1 has been met.

The approach approved in the FVMMP requires the monitoring of dust deposition and plant health to enable adaptive management in response to monitoring results.

Dust

For the purposes of the FVMMP, dust deposition monitoring is conducted with monthly samples taken at 10 locations in and around the Mt Gibson Ranges (Figure 3). The dust deposition trigger level adopted by the Project is 10 g/m$^2$/month insoluble solids. All results were below this trigger level (Figure 4).

The dust deposition bottle from DM14 broke whilst being retrieved for the January 2019 monitoring, however it is unlikely that the trigger level would have been exceeded during this monitoring period due to the cessation of operational mining in December 2018.
Figure 3 Dust Monitor Locations
Figure 4 Dust deposition monitoring results
Vegetation Monitoring

MGM commenced implementation of the plan with baseline monitoring undertaken in December 2016 and February 2017 prior to site development. Upon approval of the FVMMP, MGM commenced implementation of the monthly, bi-monthly and quarterly monitoring required following ground disturbance. During this reporting period, the monitoring requirement was reduced to biannual. The monitoring was undertaken to determine compliance with the following trigger and threshold criteria:

- **Trigger:**
  - Statistically significant change in plant health in nearest zone of either monitored DRF species or the other monitored native plant species in comparison to control zones as measured by a reduction in mean Index of Chlorophyll Fluorescence (ICF) of at least 20% and the mean Fv/Fm ratio is less than 0.6.
  - Statistically significant change in plant condition of monitored *Darwinia masonii* in nearest zone in comparison to control zones as measured by a reduction in mean condition ratings in excess of 20%.
  - Introduction of new species or an increase in weed cover in fixed monitored quadrats in excess of five percent of the area as a result of the project.

- **Threshold:**
  - No more than 87 ha of native vegetation will be directly cleared for the project.
  - The rate of mortality of monitored rare plants in the zone immediately outside the Development Envelope exceeds natural rates due to the project.
  - Mortality of native vegetation due to the project in the zone immediately outside the Development Envelope that also occurs within an area of more than one hectare.

As per the FVMMP, Table 1 summarises the reporting provisions against the trigger and threshold criteria above within the reporting period. Further detail pertaining to the summary table is described below.

As described by section 1.1, less than 87ha of vegetation has been cleared inside the Development Envelope.

During the reporting period, MGM undertook monitoring events as required by the FVMMP in April 2018 and September 2018 (Appendix A). The key outcome from this report was the strong correlation between plant health (where health is measured by Chlorophyll Fluorescence as an Fv/Fm ratio) and rainfall as the health of vegetation appears to increase and decrease with dry-wet seasonal variations (Figure 7 and 8). There were no spatial trends between near mine and other reference sites. Further details including the annual reporting and monitoring event report cards are provided as Appendix A.

No trigger or threshold criterion was exceeded during the reporting period and therefore no external reporting was required.

### Table 1 FVMMP Reporting Table

<table>
<thead>
<tr>
<th>Key environmental factor: Flora and vegetation (MS 1045 Condition 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FVMMP environmental outcome:</strong> To ensure that the Project does not affect Rare Flora (DRF) populations and native vegetation outside the Development Envelope.</td>
</tr>
<tr>
<td>Reporting on the environmental outcome, threshold and trigger criteria for December 2017 to December 2018</td>
</tr>
<tr>
<td>Status¹</td>
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</tbody>
</table>

¹Status: 1
### Key environmental factor: Flora and vegetation (MS 1045 Condition 6)

**Trigger criteria:**
1. Dust deposition at gauges in excess of 10 g/m²/month

2. Statistically significant change in plant health of monitored DRF and other native plant species in comparison to other control zones as measured by a reduction in mean Index of Chlorophyll Fluorescence (ICF) of at least 20% or the mean Fv/Fm ratio is less than 0.6.

3. Statistically significant change in plant condition of *D. masonii* in monitored populations in comparison to control zones as measured by a reduction in mean condition ratings in excess of 20%.

4. Introduction of new species or 20% increase in weed cover in fixed monitored quadrats.

**Threshold criteria:**
1. The rate of mortality of monitored rare plants in the zone immediately outside the Development Envelope (Figure 3) exceeds natural rates due to the project.

2. Mortality of native vegetation due to the project in the zone immediately outside the Development Envelope (Figure 3) that also occurs in an area of more than one hectare.

3. Total impact (clearing or indirect mortality of native vegetation) of no more than 87 ha.

**Trigger criteria:**
1. Dust deposition *did not* exceed 10 g/m²/month at monitoring sites in Figure 5 and the monitoring requirement was achieved.

2. There *was not* a change in plant health of monitored records as measured by a reduction in mean Index of Chlorophyll Fluorescence (ICF).

3. There *was not* a significant change in plant condition of mapped *D. masonii* as measured by a reduction in mean plant condition ratings.

4. The introduction of or 20% increase in weed cover *did not* occur in fixed monitoring quadrats.

**Threshold criteria:**
1. There *was NOT* increased rates of mortality of monitored plants immediately outside the Development Envelope.

2. There *was NOT* mortality of native vegetation due to the project in the zone immediately outside the Development Envelope.

3. There was *LESS THAN* 87 ha of native vegetation that was cleared.

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**Notes:**

The status of achievement of environmental outcome is indicated by the following symbols:

- ■ Environmental outcome achieved
- ● Environmental outcome not achieved

For MGM to review and adopt trigger actions.
Figure 5 Results for health and condition monitoring of the five native species from pre-development (baseline) to final round in the annual period (October 2018)
2.2.5. Ministerial Statement 1045 – Condition 6-5

In the event that monitoring indicates exceedance of threshold criteria specified in the Condition Environmental Management Plan, the proponent shall:

1) report the exceedance in writing within seven (7) days of the exceedance being identified;

2) immediately implement the threshold contingency actions specified in the Condition Environmental Management Plan and continue implementation of those actions until the trigger criteria are being met, or until the CEO has confirmed by notice in writing that it has been demonstrated that the environmental outcome in conditions 6-1 is being met and implementation of the trigger level actions and/or threshold contingency actions are no longer required;

3) investigate to determine the cause of the threshold criteria being exceeded;

4) identify additional measures required to prevent the threshold criteria being exceeded in the future;

5) investigate to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded; and

6) provide a report to the CEO within ninety (90) days of the exceedance being reported. The report shall include:
   a) details of threshold contingency actions implemented;
   b) the effectiveness of the threshold contingency actions implemented, monitored and measured against trigger criteria and threshold criteria;
   c) the findings of the investigations required by condition 6-5(3) and 6-5(5);
   d) additional measures to prevent the threshold criteria being exceeded in the future; and
   e) measures to control or abate the significant adverse environmental impacts which may have occurred.

No threshold criteria were exceeded during the reporting period.

2.2.6. Ministerial Statement 1045 – Condition 6-6

The proponent:

1) may review and revise the Condition Environmental Management Plan, or

2) shall review and revise the Condition Environmental Management Plan as and when directed by the CEO.

The FVMMP was not revised during this reporting period.

2.2.7. Ministerial Statement 1045 – Condition 6-7

The proponent shall implement the latest revision of the Condition Environmental Management Plan, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 6-3.

The FVMMP was not revised during this reporting period. The FVMMP was implemented as per section 2.2.4.

2.3. Condition 3 (Not required at this stage)

The person taking the action must notify the Department in writing as soon as practicable and within no more than seven business days of any variation, modification, suspension,
reinstatement, extension, revocation, invalidity and/or similar change to the Western Australian Approval or part thereof.

No variation, modification, suspension, reinstatement, extension, revocation, invalidity and/or similar change to the Western Australian Approval or part thereof was made during the reporting period.

2.4. **Condition 4 (Compliant)**

To offset the residual impacts of the action on Mason’s Darwinia the person taking the action must implement the Offset Management Plan.

