

## **Newmont Boddington Gold**

# **MS971 Annual Compliance Report January to December 2017**

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## 1 INTRODUCTION

This Compliance Assessment Report (CAR) has been prepared by Newmont Boddington Gold (NBG) for the NBG Life of Mine Extension Project approved under Ministerial Statement 971 (MS 971).

MS 971 replaced the previously approved Ministerial Statement 591 (MS 591) and authorises the continued mining and processing operations as well as extension (deepening and widening) of Wandoo North and South Pits and construction of new Waste Rock Dumps, residue disposal areas and associated infrastructure.

State Environmental approval for the project extension was granted by the Minister for the Environment on 12 June 2014. Federal environmental approval for the project was granted under the EPBC Act (EPBC 2012/6370) with approval granted on 19 May 2014.

This CAR addresses the compliance status of the project for the period commencing 01 Jan 2017 – 31 Dec 2017. This report has been prepared in accordance with Office of the Environmental Protection Authority Post Assessment Guideline 3 (PAG 3; August 2012) for *Preparing a Compliance Assessment Report* and in accordance with the Compliance Assessment Plan approved by the EPA in January 2015.

The Report covers;

- A summary of the proposals implementation status;
- A statement of compliance with the requirements of the statement;
- Details of declared compliance status; and
- Information/documentation which support/verifies declarations of compliance status.

## 2 CURRENT IMPLEMENTATION STATUS

NBG is an active mining project that originally commenced operations in the 1980's. Since this time, the project has operated non-continuously under a variety of environmental approvals, the most recent being MS 591, which was superseded by MS 971 in 2014.

The Life of Mine Extension Project approves the widening and expansion of the Wandoo North and South Pits, construction of new Waste Rock Dumps, a second Residue Disposal Area (RDA) and associated infrastructure.

Works related to MS971 commenced in Q1 2016 with the commencement of clearing activities to the south of the existing operation for Waste Rock Dumps 10 and 11 and associated water management infrastructure. Dumping of waste rock onto the area prepared for WRD11 commenced in 2017.

With a revised mine plan now anticipating a reduced mine life, the second RDA (to be located in the Saddleback Treefarm area) may not be required and life of mine tailings deposition requirements are under review.

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### 3 CURRENT COMPLIANCE STATUS

During the reporting period NBG was compliant with all elements of MS 971 except for the timeframe for implementation of Condition 10-1 Legacy Offset.

#### Non-compliance/potential non-compliance 10-1

Which implementation condition or procedure was non-compliant or potentially non-compliant?	
10-1: Legacy Offset	
Was the implementation condition or procedure non-compliant or potentially non-compliant?	
<p>The Legacy Offset originated in 2002 as required by the then MS591 (Condition 12). In March 2006 NBG submitted a proposal under which land of comparable conservation value (Lot part of Lot 420 on Deposited Plan 50652 being the land comprised in Certificate of Title Volume 2638 Folio 145) would be transferred to the State. In November 2009 the Department confirmed that the proposal met the commitments set out by Condition 12.</p> <p>In June 2014 the Minister approved the NBG expansion project which included a Legacy Offset to transfer the requirement of Condition 12 of MS591 into the ratified MS971 (Condition 10). NBG is currently outside of the two year timeframe provided in MS971 for the implementation of the Legacy Offset. Whilst the offset has been progressed, delays in finalising the land swap have occurred due administrative issues with numerous third parties which in part has been driven by the northern part of the Excision Area (1006 ha) being situated in the Worsely State Agreement Area (bauxite exploration and mining activities).</p>	
On what date(s) did the non-compliance or potential non-compliance occur (if applicable)?	
Legacy Offset should have been implemented by June 2016.	
Was this non-compliance or potential non-compliance reported to the Chief Executive Officer, DWER?	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Reported to DWER verbally Date _____ <input type="checkbox"/> Reported to DWER in writing Date <u>29/06/2016</u>	<input type="checkbox"/> No
What are the details of the non-compliance or potential non-compliance and where relevant, the extent of and impacts associated with the non-compliance or potential non-compliance?	
<p>There has been no environmental impact as a result of the delay in finalisation of the Legacy Offset as the land remains excised from the Mining Operation. NBG have continued to liaise with numerous government agencies and third parties in an attempt to finalise the Legacy Offset. NBG is currently facilitating the transfer of the new Certificates of Title to the State.</p>	
What is the precise location where the non-compliance or potential non-compliance occurred (if applicable)? (please provide this information as a map or GIS co-ordinates)	
See Figure 4. (Part of Lot 420 on Deposited Plan 50652 being the land comprised in Certificate of Title Volume 2638 Folio 145)	
What was the cause(s) of the non-compliance or potential non-compliance?	
See letter from June 2016.	

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Administrative issues between State Departments and a Third Party caveats present on the northern component of Lot 420. Advice sought from Land-Gate in 2017 determined that NBG would progress with the subdivision of land and then seek the removal of the caveat from the northern portion of the land. The new Certificates of Title have been granted and NBG is facilitating the transfer of ownership of the land. Both NBG and the then DPaW acknowledged through a MOU that the Legacy Offset (Excision Area) is subject to the approval of third parties, including the Conservation Commission and the Parliament of Western Australia, therefore, whilst the Department intends to progress this transaction the outcome is uncertain and not within the control of the Department.

What remedial and/or corrective action(s), if any, were taken or are proposed to be taken in response to the non-compliance or potential non-compliance?

NBG is continuing to finalise the Legacy Offset.

What measures, if any, were in place to prevent the non-compliance or potential non-compliance before it occurred? What, if any, amendments have been made to those measures to prevent re-occurrence?

NBG has another landswap to progress. Land has been identified for this Landswap on Newmont owned property.

Please provide information/documentation collected and recorded in relation to this implementation condition or procedure:

- in the reporting period addressed in this Statement of Compliance; and
- as outlined in the approved Compliance Assessment Plan for the Statement addressed in this Statement of Compliance.

(the above information may be provided as an attachment to this Statement of Compliance)

A declaration of compliance status has been included below as specific within the OEPA's *Post Assessment Form for a Statement of Compliance*.

In accordance within Condition 4-3 of MS 971 *"The proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1"*, a summary of the compliance status has been provided within the audit table. Additional information on the implementation and compliance status of required management plans has been included within section 4.

The audit table contains each Ministerial condition separated into audit elements for auditing purposes as specific within Office of the Environmental Protection Authority Post Assessment Guideline 1 (PAG 1) for *Preparing an Audit Table*.

The audit table contains the following elements:

- Audit Code: Alphanumeric code given to each implementation condition, procedure or commitment
- Subject: The environmental subject/issue
- Requirement: Copy of the wording of the relevant implementation condition, procedure or commitment
- How: The way the requirement must be undertaken
- Evidence: Information of data required to verify compliance

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- Phase: Project phase applicable to the audit element
- Timeframe: Specific timing and/or location
- Status: Describes the current stage of implementation of each requirement, including notes about fulfilment compliance
- Further Information: Links to source of further detail

**Proponent Declaration - Compliance Status**

I, JAVIER BRODALKA....., (full name and position title)  
declare that I am authorised on behalf of Newmont Boddington Gold (being the person responsible for the proposal) to submit this form and that the information contained in this form is true and not misleading.

Signature: .....

Date: 18/6/2018.....

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### 1.1.1 Ministerial Statement 971, June 2014 – Current

Note: This audit table has been prepared in accordance with OEPA Post Assessment Guidelines for Preparing an Audit Table (February 2012). As such the following abbreviations have been used for compliance status: C = Compliant, CLD – Completed, PNC – Potentially Non-compliant, NR = Not Required at this stage, NA = Not Auditable, IP = In Progress.

**Table 1. Summary of MS971 Conditions and Compliance Status**

Topic	Audit Code	Requirement	Status	Comment
<b>Proposal Implementation</b>	MS971:1.1	When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Column 3 of Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the Proposal has been approved under the EP Act.	C	The authorised extent outlined in Schedule 1 has not been exceeded. As of 31 Dec 2017.
<b>Contact Details</b>	MS971:2.1	The Proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.	C	No changes have occurred following grant of the approval.
<b>Time Limit for Proposal Implementation</b>	MS971:3.1	The proponent shall not commence implementation of the proposal after the expiration of five (5) years from the date of this statement, and any commencement, within this five (5) year period, must be substantial.	NR	Implementation of the proposal commenced in February 2016 with the commencement of the waste rock dump expansion works (WRDs 10 and 11) which included: primary/secondary/tertiary harvesting activities, clearing and grubbing activities, establishment of drainage infrastructure and transport corridors, stockpiling of rehabilitation material, harvesting of bauxite and site preparation.
	MS971:3.2	Any commencement of implementation of the proposal, within five (5) years from the date of this statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of five (5) years from the date of this statement.	C	Approximately 300 ha associated with the 1755ha of native vegetation approved to be cleared to date under MS971. This clearing was primarily associated with the footprint required for future waste rock dumps 10 and 11 (and includes access roads, drainage and mine water storage).  The 2016 report stated approximately 330ha of native vegetation had been cleared since the 2014 approval, however, upon review this had included clearing of cleared pastoral land or highly degraded vegetation on Hotham Farm which was not included in the 1755 ha of native vegetation.  Other minor clearing works have included the establishment of new fire breaks within the development envelope.
<b>Compliance Reporting</b>	MS971:4.1	The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the CEO.	C	Compliance Assessment Plan submitted to the CEO in December 2014 with approval received in January 2015.

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Topic	Audit Code	Requirement	Status	Comment
	MS971:4.2	<p>The proponent shall submit to the CEO the Compliance Assessment Plan required by condition 4-1 at least six (6) months prior to the first Compliance Assessment Report required by condition 4-6, or prior to implementation, whichever is sooner. The compliance assessment plan shall indicate:</p> <ol style="list-style-type: none"> <li>1) the frequency of compliance reporting;</li> <li>2) the approach and timing of compliance assessments;</li> <li>3) the retention of compliance assessments;</li> <li>4) the method of reporting of potential non-compliances and corrective actions taken;</li> <li>5) the table of contents of compliance assessment reports; and</li> <li>6) public availability of compliance assessment reports.</li> </ol>	C	Compliance Assessment Plan submitted to the CEO in December 2014 with approval received in January 2015.
	MS971:4.3	The proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.	C	<p>Compliance Assessment Reports have been submitted annually since the acceptance of the Compliance Assessment Plan.</p> <p>The 2016 and 2017 reports formed part of the NBG Annual Environmental Report.</p> <p>A decision was made in 2018 to remove the MS971 Compliance Report from the AER and submit as a separate document to the oEPA.</p> <p>This compliance assessment report provides updates for the 2017 calendar year and the first half of 2018.</p>
	MS971:4.4	The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and shall make those reports available when requested by the CEO.	NR	All compliance assessments will be maintained within NBG's document and records management system.
	MS971:4.5	The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.	C	There have been no potential non compliances with MS 971.
	MS971:4.6	<p>The proponent shall submit to the CEO the first Compliance Assessment Report by June 2015 addressing the twelve (12) month period from the date of issue of this Statement and then annually from the date of submission of the first compliance assessment report. The Compliance Assessment Report shall:</p> <ol style="list-style-type: none"> <li>1) be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;</li> <li>2) include a statement as to whether the proponent has complied with the conditions;</li> <li>3) identify all potential non-compliances and describe corrective and preventative actions taken;</li> <li>4) be made publicly available in accordance with the approved compliance assessment plan; and</li> <li>5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.</li> </ol>	C	<p>CAR submissions were incorporated into the NBG Annual Environmental Report (AER) in 2016 and 2017. The AER is required to be submitted to the Department of Mines, Industry Regulation and Safety (DMIRS) and Department of Water and Environmental Regulation (DWER) by June 30 annually.</p> <p>Copies of the AER are supplied to all members of the Boddington Gold Mine Environmental Management Liaison Group (BGMEMLG). The OEPA forms part of this group.</p> <p>A review of SER content was conducted in Q1 2018 and as a result a decision was made to remove the CAR from the AER and make a separate CAR submission to the OEPA.</p>

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Public Availability of Data	MS971:5.1	Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)) relevant to the assessment of this proposal and implementation of this Statement.	C	This CAR will be made publically available on <a href="http://newmont.com">newmont.com</a> following receipt of approval from the CEO.
	MS971:5.2	If any data referred to in condition 5-1 contains particulars of: <ol style="list-style-type: none"> <li>1) a secret formula or process; or</li> <li>2) confidential commercially sensitive information;</li> </ol> the proponent may submit a request for approval from the CEO to not make this data publically available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.	NR	To date no requests have been made to the CEO to exclude any information from the Compliance Assessment Report or Annual Environmental Report.
Flora and Vegetation	MS971:6.1	The proponent shall ensure that there is no increase in the spread of diseases, no establishment of new environmental weed taxa and no more than 15% increase in the area occupied by environmental weeds or increase in percentage cover in infested areas above the baseline levels described in the Public Environmental Review document (2013) and associated appendices which is attributable to implementation of proposal.	C	<p>The NBG Weed and Disease Management has been approved by oEPA (approval letter dated 15/09/2016).</p> <p>To date NBG has not seen an increase in forest disease or weed taxa more than 15% within the development envelope.</p> <p>The 2016 triennial forest disease assessment identified 2 previously unidentified infestations of Phytophthora dieback. However, it was concluded that these infestations were not considered newly introduced. No significant disease spread or evidence of newly introduced infestations were observed. The assessment covered 156.2 km of access tracks and roads, 4.5 km of drill hold access routes and 11.5 km of gully area. See Figure 2.</p> <p>Generally, the infestation boundaries remained unchanged, with the exception of D1 dam and the Wells Terminal Infestation where disease spread of up to 20m was observed. The former is believed to be due to flooding events of this facility spreading the pathogen further into fringing vegetation. See Figure 3.</p>
	MS971:6.2	The proponent shall prepare a Weed and Disease Monitoring and Management Plan in consultation with the Department of Parks and Wildlife to the requirements of the CEO for the proposal area, within six (6) months of this statement being issued.	CLD	<p>NBG submitted a Weed and Disease Management Plan in December 2014 within the timeframe specified by the condition. The plan was approved by oEPA (approval letter dated 15/09/2016).</p> <p>This management plan will continue to be reviewed and updated as required.</p>

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	MS971:6.3	The Weed and Disease Management Plan required pursuant to condition 6-2 shall: <ol style="list-style-type: none"> <li>1) when implemented, substantiate whether condition 6-1 is being met;</li> <li>2) detail the monitoring methodology, proposed frequency and timing of monitoring, and location of monitoring sites which, when implemented, verify that condition 6-1 is being met;</li> <li>3) identify criteria to trigger implementation of management and/or contingency measures to prevent the spread of weeds and diseases;</li> <li>4) identify management and/or contingency measures to be implemented in the event that criteria identified pursuant to condition 6-3(3) have been exceeded.</li> </ol>	C	NBG submitted a Weed and Disease Management Plan in December 2014 within the timeframe specified by the condition. The plan was approved by oEPA (approval letter dated 15/09/2016). This management plan is currently under review with the revised version expected to be sent to the oEPA in Q3 2018.
	MS971:4	The proponent shall implement the approved Weed and Disease Management Plan until otherwise agreed by the CEO	C	The approved plan is currently being implemented.
	MS971:6.5	In the event that monitoring pursuant to condition 6-3(2) indicates criteria defined pursuant to condition 6-3(3) are not being met, the proponent shall: <ol style="list-style-type: none"> <li>1) immediately implement management and/or contingency measures identified pursuant to condition 6-3(4) until criteria pursuant to condition 6-3(3) are being met, or until advised otherwise by the CEO; and</li> <li>2) investigate the likely cause(s) of the criteria defined pursuant to condition 6-3(3) not being met; and</li> <li>3) submit the findings of the investigation required pursuant to condition 6-5(2) to the CEO within twenty-eight (28) days of identification of the criteria defined pursuant to condition 6-3(3) not being met.</li> </ol>	C	Contingency measures have been established within the weed and disease management plan. To date these measures have not been required to be implemented.  As a result no investigations or submission of findings to the CEO have been made or required.
	MS971:6.6	The proponent may review and revise the Weed and Disease Management Plan to the requirements of the CEO.	NR	There have been no requests to review the management plan.
	MS971:6.7	The proponent shall review and revise the Weed and Disease Management Plan as and when directed by the CEO	NR	There have been no requests to review the management plan.
	MS971:6.8	The proponent shall implement the revisions of the Weed and Disease Management Plan required by conditions 6-6 and 6-7.	NR	There have been no requests to review the management plan.
<b>Hydrological Processes</b>	MS971:7.1	The proponent shall ensure that the dewatering drawdown associated with the proposal does not cause long term adverse impact to the health and abundance of groundwater dependent vegetation.	C	Groundwater drawdown continues to be monitored. To date monitoring has not shown that the localised dewatering is having a long term adverse impact to the environment. Monitoring is guided by the Groundwater and Groundwater Dependent Vegetation monitoring and management plan.

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Topic	Audit Code	Requirement	Status	Comment
	MS971:7.2	The proponent shall prepare a Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan to the requirements of the CEO within twelve (12) months of this statement being issued.	IP	Development of the Groundwater and Groundwater Dependent Vegetation Management Plan is in progress. The plan was submitted to the OEPA in May 2015. NBG received feedback from the oEPA in May 2017. Prior to this NBG had assessed the existing monitoring program and identified opportunities for improvement. NBG is currently working to improve this monitoring program and will resubmit the Plan to the oEPA by November 2018 (as per agreement with the oEPA).
	MS971:7.3	The Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan required pursuant to condition 7-2 shall: <ol style="list-style-type: none"> <li>1) when implemented, substantiate whether condition 7-1 is being met;</li> <li>2) identify all Groundwater Dependant Vegetation in the area with the potential to be impacted by the proposal, including the riparian vegetation associated with the Hotham River;</li> <li>3) when implemented, verify that the Groundwater model prepared for the Public Environmental Review (2013) and described in Schlumberger 2013 reflects observed conditions and expected outcomes/impacts;</li> <li>4) detail the monitoring methodology, proposed frequency and timing of monitoring, location of monitoring sites etc which, when implemented, verify that condition 6-1 is being met;</li> <li>5) identify criteria associated with groundwater levels and groundwater dependent vegetation health to trigger implementation of management and/or contingency measures to prevent impacts to groundwater dependent vegetation; and</li> <li>6) identify management and/or contingency measures to be implemented in the event that criteria identified pursuant to condition 7 -3(5) are exceeded.</li> </ol>	IP	The Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan includes all elements as required by MS971:7.3
	MS971:7.4	The proponent shall implement the approved Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan until otherwise agreed by the CEO.	C	The monitoring program is currently being revised and redeveloped. This will be included in the Plan to be submitted to the oEPA by November 2018.
	MS971:7.5	In the event that monitoring pursuant to condition 7-3 indicates criteria pursuant to condition 7-3(5) have been exceeded the proponent shall: <ol style="list-style-type: none"> <li>1) immediately implement management and/or contingency measures, identified pursuant to condition 7 -3(6) and continue implementation until criteria pursuant to condition 7 -3(5) are being met, or until otherwise agreed by the CEO; and</li> <li>2) submit details of management and/or contingency measures implemented pursuant to condition 7-5(1) to the CEO within twenty-eight (28) days of identification that criteria pursuant to condition 7-3(5) have been exceeded</li> </ol>	C	Contingency measures have been established within the Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan. To date monitoring has not indicated the need to implement any contingency measures.

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	MS971:7.9	The proponent may review and revise the Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan to the requirements of the CEO;	NR	There have been no requests to review the management plan.
	MS971:7.10	The proponent shall review and revise the Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan as and when directed by the CEO.	NR	There have been no requests to review the management plan.
	MS971:7.11	The proponent shall implement the revisions of the Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan required by conditions 7-9 and 7-10.	NR	There have been no requests to review the management plan.
<b>Bibbulmun Track</b>	MS971:8.1	The proponent shall ensure that there are no adverse impacts to the recreational values of the Bibbulmun Track as a result of the implementation of the proposal.	NR	Within the PER WRD 12 was identified as having potential to impact on the recreational values of the Bibbulmun track. Clearing and/or construction within the WRD12 boundary is not a component of the current NBG business plan. If future business plans were to include WRD12 then condition 8.2 will be actioned. As a platinum sponsor of the track, NBG maintains schedule contact with respective Bibbulmun management regarding ongoing mine changes & maintenance activities.
	MS971:8.2	The proponent shall prepare a Bibbulmun Track Management Plan to the requirements of the CEO, on the advice of the Department of Parks and Wildlife, pursuant to the requirements of condition 8-1. This plan is to be submitted no later than 18 months prior to the planned commencement of construction of Waste Rock Dump 12.	NR	As the current mine plan excludes the construction of WRD 12 there is no requirement to submit the Bibbulmun Track Management Plan.
	MS971:8.3	The Bibbulmun Track Management Plan required pursuant to condition 8-2 shall: <ol style="list-style-type: none"> <li>1) when implemented, substantiate whether condition 8-1 is being met;</li> <li>2) identify in consultation with stakeholders the route of any planned track diversion;</li> <li>3) identify appropriate noise and amenity criteria for areas along the track in proximity to operations and Mount Well's Hut;</li> <li>4) identify planned investigations for noise and amenity impacts to the Bibbulmun Track and Mount Wells Hut to verify that condition 8-1 will be met;</li> <li>5) identify management and contingency measures, including realignment of the Bibbulmun Track and (if required) relocation of the Mount Wells Hut, to be implemented in the event that investigations pursuant to condition 8-3(4) indicate that criteria identified pursuant to condition 8-3(3) are likely to be exceeded; and</li> <li>6) identify arrangements to meet all costs associated with any diversion of the Bibbulmun Track and if required, relocation of Mt Wells Hut in consultation with the Department of Parks and Wildlife;</li> </ol>	NR	If required the Bibbulmun Track Management Plan will be written to include these elements. Refer to MS971:8.2.

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	MS971:8.4	Prior to commencement of the construction of Waste Rock Dump 12 (Figure 1) the proponent shall implement the approved Bibbulmun Track Management Plan and continue implementation until rehabilitation earthworks associated with Waste Rock Dump 12 have been completed or until otherwise approved by the CEO.	NR	The Bibbulmun Track Management Plan will be implemented (if required) once approved.
	MS971:8.5	The proponent may review and revise the Bibbulmun Track Management Plan to the requirements of the CEO, on the advice of the Department of Parks and Wildlife.	NR	There have been no requests to review the management plan to date.
	MS971:8.6	The proponent shall review and revise the Bibbulmun Track Management Plan as and when directed by the CEO, on the advice of the Department of Parks and Wildlife.	NR	There have been no requests to review the management plan to date.
	MS971:8.7	The proponent shall implement the revisions of the Bibbulmun Track Monitoring Plan required by conditions 8-5 and 8-6.	NR	There have been no requests to review the management plan to date.
<b>Offsets</b>	MS971:9.1	To offset the significant residual impact to 1,755 ha of native vegetation which includes: <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo) and <i>Calyptorhynchus banksii naso</i> (Forest Red-tailed Black Cockatoo) foraging and breeding habitat, <i>Calyptorhynchus baudinii</i> (Baudin's Black Cockatoo) foraging habitat; fragmentation of <i>Bettongia penicillata ogilbyi</i> (Woylie) and <i>Dasyurus geoffroyi</i> (Chuditch) habitat; and loss of 618 ha of forest with conservation values currently vested in the Conservation Commission, the proponent shall undertake an offset program in accordance with conditions 9-2 to 9-12.	IP	Newmont is in the process of reviewing the Land Offset Management Plan. The revision will include a phased approach to offset implementation with certain offsets triggered as clearing requirements increase as a result of evolving mine plans. The revised plan will still address impacts to the three species of Black Cockatoos, Woylie and Chuditch habitat.
	MS971:9.2	Within one (1) year of the date of this Statement, the Proponent shall prepare a Land Offset Plan to the requirements of the CEO on advice of the Department of Mines and Petroleum.	IP	NBG has submitted a Land Offset Management Plan, however, review and approval has been paused as NBG would like to review the plan and re-submit with the phased clearing and associated offset approach. Under the phased approach the 470ha restoration offset will be progressed initially. Once the native vegetation clearing exceeds 450ha of native vegetation (as part of the 1755ha approved under MS971 and EPBC 2012/6370), the 2000ha conservation covenant option will be implemented. The revised Offset Land Management Plan is anticipated to be submitted to the oEPA in Q3 2018. The Offset Land Management Strategy is also being revised for submission to DotEE under EPBC 2012/6370 and will reflect the phased offset approach.

