ANNUAL COMPLIANCE REPORT
Iron Hill Deposit Mining Project,
Mt Gibson Ranges, WA
(EPBC 2015/7514)
10 February 2017 – 9 February 2018
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Cover photo: Translocation Trial Plot (November 2017)
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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 deposit, 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 contain infrastructure and haul roads, however they were excluded from the Project area because they did not contain any species which resulted in the Project being classified 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 removed from the Project area, as defined for the purpose 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 2017 to 9 February 2018.

1.1. Project Status

Development within the Project area commenced on 10 February 2017. The total area of native vegetation clearing for the Project during the reporting period was 43ha (including 2.65ha of pre-existing tracks). The Project Layout and vegetation clearing to date 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 3,512,763 tonnes of ore and 546,521 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.

A total of 33,915 m³ of topsoil was collected from the Project area during the reporting period for use in future rehabilitation activities.
Figure 1 Site Layout and Vegetation Clearing during the Reporting Period

Mount Gibson Mining Limited ©
Figure 2 *Darwinia masonii* records within the disturbed area
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 43ha (including 2.65ha of pre-existing tracks) of vegetation was cleared within the Project area during this reporting period (Figure 1). This included 991 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;
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.

### 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 Dust Monitor Locations). The dust deposition trigger level adopted by the Project is 10 g/m²/month. With the exception of DM14 August 2017 results, all monitoring of dust deposition was equal to or below this level. Whilst results in August 2017 coincided with the second highest rainfall for the reporting period, the predominant average wind direction was towards the North East which may have resulted in fugitive dust generated from mining activities drifting towards DM14, which is located in very close proximity to the mine pit.

The trigger was not exceeded for two consecutive months, and therefore did not require further action as per the approved FVMMP. However, MGM has sought to implement certain actions by installing a secondary weather station at the Iron Hill office to increase the intensity of weather monitoring so it is available for use prior to blasting. The application of dust controls such as water carts and road binding agents was also increased during dry periods. Since the August 2017 result at DM14, the criterion was not exceeded again. The monitoring results for October 2017 equalled but did not exceed the trigger value.
Figure 3 Dust Monitor Locations

ANNUAL COMPLIANCE REPORT
Iron Hill Deposit Mining Project

Mount Gibson Mining Limited ©
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. 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. Further detail pertaining to the summary table is described below.

**Forty three hectares of vegetation has been cleared** inside the Development Envelope. MGM submitted a Six-monthly status report to the Western Australian Department of Water and Environmental Regulation, and the Western Australian Department of Biodiversity, Conservation and Attractions describing implementation of the flora and vegetation monitoring program from the baseline phase through to project implementation during March to September 2017. This report concluded there had been no mortality of vegetation or rare flora immediately outside the Development Envelope, no introduction of new species nor increase in weed cover and no significant reduction in plant health or condition due to effects of mining.

Subsequent rounds of monitoring as per the FVMMP undertaken in October and December 2017 have shown similar trends to that described by the Six-monthly status report. However, in one of the five monitored native species (*Philotheca sericea*) a greater than 20% change in health in comparison to baseline monitoring and control zones was detected in December 2017. This was a single result and, as such, did not exceed trigger action criterion of the plan which stipulates further actions are required if there is a statistical difference for two consecutive monitoring rounds. MGM responded to this result by undertaking an additional subset of monitoring internally in mid January 2018 to determine if further action was warranted prior to the next scheduled monitoring event. This monitoring demonstrated that the vegetation had recovered sufficiently such that there was no trigger exceedence. The recovery is attributed to a summer rainfall event that occurred on 15 January 2018 (approx 49mm across the Mt Gibson Ranges). The scheduled monitoring for February 2018 confirmed this result.