This report forms the Annual Offsets Status Report required by the Offset Management Plan and demonstrates that the Offset Management Plan has been implemented during the reporting period. It is noted that Section 7.1 of the Offset Management Plan, the report would be submitted ‘initially, within fifteen months after the date this plan is approved and thereafter annually, or as agreed to in writing by the DoTEE.’ The Offset Management Plan was approved on 8 February 2017 and, as a result, this report was initially due on the 7th May 2018 and thereafter annually.

Table 2 Offset Management Plan Status Report

<table>
<thead>
<tr>
<th>Reporting Matters</th>
<th>Compliance</th>
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<tr>
<td>Description of translocation plot: a) Location; b) Substrate; c) Elevation; d) Slope.</td>
<td>Translocation plots 4, 6, 14, 16 and 17 have been developed to meet the requirements of this Offsets Management Plan. The plot descriptions are included in Appendix B, the location of the plots is shown in Figure 7.</td>
</tr>
<tr>
<td>Source Population.</td>
<td>The plants used to offset this Project were sourced from TPFL population 1 (Iron Hill).</td>
</tr>
<tr>
<td>Survivorship (total numbers and overall %).</td>
<td>As at 21 January 2019, a total of 3,096 <em>Darwinia masonii</em> had been planted in translocation plots for the purpose of this Offsets Management Plan. A total of 2,580 (83%) were still alive.</td>
</tr>
<tr>
<td>Percentage of plants that are flowering, and producing seed in each translocation area and in the adjacent TPFL (against completion Criteria of Section 5.1).</td>
<td>Interim criteria relating to flowering and seed production are medium term criteria that do not apply until 3-5 years from translocation, by which time plants will increase in maturity. However, the percentage of flowering plants was recorded in Spring 2018 and is shown by Table 3 for each plot and overall.</td>
</tr>
<tr>
<td>Presence of new recruits in the vicinity of each translocation plot.</td>
<td>Presence of new recruits relates to long term (after 5 year) completion criteria and does not yet apply.</td>
</tr>
<tr>
<td>Requirement for additional plantings if success criteria has not been achieved or is not on track to be achieved.</td>
<td>Short term interim criteria (Greater than 200 individuals in each plot (&gt;70% survival) or greater than 70% survival overall, across all plots) have been met so no additional plantings are required at this stage (Table 3).</td>
</tr>
<tr>
<td>Number of Darwinia masonii removed from the Project area due to implementation of the Proposal in relation to the 100% offset required as per the EPBC Act offsets calculator as presented in this Plan.</td>
<td>1,105 recorded <em>Darwinia masonii</em> were removed from the Project area.</td>
</tr>
<tr>
<td>Outcomes of annual audit and review as described by Section 8.</td>
<td>The short term interim criteria were achieved over the reporting period. The overall goal was also achieved to the extent possible during the reporting period, with the re-establishment of more than double the number of the plants that were removed for the Project. The annual review and audit of the plan demonstrated the current plan is effective at achieving the overall goal. Overall Offsets goal: Re-establishment and/or translocation of Darwinia masonii proportionate to the number removed at Iron</td>
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ANNUAL COMPLIANCE REPORT
Iron Hill Deposit Mining Project

Hill deposits (as a result of implementing the proposal) across the Mt Gibson Ranges (expenditure by MGM in total over a five year period being two nominal years of mining and then three years of post-mining) to meet a net present value equal to 100% of the EPBC Act Offsets Policy and Calculator.

Offsets Program Summary for Reporting Period

During May 2018, infill planting of 354 juveniles across all plots was undertaken to replace senesced plants. The total number of juveniles planted for the duration of the program is 3,096.

Monthly and annual monitoring was undertaken in accordance with the submitted OMP and to determine progress in meeting both short and medium term success criteria as detailed below.

Monthly monitoring for survival considered those which are evidently alive, those which are alive though appear to be in doubt (50/50 chance of survival) and those which are evidently dead. The number of D. masonii flowering was also recorded. Plants were recorded positive for flowering if they had one or more flowers. Some plants were flowering more than others, however counting all flowers per plant was considered impractical.

For the purpose of comparing seed viability, MGM staff collected 1 infructescence from 80 D. masonii for comparison to infructescences from natural populations. The focus of the collection was on those plots and plants which had survived since 2016, though small collections were also made from other younger plots and plants. Botanic Gardens and Parks Authority (‘BGPA’) were commissioned to undertake this analysis and compile a report. The results of this study will be included in the next reporting period as the report is yet to be finalised.

Growth of each plant was recorded to the nearest 5cm and a summary of the results is provided within Table 3 and Figure 6. At the end of the reporting period, a total of 2,580 plants were rated as ‘alive’ giving an overall survival rate of 83% of all translocated plants (3,096).

Plot 4 has shown the lowest rate of growth (average of 9.37cm) and flowering (26%). This growth rate is more than three times that observed by BGPA (2010) (2.9cm/yr) for seedlings within natural populations. Plot 14 also showed a lower rate of flowering (27%) and Plot 16 a lower rate of average growth (12cm). The majority of plots are producing flowers at a young age, predominantly because they have been sourced with cuttings from mature plants, but this indicates an ability to survive and reproduce.

In comparison to success criteria both the short and medium term criteria for survival have been met as the rate of survival was greater than 70% and more than 200 plants were recorded alive in each plot. To achieve the long term completion criteria of 1,105 plants taken, only 36% of the individuals planted would need to survive and meet completion criteria. Should adaptive management be necessary, MGM holds more than 2,000 juvenile plants in the nursery for supplementary plantings at the established plots should it be needed in the future.

The location of current translocation plots is shown by Figure 7 and further background information on each plot is within Appendix B.
Figure 6 Darwinia masonii rates of survival across all translocation plots

Table 3 Summary results of survival, growth and rate of flowering for all *Darwinia masonii* plots

<table>
<thead>
<tr>
<th>Plot #</th>
<th>Survival Total Planted</th>
<th>% Survival</th>
<th>Average 2018 Growth (cm/yr)</th>
<th>Flowering Rate %</th>
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<tr>
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<tr>
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<tr>
<td>Average</td>
<td></td>
<td></td>
<td>83</td>
<td>16</td>
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</table>
Figure 7 Location of current translocation plots
2.5. **Condition 5 (Compliant)**

Within 30 days after the commencement of the action, the person taking the action must advise the Department in writing of the actual date of commencement.

The Department was notified of the commencement date (10 February 2017) by letter on 25 February 2017.

2.6. **Condition 6 (Not required at this stage)**

The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the Offset Management Plan required by this approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department’s website. The results of audits may also be publicised through the general media.

No requests were received by the Department during the reporting period.

2.7. **Condition 7 (Compliant)**

Within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of the Offset Management Plan as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the Department at the same time as the compliance report is published. Reports must remain on the website for the life of this approval. The person taking the action must continue to comply with this condition until such time as agreed in writing by the Minister.

The 12 month report for the previous reporting period is available from www.mtgibsoniron.com.au. The Plan was published on this website on 3 May 2018. The Department was provided with this information with the submission of the report for previous reporting period. A copy of this current report has been posted to the same website.

2.8. **Condition 8 (Not required at this stage)**

Upon the direction of the Minister, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister.

The Minister did not provide a direction to undertake an independent audit of compliance during this reporting period.

2.9. **Condition 9 (Compliant)**

Unless otherwise agreed to in writing by the Minister, the person taking the action must publish the Offset Management Plan referred to in these conditions of approval on their website. The Offset Management Plan must be published on the website within 1 month of the date of this approval, or for revisions to the plan, within 1 month of being approved by the Minister under section 143A of the EPBC Act.
The Offset Management Plan is available from www.mtgibsoniron.com.au. The Plan was published on this website on 17 February 2017.

2.10. **Condition 10 (No longer relevant)**

> If, at any time after 5 years from the date of this approval, the person taking the action has not substantially commenced the action, then the person taking the action must not substantially commence the action without the written agreement of the Minister.