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	MS971:9.3	The land subject to the Land Offset Plan identified in condition 9-2 shall contain at least 2,000 hectares of native vegetation in similar condition to the vegetation being impacted by the proposal, or as otherwise agreed by the CEO.	IP	<p>The land contained within the Land Offset Plan will contain at least 2,000ha. This detail will be contained within the Land Offset Management Plan.</p> <p>NBG is currently revising the Land Offset Management Plan to implement a phased offset approach (as discussed above for Condition 9.2). At present, NBG will implement this offset once it is clear that there will be more than 450ha of native vegetation clearing required for the expanded operations from commencement of the approval of MS971 (to date approximately 298.5 ha of native vegetation clearing has occurred since the 2014 approval). See Figure 1 showing clearing since 2014.</p> <p>Note: native vegetation clearing under MS971 and EPBC 2012/6370 differs from the operational footprint approved via Mining Proposal under the WA Mining Act. The operational footprint includes disturbance on Hotham Farm pastoral land that was not considered as native vegetation clearing under environmental approvals.</p>
	MS971:9.4	<p>The Plan identified in condition 9-2 shall:</p> <ol style="list-style-type: none"> <li>1) identify the area to be protected and managed for conservation;</li> <li>2) if any of the vegetation in the area identified is in a degraded condition, identify improvement actions and a timeframe for the actions to be undertaken to improve the condition of native vegetation in that area;</li> <li>3) demonstrate that individual land parcels are at least 90 hectares in area;</li> <li>4) be located within fifty (50) kilometres of the proposal development envelope unless otherwise agreed by the CEO;</li> <li>5) identify the environmental attributes of the land to be acquired which must contain: a) known foraging and breeding habitat for <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo), <i>Calyptorhynchus banksii nasa</i> (Forest red-tailed Black Cockatoo), and foraging habitat for <i>Calyptorhynchus baudinii</i> (Baudin's Black Cockatoo) within 6 kilometres of permanent drinking water; b) habitat for <i>Bettongia penicillata ogilbyi</i> (Woylie) and foraging and breeding habitat for <i>Dasyurus geoffroii</i> (Chuditch);</li> <li>6) detail: <ol style="list-style-type: none"> <li>a) the conservation activities identified in 9-4(2) that will be undertaken, with associated completion criteria;</li> <li>b) funding arrangements and timing of funding for conservation activities identified in condition 9-4(6a);</li> <li>c) monitoring requirements for activities identified in condition 9-4(6a);</li> <li>d) timing arrangements including an agreed end point for protection of land identified in condition 9-3; and</li> <li>e) the role of the proponent.</li> </ol> </li> </ol>	IP	<p>The revised Land Offset Management Plan will include all elements that are outlined within MS971:9.4 and other relevant conditions and requirements outlined within Section 9 of the approval.</p> <p>Review and approval of the documentation by external parties will verify the plan contains the required elements outlined within this condition.</p>

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Topic	Audit Code	Requirement	Status	Comment
	MS971:9.5	In the event that condition 9-3 is unable to be implemented within the timeframe identified in condition 9-4(6d) the proponent shall identify a similar conservation benefit for the species identified in condition 9-1 as provided by the offset in condition 9-3 to be implemented and update the plan identified in condition 9-2 to the satisfaction of the CEO within three (3) months of the end of the timeframe identified in 9-4(6d).	NR	This condition is not applicable at this time
	MS971:9.6	The area identified in the approved Land Offset Plan shall be placed under a conservation covenant in consultation with the Department of Parks and Wildlife to the satisfaction of the CEO	NR	The process for triggering this offset will be outlined in the revised Land Offset Management Plan.
	MS971:9.7	The proponent shall implement the approved Land Offset Plan identified in condition 9-2 until the CEO advises implementation may cease.	NR	The Land Offset Plan will be implemented once developed and approved.
	MS971:9.8	Within two (2) years of the date of this statement, or at a date as agreed by the CEO, the Proponent shall ensure 470 hectares of Hotham Farm is protected in perpetuity by an instrument or instruments approved by the CEO.	IP	<p>The implementation of this offset has commenced.</p> <p>Discussions with the Parks and Wildlife Branch indicate that the conservation covenant cannot be progressed until the area until agreed completion criteria have been met. Therefore, NBG is unable to place an instrument of protection over this land. However, NBG holds mining tenements over most of the 470ha covered by the restoration area and owns the land. This will remain in place until the Conservation Covenant can be placed.</p> <p>Greening Australia was awarded a 3-year contract in 2016 to complete the initial habitat restoration works over a 470ha parcel of pastoral land. The implementation plan has been supplied to oEPA to demonstrate progress on this offset.</p> <p>The following works have been completed in relation to this offset:</p> <ul style="list-style-type: none"> <li>• Fencing of the 470ha completed in 2017 to prevent damage to establishing vegetation from herbivores.</li> <li>• Removal of herbivores from the fenced facility.</li> <li>• Seeding and initial planting throughout Autumn/Winter 2017. In total 265ha of the 300ha of cleared pastoral land was seeded in 2017. Approximately 135 species of plants were seeded over the area with the majority of seed being sourced within a 50km radius of the site.</li> <li>• Planting of 9900 plants of recalcitrant species (10 species).</li> <li>• Site pre-seeding weed management.</li> <li>• Post-seeding weed management with a focus on declared weed species (i.e. cotton bush).</li> <li>• Routine monthly monitoring to assess condition of revegetation.</li> <li>• Initial planning for works to be completed in the remnant vegetation on the site (totals 170ha).</li> <li>• Commencement of the development of the long term completion criteria and monitoring program.</li> </ul> <p>The 2017 Annual Report from Greening Australia has been included as Appendix A.</p>

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Topic	Audit Code	Requirement	Status	Comment
				<p>NBG has developed a Project Advisory Group (PAG) which is a group of specialists to review the plan and provide expert guidance to achieve the best outcomes for the offset.</p> <p>2018 Planned works includes:</p> <ul style="list-style-type: none"> <li>• Seeding of the remaining 35ha of cleared pastoral land.</li> <li>• On-going weed management.</li> <li>• On-going monitoring for initial success and to assess competition by weeds and potential impacts from grazing herbivores.</li> <li>• Finalisation of the long term completion criteria and monitoring program.</li> <li>• Initial annual monitoring of success against reference sites planned for Spring 2018.</li> </ul> <p>NBG will liaise with the PaW Branch when credible data is available to demonstrate the conservation value of this area in order to apply for a protective mechanism for this offset.</p>
	MS971:9.9	The Proponent shall manage the land identified in condition 9-8 in accordance with the Newmont Boddington Gold Overarching Offset Strategy dated 15 November 2013.	C	Newmont will manage the Hotham Farm offset in accordance with the Land Offset Management Plan.
	MS971:9.10	The proponent shall implement the offset identified in condition 9-8 until the CEO advises implementation may cease.	IP	<p>The Hotham Farm Offset is currently being implemented and will continue to be implemented until the CEO advises implementation may cease.</p> <p>Refer to comments made for Condition 9.8 and Appendix A for the 2017 Annual Report from Greening Australia.</p>
<b>Offsets</b>	MS971:9.11	<p>Within twelve (12) months of the date of this Statement, the proponent shall prepare a Land Exchange Plan, for the approval of the CEO on advice of the Director General of the Department of Parks and Wildlife. The Land Exchange Plan shall include:</p> <ol style="list-style-type: none"> <li>1) details of land to be ceded to the State for incorporation into the conservation reserve system and vesting in the Conservation Commission of Western Australia;</li> <li>2) total amount of land to be ceded;</li> <li>3) a requirement that the total area to be ceded be based on providing an equivalent value to the forest area vested in the Conservation Commission being removed, with a minimum of at least 618 hectares; and</li> <li>4) a proposed timeframe for the ceding of land to occur.</li> </ol>	IP	<p>Information on this land exchange plan was included in the Land Offset Plan provided to oEPA in 2015. However, this plan is now under review.</p> <p>Land has been identified for the purpose of the Land Swap.</p> <p>Limited progress was made on this offset requirement in 2017.</p> <p>Newmont is still progressing the Land Swap and is in the process of developing a draft MoU to provide to the Department of Parks and Wildlife.</p>
	MS971:9.12	The proponent shall implement the approved Land Exchange Plan identified in condition 10-1.	IP	The Land Exchange will be progressed.
<b>Legacy Offset</b>	MS971:10.1	The proponent shall implement the offset previously committed to in the now superseded Statement 591 (provide land to the State) as described in Schedule 3 of this Statement to the satisfaction of the CEO within two years of this statement being issued.	IP/NC	Newmont has been issued separate certificates of title for the subdivided land. Newmont has commenced engagement with the Parks and Wildlife Branch and South32/Worsley to facilitate the transfer of new certificate of title to the State. See Figure 4.

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## 1.2 Audit Tables and Summaries of Compliance

### 1.2.1 Ministerial Statement 971 - Schedule 1: Key Characteristics Table June 2014

Table 1: Summary of the proposal	
<b>Proposal Title</b>	Newmont Boddington Gold Life of Mine Expansion
<b>Proponent Name</b>	Newmont Boddington Gold Pty Ltd
<b>Short Description</b>	<p>The proposal is for the continuation of the existing operations and for an expansion of the existing operations at the Newmont Boddington Goldmine and includes:</p> <ul style="list-style-type: none"> <li>• Pit expansion (widening and deepening);</li> <li>• increased ore production resulting in increased waste quantities;</li> <li>• increase to existing stockpiles and development of ancillary infrastructure; expansion of waste rock dumps;</li> <li>• construction of a new residue disposal area; and</li> <li>• construction of new water storage areas.</li> </ul> <p>The regional location is shown in Figure 1.</p>

Table 2: Location and authorised extent of the physical and operational elements		
Physical Elements		
Column 1	Column 2	Column 3
Element	Location	Authorised Extent
Development Envelope	Figure 2	11,712 ha
Disturbance Footprint	Figure 2	Clearing of no more than 6,850ha of vegetation within the 11,712ha development envelope
Clearing of Native	Figure 2	Clearing of no more than 5,435ha of native vegetation within the 11,712 ha development envelope.
Waste Rock Dumps	Figure 2	1 ,500 Mt over life of proposal
Mine Activities	Figure 2	Open cut basement mining to approximately -252 AHD for the north pit and -432 AHD south pit
Operational Elements		
Element	Total extent of proposal	
Mine Life	Continued operations until 2041	
Water Use	47 ML/day	

### 1.2.2 Ministerial Statement 971 - Schedule 3: Legacy Offset June 2014

Legacy Offset			
<p>1. The proponent shall identify in consultation with the Department of Parks and Wildlife and provide to the State, for incorporation into the conservation reserve system:</p> <ul style="list-style-type: none"> <li>• Preferably land of comparable conservation value and approximately equal to the area of State Forest affected by BGM mining (North Pit and South Pit as shown in Figure 1 of Schedule 1 of this statement) and the F1 Residue Disposal Area as shown in Figure 1 of Schedule 1 of this statement, or</li> <li>• Land of comparable conservation value and approximately equal to the area of State Forest affected by the F1 Residue Disposal Area as shown in Figure 1 of Schedule 1 of this statement.</li> </ul>			
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#### 4 DECLARED COMPLIANCE STATUS - MANAGEMENT PLANS

##### 4.1 Weed and Disease Monitoring and Management Plan

Following acceptance of the Weed and Disease Management by the OEPA in September 2016, NBG have implemented the plan in its current format.

The primary objectives of the management plan are aligned to those criteria outlined within condition 6-3 (1 – 4) of MS 971 (Table 2). In addition 1 primary objective has been established associated with the proposed monitoring program.

**Table 2. NBG Compliance with Weed and Disease Monitoring and Management Plan**

Condition	Key Requirement/Objective	Compliance Status
Sec 4	<p>Management of forest disease spread</p> <p><b>Target</b> - No increase in spread of forest disease area attributable to mining operations</p>	<p><b>Non Compliant (due to expansion of D1 infestation boundary – see below)</b></p> <p>The 2016 triennial survey was conducted over 156.2 km of potential tracks and roads, 4.5km of potential drill hole access routes, and 11.5 km of gully area. In addition to the linear mapping, an additional 63.4ha of infested areas within the operational mine area was rechecked and demarcated.</p> <p>Thirteen infestations were identified with 11 of these having been being previously identified. Both of the new infestations were found in areas previously unsurveyed and one of these new areas exists outside of the development envelope.</p> <p>Some expansion of the disease boundary around D1 dam was observed (associated with the high water level during high rainfall events and maximising storage capacity in this facility).</p> <p>The Wells Terminal infestation had spread up to 20m. The Wells Terminal infestation lies outside of the Development Envelope but is monitored as it is located within NBG held Mining Tenements.</p> <p>The Weed and Disease Monitoring and Management Plan is currently being reviewed.</p> <p>Figure 2 shows the current forest</p>

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Condition	Key Requirement/Objective	Compliance Status
	<p>Management of all Weed Species</p> <p><b>Target</b> - No more than a 15% increase in the area impacted by all weed species</p>	<p>disease status at NBG.</p> <p><b>Compliant</b></p> <p>At the end of the reporting period there has been no increase in weed species impact area attributable to mining operations within the Development Envelope.</p> <p>Known historical declared species infestations (primarily Cotton Bush) were inspected and managed as required inside the operational footprint during 2017.</p> <p>Considerable weed management efforts were invested on the Hotham Farm Restoration Area in 2017 in preparation for seeding and planting works (and post seed establishment).</p> <p>The Weed and Disease Management and Monitoring Plan is currently under review. This will involve improved records keeping for weed management activities, review of the weed GIS layer to separate declared weeds and improved planning with the weed management calendar.</p> <p>See Figure 3 for current known weed infestations on site.</p>
	<p>Declared Weed Species Management</p> <p><b>Target</b> - Reduction in area impacted by Declared Weed species.</p>	<p><b>Compliant</b></p> <p>NBG has undertaken weed management activities focused on the management of Narrow Leaf Cotton Bush during 2017. Management areas have focused on known populations around the South Pit and South Clear Water Pond.</p> <p>Management of this declared weed species was also a focus area for the Hotham Farm restoration site which sits outside of the Development Envelope.</p>

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Condition	Key Requirement/Objective	Compliance Status
	Declared Weed Species Management <b>Target</b> - Report all declared weed species to nominated authority	<b>Compliant</b> No new weed populations were identified during the reporting period that require reporting to a nominated authority.
	Communication of Management success <b>Target</b> - Annual updates provided to BGMEMLG members	<b>Compliant</b> Communication is made regarding weed and forest disease management activities within BGMEMLG meetings and via annual compliance reporting.

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#### 4.2 Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan

The Groundwater and Groundwater Dependent Vegetation Monitoring and Management Plan (GGDVMMP) was submitted to the OEPA for review and approval in May 2015. At the time of preparing this report, NBG had not received feedback from the OEPA on their acceptance of the plan.

Whilst a decision on the OEPA's acceptance on the Management Plan is pending, NBG has continued to implement the developed plan, including the execution of the proposed monitoring program with the inaugural sampling program completed in 2015, 2016 and 2017. Whilst the result of the monitoring suggests that there are decreasing trends in several of the measured parameters, it is likely that these are a result of reduced rainfall from climate change and a drying landscape. The current groundwater abstraction for safe mining and the water supply from the production bores does not appear to be adversely impacting GDV as they are evident from impact and control sites and at monitoring sites with varying distances from the operation.

The 2017 report concluded that the monitoring program required amendment to better capture the changes and trends in GDV and a revision of monitoring sites, to reduce the substantial variation in the data being collected.

Following this, the GGDVMMP has been under review by an independent third party. They have identified a number of flaws in the original assessment of GDV and, in consultation with a consultant hydrogeologist, are developing a process to revise the assessment of GDV and monitoring of these systems for potential mine related impacts. The GGDVMMP will be revised following this work and re-submitted to the OEPA in Q4 2018.

It should be noted that feedback on the 2015 GGDVMMP was received in 2017 from the OEPA. They OEPA had identified areas of opportunity for improvement to the Plan. This feedback has been incorporated into the revision of the Plan that is currently underway.

NBG's compliance with those criteria contained within the relevant conditions and those objectives set to determine monitoring program success have been summarised in Table3 below.

Table 6-1 of the GGDVMMP summarises which sections of the plan address each of the conditions specified in Section 7 of MS 971.

**Table 3. NBG Compliance with Groundwater and Groundwater Dependent Vegetation Monitoring Plan**

Condition	Key Requirement/Objective	Compliance Status
Sec 7.1	Obtain sufficient data relating to the health and condition of GDV at pre-determined locations within the Boddington Gold Mine and surrounding catchments to enable assessment of compliance with Condition 7 of Ministerial Statement No. 971	<p><b>Compliant</b></p> <p>The groundwater monitoring program has been designed to determine if NBG mine operations is impacting on Groundwater and Groundwater Dependent Vegetation outside that predicted within the model submitted with the PER.</p> <p>Initial monitoring events target both control and impact sites and intend to establish a baseline level for a variety</p>

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Condition	Key Requirement/Objective	Compliance Status
		<p>of parameters at each location.</p> <p>The program has been designed to differentiate between environmental impacts and those attributable to the mine where possible.</p> <p>Opportunities for improvement to the plan have been identified and the monitoring program (and the GGDVMMP) is currently under review.</p>

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### **4.3 Bibbulmun Track Management Plan**

In order to offset potential impacts to the Bibbulmun Track, condition 8-2 specifies that NBG is required to prepare a Bibbulmun track Management Plan to the requirements of the CEO on advice from Department of Biodiversity, Conservation and Attractions (Previously DPaW).

The requirement for submission of the Bibbulmun Track Management Plan is triggered 18 months prior to construction of Waste Rock Dump 12 (WRD 12). As the construction of WRD 12 is not included within the current NBG LOM business plan the management plan has not been prepared or submitted.

### **4.4 Land Offset Management Plan**

The Land Offset Plan (LOP) was submitted to the OEPA for review and approval in June 2015. Following a review of the mine plan in 2015/16 the expected mine lift of the operation was anticipated to be 2029. As a result of this decision, the extent of clearing that would be required would be greatly reduced from what was approved under the LOM Extension Public Environmental Report (MS971). Discussions were held with the OEPA to seek guidance on the pathway for approving a phased offset approach (i.e. offsets would be implemented for the first phase of clearing required for waste rock dump expansion and associated infrastructure and if mine life was to increase again and further clearing required, the remaining offsets required under MS971 would be implemented). It was agreed that the oEPA would hold off on approval of the Land Offset Management Plan until a resolution had been agreed.

Resolution on a path forward was agreed in March 2017 following advice from the oEPA. NBG is currently working on a revised Land Offset Management Plan that will satisfy the requirements of MS971 and EPBC 2012/6370.

Current compliance with the Offset Conditions specified in MS971 is provided in Table 1.

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## 5 OTHER INFORMATION – SUPPORTING EVIDENCE

The following sub sections provide evidence of NBG's compliance with relevant conditions of MS 971.

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5.1 Compliance Report Figures

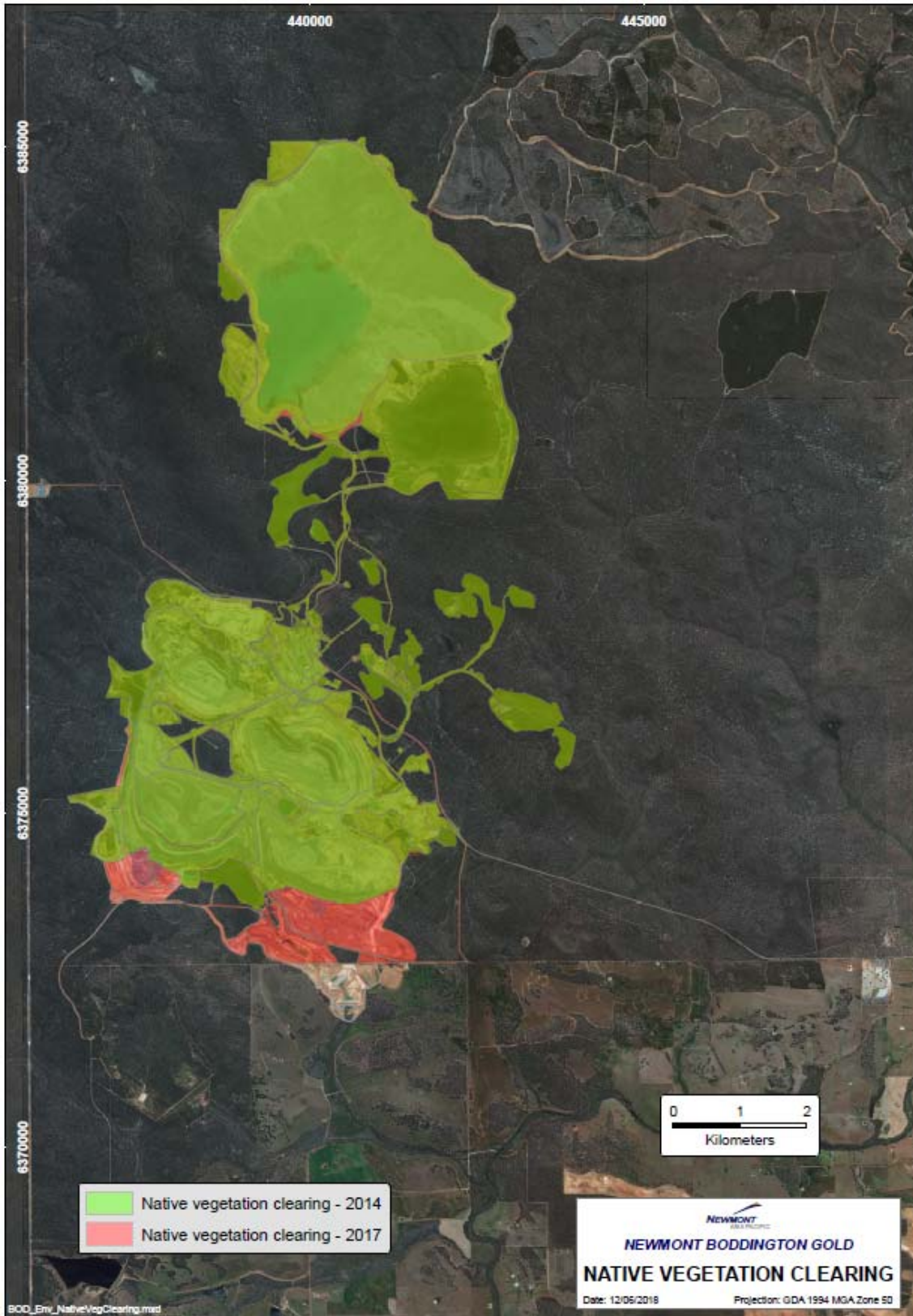
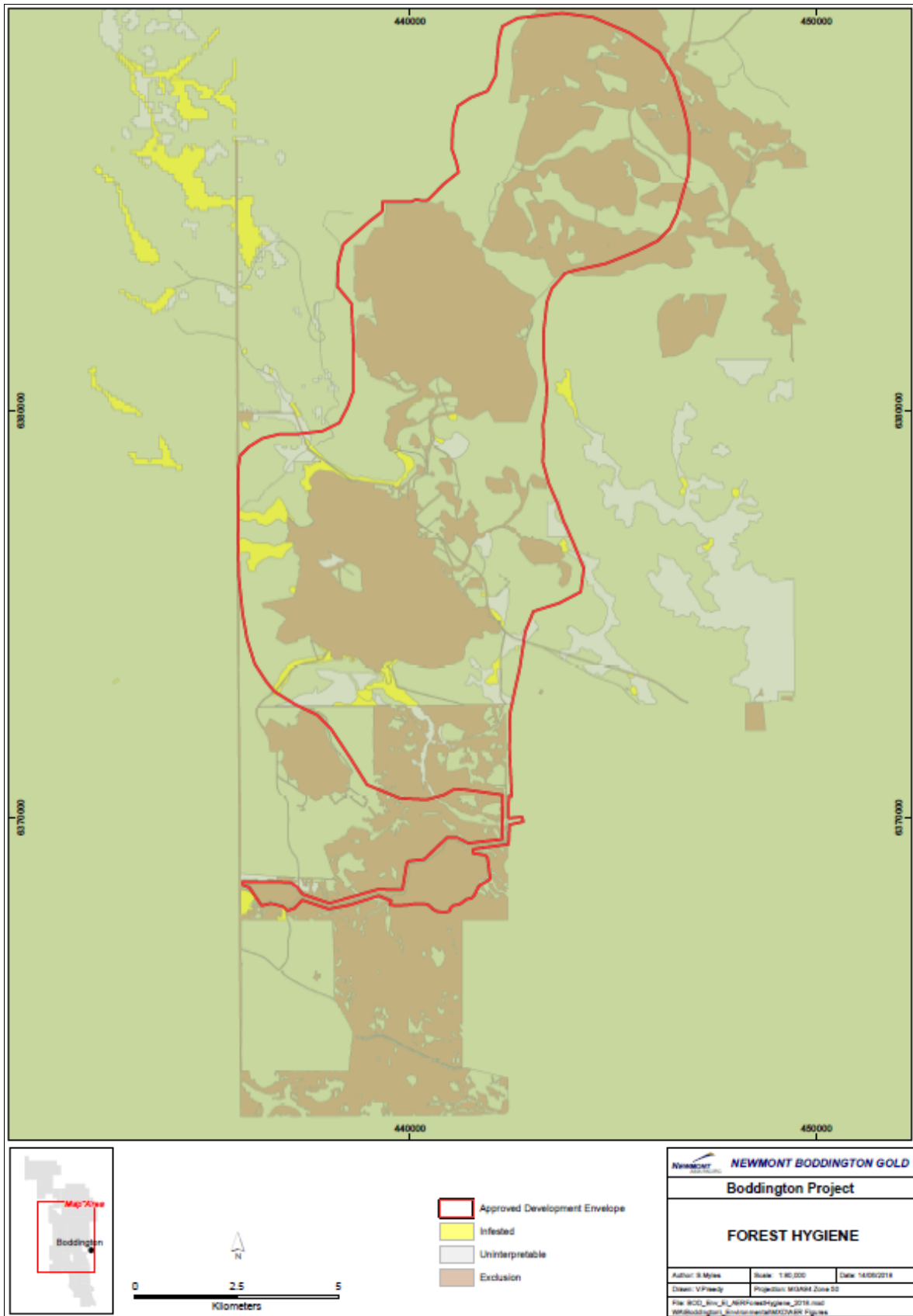


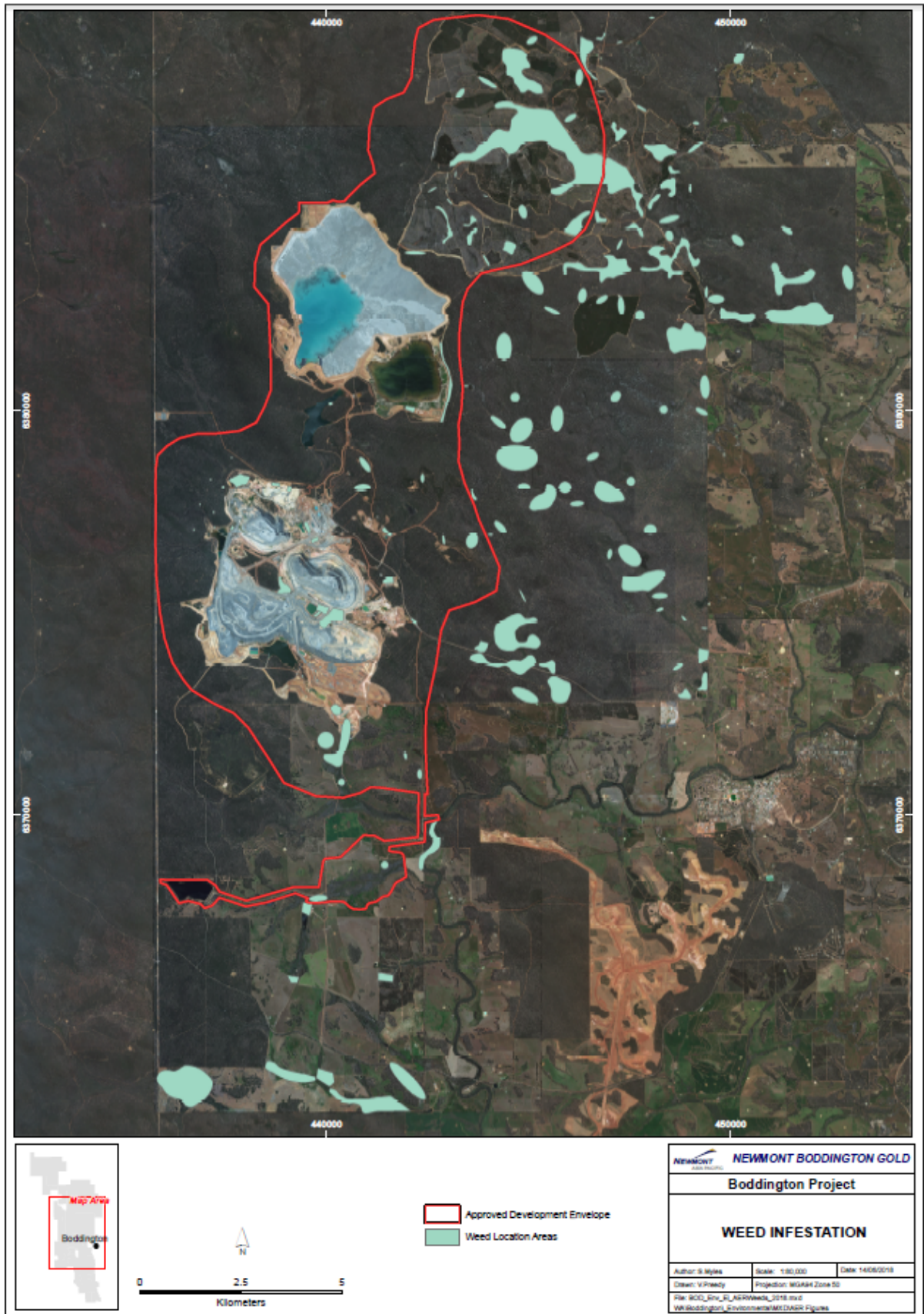
Figure 1 – Extent of Native Vegetation Clearing that has occurred since MS971 approval

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**Figure 2. Extent of Known Forest Disease Boundaries**

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**Figure 3. Current Known Weed Infestations**

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## 6 Appendix A

### 2017 Annual Report

### Hotham Farm Restoration Project

### (Greening Australia)

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# **Hotham Farm Biodiversity Offset Restoration Programme**

*Annual Report, June 2018*

*Prepared for Newmont Boddington Gold*

## Executive Summary

The Hotham Farm Restoration Project forms one component of a land offset strategy required under the Newmont Boddington Gold (NBG) Life of Mine (LOM) Extension Project approval conditions for the expansions of the Boddington Gold Mine.