Most notable from this monitoring was the strong correlation of seasonal effect and rainfall on plants across all the monitoring sites (Figure 5). The 12-month summary report has been prepared by consultants, Astron Environmental, and is included in Appendix A. This demonstrates mining activity had not affected the health of vegetation outside the Development Envelope in the monitoring period.
No 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>
<th>Reporting on the environmental outcome, threshold and trigger criteria for December 2016 to December 2017</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trigger criteria:</strong></td>
<td></td>
<td>For MGM (internal only) to review and adopt trigger actions. See section 2.2.2 and 2.2.3 above for further description of the triggers and how they have been addressed.</td>
</tr>
<tr>
<td>1. Dust deposition at gauges in excess of 10 g/m²/month</td>
<td>1. Dust deposition <em>did</em> exceed 10 g/m²/month at monitoring sites in Figure 5 and the monitoring requirement <em>was</em> achieved.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>2. There <em>was</em> a change in plant health of monitored records as measured by a reduction in mean Index of Chlorophyll Fluorescence (ICF). It was measured for species <em>Philotheca sericea</em>.</td>
<td></td>
</tr>
<tr>
<td>3. Statistically significant change in plant condition of <em>D. masonii</em> in monitored populations in comparison to control zones as measured by a reduction in mean condition ratings in excess of 20%.</td>
<td>3. There <em>was not</em> a significant change in plant condition of mapped <em>D. masonii</em> as measured by a reduction in mean plant condition ratings.</td>
<td></td>
</tr>
<tr>
<td>4. Introduction of new species or 20% increase in weed cover in fixed monitored quadrats.</td>
<td>4. The introduction of or 20% increase in weed cover <em>did not</em> occur in fixed monitoring quadrats.</td>
<td></td>
</tr>
<tr>
<td><strong>Threshold criteria:</strong></td>
<td><strong>Threshold criteria:</strong></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>1. There <em>WAS NOT</em> increased rates of mortality of monitored plants immediately outside the Development Envelope.</td>
<td>☑ Yes</td>
</tr>
<tr>
<td>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.</td>
<td>2. There <em>WAS NOT</em> mortality of native vegetation due to the project in the zone immediately outside the Development Envelope</td>
<td>☑ Yes</td>
</tr>
<tr>
<td>3. Total impact (clearing or indirect mortality of native vegetation) of no more than 87 ha.</td>
<td>3. There was <em>LESS THAN</em> 87 ha of native vegetation that was cleared.</td>
<td>☑ Yes</td>
</tr>
</tbody>
</table>

Notes:
¹The status of achievement of environmental outcome is indicated by the following symbols:
- Environmental outcome achieved
- Environmental outcome not achieved
Figure 5 Results for health and condition monitoring of the five native species

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 is due by 7 May 2018 and thereafter annually.

Table 2 Offset Management Plan Status Report

<table>
<thead>
<tr>
<th>Reporting Matters</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of translocation plot:</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>a) Location;</td>
<td></td>
</tr>
<tr>
<td>b) Substrate;</td>
<td></td>
</tr>
<tr>
<td>c) Elevation;</td>
<td></td>
</tr>
<tr>
<td>d) Slope.</td>
<td></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 22 January 2018, a total of 2,732 <em>Darwinia masonii</em> had been planted in translocation plots for the purpose of this Offsets Management Plan. A total of 2,369 (87%) were still alive. This is 173% of the number to be recovered through the offset.</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 tend further to maturity.</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 but MGM plans to resupply existing translocation plots with approximately 300 juvenile plants from available nursery stock during 2018.</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>991 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 <em>Darwinia masonii</em> proportionate to the number removed at Iron 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.</td>
</tr>
</tbody>
</table>
**Offsets Program**

In the spring of 2015 cuttings were collected under a WA Parks and Wildlife permit from the populations across Iron Hill and Iron Hill South. Further cuttings were also collected under a DBCA permit in spring 2016 from the same populations. This was done so that adequate stock was collected from the areas designated for vegetation clearing prior to the development of the project and the genotypes across Iron Hill and Iron Hill South were held within the collected and translocated stock. It also allowed adequate time for those cuttings to be grown in a nursery (approximately 1 year) and juvenile plants to be ready for planting in the subsequent year.

In July and August 2016, 675 juvenile *Darwinia masonii* (from Iron Hill and Iron Hill South source stock) were planted across plots 4, 14 and 16. By July 2017, each group of translocatees in each plot showed varying survival with 86% at plot 4; 77% at plot 14; and, 58% at plot 16. The total average rate of survival was 71% with a total of 480 plants alive and growing. Growth rate as height (to the nearest 5cm) was recorded in April 2017 for comparison to initial heights and there was a degree of difference between each plot. The average growth at plot 4 was 11cm with a range of 0 to 37cm, plot 14 had an average growth of 21cm with a range of 0 to 58cm and plot 16 had an average growth of 14cm with a range of 0-52cm. Interestingly, while the survival rate was highest at plot 4, the growth rate was highest at plot 14.

Immediate effects of translocation were observed at plots 14 and 16 with a sharp reduction in survival during the early months which was counteracted in part by increased watering. Over the course of monthly monitoring, a degree of difference between and within plots became apparent and was considered to be due to the varying characteristics of each plot, such as substrate and/or micro environments around individual plants.