The action has been substantially commenced.
3. CONCLUSION

MGM complied with all approval conditions under EPBC 2015/7514 during the reporting period. At the end of the reporting period, the key objective of no adverse effects to surrounding vegetation including rare flora species as per the FVMMP was maintained and significant progress has been made towards achieving the key objective to offset the residual impact to *Darwinia masonii*. 
APPENDIX A

FLORA AND VEGETATION SIX AND TWELVE MONTH STATUS REPORTS
## Iron Hill Flora and Vegetation Monitoring Report Card

### Mount Gibson Mining Ltd

#### Author:
A. Williams

#### Reviewer:
R. Archibald

#### Issue Date:
20/04/2018

#### Rev:
A

#### Monitoring Dates:
10 – 11 April 2018

#### Rainfall:
0 mm

#### Max Temp:
25.6 °C

#### Previous 3 months rainfall:
97.0 mm

### TRIGGERS

<table>
<thead>
<tr>
<th>Plant Health</th>
<th>Exceeded?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistically significant change in plant health in nearest zone of either monitored DRF species or the other monitored native plant species in comparison to control zones as measured by a reduction in mean Index of Chlorophyll Fluorescence (ICF) of at least 20% and the mean Fv/Fm ratio is less than 0.6.</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plant Condition</th>
<th>Exceeded?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistically significant change in plant condition of monitored D. masonii or L. gibsonii in nearest zone in comparison to control zones as measured by a reduction in mean condition ratings in excess of 20%.</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weed Cover</th>
<th>Exceeded?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of new species or an increase in weed cover in fixed monitored quadrats in excess of 5% of the area as a result of the project.</td>
<td>No</td>
</tr>
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### BASELINE

Data collected between December 2016 and February 2017

### Δ BASELINE - NOW

#### NEAR

<table>
<thead>
<tr>
<th>Species</th>
<th>Mean Fv/Fm ± SD</th>
<th>% change from baseline</th>
<th>MEDIUM</th>
<th>FAR</th>
<th>Sig</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. acutivalvis</td>
<td>0.73 ± 0.09&lt;sup&gt;a&lt;/sup&gt;</td>
<td>↓ 8%</td>
<td>0.75 ± 0.08&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>↓ 8%</td>
<td>0.73 ± 0.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>↓ 1%</td>
</tr>
<tr>
<td>D. masonii</td>
<td>0.74 ± 0.08</td>
<td>↓ 6%</td>
<td>0.77 ± 0.05</td>
<td>↓ 3%</td>
<td>0.77 ± 0.05</td>
<td>↓ 2%</td>
</tr>
<tr>
<td>L. gibsonii</td>
<td>0.74 ± 0.14&lt;sup&gt;a&lt;/sup&gt;</td>
<td>↑ 10%</td>
<td>0.78 ± 0.03&lt;sup&gt;b&lt;/sup&gt;</td>
<td>↑ 29%</td>
<td>0.72 ± 0.09&lt;sup&gt;a&lt;/sup&gt;</td>
<td>↑ 13%</td>
</tr>
<tr>
<td>M. nematophylla</td>
<td>0.76 ± 0.04</td>
<td>↓ 6%</td>
<td>0.78 ± 0.08</td>
<td>↓ 4%</td>
<td>0.78 ± 0.03</td>
<td>↓ 4%</td>
</tr>
<tr>
<td>P. sericea</td>
<td>0.71 ± 0.08&lt;sup&gt;a&lt;/sup&gt;</td>
<td>↓ 5%</td>
<td>0.76 ± 0.05&lt;sup&gt;a&lt;/sup&gt;</td>
<td>↓ 7%</td>
<td>0.70 ± 0.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>↑ 11%</td>
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#### Median (mean ± SD); % change in mean

<table>
<thead>
<tr>
<th>Species</th>
<th>Health</th>
<th>Dust Rating</th>
<th>% Plants with Dust&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. acutivalvis</td>
<td>2 (2.0 ± 0.37)</td>
<td>↑ 10%</td>
<td>12&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>D. masonii</td>
<td>1 (1.4 ± 0.59)</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>L. gibsonii</td>
<td>0 (0.5 ± 0.50)</td>
<td>↑ 22%</td>
<td>0%</td>
</tr>
<tr>
<td>M. nematophylla</td>
<td>1 (1.5 ± 0.55)</td>
<td>↓ 12%</td>
<td>0%</td>
</tr>
<tr>
<td>P. sericea</td>
<td>2 (2.0 ± 0.22)</td>
<td>↑ 1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

| Dust Rating | 0 (0.0 ± 0.0) | ↓ 14% | 0 (0.0 ± 0.0) | ↓ 10% | 0 (0.0 ± 0.0) | ↓ 11% | ns |

| % Plants with Dust<sup>a</sup> | 12<sup>a</sup> | ↑ 12%<sup>a</sup> | 0% | 0% | 0% | ** | 5. |

### Significance codes:
s = not significant, * = P < 0.05, ** = P < 0.010, *** = P < 0.001; Different letters in subscript denote differences between zones; NA = not analysed.

*Percentage of plants with a dust score of 2 or above

*Plant health data was collected in three medium zone Darwinia sites but PEA data was collected in two medium zone Darwinia sites.

*percentage of plants with dust was 0 in all sites at baseline.
Figure 1: Mean Fv/Fm by zone at baseline (corrected; Dec 2016 - Feb 2017) and in April 2018 for each species. Black horizontal line indicates trigger threshold of 0.6. Green and yellow horizontal lines indicate highest and lowest mean Fv/Fm values (calculated per field visit at each zone) observed since baseline. Error bars indicate standard deviation. Hash symbol above bars indicates where there has been a reduction of 10% or more between baseline and April 2018 mean values, and asterisks above bars indicate where there has been a reduction of 20% or more between baseline and April 2018 mean values. “Corrected” refers to an adjustment made for time of measurement within a day (see Methods below).
Figure 2: Mean Fv/Fm by site at baseline (corrected; Dec 2016 - Feb 2017) and in April 2018 for each species. Black horizontal line indicates trigger threshold of 0.6. Green and yellow horizontal lines indicate highest and lowest mean Fv/Fm values (calculated per field visit at each site) observed since baseline. Error bars indicate standard deviation. Hash symbol above bars indicates where there has been a reduction of 10% or more between baseline and April 2018 mean values. Asterisk above bars indicates where there has been a reduction of 20% or more between baseline and April 2018 mean values. “Corrected” refers to an adjustment made for time measurement within a day (see Methods below).
Figure 3: Mean Fv/Fm by site at baseline (corrected; Dec 2016 - Feb 2017) and in April 2018 for *L. gibsonii*. Black horizontal line indicates trigger threshold of 0.6. Green and yellow horizontal lines indicate highest and lowest mean Fv/Fm values (calculated per field visit at each site) observed since baseline. Error bars indicate standard deviation. Hash symbol above bars indicates where there has been a reduction of 10% or more between baseline and April 2018 mean values. Asterisk above bars indicates where there has been a reduction of 20% or more between baseline and April 2018 mean values. “Corrected” refers to an adjustment made for time of measurement within a day.
Figure 4: Median health score by zone at baseline (Dec 2016 - Feb 2017) and in April 2018 for each species. Error bars indicate standard deviation. Hash symbol above bars indicates where there has been a reduction of 10% or more between baseline and April 2018 mean values. Asterisk above bars indicates where there has been a reduction of 20% or more between baseline and April 2018 mean values. NB: *Lepidosperma gibsonii* has not been included in this figure since median health scores both at baseline and in April 2018 were zero.
NOTES: RESULTS AND DISCUSSION

1. For *A. acutivalvis*, leaf chlorophyll fluorescence declined significantly more within the near zone than in the far zone. Values at all zones were above 0.6, and decline since baseline in all zones was less than 20%, therefore no trigger was exceeded.

2. For *L. gibsonii*, leaf chlorophyll fluorescence increased significantly more in the medium zone than in the near and far zones. All leaf chlorophyll fluorescence values were greater than 0.6 and no decline was evident relative to baseline values. Therefore, no trigger was exceeded.

3. For *P. sericea*, decline in leaf chlorophyll fluorescence was significantly greater in the near and medium zones than in the far zone. All values were greater than 0.6 and all zones showed less than 20% decline since baseline. Therefore, no trigger was exceeded.