The project comprises the restoration and management of approximately 332 ha of cleared pastoral land and improvement of 138 ha of remnant vegetation within the Project Area. Approval conditions require NBG to establish a protective mechanism over the 470 ha site with the overarching objectives:

- (i) providing a foraging resource for Black Cockatoos (Baudin's Black Cockatoo (*Calyptorhynchus baudinii*), Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) within ten years of restoration;
- (ii) providing this resource within a short distance of established Jarrah/Marri forest (i.e. Black Cockatoo breeding habitat) and permanent water resources; and
- (iii) providing foraging refuge habitat and linkage for mammal species such as Woylie (*Bettongia penicillata ogilbyi*) and Chuditch (*Dasyurus geoffroi*).

In April 2016, NBG commissioned Greening Australia (GA) in partnership with Dr Geoff Woodall to undertake the Hotham Farm Restoration Programme with the aim of achieving the approval conditions. This initial three-year program involves capturing baseline data, planning restoration actions, implementing revegetation activities, remnant habitat management, and other environmental management measures. The implementation of these tasks was structured in five phases with GA progressing four of the five phases in 2017. Phase two deliverables were associated with the fence construction and was assumed by NBG. A summary of progress for each phase is provided below:

- Phase 1 Technical planning: Execution of the technical planning phase has included delivery of safety compliance documentation, land mapping and the capture of a range of baseline data culminating in the preparation and submission of the Project Execution Plan.
- Phase 3 Site preparation: Completion of the site preparation phase included the implementation of deliverables associated with seed supply and testing, pest control, pre-seeding weed management and soil preparation for direct seeding. The creation of nesting hollows and habitat construction was removed from the current GA scope of works.
- Phase 4: Restoration/Revegetation Execution: Deliverables include development of a method for vegetation placement (PEP), the seeding of 83% of cleared agricultural area, completion of post seeding weed control and the provision of data and mapping for the associated works.
- Phase 5: Monitoring and reporting: Deliverables include the establishment of a monthly routine monitoring inspection program culminating in the provision of monthly progress reporting summarising work activities and revegetation status. This submission of this report represents another deliverable within this project phase.

Deliverables not completed during this reporting period include:

- implementation of remnant vegetation management strategies;
- the finalisation of definitive completion criteria for the Project;
- annual monitoring within the Project Area; and
- the development of a species list for future infill planting.

Each of these items are linked, and their completion will facilitate progress towards completion of the Project. They therefore represent a priority for joint consideration and subsequent embedding in the future works program.

In addition to that covered by the deliverables above, ongoing works for the Project will include:

- completion of direct seeding;
- weed control (broadacre, targeted both outside and within remnant vegetation),
- pest management,
- routine monitoring and inspections; and
- monthly reporting.

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This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

**QUALITY STATEMENT**

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**Revision Schedule**

Rev No	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
1.0	29/01/2018	Preparation	Arielle Fontaine			
2.0	08/03/2018	Preparation	Liam Mulcahy		Blair Parsons	David Timmel
3.0	08/06/2018	Final	Liam Mulcahy	Liam Mulcahy	Blair Parsons	David Timmel

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**LIST OF ABBREVIATIONS**

- DBCA: Department of Biodiversity, Conservation and Attractions
- FISEM: Feral Invasive Species Eradication Management
- GA: Greening Australia
- NBG: Newmont Boddington Gold
- NSS: Nindethana Seed Service
- PEP: Project Execution Plan
- LMU Land Mapping Units

# 1 Introduction

## 1.1 BACKGROUND

Newmont Boddington Gold (NBG) commissioned Greening Australia (GA) in partnership with Dr Geoff Woodall in April 2016 to undertake a Biodiversity Offset Restoration Programme over 470 ha of degraded farmland on the southern section of Hotham Farm (The Project Area) (**Figure 1**). Hotham Farm is located approximately 110 km southeast of Perth and 10 km south of the Boddington Gold Mine, in the Southwest of Western Australia (**Figure 1**).

The Hotham Farm restoration programme (the restoration programme) forms one component of a land offset strategy required under NBG's Life of Mine (LOM) Extension Project approval conditions under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) 2012/6370 and Ministerial Statement 971 (MS 971) under the WA *Environmental Protection Act 1986* (EP Act) for the clearing of land associated with Waste Rock Dump (WRD) expansions and construction of a second Residue Disposal Area (RDA) at the Boddington Gold Mine. NBG proposed a staged strategy for the implementation of offset requirements to coincide with the execution of components associated with the LOM Extension Project; accordingly, this commenced in August 2015.

Implementation of the offset requirement is embodied within a proposed restoration programme on primarily cleared agricultural land. ('the Project', to be undertaken by Greening Australia).

The bulk of the baseline data and assessments were completed during 2016, with preparation of the Project Execution Plan being finalised in October 2017. Seed Procurement, site preparation and revegetation and restoration activities commenced during the 2017 reporting period.

## 1.2 PURPOSE

The purpose of this report is to provide an update on the Project for the period of 01 January to 31 December 2017, in accordance with the planned management controls to be applied throughout the Project Area to address management issues as outlined in the PEP. The report also documents the proposed activities to be undertaken during 2018.

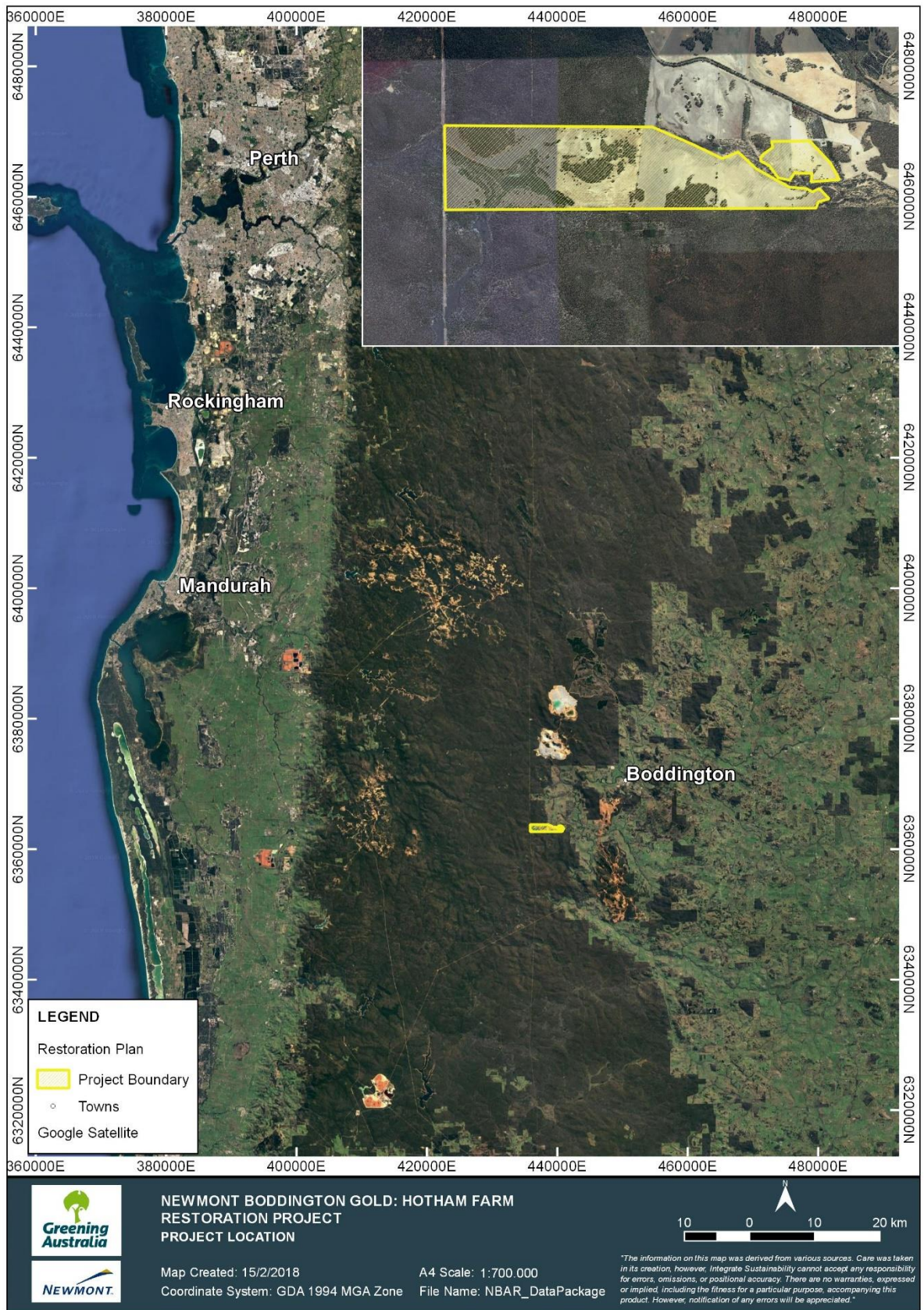


Figure 1: Project Location

## 1.3 RESTORATION OBJECTIVES

The restoration programme has adopted a ‘best practice’ approach and the overarching design of the plan, has been prepared in accordance with the National Standards for the Practice of Ecological Restoration in Australia (McDonald *et al.* 2016). As such, “target, goals and objectives” as described in McDonald *et al.* (2016) have been used to define key management parameters for the restoration programme.

### 1.3.1 Target

Greening Australia, in liaison with NBG and its Project Advisory Group, agreed upon a target for the restoration programme, in alignment with McDonald *et al.* (2016):

*Hotham Farm will be restored from highly degraded agricultural land towards a functioning ecosystem resembling a set of defined reference sites. The restoration will achieve a 2.5 – 3-star recovery rating (sensu McDonald et al. 2016).*

### 1.3.2 Goal

Greening Australia, in liaison with NBG and its Project Advisory Group, agreed upon a goal for the restoration programme, in alignment with McDonald *et al.* (2016):

*Through the ecological restoration of highly degraded agricultural lands, and the management and protection of existing remnant vegetation, the programme aims to restore ecosystem functions consistent with the surrounding vegetation types of the Northern Jarrah Forest.*

The restoration programme currently has no set timeframe for achieving this goal; however, the Project that forms the initial phase of works has a three-year life in accordance with the contract between NBG and Greening Australia.

### 1.3.3 Programme Objectives

Condition 9-8 of MS 971 requires NBG to establish a protective mechanism over 470 ha of land located on Hotham Farm with the following objectives:

- (iv) providing a foraging resource for Black Cockatoos (Baudin’s Black Cockatoo (*Calyptorhynchus baudinii*), Carnaby’s Black Cockatoo (*Calyptorhynchus latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) within ten years of restoration;
- (v) providing this resource within a short distance of established Jarrah/Marri forest (i.e. Black Cockatoo breeding habitat) and permanent water resources; and
- (vi) providing foraging refuge habitat and linkage for mammal species such as Woylie (*Bettongia penicillata ogilbyi*) and Chuditch (*Dasyurus geoffroi*).

NBG have the responsibility to establish a conservation covenant over the Project Area to fulfil the requirement to establish a protective mechanism. The establishment of the covenant is currently not scheduled; however, this will be established once agreed completion criteria for the programme are met.

The Project Area was selected for restoration as it fulfilled the requirements of *Objective ii* from Condition 9-8 of MS 971 in that it is located immediately adjacent to native Jarrah/Marri Forest and has permanent water resources located within the Project Area in the form of existing wetlands. The restoration project addresses *Objectives i* and *iii* and provides detailed strategies, plans, methods and contingency measures designed to achieve the objectives.

## 1.4 SCOPE OF WORK

A combination of approaches have been employed as part of the Project to facilitate the restoration programme in reaching the stated target including: natural regeneration (i.e. where ecosystem disturbance is relatively low); assisted regeneration (where degraded remnant vegetation requires active intervention); and reconstruction (for cleared agricultural land, *sensu* McDonald *et al.* 2016).

The first three years of restoration activities at Hotham Farm are addressed within confines of the Project. Key activities include:

- i. capturing a range of baseline data to measure ecosystem attributes. This will inform planning of restoration actions, development of appropriate Project completion criteria and facilitate the assessment of restored ecosystem parameters relative to a desired trajectory towards a functioning ecosystem;
- ii. development of restoration strategies and an implementation plan to achieve Project Objectives (this document);
- iii. implement direct seeding to establish a suite of species representative of appropriate reference sites within the 300 ha of cleared agricultural land;
- iv. implement identified measures to restore habitat values to 170 ha of remnant vegetation; and
- v. implement infill planting and other contingency measures within the three-year period to ensure the scope of works is fulfilled.

To achieve the goals and objectives of the Project, six phases have been identified:

1. restoration plan development;
2. fencing;
3. site preparation;
4. initial restoration and revegetation execution;
5. monitoring and reporting; and
6. infill planting and remediation works.

GA executed Phases 1, 3, 4 and 5 during the reporting period. Phase 2 was executed by NBG. No annual monitoring was completed during the 2017 reporting period and GA expects that this will be completed during the 2018 reporting period.

## 1.5 PROJECT OBJECTIVES

The project objectives as outlined in the Project Execution Plan (PEP) include:

1. prepare a restoration plan, detailing key activities to be undertaken within the initial three-year Project period, designed to ensure restoration programme objectives can be achieved in the long term ( $\geq 10$  years).
2. Direct seed 300 ha of cleared agricultural land in the Project Area with seed mixes comprising suites of native species of local provenance that have been developed to meet the Project Objectives.
3. identify and undertake management measures within remnant native vegetation within the Project Area to achieve improved ecological condition.
4. undertake monitoring and reporting of restoration performance to measure success of plant establishment and growth and identify any requirement for remedial management measures such as weed or pathogen control or the application of additional plant establishment strategies.
5. undertake infill planting and conduct other remedial measures as required to ensure that:
  - plant survival within the 300 ha of direct seeding has not declined by more than 10% after infill planting and seeding is complete;
  - dominant species within each LMU are healthy and comprise more than 50% of native plant cover;
  - weed cover within the 300 ha of direct seeded vegetation is no greater than 30% on average;
  - vegetation condition within vegetation remnants is demonstrably improved over the baseline condition with respect to weed presence and native species presence and cover (note - these areas may be the subject of trials and as such this objective may be met through the successful implementation of trials to identify appropriate treatments to improve ecological function and condition); and
  - there are no Declared weeds present in the Project Area at the end of three years.

## 2 Restoration Activities

### 2.1 RESTORATION MANAGEMENT PLAN (PHASE 1)

Several baseline assessments were completed to gather information on the Project Area and surrounds to inform the design and implementation of the Restoration Programme.

A desktop review of available literature was conducted to ensure that habitat requirements of Black Cockatoos (*Calyptorhynchus latirostris*, *Calyptorhynchus baudinii*, *Calyptorhynchus banksii naso*), Woylie (*Bettongia penicillata ogilbyi*) and Chuditch (*Dasyurus geoffroii*) were factored into the Project, as part of defining habitats to be created.

Restoration activities within the cleared agricultural areas at Hotham Farm were guided by determining Land Management Units (LMU) defined primarily by soil type, topography and associated or inferred vegetation types. A key purpose of the LMUs was to enhance habitat value for native fauna and flora by creating a mosaic of communities within the Project Area, in broad alignment with naturally occurring ecological communities.

Creation of LMUs was informed through baseline assessments including a Soil Survey, Vegetation Reference Site Survey and Weed Survey. Land Management Unit (LMU) mapping was completed in late 2016 (**Section 2.1.1**). Details of baseline assessments completed during the reporting period are also provided in the sections below.

#### 2.1.1 Land Unit Mapping

Mattiske Consulting (2013) identified and mapped regional vegetation complexes. Michibin, Dwellingup 4 and Pindalup systems are predominant throughout the Project Area. As the majority of land within the Project Area has been cleared, vegetation types can only be inferred based in the surrounding remnant vegetation (Greening Australia, 2015). To this end, GA conducted further assessment to more accurately map soil types, and therefore, better define vegetation association boundaries.

As part of GA's assessment, LMUs were broadly defined by soil type and topography, within which, vegetation types (and associated species composition) were assigned based on vegetation mapping undertaken by Mattiske (2013), supplemented with baseline vegetation and soil field data. The LMUs and associated site vegetation types (SVTs) were mapped across the site by matching existing vegetation boundaries/extents with corresponding topography and soil types. Where a single SVT could not be identified for a soil unit, multiple SVTs occurring on similar soil/topography units were grouped to create the LMU. Where the creation of an LMU could not adequately address restoration programme objectives, additional management measures have been identified (Greening Australia, 2017).

The original LMUs were ground truthed in May 2017 with Greg Woodman. As a result of observations made during the field survey, some minor adjustments were made to the LMU boundaries to ensure that the LMUs were consistent with soil standards and Local Vegetation Type descriptions (Mattiske, 2013). Adjustments made to the original LMUs include:

- minor adjustments to LMU boundaries;

- addition of a fringing vegetation LMU coinciding with SVT E (Matisse 2013);
- linking of GA named LMUs with SVTs (Matisse 2013);
- Loamy gravel and Rocky gravel LMU associated with SVT S and SP (Matisse 2013)
- Wandoo System LMU associated with SVT M (Matisse 2013)
- Drainage Line LMU associated with SVT L1 (Matisse 2013); and
- Deep Sand LMU associated with SVT S and SP, with an increased representation of *Allocasuarina fraseriana* and *Banksia grandis*.

A detailed description of the LMU Assessment is provided in the Project Execution Plan, and the final LMU descriptions and map are provided in **Appendix 1** and **2**, respectively.

### 2.1.2 Vegetation Reference Site Survey

A survey of reference sites was conducted in September and November 2016 and involved the identification and surveying of five reference sites (NB01 – NB05, **Table 1**). These sites were located in George Forest Block adjacent to the southern boundary of the Project Area and in remnant patches within it. All sites were identified by Matisse as having a condition score of ‘Excellent’ or above (**Figure 2**). Each site was chosen to broadly match key SVTs present within the Project Area. These reference sites were used to confirm and expand on the species lists from Matisse (2013), and to provide data on plant densities of dominant species in similar forest areas to inform seeding rates.

**Table 1: Reference sites and corresponding SVTs and Local Soil Types surveyed**

Reference Site	SVT	Soil Unit
NB01	M	Clay Loam
NB02	S and SP	Loamy Gravel
NB03	PS	Deep Sand
NB04	A1	Semi-Wet Soil
NB05	L	Semi-Wet Soil

At each reference site a 20 x 20 m vegetation assessment quadrat was established, and the following information recorded:

- quadrat number;
- date of survey;
- personnel;
- GPS coordinate (GDA 94);
- site photograph;
- soil characteristics (density, texture and colour);
- topography (landform type and aspect);
- disturbance (if present);
- presence of all vascular flora taxa within each quadrat (including overhang from plants rooted outside the boundary); and
- approximate time since fire.

In addition to the above data, plant numbers were recorded for dominant species within each stratum to support development of seeding rates for LMUs. Plant counts were collected either within the 20 m x 20 m quadrat or within a smaller nested quadrat for small species where densities were very high (10 m x 10 m or 1 m x 1 m). Raw data from reference site surveys has been provided to NBG within the PEP (October 2017).

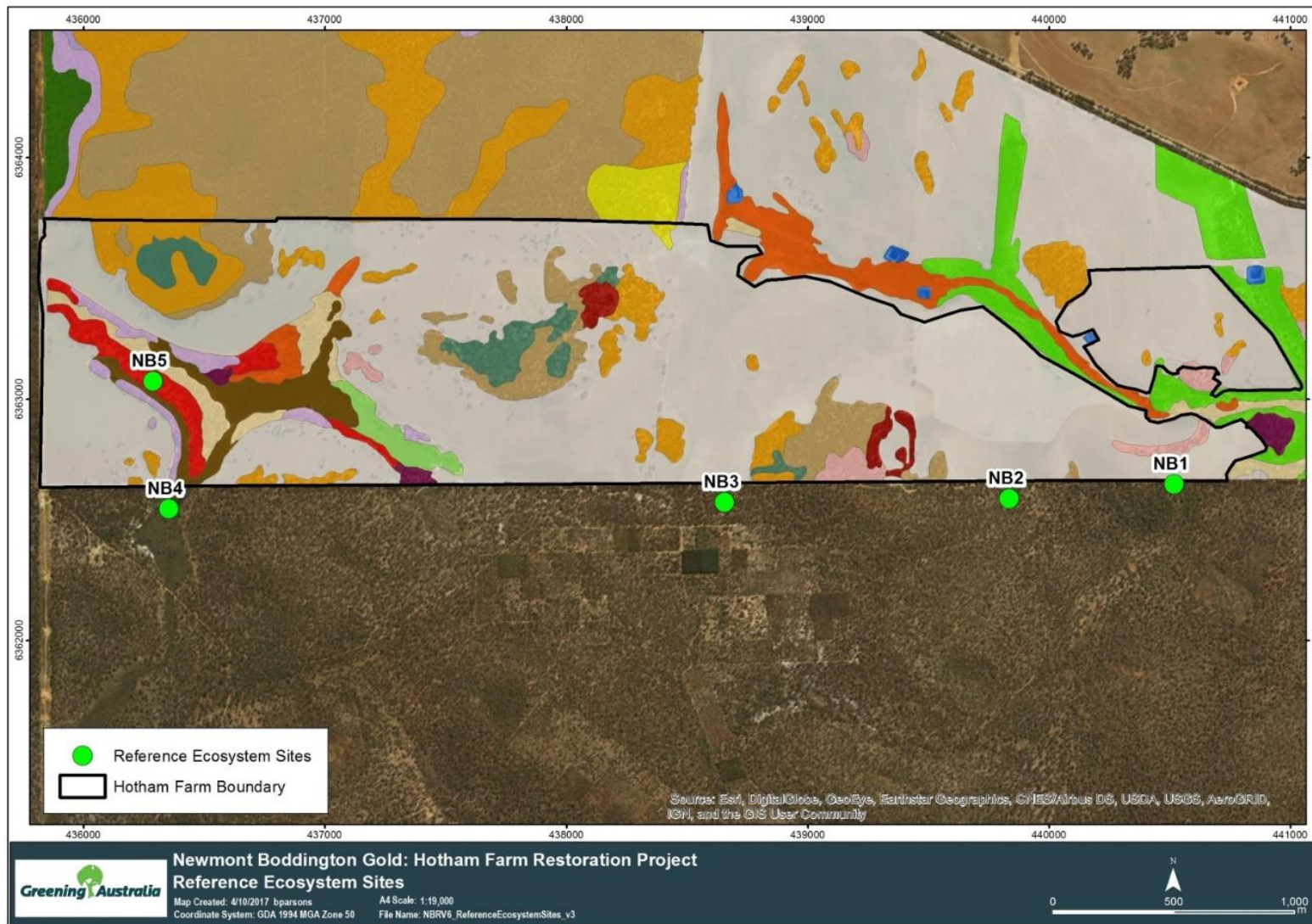


Figure 2: Location of reference sites within the Project

### 2.1.3 Soil Sampling

Targeted soil sampling (October 2016) was undertaken at intervals of 100 m along seven transects located throughout the Project Area to survey the distribution of soil types in both cleared land and remnant vegetation (**Figure 3**). A portion in the east of the Project Area was not surveyed as it was under crop and not accessible at the time of survey. Transects were positioned to achieve geographic coverage and encompass topographic (ie. hilltops, through mid-slope to valley floors) and environmental variation within the Project Area. Sixty-nine test pits were excavated to a depth of 400 mm or until an impermeable layer was reached. Soil profiles were characterised visually and data on depth, soil type and texture were recorded on site in accordance with the field texture grades described in the Australian Soil and Land Survey Field Handbook (National Committee on Soil and Terrain 2009). GPS coordinates and a photo of the soil profile were recorded at each sample location.