Key learnings taken from the early work of 2016 were applied in the translocation round of 2017 with the careful selection of new plots and the expansion of existing plots. Plots 4, 14 and 16 were expanded and plots 6 and 17 were newly developed. During July 2017, a further 2,057 juvenile *Darwinia masonii* were planted across those five plots. Monitoring has been conducted in accordance with the submitted OMP. This has involved regular monitoring for the first two months observing general health and condition, baseline heights (nearest 5cm) and monthly monitoring for survival. Monitoring for survival has included scoring each plant as ‘alive’, ‘50/50’ or ‘dead’. The score of ‘50/50’ is given to plants which appear stressed but are not dead. For example the leaves may be yellowing or browning.

At the end of the reporting period, a total of 2,369 plants were rated as ‘alive’ giving an overall survival rate of 87% of all translocated plants. The improved rate of survival is mostly due to the large number of plantings in 2017 but also a reflection of the learnings gained from plantings in 2016, including improved translocation techniques. The rate of survival across each month is shown by Figure 6.

Some plants were observed to be flowering during the spring of 2017, however this was not widespread or in large volumes. As it is very early in the translocation program, there is no evidence of new recruits sourced from seed set by translocated plants.
Figure 6 Darwinia masonii rates of survival across all translocation plots
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 (Not required at this stage)**

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.

This condition did not fall during the reporting period as the Project was in its first year of operation.

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.

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 impact to *Darwinia masonii*.
APPENDIX A

FLORA AND VEGETATION TWELVE MONTH STATUS REPORT
Dear Troy,

Re: Iron Hill Flora and Vegetation Monitoring – Twelve Month Analysis, March 2018

1 Introduction

This letter presents a summary of the results of monitoring conducted by Astron Environmental Services and Mount Gibson Mining Ltd (MGM) between December 2016 and February 2018. The scope of work includes graphical representation of quantitative data in relation to the plant trigger criteria outlined in the Iron Hill Flora and Vegetation Management and Monitoring Plan:

"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 of less than 0.6."

In addition, dot-point commentary on the results is provided to assist MGM in preparing a report for the regulator.

2 Methods

Methods were as per Astron Environmental Services (2017a). Sites monitored varied between surveys (for more details refer to individual report cards).

Corrections have been applied to the Fv/Fm data collected in the warmer months to account for the time of day at which measurements were taken (Astron Environmental Services 2017a; 2017b). Values from June-September 2017 have not been corrected since corrections are not required in the winter season (Astron Environmental Services 2017c). No corrections were made for January 2018 data since time of measurement was not available.

Rainfall data used in these analyses were obtained from MGM and supplemented with data from the Bureau of Meteorology Ninghan Station (#7068) where necessary (Bureau of Meteorology 2018).
3 Results

Key results include:

- Mean Fv/Fm dropped below 0.6 in July, August and December 2017 for *Allocasuarina acutivalvis* and *Darwinia masonii*; and in December 2016, and July, August and December 2017 for *Lepidosperma gibsonii* and *Philotheca sericea* (Figure A1.1). Mean Fv/Fm for *Melaleuca nematophylla* remained above 0.6 for the entire period.

- Mean Fv/Fm dropped more than 20% below December 2016 values in July, August and December 2017 for *A. acutivalvis*, *D. masonii* and *P. sericea* (Figure A1.1).

- The temporal trend for *D. masonii* was very similar to those of the other native species that cohabit the monitoring sites.

- The trigger criterion for plant health was exceeded for *P. sericea* in December 2017. No other species exceeded the plant health trigger during the monitoring period.

- Increased rainfall in August 2017 resulted in increased Fv/Fm for all species in September 2017 (Figure A1.2). Likewise, rainfall in January 2018 resulted in increased Fv/Fm for all species in February 2018 (Figure A1.2). Fv/Fm values for all species across all zones were well above 0.6 at these times (Figure A1.1, Figure A1.2).

- There is no evidence of any effect on *D. masonii* (or any other species) near the mine.

4 Discussion

Fv/Fm has fluctuated considerably since December 2017. These fluctuations appear to be associated with rainfall in January 2018. In four of the five species, mean Fv/Fm appears to decline quickly in the absence of rainfall, with the most pronounced decline observed in *P. sericea*. *Melaleuca nematophylla* showed the least variation, with mean values remaining above 0.6 for the entire monitoring period.