4. There were no significant differences between zones for change in mean health since baseline for any of the target species. Therefore no trigger was exceeded.

5. The number of plants displaying a dust score of 2 or more remained significantly greater in the near zone than in the medium and far zones.

General Mortality counts were undertaken for *D. masonii*. Out of the 233 *D. masonii* observed across the 15 sites monitored in April 2018, two plants were considered dead (one each at medium zone site D33 and near zone site DIH38). A *D. masonii* plant at DIH43 was also recorded as being near death. Among the other three species that co-occur with *D. masonii*, no mortality has been observed (as assessed by the presence of live foliage on permanent monitoring plants). One new *L. gibsonii* individual has been observed to undergo rapid regeneration from the base, further monitoring will be required to determine if this plant can be confirmed as dead.

Given that mortality has been observed in both medium and near zone *D. masonii* monitoring sites, this is most likely a consequence of natural attrition accelerated by low rainfall between September 2017 and January 2018. Although significant rainfall was received in January 2018 prompting increased health in many plants, it appears to have been insufficient to prompt recovery in some individuals.

METHODS

Statistical analyses were carried out in R using the linear model function (R Core Team, 2016). The response variable was difference in Fv/Fm from baseline to January 2018 with “zone” as the factor. Plant was used as the replicate. Data was assessed for normality prior to analysis and was transformed using a BoxCox transformation where necessary. When results were significant (P < 0.05), pairwise comparison were performed to test for significant differences between zones. Comparison of health scores among zones was analysed using a Kruskal-Wallis rank sum test in R. Where results were significant (P < 0.05), a Nemenyi’s test of multiple comparisons was performed to test for significant differences between zones. Tests of differences between zones in the proportion of plants with a dust score of 2 or above were run using a Pearson’s Chi-squared test in R. All other methods were as per Astron (2017).

No correction was applied to the most recent Fv/Fm data due to the mild conditions present during the survey (temperatures < 30 degrees). The correction applied to Fv/Fm data for the baseline measurements was made using the following procedure. Firstly, outliers (Fv/Fm values that were more than two standard deviations from the mean) were removed from the data set. After that, a 2nd order polynomial trend line was fitted to the data with the independent variable as time in minutes; the earliest measurement made in a day across the trip was assigned as 0 and all subsequent measurements in minutes from this time (regardless of day). The regression equation, minus the intercept parameter, was then used to adjust the raw values to time corrected values. A cap at 0.86 was applied as this is the maximum value that is recorded in the field.

In order to monitor mortality of *D. masonii*, plants within a defined radius (specific to each site) were tagged with yellow cattle tags and were counted as dead or live.
### REFERENCES

<table>
<thead>
<tr>
<th>Citation</th>
<th>Source</th>
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</thead>
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### Iron Hill Flora and Vegetation Monitoring Report Card

**Mount Gibson Mining Ltd**

**Flora Monitoring, September 2018**

**Mount Gibson Mining Ltd**

**Astron Environmental Services**

**Issue Date:** 12/10/2018  
**Rev:** A

**Author:** A. Funnekotter  
**Reviewer:** R. Archibald  
**Approval:** S. Pearse

**Monitoring Dates:** 26 – 28 September 2018  
**Rainfall:** 0 mm  
**Max Temp:** 27.8°C  
**Previous 3 months rainfall:** 94.8 mm

**TRIGGERS**

<table>
<thead>
<tr>
<th>Plant Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistically significant change in plant health in nearest zone of either monitored DRF species or the other monitored native plant species in comparison to control zones as measured by a reduction in mean Index of Chlorophyll Fluorescence (ICF) of at least 20% and the mean Fv/Fm ratio is less than 0.6.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plant Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistically significant change in plant condition of monitored <em>D. masonii</em> or <em>L. gibsonii</em> in nearest zone in comparison to control zones as measured by a reduction in mean condition ratings in excess of 20%.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weed Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of new species or an increase in weed cover in fixed monitored quadrats in excess of 5% of the area as a result of the project.</td>
</tr>
</tbody>
</table>

**BASELINE**

Data collected between December 2016 and February 2017

<table>
<thead>
<tr>
<th>Δ BASELINE - NOW</th>
<th>NEAR (5 <em>D. masonii</em> sites; 4 <em>L. gibsonii</em> sites)</th>
<th>MEDIUM (2 <em>D. masonii</em> sites; 2 <em>L. gibsonii</em> sites)</th>
<th>FAR (6 <em>D. masonii</em> sites; 4 <em>L. gibsonii</em> sites)</th>
<th>Sig</th>
<th>Note</th>
</tr>
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**Mean Fv/Fm ± SD; % change from baseline**

<table>
<thead>
<tr>
<th>Species</th>
<th>Near</th>
<th>Medium</th>
<th>Far</th>
<th>Sig</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>A. acutivalvis</em></td>
<td>0.80 ± 0.04&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.82 ± 0.03&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>0.80 ± 0.06&lt;sup&gt;b&lt;/sup&gt;</td>
<td>↑ 6%</td>
<td>* 1.</td>
</tr>
<tr>
<td><em>D. masonii</em></td>
<td>0.81 ± 0.03</td>
<td>0.82 ± 0.04</td>
<td>0.81 ± 0.02</td>
<td>↑ 2%</td>
<td>NS</td>
</tr>
<tr>
<td><em>L. gibsonii</em></td>
<td>0.79 ± 0.04&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.81 ± 0.03&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.77 ± 0.06&lt;sup&gt;a&lt;/sup&gt;</td>
<td>↑ 18%</td>
<td>*** 2.</td>
</tr>
<tr>
<td><em>M. nematophylla</em></td>
<td>0.80 ± 0.03</td>
<td>0.82 ± 0.03</td>
<td>0.80 ± 0.04</td>
<td>↓ 2%</td>
<td>NS</td>
</tr>
<tr>
<td><em>P. sericea</em></td>
<td>0.76 ± 0.05&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.80 ± 0.05&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.78 ± 0.03&lt;sup&gt;b&lt;/sup&gt;</td>
<td>↑ 19%</td>
<td>*** 3.</td>
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**Median (mean ± SD); % change in mean**

<table>
<thead>
<tr>
<th>Species</th>
<th>Health</th>
<th>Weed Cover</th>
<th>Dust Rating</th>
<th>% Plants with Dust*</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>A. acutivalvis</em></td>
<td>2 (1.9 ± 0.4)</td>
<td>0.1 (0.1 ± 0.2)</td>
<td>1 (1.0 ± 0.2)</td>
<td>7&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td><em>D. masonii</em></td>
<td>2 (1.6 ± 0.7)</td>
<td>0.0 (0.0 ± 0.05)</td>
<td>0 (1.0 ± 0.0)</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td><em>L. gibsonii</em></td>
<td>1 (0.6 ± 0.6)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0 (0.0 ± 0.0)</td>
<td>0 (1.0 ± 0.0)</td>
<td>0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><em>M. nematophylla</em></td>
<td>2 (2.0 ± 0.3)</td>
<td>0.0 (0.0 ± 0.0)</td>
<td>0 (1.0 ± 0.0)</td>
<td>0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><em>P. sericea</em></td>
<td>2 (1.9 ± 0.5)</td>
<td>0.0 (0.0 ± 0.0)</td>
<td>0 (1.0 ± 0.0)</td>
<td>0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Significance codes: NS = not significant, * = P < 0.05, ** = P < 0.010, *** = P < 0.001; Different letters in subscript denote differences between zones; NA = not analysed.