Soil pits were used to determine the presence of any physical or chemical barriers in the surface soils that may impact on the successful establishment of native vegetation through direct seeding. Deeper excavations were not undertaken to investigate soil profiles due to time constraints; however, regional soil descriptions and mapping (DAFWA 2017) were used to infer soil profile characteristics. Twenty of the sixty-nine sample pits were in remnant vegetation within the Project Area.

The soil sampling identified six main soil types broadly correlating with DAFWA 2017 mapping (**Appendix 3**).



Plate 1: Greening Australia Project officer undertaking soil sampling in October 2016

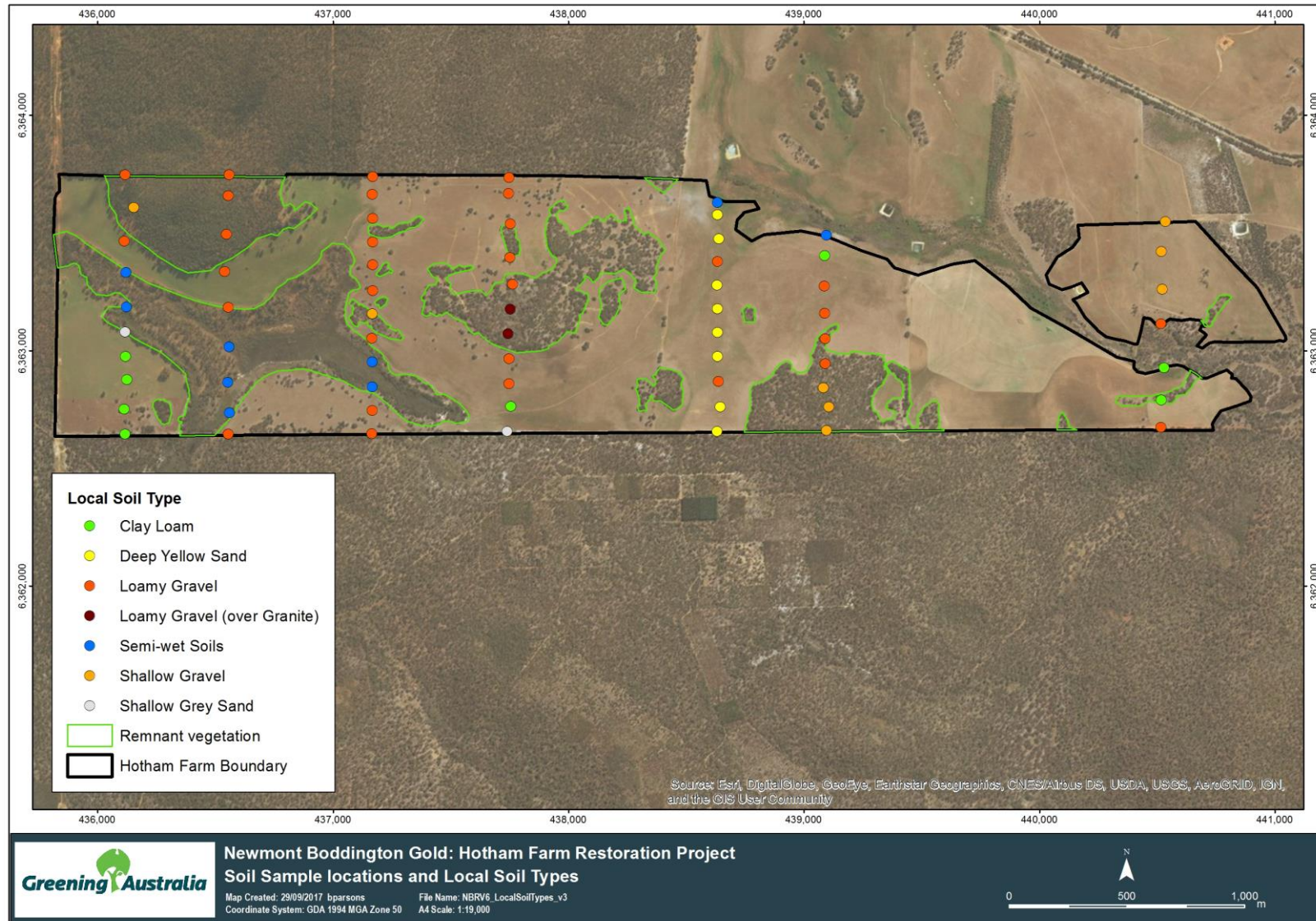


Figure 3: Soil survey locations and Local Soil Types within the Project Area

## 2.1.4 Leaf Litter and Bulk Density analysis

As part of the soil sampling process in November 2016, analysis of leaf litter and bulk densities was undertaken to compare the differences between cleared agricultural land and adjacent native vegetation areas. This data provides a baseline for future comparison of revegetation progress or ecosystem function. Methods used for this analysis were consistent with those used by Brown and Wherrett (2016) and McKenzie *et al.* (2004).

Five paired sites (10 sites in total, one pair per LMU), were selected in agricultural land within the Project Area and adjacent state forest along the southern boundary of the Project Area. These sites were located along transect lines which ran through the Project Area (L1, L2, L5, L7 and L8) (**Table 2, Figure 4**).

**Table 2: Location of paired sites for the collection of bulk density data**

Transect no.	LMU	Location	Easting	Northing
1	S, SP	Hotham Farm	436116	6362677
1	S, SP	George Block	436117	6362599
2	L	Hotham Farm	436343	6362674
2	L	George Block	436349	6362595
5	PS	Hotham Farm	438632	6362700
5	PS	George Block	438635	6362621
7	S, SP	Hotham Farm	439822	6362699
7	S, SP	George Block	439819	6362625
8	M	Hotham Farm	440522	6362709
8	M	George Block	440521	6362630

All sites were located at between 40–55 m from the fence line to avoid edge effects whilst ensuring that paired sites remained within the same land unit. Four samples were taken at each site (40 samples in total) with each sample collected from a standard 25 x 25 cm quadrat to ensure replication. This baseline data will be directly comparable between restoration sites and reference sites over time. The parameters analysed and recorded will be utilised in the long-term monitoring programme. Data recorded at each site included:

- the depth of the litter layer;
- all leaf litter was then extracted to conduct dry weight analyses;
- soil bulk density measurements in accordance with techniques described by Brown and Wherrett (2016).

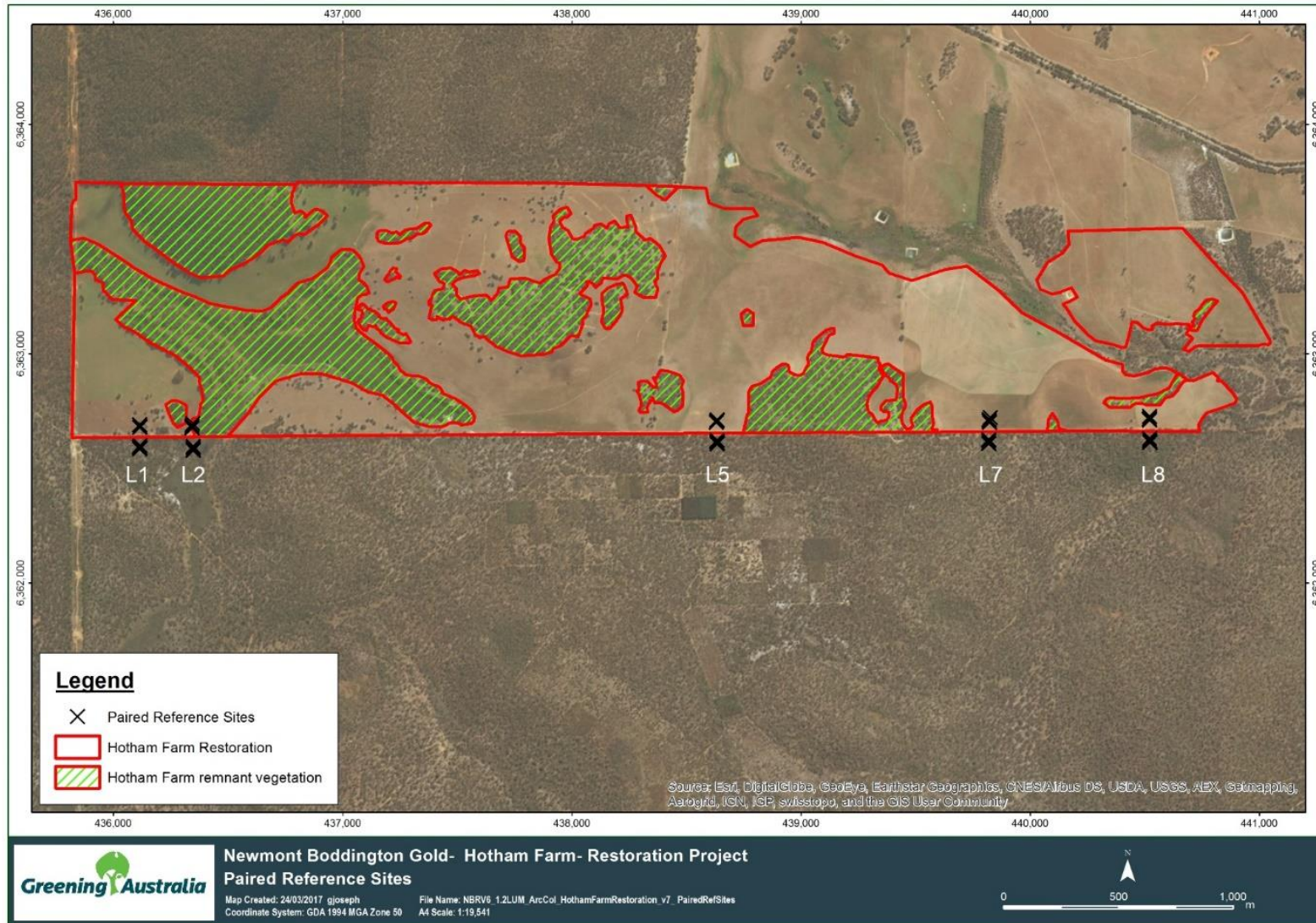


Figure 4: Location of paired sites within the Project Area and surrounding state forest

Leaf litter and soil samples were placed in an oven and dried for a period of 72 hours. Leaf litter was weighed. Soil bulk density was calculated according to method described in Brown and Wherrett (2016). The results of leaf litter and bulk density analysis have been provided to NBG in February 2018 .



**Plate 2: Collecting leaf litter for further analysis**

### **2.1.5 Soil Nutrient Analysis**

Bulk density samples sourced from paired sites were analysed by CSBP Laboratories. Subsamples of 400 – 500 g were used to assess key nutrients including Colwell Phosphorus, Colwell Potassium, Sulphur (KCl 40), Organic Carbon (Walkley-Black), trace elements; electrical conductivity and pH of the soil (**Appendix 4**).

## 2.2 SITE PREPARATION (PHASE 3)

Key activities associated with site preparation included; seed procurement, soil preparation, weed control and feral animal management. Seed procurement involved five stages:

- development of LMU mixes;
- seed procurement;
- seed testing;
- seed treatment; and
- seed batching.

Weed control was completed prior to direct seeding in September 2016 and June 2017. Feral animal management occurred prior to seeding and will continue as required for the duration of the Project. Soil preparation was undertaken upon commencement of direct seeding (**Section 2.2.7**).

### 2.2.1 Seed Procurement

#### 2.2.1.1 Development of LMU Mixes

A master candidate species list was developed for each LMU using the following data:

1. all species recorded for each SVT by Matiske Consulting (2013) were combined to create a master candidate species list per LMU utilising these groupings were presented in the PEP and provided to NBG in October 2017.
2. the master candidate species lists were then supplemented with additional species recorded from corresponding reference sites; and
3. master candidate species lists were then reviewed by an experienced restoration ecologist (Dr Geoff Woodall) and used to create specific species lists for LMU seed mixes (ie. selected species known to occur within similar habitats and likely to establish and thrive on the restoration site were added and/or others removed accordingly).

Both **Appendix 5** and **Appendix 6** provide the final list of 271 species considered possible for procurement, more specifically **Appendix 5** provides the allocation of species within a specific LMU. The table details the species used in the 2017 restoration process and identifies additional species seeded that were previously not determined within a LMU.

The composition of LMU seed mixes was guided by a series of criteria to identify which species would be used within the direct seeding and/or the seedling planting components of the restoration works:

- species known to produce viable seed were included in LMU seed mixes and those that were known to not produce viable seed in any appreciable quantities were removed from the list. Some species with relatively low recorded viabilities were included as they were considered important (eg. *Petrophile heterophylla* – 36% viability, *Ptilotus manglesii* – 12% viability, *Stirlingia simplex* – 24% viability).
- Those species that could not be collected or otherwise sourced were removed from the seed mix lists (119 species) and those species where target volumes could not be achieved were identified.

- Species that could not be sourced in sufficient volumes or where plant density data from reference sites was not available were allocated to LMU seed mixes according to available seed volumes.
- Provenance was also a consideration. In some cases seed volumes were available from sources beyond 50 km of Hotham Farm but were excluded due to provenance requirements (*Gonocarpus cordiger*, Mundaring).
- Species were assessed for susceptibility to *Phytophthora cinnamomi*, ensuring that species of known susceptibility (eg. Jarrah, Sheoak and Banksia species) were not included in LMUs encompassing the wettest parts of the Project Area (LMU A1 and L).
- An additional 24 species of known provenance within the Northern Jarrah forest but not identified in the Mattiske or reference sites were included on recommendation of Dr Geoff Woodall (**Appendix 7**). Attributes influencing species inclusion were known success across varied substrates, fast colonisation, and known forage and habitat value.

In total 134 species were used in the 2017 restoration works and 138 species from the master candidate list were not used. Of the 138 species not used, 120 species were not available due to the short procurement timeline, 10 species were hand planted as recalcitrant species (**Section 2.3.2.1**) and 8 species of grasses were procured but not used in the 2017 planting effort. Of the 120 species not procured, 105 species were identified at reference sites within remnant vegetation or on the boundary of the Hotham Farm restoration site (**Section 2.1.2**). It is assumed that these species will recolonise into the restoration area over time. Grass seed was not included in the LMU mixes due to necessity for regular broadacre application of grass selective herbicide during the two-year establishment period. GA recommends this remaining grass seed be used for in restoration of the remnant vegetation areas.

**Table 3** summarises the breakdown of proposed and actual species used within each specific LMU. In all cases the total species seeded is less than the species proposed except for the L LMU. In this case, both the L and S, SP seed mixes were combined as contingency measure for seasonal variation on the boundary of these two LMUs. It is assumed that conditions close to the creek will be on average continuously wet over winter but the extent and period of water logging moving from the creek into the S, SP LMU will be dependent on seasonal conditions. Both the proposed L and the S, SP seed mixes were combined to create the final L LMU mix resulting in a higher number of species. It is intended that the conditions will favour specific species across the transition of the L and S, SP boundary zones.

**Table 3: Total number of species proposed, species used and species not used in 2017 Hotham Farm restoration effort.**

LMU	Total species proposed	Species seeded in 2017	Number of recalcitrant species planted in 2017	Grass species proposed but not used	Other species not used in 2017
A1	59	27	-	1	31
L	69	118 (34*)	-	2	34
M	100	35	4	4	57
PS	152	65	6	7	74
S-SP	204	92	10	8	94

\*34 – of the 69 L LMU species considered 34 were used. The remaining 84 are S, SP LMU species.

The seed species sown within each LMU (**Appendix 6**) were classified into three categories:

1. **Dominant Species:** those species that are dominant within a vegetation community and therefore represent the basis of vegetation structure and function. These species are mostly known to be successful in direct seeding and seed can be readily accessed in large quantities required for large scale restoration.
2. **Adjunct Species:** those species occurring in lower abundance and density, therefore having less influence on vegetation structure and function. These species have inherent biodiversity value, increase site resilience to disturbance and contribute to increase the species richness and ecological functioning of the site.
3. **Recalcitrant Species:** For the purposes of this project 'recalcitrant' refers to species from the Northern Jarrah Forest that produce low quantities of seed, produce seed of low viability or seed requiring unknown cues to elicit germination. This category also includes species that are known to not germinate readily in typical direct seeding implementation and require different means of introduction to the site (see **section 2.2.9**). NB – a species may be classified as both recalcitrant and adjunct.

Species not included within the 2017 restoration works will be reviewed with the Project Advisory Group to investigate potential for their inclusion in 2018 restoration works. The total procurement list is documented in **Appendix 6** and specific LMU seed mixes are presented in **Appendix 8**.

### 2.2.1.2 Seed Procurement and Management

Seed procurement was managed by Nindethana Seed Service (NSS) with seed sourced from NBG and Nindethana stocks and via collection commencing in August 2016 until June 2017. Provenance restrictions were placed on all seed supplies, with collections to be made within a 50 km radius of Hotham Farm, except for *Gastrolobium calycinum* and *Verticordia densiflora*. These two species could not be collected from the local area; however, seed collected from Bindoon (*G. calycinum*) and Kalamunda (*V. densiflora*) was available. *G. calycinum* is critical to the establishment of habitat for Woylies and *V. densiflora* is a key species within the 'L' LMU.

The collecting radius of 50 km was selected to ensure that sufficient seed volumes could be collected within the restricted collection window. All seed provenance details are provided in **Appendix 5**.

### 2.2.1.3 NBG seed

A substantial amount of seed was provided by NBG to GA for inclusion in the seed mixes for the Hotham Farm restoration works. Assessment of seed was required due to the historical age of the collection and the inconsistent conditions in which it had been stored. This assessment included re-cataloguing, re-weighing and the removal of mouldy specimens from the collection. Due to the unknown storage history of the NBG supplied seed, GA recommended the procurement of new seed maintained under optimal storage conditions. In total, 27 species from the NBG collection were supplemented with additional seed in the final procurement. The entire NBG seed collection was relocated to NSS for storage. A comprehensive stocktake of NBG seed detailing seed used in 2017 was provided to NBG in November 2017 and February 2018.



Plate 3: Sorting seed batches prior to seed treatment, May 2017

### 2.2.1.4 Seed Quality Assurance

Seed of species to be used in direct seeding was checked for suitability prior to purchase from Nindethana Seed Service. As a measure of quality assurance, where possible all species of seed supplied by NSS was viability tested via cut tests. Where cut tests are unsuitable (e.g. small seeded myrtaceous species), a standard germination test was used to determine seed viability. Pot tests were used to assess germination of key species when sown under field like conditions. All tests were conducted in accordance with current revegetation industry standards (Florabank 1999). Any seed batches assessed as unsuitable will not be supplied for the revegetation programme. Methodologies and results for each testing method are discussed below.

- All dominant species will be germination tested in accordance with current revegetation industry standards (Florabank 1999). Any seed batches assessed as unsuitable will not be supplied for the revegetation programme.

- *Eucalyptus marginata*, *Banksia grandis*, *Bossiaea ornata*, *Acacia drummondii* and *Trymalium ledifolium*, assessed as key dominant species, will be tested in pot trials to assess response of germinants in soil from the revegetation area. Parameters to be observed include:
  - seedling emergence;
  - seedling vigour with/without supplementary nutrition; and
  - seedling morphology.

## 2.2.2 Seed Testing and Treatment

### 2.2.2.1 Viability testing procedure

Viability testing was conducted by NSS using the cut-test method. All species proposed for direct seeding were viability tested with the exception of species that were too small to sample (for example, Myrtaceae family contains a number of species with small seed). Species not subject to viability testing were tested for germination (**Section 2.2.2.2**). Testing was carried out for the duration of the procurement period September 2016 – June 2017. Cut testing was carried out using the following method:

- four replicates of a of minimum 25 seeds were selected from a seed batch;
- each seed in a replicate was cut along the length using a sharp blade;
- the contents of each seed were inspected (contents should appear firm, creamy and white in colour);
- the proportion of viable seed was recorded as a percentage of the sample.

Results of viability are detailed in seed procurement table provided in **Appendix 5**.

### 2.2.2.2 Germination testing procedure

Germination testing was conducted by NSS during the procurement period September 2016 – June 2017. Two methods were used to carry out testing based on the size of the seed:

#### Small seed

1. the required quantity of seed was removed based on size of seed;
2. recommended pre-treatments were performed (ie. smoke or hot water);
3. seed was placed onto damp paper towel in a plastic container and moistened from a spray bottle on mist setting;
4. a lid was placed on the seed container and put in an area receiving sunlight and warmth;
5. moisture and humidity were monitored several times a day and maintained as necessary;
6. the date of first germination was recorded and germinants counted on a regular basis;
7. the date of inspection and number of germinants was recorded for a minimum testing period of four weeks.

#### Large seeds eg. *Banksia*, *Hakea*, *Corymbia*

1. the required quantity of seed was removed based on size of seed;
2. a clean Col-Max tray was filled with native seed raising mix (**Plate 4**);
3. one seed was sown into each cell at the required depth and covered;

4. seeds were misted at a low pressure setting;
5. trays were placed in a sheltered outdoor position;
6. moisture levels were inspected daily and maintained;
7. germinants were counted on a regular basis and the date of first germination recorded;
8. testing continued for four weeks unless the species was known to take longer to germinate.



Plate 4: *Corymbia calophylla* (Marri) seed undergoing germination testing at NSS, May 2017

Result of germination testing have been provided to NBS in July 2017 and the original spreadsheet completed by NSS was supplied in February 2018.

### 2.2.2.3 Pot trials

Pot trials were conducted by Dr Geoff Woodall to provide basic information regarding progressive growth of key species and individual seed batches when sown under field like conditions. As technical advisor, Geoff used these trials to complement knowledge and inform decisions made during the establishment phase of the project (e.g. seeding rates, equipment setup and nutrition management). Loamy gravel soil was collected from Hotham Farm and taken to Albany and used for pot trials during the procurement

period September 2017 – June 2018. The full report produced by Dr Geoff Woodall was submitted to NBG in February 2018. Key findings gained from the pot trial included:

- growth and colour of key species indicated adequate nutrition in the substrate for good establishment (**Plate 5**);
- loamy gravels hold moisture better than expected and excessive moisture may cause problems to germinants. Optimal seeding times will be critical to reduce the risk of inhibited germination;
- pot trials complemented germination testing conducted by NSS for a number of key species.



Plate 5: *Banksia grandis* (Bull Banksia) 12 weeks after sowing, no nutrients added, July 2017

#### 2.2.2.4 Seed Treatment

Breaking seed dormancy remains the most important factor in improving seed germination of Australian Native Seed (Richards and Beardsell 1987). Seed treatment was undertaken by GA as part of the seed batching process in May 2017, with three techniques used to break dormancy in preparation for direct seeding:

- hot water scarification;
- dry smoke; and
- rapid ageing.

Individual treatments for seed used in the 2017 direct seeding program is listed on within the seed procurement table (**Appendix 5**).

### Hot water treatment

Batches of seed requiring hot water scarification were placed in a large sieve and submerged in hot boiling water for up to 10 seconds. Seed was then removed, shaken in the sieve then resubmerged in cool water (**Plate 7**). This process was repeated three times for each batch of seed. Once treated, quantities of seed were spread thinly over shade cloth and left to dry in sun. Drying seed was regularly inspected for moisture by turning seed piles and re-spreading until dry. Volume of treated seed was then measured, labelled and bagged in preparation for batching.



Plate 6: Hot water treatment of Acacia seed, May 2017



Plate 7: Seed drying in the sun post hot water treatment, May 2017

#### 2.2.2.4.1 Smoke treatment

A large steel framed tent and a modified fridge were used to expose seed to smoke as part of seed treatment. Large quantities of seed were spread thinly over improvised shelving and smoked in the tent (**Plate 9**) while smaller quantities were smoked in the fridge on small mesh trays. In both cases, smoke was generated in a 60 litre steel drum by slow combustion of dry organic native plant material. The drum is connected to the tent and fridge by a flexible the pipe that delivers smoke for fumigation (**Plate 10, 11**). An outlet hole in the fridge and tent draws smoke through the pipe and into the fumigation area. Seed batches were left exposed to smoke for a minimum period of three hours. The volume of treated seed batches was recorded, labelled and stored for batching.



Plate 8: Laying seed out prior to smoke treatment, May 2017



Plate 9: Seed undergoing smoke treatment, May 2017



**Plate 10: Seed undergoing smoke treatment, May 2017**

#### 2.2.2.4.2 Rapid seed ageing

Rapid seed ageing (a method of scarification) is recommended for hard seeded species (mainly legumes) to be placed in nursery rows (Chia 2016, K. Dixon pers. comm.). A series of rapid wetting and drying cycles are used to break down the external seed coat promoting germination. The rapid seed ageing process was conducted in glasshouses over a six-week period from March to April 2017.