This report was prepared by Dr Anna Williams and reviewed by me. If you have any queries, please don’t hesitate to contact me.

Yours sincerely

ASTRON ENVIRONMENTAL SERVICES


Dr Robert Archibald
Principal Scientist

Attachments

Attachment 1: Time Series Figures
References


Attachment 1: Time Series Figures
Figure A1.1: Mean Fv/Fm by zone for each species over the 14 months since baseline monitoring. Fv/Fm data from December 2016 to June 2017, and from November to December 2017 have been corrected for the effect of measurement time. Solid horizontal line indicates the trigger criterion of 0.6. Asterisks indicate a decline of more than 20% compared to the mean baseline Fv/Fm. Error bars indicate standard deviation.
Figure A1.2: Mean Fv/Fm across all zones combined for each species, and total daily rainfall (in mm). Fv/Fm data from December to June 2017, and November to December 2017 have been corrected for the effect of measurement time. Horizontal line indicates trigger criteria of 0.6. Error bars represent standard deviation.
APPENDIX B

TRANSLOCATION SITES BACKGROUND INFORMATION
**Map and Layout**

The map and layout for the setup and installation as of 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 was very rocky ground 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

Planting Station B was undertaken in mid July 2016. Planting of Station A and C was undertaken in mid to late July 2017.

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 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 same method of planting followed for 2016 and 2017 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 and 2017 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 1: Soil type classification**

<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 widely covering the site. 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 in both years 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 the technique. Others involved were Matt Hamilton (Snr Environmental Officer MGM) and Phil Readhead (Snr Environmental Officer MGM).

In 2017 all plants were planted by Tranen, specialized revegetation contractors.

**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.

**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>
Map and Layout

The map and layout is shown by Figure 1.

Figure 1: Map and layout of plot 6
Photos

Plate 1: Plot 6 Station A

Plate 2: Plot 6 Station B

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, although it appears to be relatively undisturbed. Regardless the area did appear to be potentially prospective for the propagation of *D. masonii* and there was
ample space to wind two irrigation lines across the area and plant alongside the lines without disturbing native vegetation.

**Date of Planting**

Station A and Station B were planted in mid-late July 2017.

**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 and 2017 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.

**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>
</tr>
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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.

**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 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.

Table 2: Seedling health rating

<table>
<thead>
<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>
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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>
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<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 is shown by Figure 1 below.

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

Plate 1: Plot 14 station A 2017
Plate 2: Plot 14 station B as at 2016

Plate 3: Plot 14 Station C as at 2017
Methodology:

History

The site is a former drill pad utilised for exploration prior to MGM 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 4: Plot 14 prior to use as a translocation site

Date of Planting

The site was initially planted in early August 2016 with juvenile *Darwinia masonii* individuals. Further supplementary planting was undertaken in mid to late July 2017.

Method of planting

The method of planting was largely the same in 2016 and 2017. 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. In 2017 all plants were watered in with approximately 500ml to 1ltr of water.

Tagging of plants
During both 2016 and 2017 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 was very steep as detailed by the History section above. The soil varied across the site 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 other 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 all stations and predominantly soil type 3, as per the key below.

Table 1: Soil type classification

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<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 collected from Iron Hill during spring 2015 and spring 2016

Expertise of planters

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 all plants were planted by Tranen (revegetation contractors).

Condition of plants

In 2016 the juvenile 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 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 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.

Table 2: Seedling health rating

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<tr>
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<td>1</td>
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</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.

![Figure 1: Map and layout of plot 16](image)

Photos

![Plate 1: Plot 16 Station A planted 2016](image)

![Plate 2: Plot 16 Station B planted 2017](image)
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

Station A was planted in early August 2016 and Station B was planted in mid-late July 2017.

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 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 and 2017. 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 both 2016 and 2017 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>
<thead>
<tr>
<th>Soil Type</th>
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<tbody>
<tr>
<td>1</td>
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<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>
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<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 Year (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 all plants were planted by Tranen (revegetation contractors).

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 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.

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>
Map and Layout

The map and layout is shown by Figure 1.

Figure 1: Map and layout of plot 16
Photos

Plate 1: Plot 17 planted 2017

Plate 2: Plot 17 planted 2017

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**

The plot was planted in mid-late July 2017.

**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 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**

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 did 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**

<table>
<thead>
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<td>2</td>
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<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>
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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

All plants were planted by Tranen, specialized revegetation contractors.

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 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.

Table 2: Seedling health rating

<table>
<thead>
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<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>