*Percentage of plants with a dust score of 2 or above

*percentage of plants with dust was 0 in all sites at baseline.
Figure 1: Mean Fv/Fm by zone at baseline (corrected; Dec 2016 - Feb 2017) and in September 2018 for each species. Black horizontal line indicates trigger threshold of 0.6. Green and yellow horizontal lines indicate highest and lowest mean Fv/Fm values (calculated per field visit at each zone) observed since baseline. Error bars indicate standard deviation. “Corrected” refers to an adjustment made for time of measurement within a day (see Methods below).
Figure 2: Mean Fv/Fm by site at baseline (corrected; Dec 2016 - Feb 2017) and in September 2018 for each species. Black horizontal line indicates trigger threshold of 0.6. Green and yellow horizontal lines indicate highest and lowest mean Fv/Fm values (calculated per field visit at each site) observed since baseline. Error bars indicate standard deviation. “Corrected” refers to an adjustment made for time measurement within a day (see Methods below).
Figure 3: Mean Fv/Fm by site at baseline (corrected; Dec 2016 - Feb 2017) and in September 2018 for *L. gibsonii*. Black horizontal line indicates trigger threshold of 0.6. Green and yellow horizontal lines indicate highest and lowest mean Fv/Fm values (calculated per field visit at each site) observed since baseline. Error bars indicate standard deviation. “Corrected” refers to an adjustment made for time of measurement within a day.
Figure 4: Median health score by zone at baseline (Dec 2016 - Feb 2017) and in September 2018 for each species. Error bars indicate standard deviation. NB: Median health scores for *Lepidosperma gibsonii* at baseline were zero.
NOTES: RESULTS AND DISCUSSION

1. For *A. acutivalvis*, leaf chlorophyll fluorescence declined significantly more within the near zone than in the far zone. Values at all zones were above 0.6, and decline since baseline in all zones was less than 20%, therefore no trigger was exceeded.

2. For *L. gibsonii*, leaf chlorophyll fluorescence increased significantly more in the medium zone than in the near and far zones. All leaf chlorophyll fluorescence values were greater than 0.6 and no decline was evident relative to baseline values. Therefore, no trigger was exceeded.

3. For *P. sericea*, increase in leaf chlorophyll fluorescence was significantly greater in the far zone than in the near and medium zones. All values were greater than 0.6 and all zones showed less than 20% decline since baseline. Therefore, no trigger was exceeded.

4. For *L. gibsonii*, median health score increased significantly more in the far zone than the near zone. However, all zones showed an increase in health score therefore no trigger was exceeded.

5. Two individuals of the invasive species *Sonchus oleraceus* were identified in the area between sites DIH39 and DmIH03 (in close proximity to the development envelope). This species has not previous been recorded during the monitoring program, however, since neither plant occurred within a fixed monitoring quadrat, no trigger has been exceeded. *Sonchus oleraceus* was previously recorded in the area in 2008 (Meissner and Caruso, 2008), however not in the most recent flora survey (Eco Logical, 2016). No other *S. oleraceus* individuals were identified in the area, and the two plants were manually removed. The invasive species *Pentameris airoides* was found at two near and two medium zone *Darwinia* monitoring sites, and four near and one far zone *Lepidosperma* site, however there was no overall increase in cover of this species relative to baseline.

6. The number of plants displaying a dust score of 2 or more remained significantly greater in the near zone than in the medium and far zones.

General Mortality counts were undertaken for *D. masonii*. Out of the 92 *D. masonii* observed across the 13 sites monitored in September 2018, no new plants were recorded as dead. The *D. masonii* plant that was recorded as near death at DIH43 in April 2018 remains near dead, and a single plant at DlHN41 was newly recorded as near death in September 2018. Among the other three species that co-occur with *D. masonii*, no mortality has been observed (as assessed by the presence of live foliage on permanent monitoring plants). No new *L. gibsonii* were considered dead during September 2018 monitoring (as assessed by the presence of live foliage on permanent monitoring plants). The *L. gibsonii* plant which was recorded as dead at L16 in April 2018 was deemed to be alive in September 2018.

METHODS

Statistical analyses were carried out in R using the linear model function (R Core Team, 2016). The response variable was difference in Fv/Fm from baseline to January 2018 with “zone” as the factor. Plant was used as the replicate. Data was assessed for normality prior to analysis and was transformed using a BoxCox transformation where necessary. When results were significant (P < 0.05), pairwise comparison were performed to test for significant differences between zones. Comparison of health scores among zones was analysed using a Kruskal-Wallis rank sum test in R. Where results were significant (P < 0.05), a Nemenyi’s test of multiple comparisons was performed to test for significant differences between zones. Tests of differences between zones in the proportion of plants with a dust score of 2 or above were run using a Pearson’s Chi-squared test in R. All other methods were as per Astron (2017).

No correction was applied to the most recent Fv/Fm data due to the mild conditions present during the survey (temperatures < 30 degrees). The correction applied to Fv/Fm data for the baseline measurements was made using the following procedure. Firstly, outliers (Fv/Fm values that were more than two standard deviations from the mean) were removed from the data set. After that, a 2nd order polynomial trend line was fitted to the data with the independent variable as time in minutes; the earliest measurement made in a day across the trip was assigned as 0 and all subsequent measurements in minutes from this time (regardless of day). The regression equation, minus the intercept parameter, was then used to adjust the raw values to time corrected values. A cap at 0.86 was applied as this is the maximum value that is recorded in the field.

In order to monitor mortality of *D. masonii*, plants within a defined radius (specific to each site) were tagged with yellow cattle tags and were counted as dead or live.
## REFERENCES

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Notes</th>
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<tr>
<td>Bureau of Meteorology 2017</td>
<td><em>Daily weather observations Payne's Find (Station #007139)</em></td>
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<tr>
<td>Meissner, R, and Caruso, Y 2008</td>
<td>'Flora and vegetation of banded iron formations of the Yilgarn Craton: Mount Gibson and surrounding area'</td>
<td><em>Conservation Science Western Australia</em>, vol. 7, no. 1, pp. 105-120.</td>
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APPENDIX B

TRANSLOCATION SITES BACKGROUND INFORMATION
Map and Layout

The map and layout for the setup and installation as at August 2017 is shown by Figure 1 below.

**Figure 1:** Map and layout of *Darwinia masonii* Translocation Plot 4 (2017).
Photos

Plate 1: Station A November 2017

Plate 2: Station B July 2016
Methodology:

History

The site was a historical drill pad and part of a previous trial conducted by BGPA. There are approximately 180 *Darwinia masonii* surviving and flowering within the BGPA plot after 11 years. Station B was previously ripped (possibly 9-10 years ago) and there were four clear rip lines to the east of the BGPA plot where irrigation lines were placed in 2016 (Figure 1 station B, Plate 2). In 2017, two additional stations were placed to the North and South of the BGPA plot to supplement the existing plants (Figure 1, Station A and C, Plate 1 and 2). Station C was clearly associated with a previous drilling pad and the ground is very rocky with no topsoil coverage. Station A was clearly previously disturbed, however the topsoil remained mostly intact. Dead trees and shrubs were removed outside of the area to make way for irrigation lines.

Date of Planting and Amount

Planting of Station B was undertaken in mid July 2016 (169 plants). Planting of Station A (191 plants) and C (138 plants) was undertaken in mid to late July 2017.

During May 2018 infill planting was undertaken to replace dead plants. In total 20 plants were planted at station A, 42 in station B and 18 in station C.

A total of 578 juveniles have been planted across the plot in total.
**Method of planting**

As shown by Figure 1 and the photos above, irrigation lines have been laid out across the entire plot to deliver water from the tank and pump on a regular basis (generally weekly or fortnightly). Each plant is fed by a dripper and drip tube which is set at a rate of 2 litres per hour. Irrigation lines were laid out prior to planting so as to guide the location of the holes. The irrigation lines are generally 0.5 to 1m apart.

The method of planting followed for 2016, 2017 and 2018 was the same. Holes were dug using hand trowels and mattocks approximately 20cm deep or enough so the top soil of the seedling was covered. Before placing the plant in the hole a slow release native plant fertilizer tablet was placed in the hole and covered with soil so it was not directly touching the plant roots. The hole was filled in with surrounding soil and where possible a small well shaped for the purpose of holding water above the plant. The plants were then watered in with approximately 500ml to 1 litre of water. This allowed the surrounding soil to mould together and bind around the plant. Initial heights were recorded to the nearest 5cm, from the ground to the uppermost leaf. All stations have been fenced with knee to waste high chicken wire secured with star pickets to deter native animals from the water source of the irrigation and the potential for collateral damage to the plants.