Seed batches were sealed in nylon mesh bags with enough room for seeds to move. A chux cloth was used to line seeding trays and bags of seed laid on top, one bag per tray. Seed bags were then buried in washed white sand to a depth of approximately two centimetres deep (**Plate 12**).



**Plate 11: GA technician preparing seed batches for rapid aging treatment**

Commencement of wet/dry cycles involved the watering of seed trays for approximately 30 mins until sand reached saturation. Sand/seed mix was moistened as required over a week period before drying phase began. Sand/seed mix was then left to dry for a week and once fully dry, left in that state for a several days before repeating the cycle. Rapid ageing was completed over four cycles.



Plate 12: Seed trays in GA hot house undergoing rapid ageing wet/dry cycles, April 2017

### 2.2.3 Seed Batching

Seed batching was conducted in three stages as illustrated below (Figure 6).

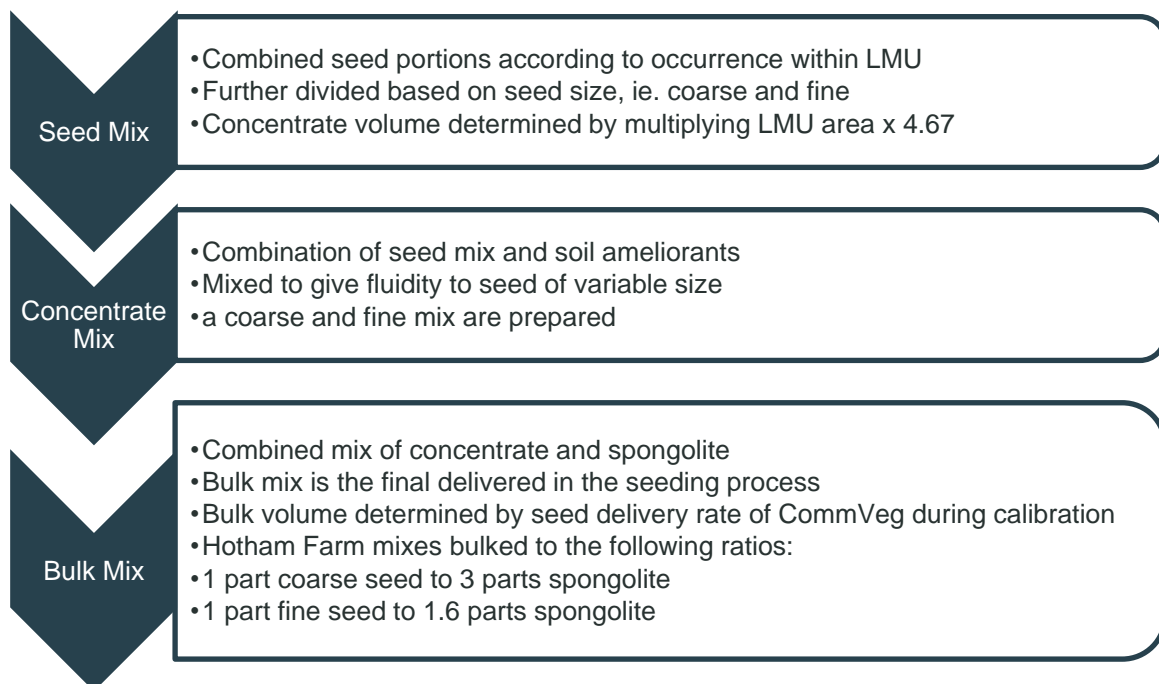


Figure 5: Illustration of the three-phase seed preparation process

### 2.2.3.1 Seed Mix Preparation

Seed batching involves the division of procured seed to make seed mixes as determined by LMU assessment (**Figure 5**). Five LMUs were determined and three of these required further division into nursery row mixes. Ground truthing in May 2017 with Greg Woodman resulted in some minor adjustments to LMU boundaries to ensure that they were consistent with soil types and local vegetation type descriptions. These adjustments saw the creation of two additional mixes Semi Wet (L and L, M) areas, *Gastrolobium* thicket mixes and an additional shallow gravel (M) mix. In total, 12 seeding mixes developed to correspond with LMUs and one direct drill mix. **Appendix 9** illustrates the position of the mixes in the Hotham Farm Landscape.

The initial step in seed batching involves the separation of seed species into two categories based on size – coarse or fine (**Appendix 8**). This separation is necessary when undertaking direct seeding using the CommVeg seeder as fine and coarse seed are separated in the seed box. This allows seed to be delivered into the soil profile at different depths to achieve optimum germination results. Quantities of seed for each LMU were based on seeding rates advised by Dr Geoff Woodall (**Appendix 8**).

### 2.2.3.2 Concentrate Preparation

Batched seed is combined with ameliorant to create a seed concentrate (**Figure 5**), which is fluid mix containing bulking agents with fertilizer that passes effectively through the CommVeg direct seeder. Individual concentrate mixes are prepared for both fine seed and coarse seed within each LMU.

The four main components and corresponding ratios for preparation of bulking mix includes spongelite (60%), vermiculite (25%), nutrient (6%) and seed mix (either coarse or fine). Preferred fertilizer used in the bulking process was a small prill Apex low phosphorus 21, 2, 7 produced by Simplot. Banrot 400WP broad spectrum fungicide was also added to fine seed concentrate only at a rate of 12 ml per 100 L of concentrate. Total concentrate volumes were calculated based on advice from Dr Geoff Woodall multiplying the total area of a LMU by 4.67. For example, the clay loam-wandoo mix (M LMU) was estimated to encompass an area of 14.4 ha in total. Therefore:

- $14.4 \text{ ha} \times 4.76 = 68.54 \text{ (69) L of concentrate.}$

Once the total volume is known the proportion of bulking ameliorants can be calculated. Using clay loam (M LMU) (14.4 ha) example above:

- spongelite (60%) =  $69\text{L} \times 0.6 = 41.4 \text{ (41) L}$
- vermiculite (25%) =  $69\text{L} \times 0.25 = 17.27 \text{ (17) L}$
- nutrient (6%) =  $69 \text{ L} \times 0.06 = 4.14 \text{ (4) L}$
- Banrot (12 ml per 100 L) =  $8.28 \text{ (8 ml) fine seed only}$

In this instance, 69 litres of coarse seed concentrate and 69 litres of fine seed concentrate were prepared for seeding within the clay loam (M LMU) (Plates 14 – 20).



Plate 13: Spreading of spongelite for the Loamy Gravel LMU mix



Plate 14: Pouring and spread of nutrient



Plate 15: Addition of vermiculite



Plate 16: Addition of batched seed mix



Plate 17: Addition of fungicide in fine seed concentrate only



Plate 18: Mixing of seed until all particulates are evenly distributed



Plate 19: Seed concentrate stored in a transferable water tight container

### 2.2.3.3 Preparation of a Bulk Seed Mix

To control the flow of seed through a CommVeg direct seeder, the opening at the top of the delivery hoses can be varied. Seed concentrate contains seed of variable size: if the opening is too small, larger seed will not pass through; if the opening is too large, seed will flow through too rapidly. Therefore, seeder calibration is essential to achieve correct seed mix flow and is conducted prior to seeding (i.e. seeder setup and determining ratio of seed concentrate to bulking agent).

**Table 4** demonstrates the actual quantities of mix used in the bulking process for the production of a 10 ha mix used across all LMUs. **Appendix 10** documents the total concentrate volumes and bulk mixes for the each of the LMU mixes.

**Table 4: Quantities of seed and bulking agent used in preparation of a 10 ha bulk mix**

	Coarse Seed	Fine Seed
Concentrate Volume (L)	46.7	46.7
Bulk Spongelite Volume (L)	140.1	74.72
Total for 10 ha (L)	189.246	122.82

## 2.2.4 Pre-seeding Weed Management

Weed control was completed in accordance with the methodology described in **Section 3.7.2** of the PEP. At least six pre-seeding weed control events were conducted between September 2016 and June 2017 in preparation for and during the direct seeding process. Details of weed species targeted, treatments used and total area sprayed is provided in **Table 5**.

**Table 5: Details of Weed control events conducted in preparation for weed control**

Date of application	Target	Treatment used	Method	Application Rate	Total Area Sprayed (ha)
20/09/16	Pasture Grass Guilford Grass Mallow	<ul style="list-style-type: none"> <li>Glyphosate 450 @ 2.5L/100L</li> <li>Brushwet @ 200mL/100L</li> <li>Metsulfuron methyl @ 8 g/100L</li> </ul>	Boom Spray	100L/ha	54 ha
16/02/17	Cotton Bush brush cutting	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Brush cutting	N/A	1.5 ha
17/02/17	Nightshade	<ul style="list-style-type: none"> <li>Glyphosate Biactive @ 2L/100L</li> <li>Agral @ 12mL/100L</li> </ul>	Boom Spray	100L/ha	1.5 ha
01/06/17	Pre-seeding Broadacre Weed Control	<ul style="list-style-type: none"> <li>Simazine 800-1200g/100L</li> <li>Glyphosate 450 @ 2L/100L</li> <li>Talsta 250 @ 40ml/100L</li> <li>Brushwet @ 250mL/100L</li> <li>Ammonium Sulphate @ 1kg/100L</li> </ul>	Boom Spray	100L/ha	301 ha
07/08/17	Guilford Grass Control	<ul style="list-style-type: none"> <li>Simazine 2kg/100L</li> <li>Glyphosate Ultra Max @ 2.5L/100L</li> <li>Pulse @ 300mL/100L</li> <li>Response @ 2L/100L</li> </ul>	Boom Spray	100L/ha	40 ha
01/08/17	Grass Selective Weed Control	<ul style="list-style-type: none"> <li>Leopard 200 @ 190mL/100L</li> <li>Talsta 250 @ 40ml/100L</li> <li>Uptake @ 500ml/100L</li> </ul>	Boom Spray	100L/ha	56 ha
01/09/17	Broadacre Glyphosate Boom Spray	<ul style="list-style-type: none"> <li>Glyphosate 450 @ 2.5L/100L</li> <li>Talsta 250 @ 40mL/100L</li> <li>Brushwet @ 200mL/100L</li> </ul>	Boom Spray	100L/ha	6.5 ha

Pre-seeding broad acre weed control targeting annual agricultural and environmental weeds commenced in September 2016 (**Figure 6** and **Plate 20**). During this application, approximately 54 ha in the central portion of the Project Area (ie associated with granite hilltop) was targeted using broadacre methods to eliminate pasture grasses, mallow and Guilford Grass (**Figure 7**). Targeted follow up

applications were repeated on this hilltop using localised boom spray and brush cutting. Observations made during routine inspections suggest there is continual recruitment of broadleaf weeds and weed control will continue to be a focus in this area (**Section 3.3.4**). Pre-seeding broadacre weed control targeting pasture weeds was completed in June 2017 coinciding with the first winter rains (**Plate 20**) AGSCOPE Pty Ltd were contracted to apply residual (simazine) and a knockdown (glyphosate) herbicide to the agricultural areas identified for direct seeding (**Figure 6**).



**Plate 20: Broadacre weed control, June 2017**

Direct seeding commenced on the 19<sup>th</sup> of June 2017 and it was observed that a localized germination of annual rye grass was occurring in response to the favourable winter conditions despite the application of a residual herbicide (**Plates 21**) Additional pre-seeding weed control activities were undertaken to address the unforeseen weed germination. Priority areas for this secondary control effort were restricted to the north facing cropping paddocks east of the deep yellow sands. Areas that had been direct seeded at this time were treated using a mix of grass specific herbicide that was applied by AGSCOPE Pty LTD. This effort was conducted in two parts, control of eastern paddock was completed for a one week period in September and the Western areas were completed in October as part of the post seeding weed control effort. A narrow 6.5 ha area in which no seeding had yet occurred was sprayed with a Glyphosate mix applied by Greening Australia using a ute mounted boom. This method was preferred as this strip was too narrow for the larger self-propelled AGSCOPE sprayer (**Figure 6**).



Plate 21: Weed cover in cropping paddock post – commencement of seeding, July 2017

Greening Australia was also responsible for spraying a 40 ha area of the south facing slope beneath the central hill directly east of the central wetland within the S, SP LMU. A proliferation of Guilford grass was observed in this area and an opportunistic spray application was still an option as seeding had not yet occurred in this area. In previous instances metsulfuron methyl was used to treat Guilford Grass however this chemical is known to be unstable in the soil profile and have residual properties. This was unfavourable as the site was to be immediately seeded so a heavier rate Glyphosate combined with ammonium sulphate adjuvant was applied (**Figure 6**). This application proved successful.



Plate 22: Guildford Grass spray area post seeding, September 2017

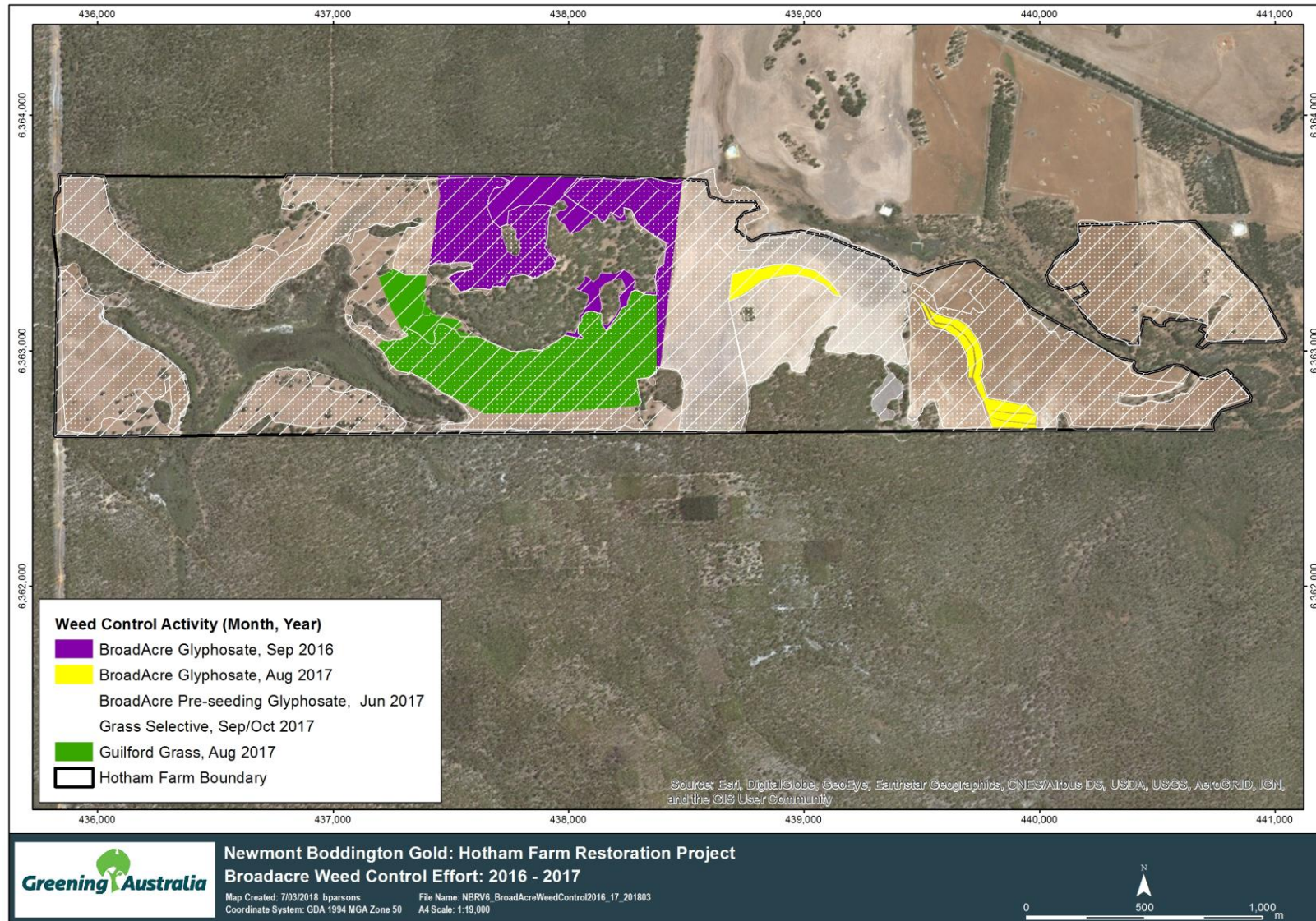


Figure 6: Broadacre weed control activities completed at Hotham Farm in 2016 - 2017

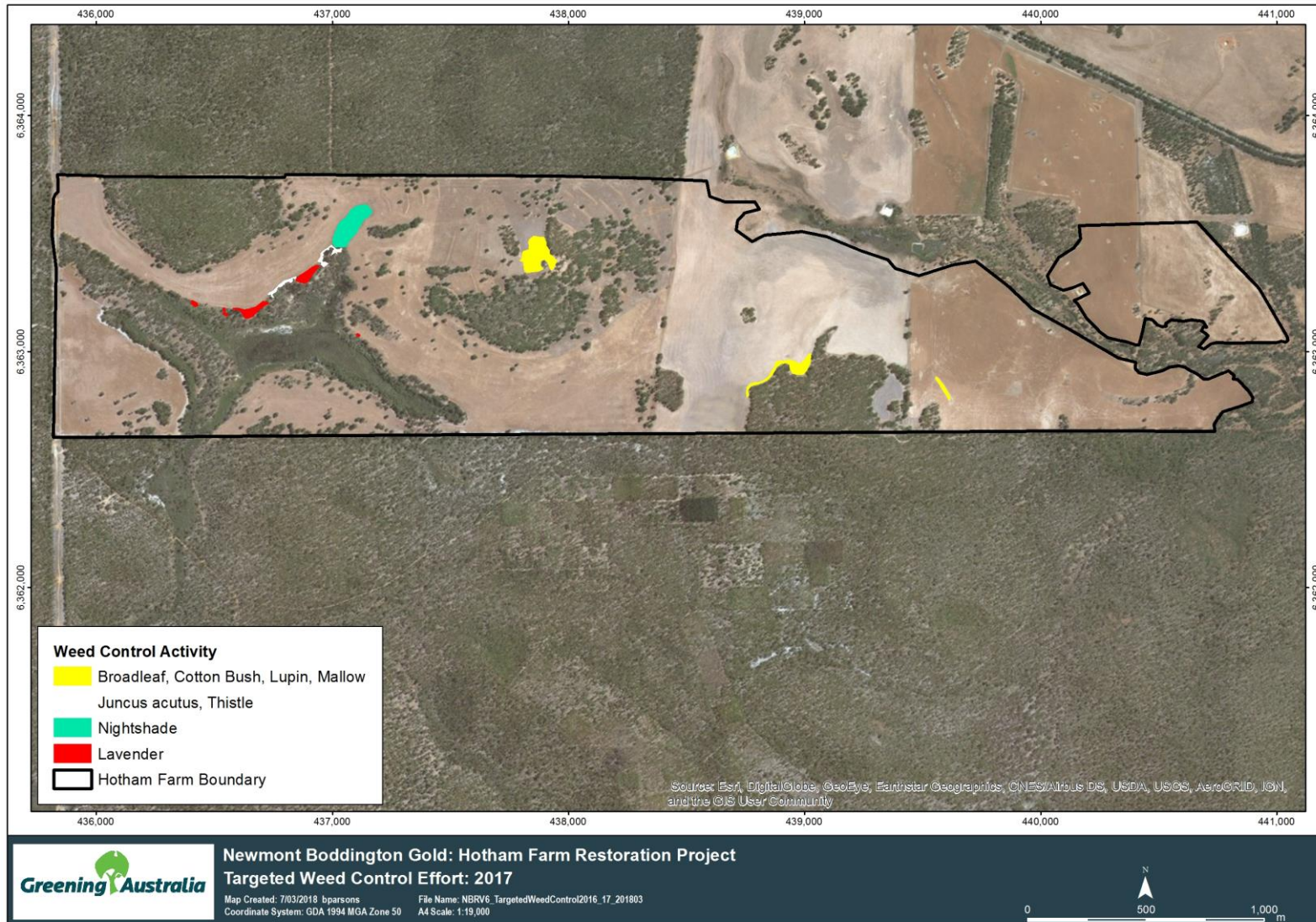


Figure 7: Targeted weed control activities completed at Hotham Farm in 2017

## 2.2.5 Pest Animal Control

Pest animal control has occurred on an 'as needed' basis and will continue for the duration of the Project, informed by routine monitoring and inspections. Herding events were conducted in May 2017 to reduce kangaroo numbers within the Project Area. At this time Feral Invasive Species Eradication Management (FISEM) was under NBG contract and these works coincided with the installation of gates and closure of the compound.

In June 2017, Greening Australia contracted FISEM to undertake an initial feral animal control program prior to commencing the seeding program. Approximately 55 kangaroos were removed by mustering, and a total of 28 were removed by shooting. One male fox was also removed from the project area by shooting. No feral pig activity was observed from inside the project area during the control program. A second kangaroo cull event was undertaken in August 2017, removing 16 individuals by shooting. One male fox was also removed from the Project Area. Greening Australia continues to monitor the kangaroo population. Should observed numbers exceed the threshold level of ten, a control program will be undertaken. A summary of the pest control results is noted below.

**Table 6: Summary of pest control actions for 2017 at Hotham Farm reported by FISM**

Species	Treatment		
	Herding	Trapping	Shooting
<b>Kangaroo</b>	55	0	44
<b>Pig</b>	0	0	0
<b>Rabbit</b>	0	0	0
<b>Fox</b>	0	0	2

FISEM has recommended the construction of fencing extensions running perpendicular to the compound fence, placed immediately next to kangaroo gates situated mid fence line. Kangaroos have been observed getting stuck in the corners of the compound; by creating a similar feature adjacent to kangaroo gates, individuals are more likely to be funnelled through the gates. An alternative to this is to install additional kangaroo gates in the corners of the compound. Reports provided to Greening Australia by FISEM upon completion of each management event have been submitted to NBG.

Three rabbit monitoring transects were established in October 2017 to monitor rabbit activity during routine inspections. A map of rabbit monitoring transect locations is provided in **Appendix 11**. Rabbit activity observations made over the period October 2017 – January 2018 are documented in **Table 7**. Rabbits are having little to no impact on revegetation.

**Table 7: Rabbit Monitoring Observations, October – January 2017**

Transect no.	Number of fresh diggings	Scats	Sighting
RbT1	29	0	0
	8	0	0
RbT2	0	0	0
	0	0	0
RbT3	0	0	0
	0	0	0

## 2.2.6 Remnant Vegetation Management

Key Project works during the 2017 project reporting period have included a baseline field survey and weed control. Greening Australia have proposed three management approaches in the PEP (Greening Australia 2017), which were informed by baseline survey data. Greening Australia is awaiting feedback from NBG regarding a preferred approach before specific restoration activities can occur.

### 2.2.6.1 Remnant Vegetation Survey

Remnant vegetation patches in the Project Area were surveyed during August 2017 to assess their vegetation condition, characterise the quality and complexity of habitat they provide for fauna species and their relative value within the context of the entire Project Area (Greening Australia, 2017).

Information collected during the survey includes:

- GPS locations for remnant vegetation survey locations;
- landscape and soil features;
- vegetation cover, condition and species composition;
- presence or absence of logs, rock outcropping, hollows and other habitat structures;
- estimate of leaf litter cover percentage and type;
- presence or absence of water;
- types of disturbance (e.g. weeds, fire, logging) and levels of disturbance; and
- photos of each survey point.

Results from the remnant vegetation assessment were used to determine appropriate restoration techniques to be administered, dependent upon their current state. Full details of survey results and proposed restoration techniques were provided to NBG in the PEP submitted in October 2017.

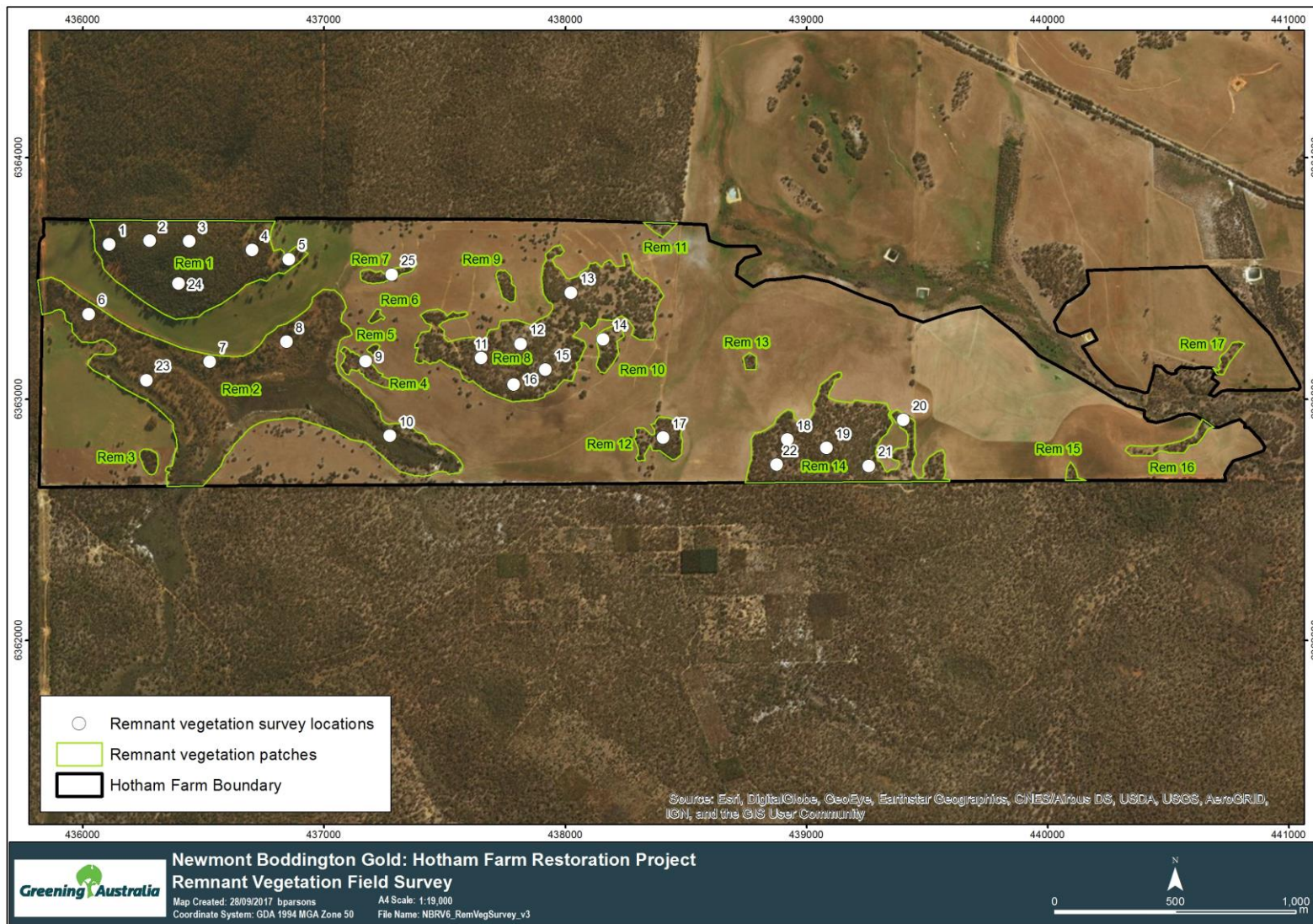


Figure 8: Location of remnant vegetation survey sites

### 2.2.6.2 Remnant Vegetation Weed Control

Weed control within remnant vegetation has primarily targeted *Lavandula stoechas* (French Lavender) and *Juncus acutus* (Spiny Rush) populations located in the north eastern corner of the central wetland (Figure 7).