**Tagging of plants**

During both 2016, 2017 and 2018 the irrigation line on each plant was labelled with a metal ID to identify the genotype of the plant and numbered using a white marker pen.

**Substrate / Ground**

- **Station A** – substrate is a mixture of topsoil still intact and gravelly rocks. This was uniform across the station. It resembles soil type 2 as per Table 1.

- **Station B** - The ground varies with the southerly lines being in more rocky and harder ground which was harder to dig. The northerly lines are in softer ground, though it is clear there are still gravel and rocks which had been upturned by previous ripping. The substrate was predominantly soil type 2 and 3, as per Table 1.

- **Station C** – substrate was uniform across the whole station being quite hard and rocky, lacking any real topsoil material. Though there were adequate fines for planting. It is closer to soil type 3 as per Table 1.

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sandy duplex soils of moderate to high depth (e.g. sandy plains), red in colour</td>
</tr>
<tr>
<td>2</td>
<td>Sandy loams of shallow to moderate depth with sparse to moderate rock outcroppings (e.g. lower and mid slopes of BIF), red in colour</td>
</tr>
<tr>
<td>3</td>
<td>Sandy loams of shallow depth with extensive rock outcroppings and scattered stones (e.g. mid and upper slopes of BIF), red in colour</td>
</tr>
<tr>
<td>4</td>
<td>Extensive Banded Ironstone Formation outcroppings of limited depth (BIF crests)</td>
</tr>
</tbody>
</table>

**Mulch / Existing Vegetation**

- **Station A** – There was some mulch on the ground left over by dead vegetation and blown in from surrounding trees and shrubs, also partially shading the area.
• Station B - There was some mulch on the ground but it was not covering the site widely. The site had been used by BGPA for a trial previously on *Darwinia masonii*, although this plot was not irrigated by BGPA as per the BGPA plot directly adjacent. Since this time there was no remaining *Darwinia masonii* and other species had begun recolonizing the disturbed ground. This did not limit access but it did limit the layout of the irrigation lines.

• Station C – there was no visible mulch on the ground, although some native species had colonized the area, the ground was predominantly rocky.

**Origin of plants**

The plants used each year were grown in nursery by Ben Croxford (Manager) at the Nuts about Natives Nursery. Cuttings were collected from Iron Hill during spring 2015 and spring 2016.

**Expertise of planters**

In 2016 Ben Croxford assisted with the planting and provided guidance on technique. Others involved were Mount Gibson Mining environmental staff.

In 2017 and 2018 all plants were planted by Tranen, specialized revegetation contractors and MGM personnel under supervision of Tranen.

**Condition of plants**

In 2016 the juvenile plants appeared to be in good condition with green healthy leaves. Heights were recorded and ranged from approximately 9cm to 30cm. The soil within the pots was moist at the time of planting. According to Table 2, the seedling health was in the range of Type 1 and 2.

In 2017 the seedlings were in very healthy condition. The nursery experienced greater success with propagation which was partly due to a higher quality source of water. The soil within the pots was moist at the time of planting and height ranged from 5 to 55cm. According to Table 2, the seedling health was in the range of Type 1 and 2. The large range may been due to some plants having been sourced from cuttings taken in 2016 with less time to grow in the nursery than those that were sourced from cuttings in 2015.

In 2018 the seedlings were in very healthy condition. The soil within the pots was moist at the time of planting and the height ranged from 23 to 50cm. According to Table 2, the seedling health was in the range of Type 1 and 2.

**Table 2: Seedling Health Rating**

<table>
<thead>
<tr>
<th>Seedling Health Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excellent (e.g. multi-stemmed, new growth, vivid colour, &gt;20cm height, healthy root mass which is not root-bound)</td>
</tr>
<tr>
<td>2</td>
<td>Moderate (e.g. single and multi-stemmed, a high proportion of new growth, atypical colour, 10-20cm in height, healthy root mass, slightly root bound)</td>
</tr>
<tr>
<td>3</td>
<td>Poor (e.g. single stemmed, minimal new growth, lighter in colour, &lt;10cm height, mostly root bound, evidence of senescence)</td>
</tr>
</tbody>
</table>
**Darwinia masonii** Translocation Site – Plot 6 – Background Notes

*Map and Layout*

The map and layout is shown by Figure 1.

![Map](image)

Figure 1: Map and layout of plot 6
History

The plot is located on a small BIF knoll to the South East of Iron Hill South Pit. *Darwinia masonii* has not been previously recorded on this small knoll with the nearest records being Iron Hill South and there is a gentle rise across the knoll. There has been some evidence of camping or non-invasive exploration identified across the area. It appeared potentially prospective for the propagation of *D.*
masonii and there was ample space for two irrigation lines across and plants alongside the lines without disturbing native vegetation.

**Date of Planting and Amount**

Station A (151 plants) and Station B (149 plants) were planted in mid-late July 2017.

In May 2018 infill planting was undertaken to replace dead plants (16 plants).

A total of 316 juveniles have been planted at plot 6 across both stations.

**Method of planting**

As shown by Figure 1 and the photos above, irrigation lines have been laid out from the access track to the top of the knoll to deliver water from the tank and pump on a regular basis (generally weekly or fortnightly). Each plant is fed by a dripper and drip tube which is set at a rate of 2 litres per hour. Irrigation lines were laid out prior to planting so as to guide the location of the holes. The lines run separately up the knoll in slightly different directions.

No vegetation was disturbed during planting. Holes were dug mostly using mattocks. Before placing the plant in the hole a native plant fertilizer tablet was placed in the hole and covered with soil so it was not directly touching the plant roots. The hole was filled in with surrounding soil and a small well shaped for the purpose of holding water above the plant. Initial heights were recorded to the nearest 5cm, from the ground to the uppermost leaf. The plot was not suitable for fencing due to surrounding vegetation. As a trial, tree guards were placed around each plant with the intent being to deter native animals from the water source supplied by the drippers (Plate 1 and 2).

All plants were watered in with approximately 500ml to 1ltr of water.

**Tagging of plants**

During both 2016, 2017 and 2018 the irrigation line on each plant was labelled with a metal ID to identify the genotype of the plant and numbered using a white marker pen.

In 2017 151 plants were planted in Station A and 149 plants were planted in Station B.

In 2018, 7 plants were planted on station A and 9 were planted on Station B.

**Substrate / Ground**

The substrate varied across each station as they are approximately 200m in length. Topsoil was generally intact though which made digging feasible with mattocks. However some rocky, gravelly outcropping did make digging more difficult in some sections.

The substrate was predominantly soil type 2 as per Table 1.

**Table 1: Soil type classification**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Sandy duplex soils of moderate to high depth (e.g. sandy plains), red in colour</td>
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<tr>
<td>2</td>
<td>Sandy loams of shallow to moderate depth with sparse to moderate rock outcroppings (e.g. lower and mid slopes of BIF), red in colour</td>
</tr>
<tr>
<td>3</td>
<td>Sandy loams of shallow depth with extensive rock outcroppings and scattered stones (e.g. mid and upper slopes of BIF), red in colour</td>
</tr>
<tr>
<td>4</td>
<td>Extensive Banded Ironstone Formation outcroppings of limited depth (BIF crests)</td>
</tr>
</tbody>
</table>
Mulch / Existing Vegetation

There was some mulch derived from existing vegetation along each station.

Origin of plants

The plants were grown in nursery by Ben Croxford (Manager) at the Nuts about Natives Nursery from cuttings collected from Iron Hill during spring 2015 and spring 2016.

Expertise of planters

All plants were planted by Tranen, specialized revegetation contractors, in both 2017 and 2018. MGM personnel assisted under the supervision of Tranen.

Condition of plants

In 2017 the seedlings were in a very healthy condition. The nursery experienced greater success with propagation which was partly due to a higher quality source of water. The soil within the pots was moist at the time of planting and height ranged from 5 to 50cm. According to Table 2, the seedling health was in the range of Type 1 and 2. The large range may have been due to some plants having been sourced from cuttings taken in 2016 with less time to grow in the nursery than those that were sourced from cuttings in 2015.

In 2018 the seedlings were in a very healthy condition. The soil within the pots was moist at the time of planting and the height ranged from 24 to 40cm. According to Table 2, the seedling health was in the range of Type 1 and 2.

Table 2: Seedling health rating

<table>
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<tr>
<th>Seedling Health Type</th>
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<tbody>
<tr>
<td>1</td>
<td>Excellent (e.g. multi-stemmed, new growth, vivid colour, &gt;20cm height, healthy root mass which is not root-bound)</td>
</tr>
<tr>
<td>2</td>
<td>Moderate (e.g. single and multi-stemmed, a high proportion of new growth, atypical colour, 10-20cm in height, healthy root mass, slightly root bound)</td>
</tr>
<tr>
<td>3</td>
<td>Poor (e.g. single stemmed, minimal new growth, lighter in colour, &lt;10cm height, mostly root bound, evidence of senescence)</td>
</tr>
</tbody>
</table>
Map and Layout

The map and layout as at May 2018 is shown by Figure 1 below.

**Figure 1:** Map and layout of *Darwinia masonii* translocation plot 14.

**Plate 1:** Plot 14 station A 2017 – *Darwinia masonii*
Plate 2: Plot 14 station B as at 2016 – *Darwinia masonii*

Plate 3: Plot 14 Station C as at 2017 – *Darwinia masonii*
Methodology:

History

The site is a former drill pad utilised for exploration prior to Mount Gibson Mining and Asia Iron. As seen by the photo below, there has been recolonization of pioneering species since disturbance. Those species have been retained with irrigation lines installed surrounding them. The steep gradient (approx. 30 degrees) running from the low point in the west to the high point in the east, is also evident.

Plate 6: Plot 14 prior to use as a translocation site

Date of Planting and amount

The site was initially planted in early August 2016 with juvenile *Darwinia masonii* individuals within station B (226). Further supplementary planting was undertaken in mid to late July 2017 within stations A (256 plants) and C (201 plants) and 74 infill or extra plants were planted in Station B (74 plants).

In 2018 infill planting was undertaken to replace dead *Darwinia masonii* across stations A (14 plants), B (7 plants) and C (14 plants).

In total 792 *Darwinia masonii* have been planted at plot 14.

Method of planting

The method of planting was largely the same in 2016, 2017 and 2018 for *Darwinia masonii*. Holes were dug with crowbars or mattocks and the ground was very hard to penetrate in some areas. Before placing the plant in the hole a native slow release fertilizer tablet was placed in the hole and covered with soil so it was not directly touching the plant roots. The hole was filled in with surrounding soil and a small well shaped for the purpose of holding water above the plant. Initial heights were recorded to the nearest 5cm, from the ground to the uppermost leaf. The plot was fenced with knee to waste high chicken wire secured with star pickets to deter native animals from the water source of the irrigation and the potential for collateral damage to the plants.
In 2016 the plants were not watered in as it was considered due to recent rains the ground was already quite moist and due to the rocky nature of the substrate watering in did not appear to have an effect on the substrate binding with and around the soil of the seedling. All plants were watered in with approximately 500ml to 1ltr of water.

**Tagging of plants**

During 2016, 2017 and 2018 the irrigation line on each plant was labelled with a metal ID to identify the genotype of the plant and numbered using a white marker pen.

**Substrate / Ground**

The gradient of the terrain is very steep as detailed by the History section above. The soil varies across stations A, B and C with regard to clay/gravel/rock content. Some parts were rocky and could not be dug with tools available and to some degree there were large boulders within the ground which prohibited planting. Other holes with a higher clay content could be dug relatively easily and some holes varied between these two extremes. Some holes had a very low content of fill material to replace the hole with once the plant was placed in the ground. The substrate is fairly uniform across stations A, B and C and predominantly soil type 3, as per the key below.

**Table 1: Soil type classification**

<table>
<thead>
<tr>
<th>Soil Type</th>
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<tbody>
<tr>
<td>1</td>
<td>Sandy duplex soils of moderate to high depth (e.g. sandy plains), red in colour</td>
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<td>2</td>
<td>Sandy loams of shallow to moderate depth with sparse to moderate rock outcroppings (e.g. lower and mid slopes of BIF), red in colour</td>
</tr>
<tr>
<td>3</td>
<td>Sandy loams of shallow depth with extensive rock outcroppings and scattered stones (e.g. mid and upper slopes of BIF), red in colour</td>
</tr>
<tr>
<td>4</td>
<td>Extensive Banded Ironstone Formation outcroppings of limited depth (BIF crests)</td>
</tr>
</tbody>
</table>

**Mulch / Existing Vegetation**

As detailed by History above, there was quite a lot of existing vegetation and there was some mulch on the ground, however this was not widespread due to the lower density of vegetation compared to the surrounding environment. Prior to placement of irrigation lines and planting, dead trees were removed by hand to increase the space available for juvenile plants. It is expected that those dead trees removed were not long lived species and acted as early colonisers.

**Origin of plants**

The plants were grown in nursery by Ben Croxford (Manager) at the Nuts about Natives Nursery from cuttings (*Darwinia masonii*) collected from Iron Hill during spring 2015 and spring 2016.

**Expertise of planters**

All plants were planted by Tranen and Greening Australia, specialized revegetation contractors. Mount Gibson Iron environmental staff also assisted.

**Condition of plants**

In 2016 the juvenile *Darwinia masonii* plants appeared to be in good condition with green healthy leaves. Heights ranged from approximately 4cm to 28cm. The soil contained within the pots was moist at the time of planting. According to Table 2, the seedling health was within Type 1 and 2.
In 2017 the *Darwinia masonii* seedlings were in very healthy condition. The nursery experienced greater success with propagation which was partly due to a higher quality source of water. The soil within the pots was moist at the time of planting and height ranged from 5 to 75cm. According to Table 2, the seedling health was in the range of Type 1 and 2. The large range may be due to some plants having been sourced from cuttings taken in 2016 with less time to grow in the nursery than those that were sourced from cuttings in 2015.

In 2018 the *Darwinia masonii* seedlings were in a very healthy condition. The soil within the pots was moist at the time of planting and the height ranged from 20 to 45cm. According to Table 2, the seedling health was in the range of Type 1 and 2.

Table 2: Seedling health rating

<table>
<thead>
<tr>
<th>Seedling Health Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excellent (e.g. multi-stemmed, new growth, vivid colour, &gt;20cm height, healthy root mass which is not root-bound)</td>
</tr>
<tr>
<td>2</td>
<td>Moderate (e.g. single and multi-stemmed, a high proportion of new growth, atypical colour, 10-20cm in height, healthy root mass, slightly root bound)</td>
</tr>
<tr>
<td>3</td>
<td>Poor (e.g. single stemmed, minimal new growth, lighter in colour, &lt;10cm height, mostly root bound, evidence of senescence)</td>
</tr>
</tbody>
</table>
**Darwinia masonii** Translocation Site – Plot 16 – Background Notes

Map and Layout

The map and layout is shown by Figure 1.

![Map of Plot 16](image)

Figure 1: Map and layout of plot 16

Photos

![Photo of Plot 16 Station A planted 2016](image)

Plate 1: Plot 16 Station A planted 2016
Plate 2: Plot 16 Station B planted 2017

History

Site was a previous exploration track prior to MGM and Asia Iron. Over the years the upper surface has become hardened due to the clay content, use of vehicles and lack of vegetation regrowth.

Date of Planting and Amount

Station A was planted in early August 2016 (280 plants) and Station B was planted in mid-late July 2017 (152 plants).

Infill planting was undertaken in May 2018 to replace dead plants. 92 in station A and 23 in Station B.

Method of planting

As shown by Figure 1 and the photos above, irrigation lines have been laid out across the entire plot to deliver water from the tank and pump on a regular basis (generally weekly or fortnightly). Each plant is fed by a dripper and drip tube which is set at a rate of 2 litres per hour. Irrigation lines were laid out prior to planting so as to guide the location of the holes. The lines run in parallel along the old track and are generally 0.5 to 1m apart.