Table 8: Remnant vegetation weed control activities in 2017

Date of application	Target	Treatment used	Method	Application Rate	Total Area Sprayed (ha)
07/02/17	Spiny Rush	<ul style="list-style-type: none"> <li>• Glyphosate Biactive @ 2L/100L</li> <li>• Agral @ 12mL/100L</li> </ul>	Line Spray	N/A	0.41
08/02/17	Lavender	<ul style="list-style-type: none"> <li>• Triclopyr 600 @ 2L/100L</li> <li>• Envirodye (Red) @ 300mL/100L</li> <li>• Agral @ 12mL/100L</li> </ul>	Line Spray	N/A	0.72
11/10/17	Lavender	<ul style="list-style-type: none"> <li>• Triclopyr 600 @ 2L/100L</li> <li>• Envirodye (Red) @ 300mL/100L</li> <li>• Agral @ 12mL/100L</li> </ul>	Line Spray	N/A	0.11
31/10/17	Lavender: Repeat Treatment	<ul style="list-style-type: none"> <li>• Triclopyr 600 @ 2L/100L</li> <li>• Envirodye (Red) @ 300mL/100L</li> <li>• Agral @ 12mL/100L</li> </ul>	Line Spray	N/A	0.72

The February *Juncus acutus* spraying event has had a lasting effect on individuals in the wetland. Observations made during recent routine inspections show no recovery of *Juncus acutis* since this initial event (Plate 25).



Plate 23: Dead *Juncus acutus* at the wetland, February 2017

Routine inspections have determined that the three Lavender weed control events were successful in eradicating known populations. Lavender populations outside of those known will be treated as they are identified through routine monitoring.



**Plate 24: Lavender control in the wetland remnant, October 2017**

### 2.2.6.3 Habitat Creation

A key aspect of the restoration programme is to restore habitat values for key threatened fauna species including:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*, Endangered);
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*, Endangered);
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*, Endangered);
- Chuditch (*Dasyurus geoffroi*, Vulnerable); and
- Woylie (*Bettongia penicillata ogilbyi*, Endangered).

#### 2.2.6.3.1 Black Cockatoos (*Calyptorhynchus sp.*)

It is assumed a Jarrah/Marri/Wandoo open forest will, by default, create a permanent, self-sustaining habitat for these target species. Recovery plans (DEC 2008, DPaW 2013) and guidelines (DSEWPaC 2012, DoEE 2017) have identified that critical habitat for these species include nesting, roosting and foraging habitat. A specific range of plant species were included in LMU mixes to match these habitat requirements within the Project Area (**Appendix 12**). These species were sown onsite during the direct seeding process in 2017.

#### 2.2.6.3.2 Chuditch (*Dasyurus geoffroi*)

Chuditch are known to use rock piles and holes in the ground for denning and have been observed using these features within two year old restoration (McGregor *et al.* 2014). Approximately 200 piles (rock, woody debris, or a mix of both) currently exist in the landscape and were mapped by means of a desktop survey by NBG and a field survey conducted by GA in February 2017 (**Plate 26**).



**Plate 25: Example of existing habitat pile created by farmer within the Project Area, February 2017**

The creation of den and refuge sites placed in areas between remnant vegetation to create suitable habitat linkages was originally part of GA's broad scope of works. In 2017 NBG assumed responsibility for this task as material could be easily sourced as part of their mine expansion program. No works were conducted onsite in 2017.

#### **2.2.6.3.3 Woylie (*Bettongia penicillata ogilbyi*)**

Woylies have been known to use *Gastrolobium* sp. thickets as shelter (Short *et al.* 2005). *Gastrolobium* sp. contain monofluoroacetic acid which is toxic to introduced predators. Native mammals have co-evolved and show high tolerance to this compound. It is thought that Woylies use these thickets, in part, for physical protection from predators.

During the LMU mapping process specific areas for the sowing of *Gastrolobium calycinum* were mapped and the required seed was procured for sowing as part of the 2017 direct seeding program. These areas were not sown in 2017 for reasons detailed in **Section 2.3.1.6**. Creation of thickets will be completed during the future seeding effort.

### **2.2.7 Soil Preparation**

Pre-seeding soil preparation was required within shallow gravel (S,SP LMU) and deep sand (PS LMU). Cap rock scalping using a grader blade was undertaken prior to seeding within the hilltop shallow gravel (S,SP) seed mix zone. Pre-scalping was also undertaken within the deep yellow sands as a water management strategy implemented in response to the immediate site conditions observed at the time of seeding. The methods used to undertake site preparation are discussed individually in the following sections.

### 2.2.7.1 Cap Rock Scalping – Shallow Gravels

Cap Rock scalping is used when soil profiles over cap rock are shallow or rocks are known to exist beneath the surface. The CommVeg direct seeder can pre-scalp the soil surface where soil profiles are free of rocks; however, the CommVeg scalping blade cannot run over rocks where they exist in the soil profile. In shallow soils, a two pass seeding operation is required, involving pre-scalping of the soil surface using a three point linkage grader blade attachment (**Plate 26**), followed by the drilling of seed along pre-scalped seeding lines using the CommVeg.



**Plate 26: Three point linkage grader blade in operation, June 2017**

The linkage configuration and angle of grader blade can ride smoothly over shallow cap rock and stones preparing a weed free seeding zone, reducing weed completion and creating a stable depression for water harvesting (**Plate 27**). Cap rock scalping within the shallow gravel hilltops was undertaken between June and August 2017.



Plate 27: Water accumulating in pre-scalped lines prepared with a grader, June 2017

### 2.2.7.2 Deep Sand Pre-scalping

Soil preparation and seeding within the deep sand (S, S,P LMU) were to be undertaken in a single pass using the CommVeg. Soil moisture testing conducted on 14 July showed inconsistent moisture penetration suggesting the influence hydrophobic sand. To investigate this further, a single scalping line (approx. 100 m) was cut, revealing patchy penetration beneath the soil surface.

As a risk mitigation strategy the entire Deep Sand LMU was pre-scalped using the CommVeg over two days coinciding with a forecasted low pressure system delivering rainfall to the Project Area. This exposed the soil subsurface and created shallow channels to harvest water and achieve consistent wetting along the seeding rows.

### 2.2.7.3 Pre-burn of cropping stubble

In May 2017 Marradong Fire Brigade under with the assistance of NBG staff undertook approximately 30 ha of stubble burning in the paddocks previously cropped with oats in 2016 to prepare these paddocks for native seeding (**Plate 27**). A light grass burn was also conducted on the southern slopes of the central granite hill



Plate 28: Paddock post stubble burn, May 2017

## 2.3 RESTORATION AND REVEGETATION EXECUTION (PHASE 4)

Work undertaken during the Restoration and Revegetation Execution Phase is summarised in the table below:

Table 9: Summary of works undertaken for Phase Four of the Hotham Farm Restoration Programme

Activities undertaken	2017 Period of Work
Direct seeding	June – September
Nursery row tubestock planting	July/August
Post-seeding weed control	October
Targeted Broadleaf Control	October - November

### 2.3.1 Direct Seeding

Direct seeding commenced on the 19<sup>th</sup> of June 2017 and ceased on the 28<sup>th</sup> of September 2017. In total 335 ha were identified for direct seeding and 277.5 ha or 83% of the area was completed in 2017

Seeding delays resulting in incomplete seeding coverage were a result of steeper than anticipated terrain, unforeseen cap rock and late seasonal rain causing long term inundation within the semi-wet areas. It is anticipated that the proposed area for direct seeding will be completed in 2018. The following section discusses the configurations, approach and timing of the 2017 seeding works.



**Plate 29: Commercial native vegetation seeder (CommVeg Seeder) and tractor configuration used at Hotham Farm**

### 2.3.1.1 CommVeg Configuration

Direct seeding was implemented using a CommVeg Seeder towed behind a John Deere 4720 tractor. **(Plate 29)** The CommVeg seeder has been designed to provide soil preparation, precision placement and the delivery of soil ameliorants in a single pass. Features and configurations used for the direct seeding of Hotham Farm are described below.

- **Mini-scalp:** the direct seeder initially implements a mini-scalp which removes surface biomass and weed seed stored in the top profile of the soil, allowing native seed to germinate free of competition. The scalp also forms a catchment that captures more rainfall and delivers this to the area where the seed is located **(Plate 30)**. All seeding areas within the LMUs were scalped prior to seeding. With the exception of the hill top shallow gravels and the deep yellow sands all other LMUs were scalped and seeded in a single pass. Both the shallow Gravels and the deep yellow sands were seeded using a two pass process involving initial preparation described in **section 2.2.7**.
- **Ripping Tyne:** a light duty ripping tyne is located directly behind the scalp, breaking the soil to a depth of 200 mm to provide a soft seed bed where roots of germinating plants can penetrate the soil profile. This is important in allowing roots to tap into water sources as quickly as possible. The ripping tyne was used across all LMUs during the seeding process.
- **Plough Disc:** the plough disk follows the tyne and are used to break up compacted soil, promote permeability to the lower soil profile, cut residual material and incorporate remaining residue into the top soil to promote rapid decay **(Plate 30)**. Plough Discs were used across all LMUs during the seeding process.



Plate 30: Configuration of mini scalp, ripping tyne and plough disc on CommVeg seeder

- Precision Seed Delivery:** the direct seeder delivers seed to a precise depth, which is critical in the successful germination of native seed. Two seeding openers are configured on the seeding arm delivering seed to different sowing depths. In the case of the Hotham Farm restoration larger seed (course) was sown to a depth of at 20 mm and smaller seed (fine) was sown at 7 mm beneath the soil profile (**Plate 31**). Surrounding soil is lightly pressed by the trailing press wheels located as part of the seeding arm.



Plate 31: Configuration of CommVeg seeding arms featuring forward press wheel, seed openers and a trailing press wheel

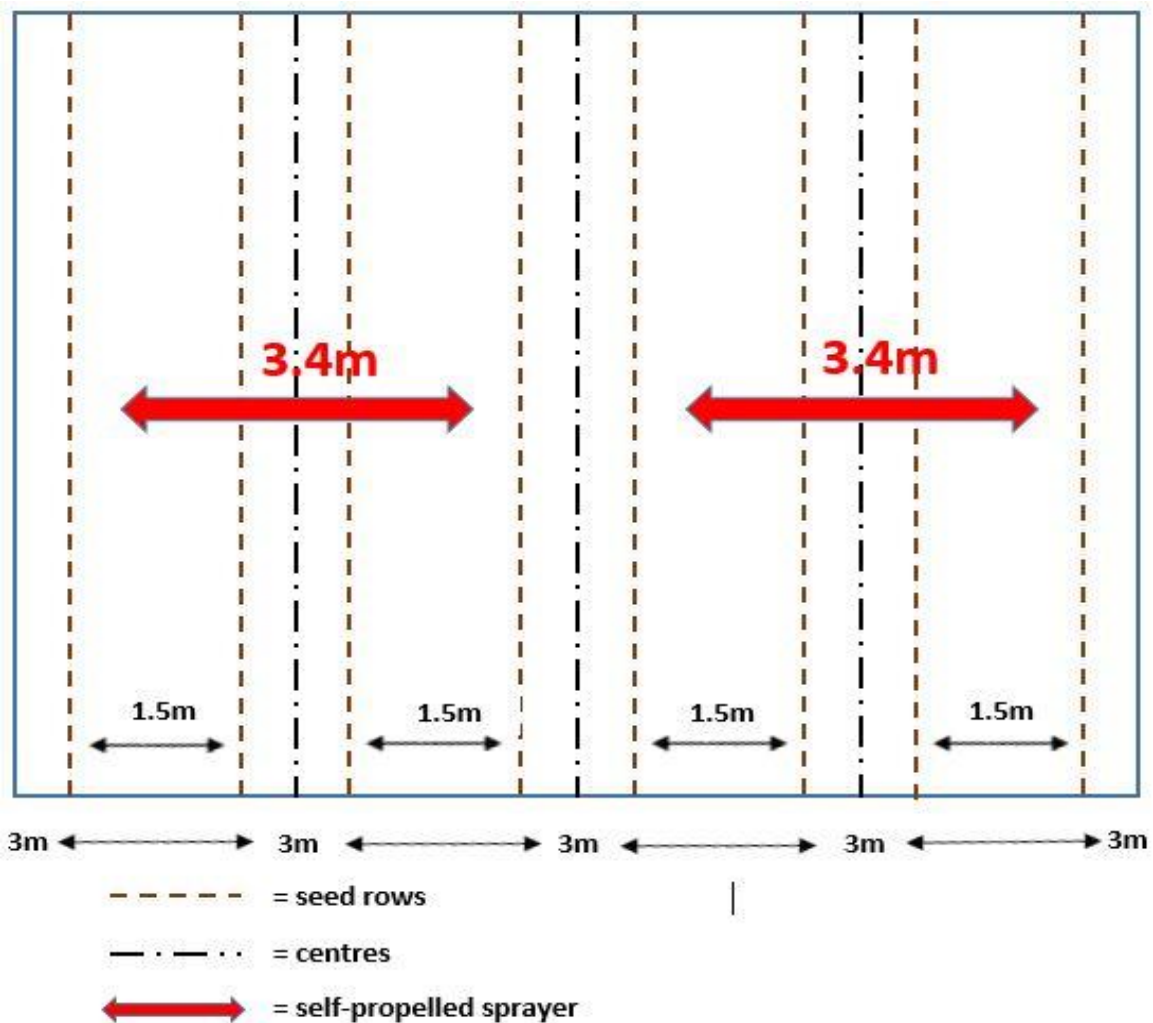
- **Soil Additives:** to improve soil condition at the site of seeding, the seed was mixed with soil additives such as bulking agent and fertiliser. The rate at which these additives were mixed has been previously discussed in section 2.2.3.

The complete configuration of implements on the CommVeg direct seeder is illustrated in **Plate 31**. It should be noted that the CommVeg has two parallel rows of implements configured in the order described above. Therefore in a single pass of the CommVeg two parallel rows are installed.

### 2.3.1.2 Landscape Configuration

Twin seeding rows were installed in a single pass at approximately 3 m centres along the contours. The inside distance measured from the centre of the parallel seeding lines as configured on the CommVeg was 1.35 m. The inter-row distance measured between the seeding lines of opposite passes measured 1.5 m. This distance represented a compromise between tight rows and ample width to drive the self-propelled boom sprayer without crushing developing vegetation. This access requirement is a necessary consideration for future weed control at the site.

Figure 9: Diagrammatic representation of seeding row placement at Hotham Farm



Two exceptions to the configuration discussed occurred during the seeding phase of the project. One variation is evident in the preparation and seeding of the shallow gravel S-SP LMU and the other was during the direct drilling process. In the case of the shallow gravels, preparatory scalping was conducted using a three point linkage grader attachment which unlike the CommVeg prepares only one single row (**Plate 26**). Single scalping lines were prepared at 3 meter centres and the CommVeg was reconfigured by raising one row of implements and shifting the other row to the centre of the machine. During the seeding phase within the shallow gravels (S-SP), just the ripping tyne followed by the seeding arm, openers and press wheels were in operation. The direct drilling process will be discussed in **Section 2.3.1.4**.

### **2.3.1.3 Nursery Rows**

Nursery rows were a subset of contour placed, scalped lines (explained above) reserved specifically for establishment of recalcitrant species and those species that would not compete well when combined with the dominant species at target seeding rates. The nursery rows are intended to act as reservoirs of increased species richness in the restoration from which species may spread over time. A list of nursery row species is available in **Appendix 8**. Nursery rows were placed throughout the S-SP, PS and M LMUs. Approximately ten percent of each LMU were reserved comprises nursery rows.

#### **2.3.1.3.1 Installation**

Nursery row concentrate mixes were made up to equal the volume required to cover approximately 10% of the associated LMU. Initially, LMU mixes were seeded continuously through a landscape block but rather than changing the mix to nursery row mix, a row was skipped leaving sufficient room for a pass to be made with nursery row mix at a later date. The placement of these gaps was made on the seeding operator's judgement with consideration for practicality and uniform placement.

Recalcitrant species were scheduled for planting into nursery rows in late July requiring the installation of all nursery rows in the corresponding LMUs. This necessitated the need to install nursery row mixes ahead of the main LMU mixes to receive the recalcitrant seedlings (**Plate 32**). Nursery row mixes were fully bulked out and seeding rows were installed uniformly across the landscape based on the operators' judgment until the specific LMU nursery row mix ran out. The distribution of nursery rows across the Hotham Farm site is represented in **Figure 8**.



**Plate 32: Example of a nursery row seed mix installed ahead of the main mix (M LMU, wandoo), July 2017**

No nursery rows were installed into the south facing slope beneath the central hill in S-SP LMU (**Figure 10**). A proliferation of Guilford Grass had grown across this slope in response to good July rainfall. No seeding could be undertaken until this area had been sprayed. Weed control commenced on the 7 August after the installation of recalcitrant species.

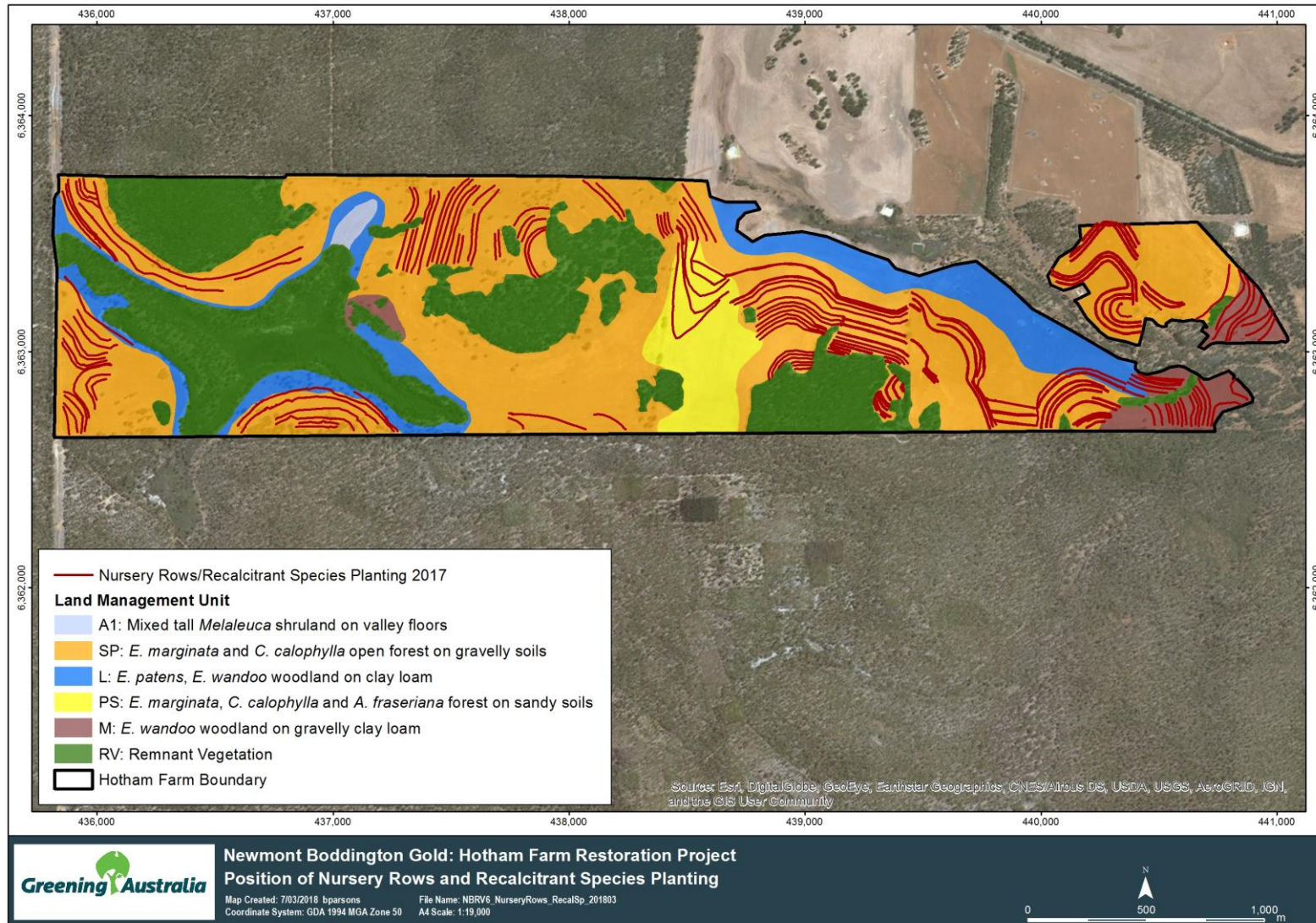


Figure 10: Location of nursery rows at the Hotham Farm Restoration Area

#### 2.3.1.4 Direct Drill

Direct drilling was a seeding method used to install seed rows perpendicular to the contour lines within the S-SP LMU, as distinct from the majority of seeding (**Section 2.3.1.2**). The objective of this technique was to introduce spatial heterogeneity into the pattern of restoration.

A specific subset of species was used during this process, based on dominance throughout the landscape, cost and ease of procurement. Species used include: *Acacia celastrifolia*, *Acacia pulchella*, *Corymbia calophylla*, and *Eucalyptus marginata*. Specific volumes are referred to in **Appendix 10** and specific seed quantities are listed in the seed procurement spreadsheet provided to NBG in **Appendix 5**.

Seeder configuration involved the lifting of all implements with only the seeder arm drilling and pressing seed into the soil profile.

Approximately, 30 ha were to have this method of seeding applied as the first activity following the break of season pre-treatment. Due to the late start priority was given for the seeding of the main S-SP mix; this continued until there was capacity to undertake both the S-SP seeding and the direct drilling simultaneously.

Direct drilling was carried out from 24 to 28 July 2017 (**Figure 11**), at which time approximately half of the S-SP LMU had already been seeded, preventing direct drilling in these areas. Nursery rows had been installed in areas where the main LMU mixes had not been seeded but the spacings between these rows was large enough that the direct drilling was not impeded. The weight of the seeder prevented the tractor from ascending perpendicular to the contour on some slopes.

Within each of the unseeded areas, a nominal figure of 20% coverage of direct drilling was proposed. To achieve this a direct drill border was driven to define the seeding area. To seed 20% of the area, two lines in every ten were seeded (each seeding line was 3 m in width; lines were seeded in groups of 2 so the width was 6 m leaving 24 m before the next group of two lines, **Plate 33**).