The method of planting was largely the same for 2016, 2017 and 2018. As there was no existing regrowth, no vegetation was disturbed during ripping. Holes were dug mostly using picks and hoes. Before placing the plant in the hole a native plant fertilizer tablet was placed in the hole and covered with soil so it was not directly touching the plant roots. The hole was filled in with surrounding soil and a small well shaped for the purpose of holding water above the plant. Initial heights were recorded to the nearest 5cm, from the ground to the uppermost leaf. The plot was fenced with knee
to waste high chicken wire secured with star pickets to deter native animals from the water source of the irrigation and the potential for collateral damage to the plants.

In 2016 the ground was already moist/wet due to rainfall just prior to planting and therefore watering in of the plants was considered unnecessary. In 2017 all plants were watered in with approximately 500ml to 1ltr of water.

Tagging of plants

During 2016, 2017 and 2018 the irrigation line on each plant was labelled with a metal ID to identify the genotype of the plant and numbered using a white marker pen.

In 2016 280 plants were planted in Station A and in 2017 152 plants were planted in Station B.

Substrate / Ground

Ground was hard and difficult to dig and holes were dug with mattocks. The substrate varied in a similar way to that of Plot 14, however the clay content was generally greater across the entire site.

The substrate was predominantly soil type 2 as per Table 1.

Table 1: Soil type classification

<table>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>Sandy loams of shallow to moderate depth with sparse to moderate rock outcroppings (e.g. lower and mid slopes of BIF), red in colour</td>
</tr>
<tr>
<td>3</td>
<td>Sandy loams of shallow depth with extensive rock outcroppings and scattered stones (e.g. mid and upper slopes of BIF), red in colour</td>
</tr>
<tr>
<td>4</td>
<td>Extensive Banded Ironstone Formation outcroppings of limited depth (BIF crests)</td>
</tr>
</tbody>
</table>

Mulch / Existing Vegetation

There was little mulch or existing vegetation across the entire plot.

Origin of plants

The plants were grown in nursery by Ben Croxford (Manager) at the Nuts about Natives Nursery from cuttings collected from Iron Hill during spring 2015 and spring 2016.

Expertise of planters

In 2016 planters included Matt Hamilton (Senior Environmental Advisor MGM), Andrew Vear (Senior Field Project Lead Greening Australia) and Joseph Meadham (Casual Field Assistant Greening Australia). Both Joseph and Andrew had undertaken similar works for Greening Australia previously.

In 2017 and 2018 all plants were planted by Tranen (revegetation contractors) with assistance from MGM personnel under the supervision of Tranen.

Condition of plants

In 2016 the juvenile plants appeared to be in good condition with green healthy leaves. Heights ranged from approximately 6cm to 32cm. The soil contained within the pots was moist at the time of planting. According to the key below, the seedling health was within Type 1 and 2.
In 2017 the seedlings were in very healthy condition. The nursery experienced greater success with propagation which was partly due to a higher quality source of water. The soil within the pots was moist at the time of planting and height ranged from 15 to 60cm. According to Table 2, the seedling health was in the range of Type 1 and 2. The large range may have been due to some plants having been sourced from cuttings taken in 2016 with less time to grow in the nursery than those that were sourced from cuttings in 2015.

In 2018 the seedlings were in very healthy condition. The soil within the pots was moist at the time of planting and the height ranged from 20 to 40cm. According to Table 2, the seedling health was in the range of Type 1 and 2.

Table 2: Seedling health rating

<table>
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<tr>
<th>Seedling Health Type</th>
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<tr>
<td>1</td>
<td>Excellent (e.g. multi-stemmed, new growth, vivid colour, &gt;20cm height, healthy root mass which is not root-bound)</td>
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<td>2</td>
<td>Moderate (e.g. single and multi-stemmed, a high proportion of new growth, atypical colour, 10-20cm in height, healthy root mass, slightly root bound)</td>
</tr>
<tr>
<td>3</td>
<td>Poor (e.g. single stemmed, minimal new growth, lighter in colour, &lt;10cm height, mostly root bound, evidence of senescence)</td>
</tr>
</tbody>
</table>
**Darwinia masonii Translocation Site – Plot 17 – Background Notes**

**Map and Layout**

The map and layout is shown by Figure 1.

![Map and layout of plot 16](image)

Figure 1: Map and layout of plot 16
History

The site sits above what appears to be a previous exploration drill pad prior to MGM and Asia Iron and the tank / pump are located on this pad which is bare of any topsoil material and mostly composed of the underlying rock. The stations are located on what also appears to be previous
disturbance as the vegetation is sparser than surrounding areas and there is evidence of tracks, dozer marks and small amounts of soil pushed up.

Date of Planting and Amount

The plot was planted in mid-late July 2017. 184 in station C, 206 in station D, 163 in station E and 192 in Station F.

In May 2018 infill planting was undertaken to replace dead plants. 28 in station C, 36 in station D, 29 in station E and 25 in station F.

In total, 863 juveniles have been planted.

Method of planting

As shown by Figure 1 and the photos above, irrigation lines have been laid out across the entire plot to deliver water from the tank and pump on a regular basis (generally weekly or fortnightly). Each plant is fed by a dripper and drip tube which is set at a rate of 2 litres per hour. Irrigation lines were laid out prior to planting so as to guide the location of the holes. The lines within each station are generally 1m apart.

Holes were dug mostly using mattocks. Before placing the plant in the hole a native plant fertilizer tablet was placed in the hole and covered with soil so it was not directly touching the plant roots. The hole was filled in with surrounding soil and a small well shaped for the purpose of holding water above the plant. Initial heights were recorded to the nearest 5cm, from the ground to the uppermost leaf. The plot was fenced with knee to waste high chicken wire secured with star pickets to deter native animals from the water source of the irrigation and the potential for collateral damage to the plants. Prior to planting all dead plants and trees were removed by hand to increase space and access for use as a translocation plot.

All plants were watered in with approximately 500ml to 1ltr of water.

Tagging of plants

In both 2017 and 2018 the irrigation line on each plant was labelled with a metal ID to identify the genotype of the plant and numbered using a white marker pen.

184 plants were planted in station C, 206 in station D, 163 in station E and 192 in station F.

Substrate / Ground

The ground was not overly difficult to dig as the topsoil was generally intact across the entire plot and was mainly uniform. Although there are some areas which provide obstruction by the way of BIF/rock outcroppings and the soil is somewhat gravelly/rocky.

The substrate was predominantly soil type 2 as per Table 1.
Table 1: Soil type classification

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<td>Sandy loams of shallow depth with extensive rock outcroppings and scattered stones (e.g. mid and upper slopes of BIF), red in colour</td>
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<tr>
<td>4</td>
<td>Extensive Banded Ironstone Formation outcroppings of limited depth (BIF crests)</td>
</tr>
</tbody>
</table>

**Mulch / Existing Vegetation**

Whilst dead trees and plants were removed prior to planting there remained some mulch across the plot due to the surrounding vegetation.

**Origin of plants**

The plants were grown in nursery by Ben Croxford (Manager) at the Nuts about Natives Nursery from cuttings collected from Iron Hill during spring 2015 and spring 2016.

**Expertise of planters**

In 2017 and 2018 all plants were planted by Tranen, specialized revegetation contractors with assistance of MGM personnel under the supervision of Tranen.

**Condition of plants**

The seedlings were in very healthy condition. The nursery experienced greater success with propagation which was partly due to a higher quality source of water. The soil within the pots was moist at the time of planting and height ranged from 5 to 85cm. According to Table 2, the seedling health was in the range of Type 1 and 2. The large range may have been due to some plants having been sourced from cuttings taken in 2016 with less time to grow in the nursery than those that were sourced from cuttings in 2015.

In 2018 the seedlings were in a very healthy condition. The soil within the pots was moist at the time of planting and the height ranged from 20 to 55cm. According to Table 2, the seedling health was in the range of Type 1 and 2.

Table 2: Seedling health rating

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