Plate 33: Direct drill lines running perpendicular to seeding rows, Jan 2018

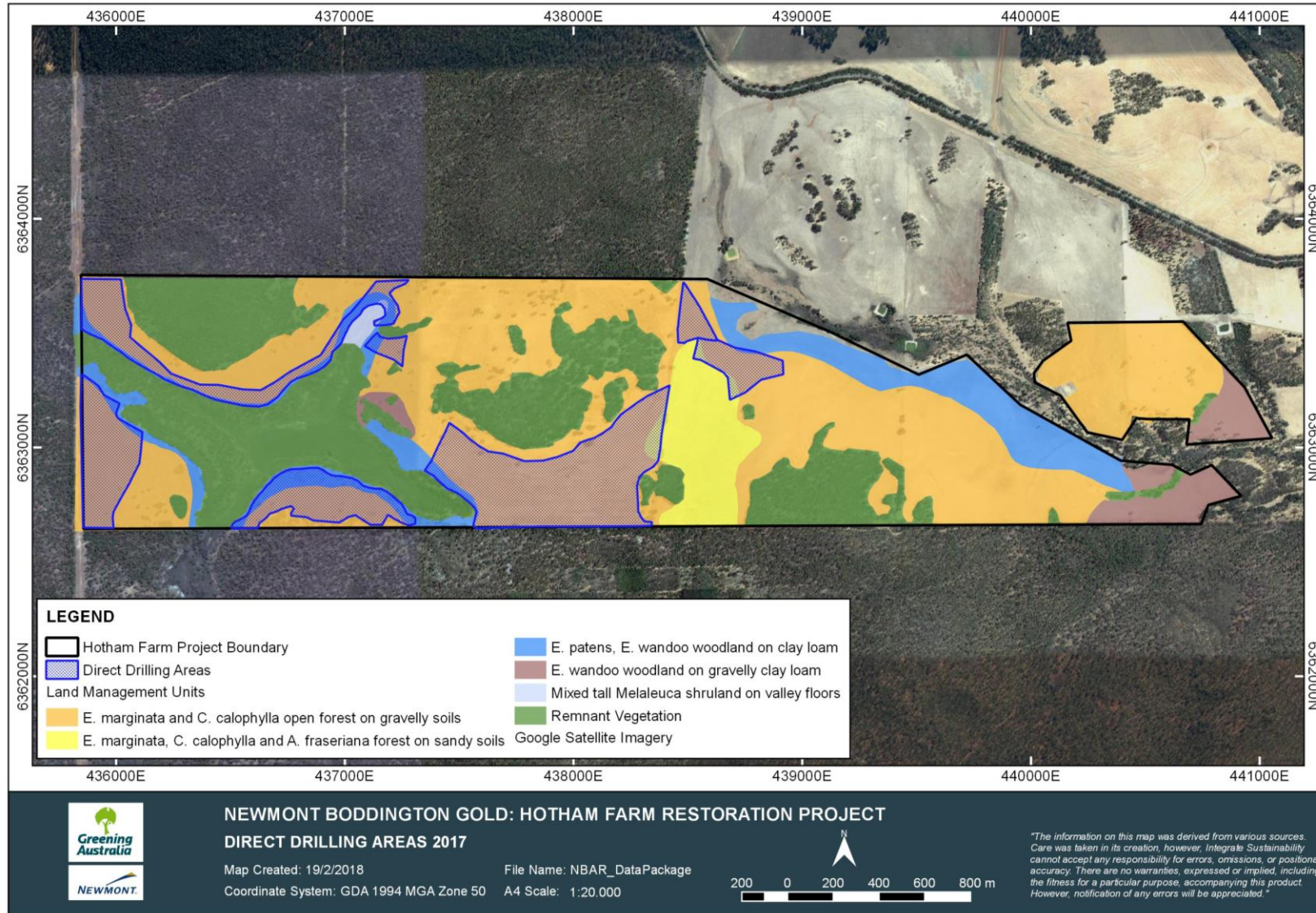


Figure 11: Direct Drill areas within the Project Area

### 2.3.1.5 Timing

Seeding preparation was timed to coincide with the first rains of the winter season, which arrived in mid-May, and pre-seeding weed control was scheduled 14 days post rainfall. This lead-in period allowed the soil profile to moisten improving soil conditions for the bonding of residual herbicide. Pre-seeding weed control was conducted in early to mid-June. Seeding commenced on the 15 June coinciding with a period of light showers to wash residual herbicide into the soil profile. Direct seeding continued for a 14 week period from mid-June until October 2017 (**Table 10**). The exact timing of seeding within each LMU was based on environmental considerations such as aspect, slope, soil type and moisture availability.

**Table 10: Timing of 2017 direct seeding for each LMU in the Project Area**

Month 2017	Week	S – SP			L		PS	A1	M	
		Loamy Gravel	Grey Sand	Shallow Gravel	Semi-Wet L	Semi-Wet LM	Deep Sand	Semi-Wet A1	Clay Loam	Shallow Gravel
June	1									
	2									
	3	North Facing Slopes								
	4									
July	5									
	6	East/West Facing Slopes					Main + Nursery			
	7									
	8	Nursery Rows							Nursery Rows	
Aug	9	Southern Facing Slopes								
	10									
	11									
	12									
Sep	13	Valley Flats								
	14									
	15						S			
	16						S		S	

Pot testing by Dr Geoff Woodall confirmed that Loamy Gravels retain moisture, allowing seeding within S- SP LMU to be sustained for the majority of the seeding period. Prioritisation within this and other LMUs was based on the influence of slope (drainage) and aspect (evaporative influence of sunlight) (**Table 11**). Nursery rows were installed as discussed in **Section 2.3.1.3**.

Seeding of free draining sand occurred during the wettest period of winter (mid-July), ensuring maximum moisture availability and a lengthened period for seedling development before conditions dry out. The installation of the deep yellow sand nursery row mix continued directly after the installation of the main mix.

Due to a capacity shortage, seeding in shallow gravels (S-SP/M) commenced in late July - August rather than early July. Ideally, seeding should occur early to maximise moisture availability as hill top shallow soils dry out quickly with the changing of season. Due to the delayed start, the installation of these seed mixes was postponed until 2018 when conditions are considered favourable. All preparatory work has been completed within the LMUs and these mixes would take priority for an immediate start in the following season.

Seeding of the clay loam wandoo mix (M) was completed in three stages. Areas located on the upper slopes were seeded in June. Lower slopes were seeded late in August when the soil moisture conditions were more favourable (ie. not waterlogged, avoiding poor germination and seed rot). Nursery rows were installed avoiding the wet areas in mid-July. The shallow gravel wandoo mix (M) was not sown in 2017 and is scheduled for 2018.

Seeding of mixes associated with seasonally wet LMUs (L and A1) was left until September allowing for dryer conditions after winter inundation. Continual spring rain prevented some semi wet areas from drying out, limiting seeder access. These areas will be completed in 2018.

### 2.3.1.6 Completion

A total of 277.5 ha out of a planned 335 ha direct seeding (83%) was completed in 2017 (**Table 11**, **Figure 11**).

**Table 11: Total area seeded and % completion of specific LMUs in 2017.**

LMU	S-SP			L		PS	A1	M	
<b>Total LMU Area</b>	<b>244.69 ha</b>			<b>46.9 ha</b>		<b>24.13 ha</b>	<b>2.03 ha</b>	<b>18.1 ha</b>	
Seed Mix	Loamy Gravel	Grey Sand	Shallow Gravel	Semi-Wet L	Semi-Wet LM	Deep Sand	Semi-Wet A1	Clay Loam	Shallow Gravel
<b>Area seeded (ha)</b>	184.5	5.5	10.3	24.8	11.6	23.3	1.3	14.6	0
<b>Total Seeded Area (ha)</b>	<b>200.3</b>			<b>36.4</b>		<b>23.3</b>	<b>1.3</b>	<b>14.6</b>	
<b>% Complete</b>	<b>82</b>			<b>78</b>		<b>100</b>	<b>64</b>	<b>81</b>	

The Semi-Wet A1 LMU was mapped to incorporate 2.03 ha but this was modified during seeding to incorporate 1.3 ha of A1 seed mix and the remainder as L seed mix (able to tolerate both wet and drier conditions) as the margins of this LMU were significantly dryer than originally anticipated (**Figure 12**).

Delays in the seeding effort were due to the following factors:

- a narrow seasonal works window;
- unforeseen shallow cap rock;
- steep and undulating terrain; and
- extended period of inundation in wet areas.

Planning for seeding works at Hotham Farm and an anticipated commencement at the start of June was informed by previous GA experience and regional climatic rainfall averages. Due to an unseasonal dry March and April, first significant rainfalls did not fall until May. Preparation requires significant lead in time to allow for soil wetting and also post spraying lee time to allow residual herbicide to stabilise in the soil. Accordingly, seeding commenced mid –June effectively shortening the scheduled season by two weeks. Consequently, seeding areas were prioritised based on ease of seeding to ensure maximum coverage within the remaining time (**Figure 12**).

Three areas within the S-SP LMU remain unseeded:

1. an area on the northern central fence line: unforeseen shallow cap rock. Additional time is required to seed using a slow, cautious approach or alternatively pre-scalping with the grader blade is required.
2. an area at the foot of the hill west of the central remnant and east of the western wetlands: annual ryegrass was prevalent, which impedes the CommVeg seeder. This area was sprayed in August to promote decay of the remnant ryegrass. The area is now ready for seeding and should be maintained until 2018.
3. an area within the S-SP LMU on steep slopes, east of the north western hillside remnant: steep and undulating terrain impeded direct seeding. Ripping and tubestock planting is more appropriate for revegetation of this area.

*Gastrolobium* thickets were proposed in two areas (**Appendix 9**). Additional *Gastrolobium* allocated for sowing into thickets seed was made available in July 2017. Given the significant expense of *Gastrolobium* seed and the shortened establishment season if sown in July seeding was postponed until 2018. Late season inundation prevented the completion of the *Gastrolobium* thicket located in the L LMU along the drainage edges towards the east of the Project Area (**Appendix 9**). Greening Australia plans to sow *Gastrolobium* seed into thickets as part of the final S, SP sowing in June 2018.

Additional areas noted as ‘not possible to seed’ (**Figure 12**) remain unseeded due to access restriction caused by steep or deeply rutted terrain and constricted movement due to rocks, woody debris or remnant vegetation. Access to these areas may be possible for a small tractor for the installation of rip lines. Areas could be planted with seedlings following ripping as part of the proposed infill planting contingency program.

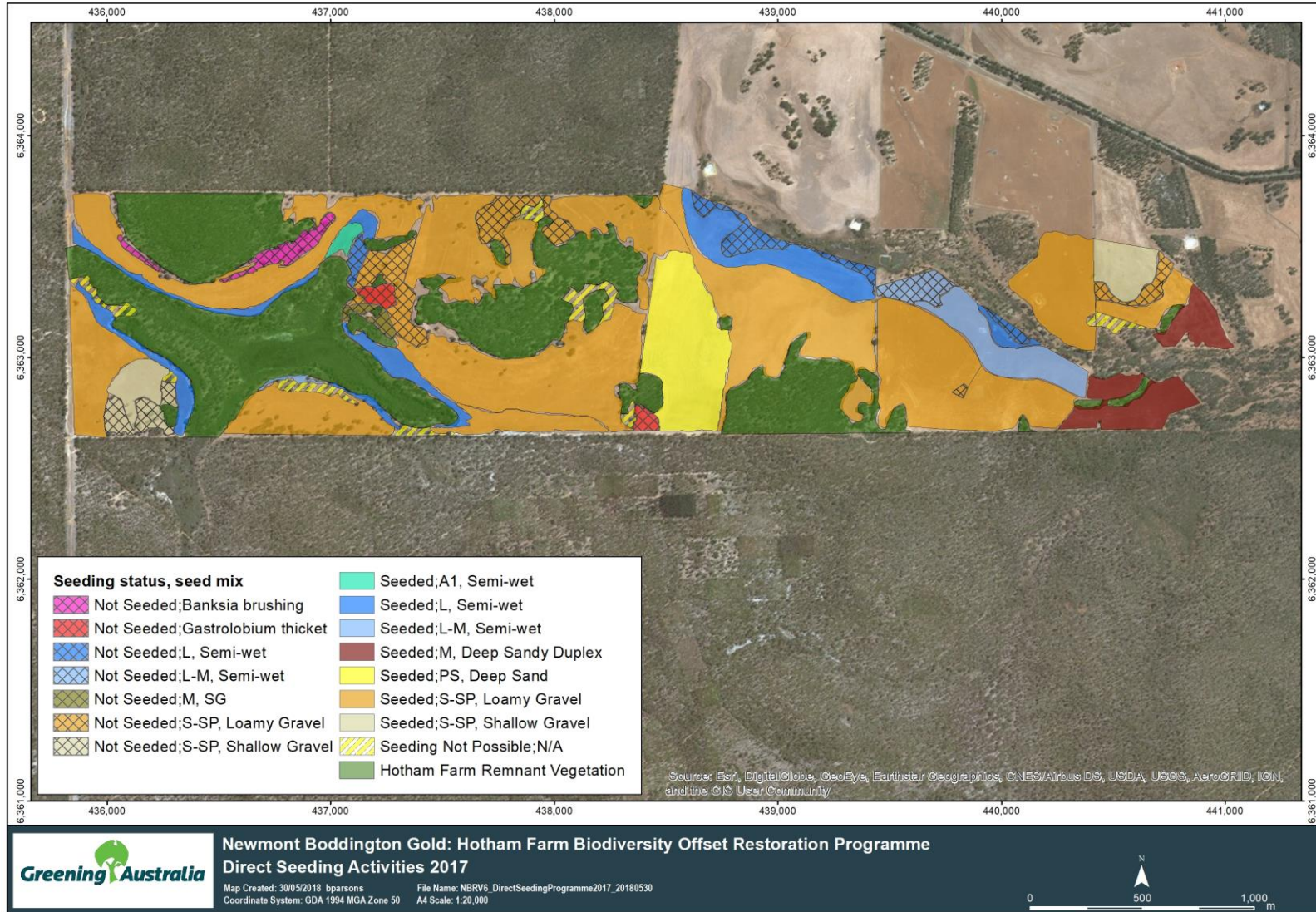


Figure 12: Direct seeded areas and associated seed mixes within the Project Area

## 2.3.2 Recalcitrant Species

Some common Jarrah Forest species produce little or no viable seed, may be inherently difficult to collect, or do not germinate via recognised dormancy breaking treatments and are referred to as 'recalcitrant species' (Grant and Koch 2007). Upon facing natural disturbances such as fire, frost, drought or grazing, these species often respond by vegetative regrowth as opposed to re-establishment through seed. These species are generally not candidates for direct seeding due to their reproductive methods and tubestock must be obtained through propagation methods such as cutting or tissue culture.

A total of 9,900 individual recalcitrant seedlings were proposed for planting in 2017. Planting material was sourced from WA Horticultural Developments and Nuts about Natives, responsible for propagation of three recalcitrant species via cuttings and seven species through tissue culture, respectively (**Table 12**).

**Table 12: Recalcitrant species tubestock planting rate, August 2017**

Species	Nursery provider	No. stems	Rate (stems/LMU)			
			LG S-SP	SG S-SP	DS PS	CL M
<i>Conostylis setigera</i>	WA Hort. Dev.	1,100	1,052	48		
<i>Hibbertia amplexicaulis</i>	WA Hort. Dev.	1,100	900	41	94	65
<i>Lechenaultia biloba</i>	WA Hort. Dev.	1,100	957	43	100	
<i>Lepidosperma apricola</i>	Nuts About Natives	232	232			
<i>Lepidosperma asperatum</i>	Nuts About Natives	1,482	1,288	59	135	
<i>Lepidosperma squamatum</i>	Nuts About Natives	581	474	22	50	35
<i>Lepidosperma tenue</i>	Nuts About Natives	1,897	1,551	71	162	113
<i>Lomandra micrantha</i>	Nuts About Natives	616	616			
<i>Tetraria capillaris</i>	Nuts About Natives	1,008	1,008			
<i>Tetraria octandra</i>	Nuts About Natives	784	682	31	71	

### 2.3.2.1 Recalcitrant Species Planting

Planting took place from the 31 July - 4 August 2017, coinciding with optimal timing for planting (**Plate 34**). The planting of recalcitrant species was confined to nursery row areas free of competition from direct seeded species (**Figure 10**). Recalcitrant species were assigned to each LMU based on baseline survey data, advice from Dr Geoff Woodall and consultation with the PAG (**Table 11**).



Plate 34: Field technicians installing recalcitrant species, August 2017

Recalcitrant species were distributed evenly throughout each of the designated LMUs (**Table 13**) based on the rate of 3000 m of seeding row per ha as per the example below for S-SP LMU:

- 22 ha x 3,000 m = 66,000 m within the LMU;
- 66,000 m/8,760 (number of recalcitrant stems to be planted) = planting interval of 8 m

**Table 13: Recalcitrant species tubestock planting design**

	LG S-SP	SG S-SP	DS PS	CL M
Nursery row area (ha)	22.0	1.0	2.3	1.6
Total length of rows (m)	66,000	3,000	6,900	4,800
Total no. stems	8,760	315	612	213
Planting intervals (m)	8	10	11	23

### 2.3.2.2 *Macrozamia riedlei* planting

The nuts of *Macrozamia riedlei* are too large to pass through the CommVeg direct seeder and require hand planting using a pottiputki. Installation of *Macrozamia riedlei* nuts occurred in late July within the S-SP and M LMUs. Seeds were planted in clusters of 3 – 5 and distributed randomly throughout the existing seeding rows (**Figure 13**). Unplanted areas south of the western wetland and eastern cropping paddock represent a shortfall in distribution. The unplanted area between the wetland and the deep yellow sands was not planted as Guildford Grass control prevented seeding lines from being installed. Supplementary planting could be achieved in 2018 with further purchase of seed.

### 2.3.2.3 *Banksia sessilis* Brushing

No *Banksia sessilis* ground work was conducted in 2017. Proposed localities of grader lines were left unseeded in preparation for brushing in 2018. Two proposed grader lines located on the south facing slope beneath the central hill remnant vegetation were seeded in error.

Greening Australia has researched availability of brushing material and has found it to be limited. Consequently, the extent of the proposed brush lines may have to be reconsidered. An alternative option may be to seed the proposed brushing areas in 2018 so there are no paddock gaps in the landscape and once there is a known quantity of brushing material, lines could be cut as planned to suit availability.

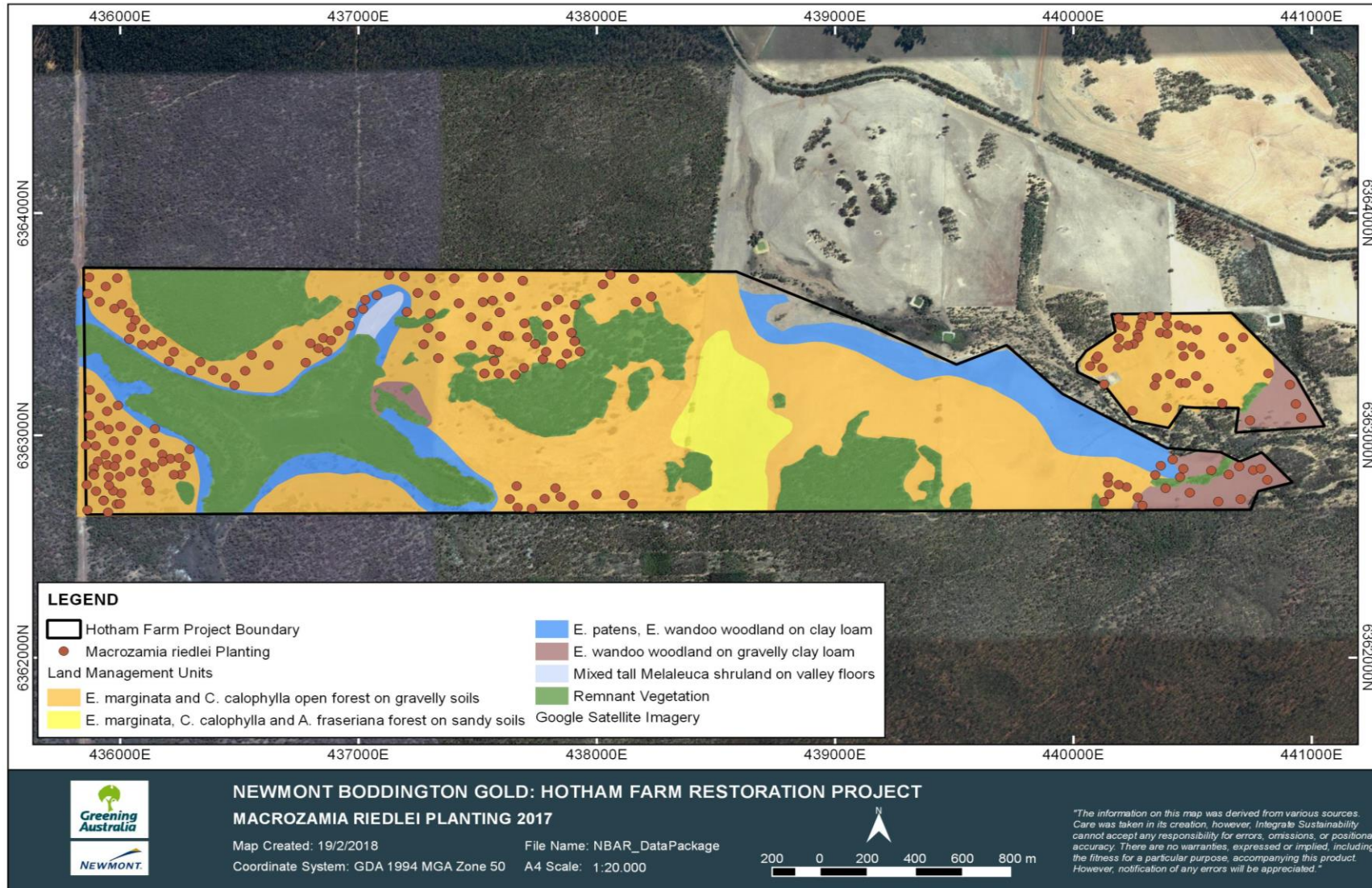


Figure 13: *Macrozamia riedlei* Planting 2017, Hotham Farm

### 2.3.3 Post-seeding Weed Management

Post seeding weed control was completed in September followed by two minor weed control events in October and November (**Table 14, Figure 6**).

**Table 14: Summary of post- seeding weed control 2017**

Date of application	Purpose	Treatment used	Method of application	Application Rate	Total Area Sprayed (ha)
11/09/2017	Grass Selective Weed Control	<ul style="list-style-type: none"> <li>• Leopard 200 @ 190mL/100L</li> <li>• Talsta 250 @ 40ml/100L</li> <li>• Uptake @ 500ml/100L</li> </ul>	Boom Spray	100L/ha	218
11/10/2017	Broadleaf Weed Control	<ul style="list-style-type: none"> <li>• Triasulfuron @ 12.5g/100L</li> <li>• Brushwet @ 250mL/100L</li> <li>• Envirodye (Red) @ 300mL/100L</li> </ul>	Line Spray	N/A	2.5
01/11/2017	Targeted Thistle Control	<ul style="list-style-type: none"> <li>• Glyphosate Biactive @ 2L/100L</li> <li>• Agral @ 12mL/100L</li> </ul>	Line Spray	N/A	0.5

AGSCOPE Pty Ltd continued the post-seeding broad acre weed control programme in September 2017. This programme targeted grasses with a grass specific herbicide which included an insecticide for on-going insect control (**Plate 36**).



**Plate 35: Dead insects observed in seeded areas following post-seeding weed and pest control programme, September 2017**

Broadleaf species including *Malva* sp., *Gomphocarpus fruticosus* (Cottonbush) and *Lupinus cosentinii* (Lupin) were targeted by Greening Australia during an October weed control effort. *Lavandula stoechas* (Lavender) along the edge of the wetland was also resprayed in this event.



Plate 36: *Malva* sp. occurring on top of the main hill in the south east, September 2017

During November, further weed control activities were undertaken including the manual removal of *Gomphocarpus fruticosus* (Cottonbush) individuals and the application of a foliolar herbicide to *Cirsium vulgare* (Spear Thistle) and *Sonchus asper* (Sowthistle) along the edge of the wetland (**Figure 7**). Further weed control of *Lupinus cosentinii* (Lupin) observed in the paddock north of remnant 14 was scheduled in November but was not completed due to access restrictions. GA had also planned further broadleaf weed control activities including control events to target Cottonbush, *Cucumis myriocarpus* (Prickly Paddy Melon) and *Citrullus lanatus* (Pie Melon) for December, however, this work was not undertaken due to further access restriction.

## 3 Monitoring and Inspection (Phase 5)

### 3.1 ANNUAL MONITORING

Revegetation monitoring was proposed annually in November for three years post seeding. The PEP documented specific parameters for monitoring and outlined method for data collection. To date, these methods have not been approved by NBG and consequently, monitoring did not occur in 2017. Quadrat locations have been proposed and also await approval (**Figure 14**). 21 quadrats have been proposed to accurately capture the variation in land units and topography. These monitoring quadrats will also aim to capture the different direct seeding methodologies (**Figure 10 and 11**).

### 3.2 ROUTINE INSPECTIONS

Routine monthly site inspections have been conducted between March 2017 and January 2018. Inspections provide qualitative information to guide management and restoration actions. Parameters monitored during routine inspections include:

- Pest fauna activity: three rabbit monitoring transects were installed to quantify rabbit activity (**Section 2.2.5**).
- third party access and damage: the perimeter fence is driven and management issues reported;
- erosion: known points of erosion are revisited and new points are recorded;
- declared or significant weed outbreaks:
  - species and locations are recorded;
  - remedial actions recommended;
- insect and/or plant pathogen related mortality;
  - 10 insect monitoring points established featuring sticky traps that are replaced monthly;
  - vegetation health is documented within a 10 m radius of insect monitoring traps targeting evidence of sucking, chewing or other insect signs on stems or leaves of revegetation;
- general vegetation health;
  - on foot visual inspection undertaken in all LMU areas, seeding mix zones and geographical localities;
  - qualitative assessments of scalp lines, soil moisture, plant size, density, diversity and health (colour, wilting).

These factors were recorded or mapped where encountered and a photograph is captured for each occurrence. GA has developed a monitoring template that guides inspection requirements. Information captured has been summarised and submitted in monthly reports.

#### 3.2.1 Weekly inspections

Proposed weekly routine monitoring and inspection (six-months post seeding until March 2018) has been difficult to maintain due to limited communication and site access from NBG. Access has been granted monthly so a current understanding of on-site conditions has maintained to this frequency.

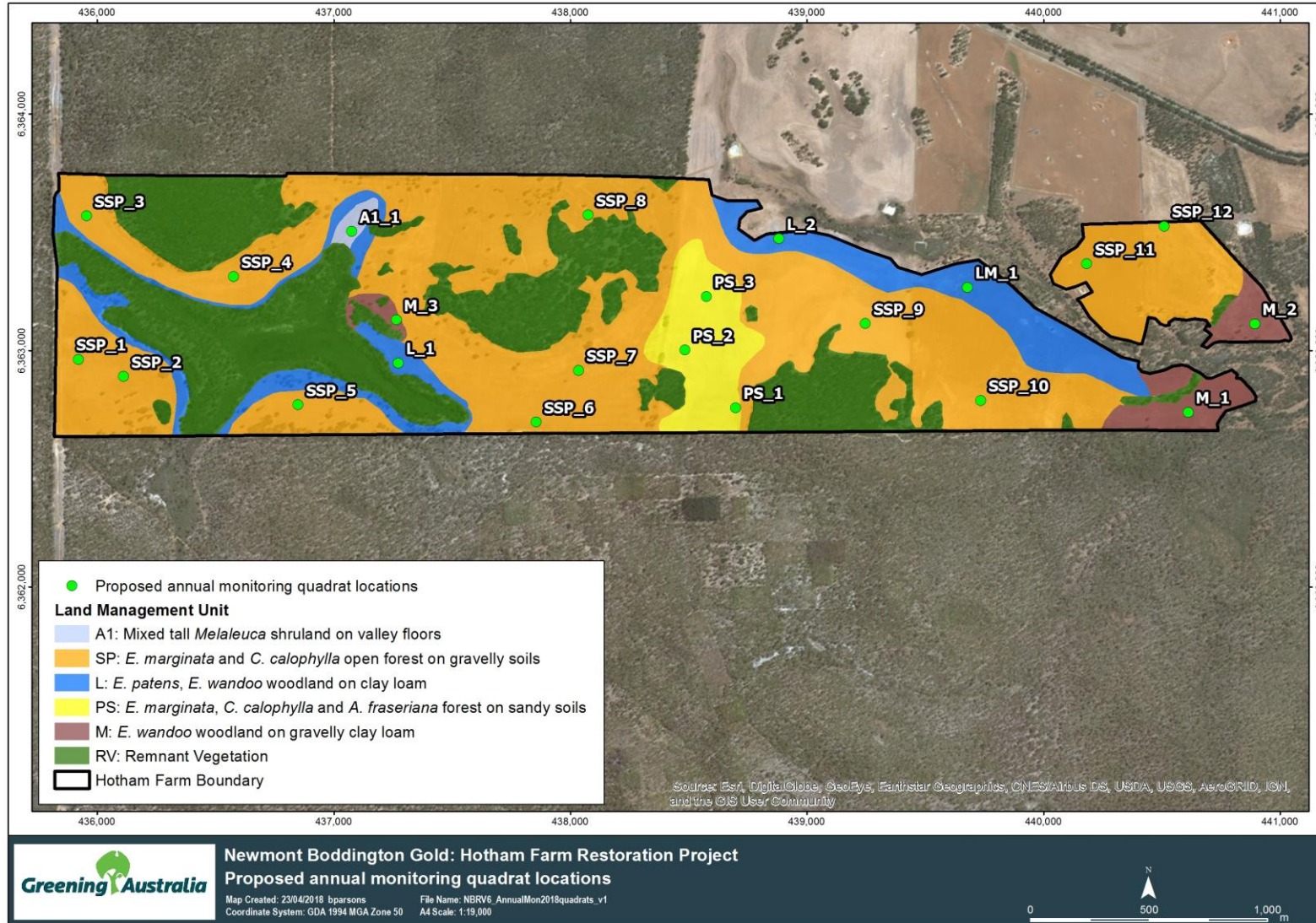


Figure 14: Proposed annual monitoring quadrats for 2018 in relation to LMUs.

### 3.2.2 Reporting

Formal monthly reporting has been submitted to NBG since May 2017. These reports detail project status in relation to contract milestones, activities undertaken, and activities scheduled, key issues, constraints and limitations. Reports also include summarised data, photographs and maps from monthly routine inspections.

## 3.3 MONITORING OBSERVATIONS

### 3.3.1 Pest Fauna Activities

A summary of all pest fauna activity for 2017 is provided in **Section 2.2.5**.

### 3.3.2 Fence Inspections

Routine fence inspection for third party damage/access to the Hotham Farm access were completed as part of routine inspections. Fence breaches, damage or maintenance concerns have been documented in monthly reports or immediate concerns conveyed directly by email. Greening Australia will continue to report fence breaches or damage to NBG for maintenance. Repeated concerns relating to the management of fences during 2017 include:

- actions still required to prevent pest access to via causeway pipes;
- rill erosion is causing gaps beneath rabbit skirting.

### 3.3.3 Erosion Monitoring

Erosion has decreased in paddock areas, which may be attributable to the deflection of water by the cross contour seeding rows. This has been particularly noticeable in the deep yellow sand. Rill erosion is increasing on fire breaks positioned on slopes (**Plate 38**) and specific locations have been provided in monthly reporting.



Plate 37. Example of rill erosion on access track at Hotham Farm, January 2017

### 3.3.4 Declared / Significant Weeds

Weed presence and locations have been identified, recorded and reported as part of routine inspection. **Table 15** provides a list of weed species observed during inspections and provides information regarding their level of threat and treatment strategy.

Complete documentation of 2017 weed control works is discussed in **Sections 2.2.6.2, 2.4.2 and 2.3.3**. Weed control in 2018 will continue using a combination of broadacre sprays in winter and spring for control of grass and the application of pesticide. Broadleaf weeds will be controlled using targeted and opportunistic spraying as informed by routine monitoring.

A future immediate priority would involve the management of cotton bush, spraying and removal of paddy/afghan melon, spraying of nightshade and the management of large infestations of mint weed. Although routine inspections has indicated that much of the seeding has been successful, ongoing weed control is a critical element post-seeding in ensuring the persistence of seedlings.

**Table 15: List of agricultural and environmental weeds identified during routine monitoring**

Scientific Name	Common Name	Distribution	Threat Level	Treatment	Comments
<i>Arctotheca calendula</i>	Cape Weed	localised	moderate - high	<ul style="list-style-type: none"> <li>suppress seed bank with residual herbicide;</li> <li>spot spray localised population</li> <li>winter</li> </ul>	<ul style="list-style-type: none"> <li>target local populations to prevent further spread (Figure 13);</li> <li>timing critical before seed set</li> </ul>
<i>Chenopodium pumelo</i>	Mint Bush	widespread	low - moderate	<ul style="list-style-type: none"> <li>suppress seed bank with residual herbicide;</li> <li>spot spray localised population</li> <li>mid-summer</li> </ul>	<ul style="list-style-type: none"> <li>impossible to control across whole of farm</li> <li>low threat as isolated individuals but competitive when dense</li> <li>targeted spraying to occur in areas of highest density (Figure 13)</li> </ul>
<i>Cirsium vulgare</i>	Spear Thistle	localised	moderate	<ul style="list-style-type: none"> <li>suppress seed bank with residual herbicide;</li> <li>spot spray localised population</li> <li>winter/spring</li> </ul>	<ul style="list-style-type: none"> <li>highly invasive if left untreated;</li> <li>localised population known and will require monitoring and follow-up treatment (Figure 13);</li> <li>heavy seed bank where populations are known to occur.</li> </ul>
<i>Citrullus lanatus,</i>	Afghan Melon	moderate spread	moderate - high	<ul style="list-style-type: none"> <li>remove remnant fruit</li> <li>spot spray localised population</li> <li>summer</li> </ul>	<ul style="list-style-type: none"> <li>impossible to eradicate across whole of farm;</li> <li>individual spot spraying events would be costly across whole farm;</li> <li>prioritise targeted efforts and combine broader melon control as part of other broadleaf efforts;</li> </ul>

Scientific Name	Common Name	Distribution	Threat Level	Treatment	Comments
					<ul style="list-style-type: none"> <li>prioritised event should occur in areas illustrated in Figure 13</li> </ul>
<i>Cucumis myriocarpus,</i>	Prickly Paddy Melon	moderate spread	moderate - high	<ul style="list-style-type: none"> <li>remove remnant fruit</li> <li>spot spray localised population</li> <li>summer</li> </ul>	<ul style="list-style-type: none"> <li>refer above</li> </ul>
<i>Lavandula stoechas,</i>	Lavender	localised	low	<ul style="list-style-type: none"> <li>spot spray localised population</li> <li>year round</li> </ul>	<ul style="list-style-type: none"> <li>main population is known and is of low threat to restoration</li> <li>population should be eradicated within project life through regular spot sprays.</li> </ul>
<i>Gomphocarpus fruticosus,</i>	Cotton Bush	localised	moderate to high	<ul style="list-style-type: none"> <li>suppress seed bank with residual herbicide;</li> <li>spot spray/brushcut localised population</li> <li>winter/spring</li> </ul>	<ul style="list-style-type: none"> <li>declared weed</li> <li>population seems to be highly localised (Figure 13);</li> <li>heavy seed bank in soil evident by dense recruitment;</li> <li>perceived as manageable threat if weed control is timely</li> <li>requires brushcutting/spraying before seed set.</li> </ul>
<i>Juncus acutus,</i>	Spiny Rush	localised	low	<ul style="list-style-type: none"> <li>spot spray localised population</li> <li>winter/spring</li> </ul>	<ul style="list-style-type: none"> <li>low threat to revegetation effort but of moderate threat to remnant vegetation;</li> <li>known population remains in check;</li> <li>regular monitoring and treatment as required.</li> </ul>
<i>Lolium rigidum</i>	Rye Grass	widespread	moderate	<ul style="list-style-type: none"> <li>grass specific broadacre spray</li> <li>autumn/winter</li> </ul>	<ul style="list-style-type: none"> <li>highly competitive for establishing seedlings or tubestock.</li> <li>managed effectively with broadacre grass specific</li> <li>timing is critical – at the mercy of AGSCOPE schedule</li> </ul>
<i>Lupinus cosentinii</i>	lupin	localised	Moderate - high	<ul style="list-style-type: none"> <li>suppress seed bank with residual herbicide;</li> <li>spot spray localised population</li> <li>winter/spring</li> </ul>	<ul style="list-style-type: none"> <li>repeated germination observed over two seasons indicates presence of a soil seedbank</li> <li>local populations are known for targeted spraying (Figure 13).</li> <li>timing of spraying critical – prolific seeder and can go to seed fast if late in the season.</li> </ul>

Scientific Name	Common Name	Distribution	Threat Level	Treatment	Comments
<i>Malva parviflora</i>	marshmallow	localised	low-moderate	<ul style="list-style-type: none"> <li>suppress seed bank with residual herbicide;</li> <li>spot spray localised population</li> <li>winter/spring</li> </ul>	<ul style="list-style-type: none"> <li>very competitive and vigorous if left untreated</li> <li>can occur anywhere, generally on windrows, paddock margins or edges of remnant bush.</li> <li>Very seasonal and can be managed effectively with spot spraying.</li> </ul>
<i>Raphanus raphanistrum</i>	Wild radish	localised	moderate - high	<ul style="list-style-type: none"> <li>suppress seed bank with residual herbicide;</li> <li>spot spray localised population</li> <li>winter</li> </ul>	<ul style="list-style-type: none"> <li>invasive and prolific seeder</li> <li>commonly observed on the margins of paddock areas that have not received regular spray</li> <li>some known locations (Figure 13) but is still recruits in the wider farm area at random</li> <li>must be sprayed immediately</li> <li>can develop herbicide tolerance.</li> </ul>
<i>Solanum nigrum</i>	nightshade	moderate spread	low - moderate	<ul style="list-style-type: none"> <li>suppress seed bank with residual herbicide;</li> <li>spot spray localised population</li> <li>spring/summer</li> </ul>	<ul style="list-style-type: none"> <li>commonly observed on the margins of paddock areas that have not received regular spray</li> <li>easy to eradicate if treated early</li> </ul>

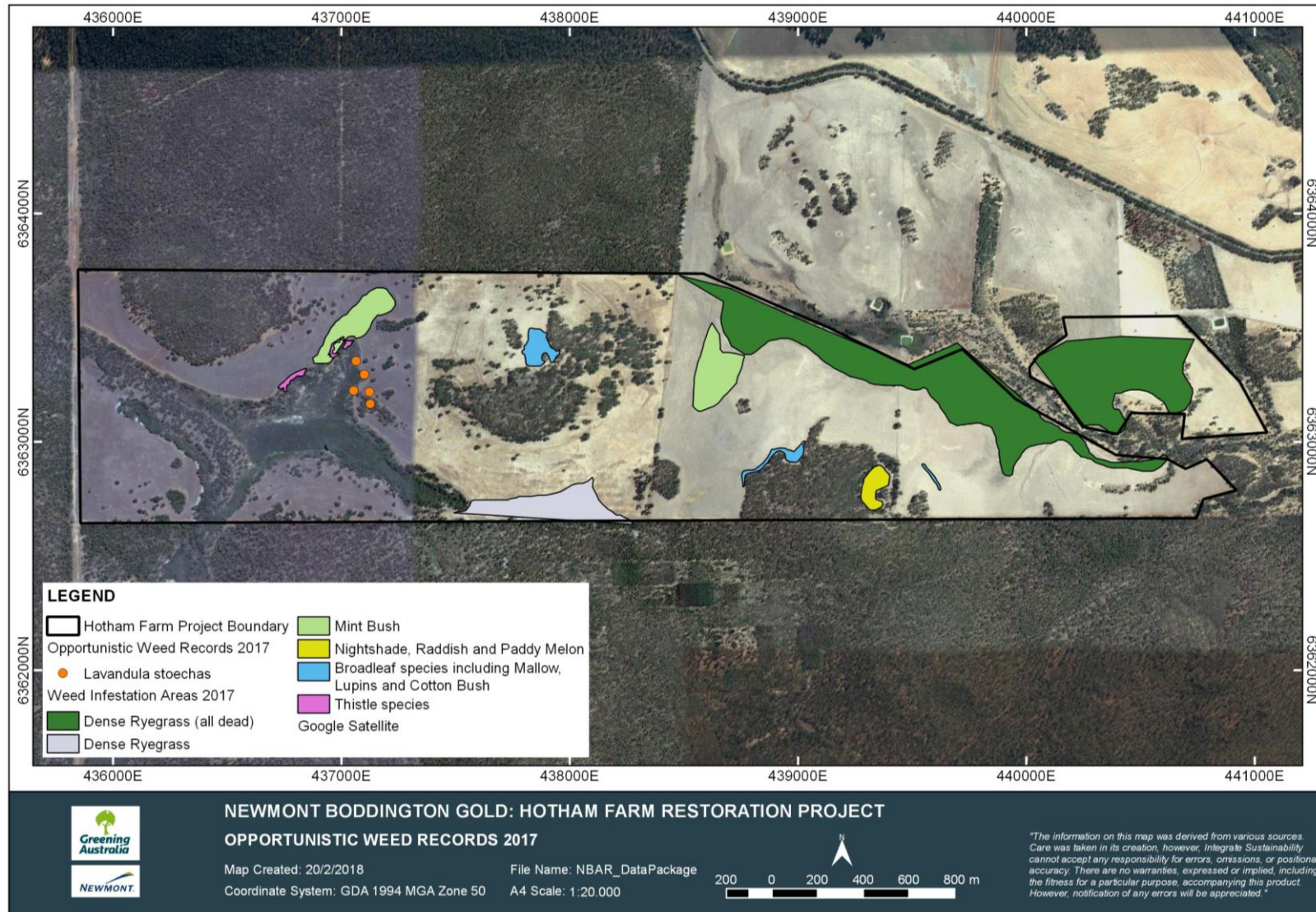


Figure 15: Locations of significant weed populations observed during routine monitoring and inspections, January 2017

### 3.3.5 Insect / Plant Pathogen Mortality

Insect trap monitoring points were established in October 2017 (**Appendix 13**). Overall observations for 2017 are summarised below:

- seedlings were generally healthy at all insect trap monitoring points;
- some signs of kangaroo presence (droppings and tracks) were noted, there were no signs of herbivory;
- minimal chewing/insect damage was noted on vegetation;
- observations from glue traps showed no signs of Rutherglen Bugs or Red-legged Earth Mites; and
- health of recalcitrant species tubestock is of concern in certain areas.

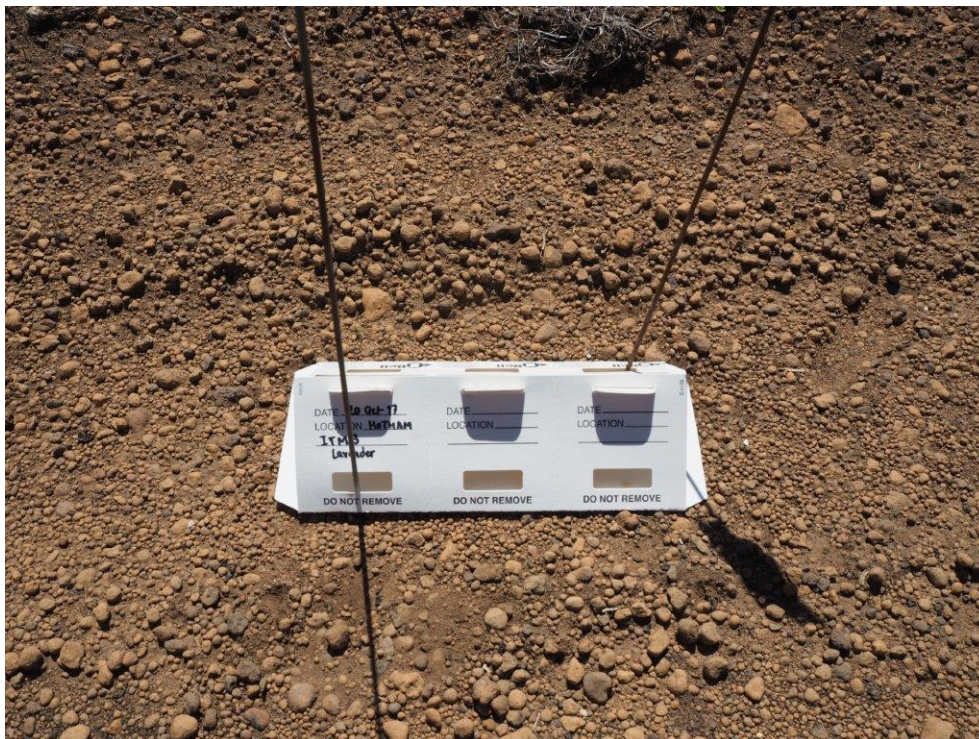


Plate 38: Insect monitoring trap in situ at Hotham Farm, October 2017

### 3.3.6 Remnant Vegetation Monitoring

On-ground work and monitoring of remnant vegetation was scheduled to commence during this reporting period, however limited work has occurred to date. Key works associated with the remnant vegetation that have been completed include baseline survey (**Section 2.2.6**) and targeted lavender and spiny rush control in the western wetland (**section 2.2.6.2**). No other restoration activities have been undertaken.

Greening Australia is awaiting feedback from NBS regarding implementation strategies in the PEP. Upon the commencement of strategies, ongoing monitoring will be conducted concurrent with restoration monitoring activities.

### 3.3.7 Photo Monitoring Points

Ten referenced photo monitoring points were established during September/October 2017 to visually monitor change over the life of the project (**Plate 40, Appendix 14**).



Photo monitoring point 1, NE 61°



Photo monitoring point 2, E 100°



Photo monitoring point 3a, S 177°



Photo monitoring point 3b, NE 49°



Photo monitoring point 4, SE 130°



Photo monitoring point 5, NE 55°



Photo monitoring point 6, N 3°



Photo monitoring point 7, N 347°



Photo monitoring point 8, NW 300°



Photo monitoring point 9, E 110°



Photo monitoring point 10, SE 128°

Plate 39: Photos captured from ten photo monitoring points installed in the Project Area, October 2017

### 3.3.8 General Vegetation Health

To date, observations relating to vegetation health have been qualitative in nature and informed by monthly routine monitoring and inspections only (ie. no observation undertaken via quantitative annual monitoring). Overall there is germination across approximately 70% of the Project Area and species appear healthy with notable growth observed between every inspection. Areas of notable success are within the S-SP loamy gravels and M wandoo LMUs (**Figure 16**). Areas of concern are within the semi-wet L, and A1 LMUs and within the white sand and S-SP shallow gravel seed mix zones (**Figure 16**). Observations suggest sowing time and weed burden may be dominant factors influencing development of vegetation.

#### 3.3.8.1 Excellent Vegetation Health

Areas rated as excellent include S- SP LMU areas in the North West, south of the central wetland and along northern central fence line (**Figure 16**). Both the Clay Loam M LMU in the far East and the bordering band of loamy gravel seed mix on the hilltop are observably progressing well. Seedling characteristics include good size (20 - 40 cm), no discolouration in foliage and the soil profile still appears to be holding a lot of moisture (**Plate 41**).



**Plate 40:** Example of seedlings rated as excellent in S-SP LMU on the central north fence line, January 2018

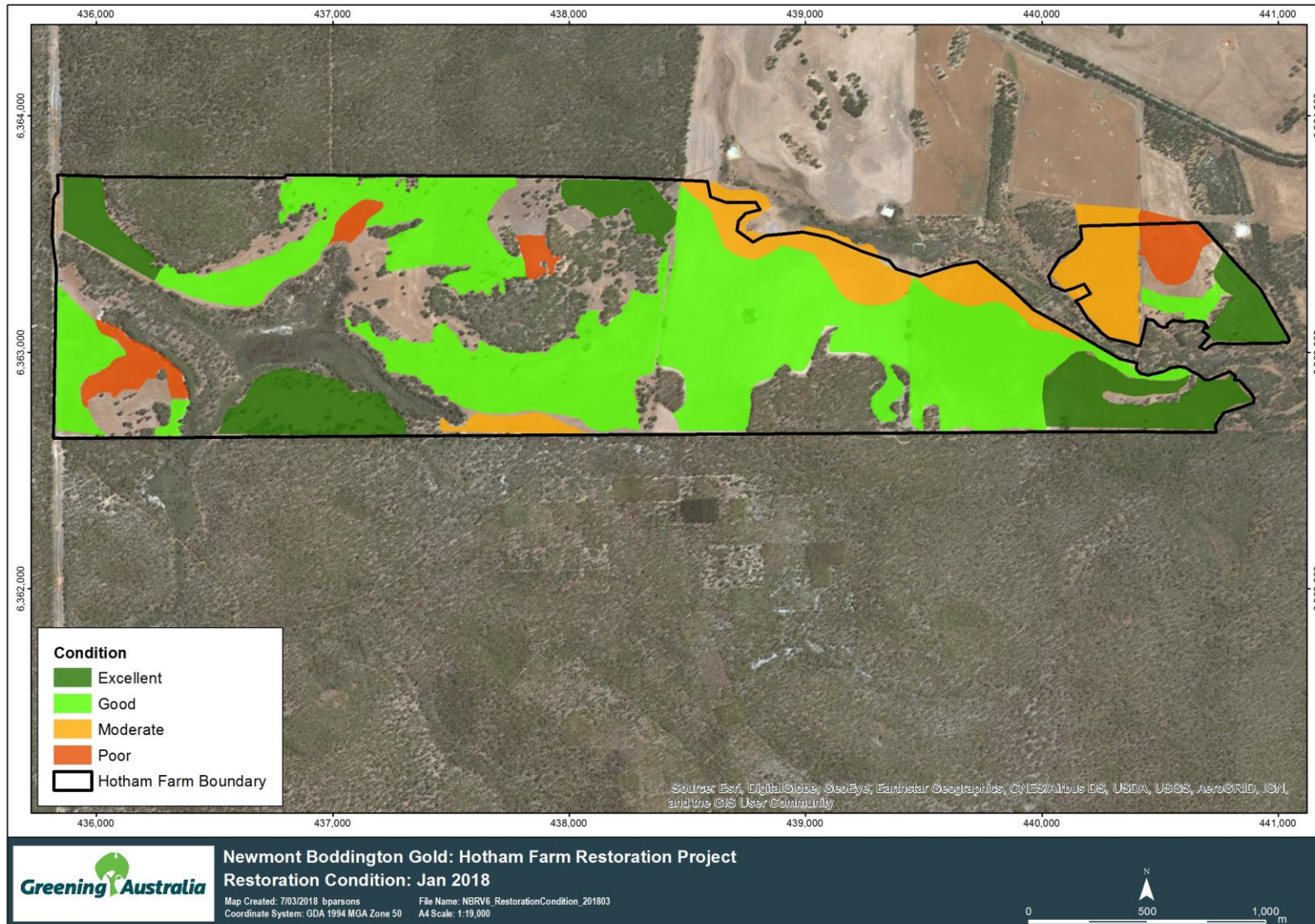


Figure 16: Subjective condition of revegetation effort within the Project Area, January 2017

Within seeding lines, a high density (5-10 seedlings per metre) and good diversity of species were present. Identifiable species include: *Acacia* sp., *Allocasuarina* sp., *Banksia* sp., *Calothamnus* sp., *Dianella* sp., *Eucalyptus* sp., *Grevillea* sp., *Melaleucas* sp., *Ptilotus* sp. and *Podolepis* sp.

Germination was observed within direct drill lines across the entire Hotham Farm Site (**Plate 42**). Success with this treatment may be attributable to the optimal timing of direct drill lines in mid-winter.



Plate 41: Example of high rate of germination in direct drill lines sown into S-SP LMU, January 2018

### 3.3.8.2 Good Vegetation Health

Areas rated as good are confined to the S-SP areas and PS LMU. These areas have been differentiated from the 'Excellent' zones based on the comparative size of the seedlings. Although similar densities are present, comparable seedlings are smaller (<25 cm) (**Plate 42**). This may be attributable to late sowing in some of the S-SP areas and poorer nutrition and less available moisture in the PS LMU.



Plate 42: Example seeding lines rated as good, steep south facing western slope within the S-SP LMU, January 2018

Seedlings have responded well to the summer rain and growth is evident when comparing observations made in January to earlier inspections. S-SP areas immediately north and east of the central wetland were classified average in December 2017 are now showing significant seedling development (**Plate 44**). Overall species diversity is on par with that described as excellent and estimated density is 5-10 germinants per square metre.



Plate 43: comparison of seeding row in the same area in December 2017 (left) and January 2018 (right) within the S-SP-LMU

### 3.3.8.3 Average Vegetation Health

Germination is occurring in “average” areas; however, diversity is lower, seedling size is generally smaller, and seedling spread is patchier (one every two metres). Differences in these areas are likely to be due to inconsistent seeding terrain and proliferation of weed cover.

A dense cover of dead Rye Grass is evident along Semi-wet L and within sections where the grey sand mix was sown. Weeds have encroached into seeding lines and *Acacia* sp. and *Eucalyptus* sp. are sparse but persisting. Seedling height is between 10 mm – 15 mm (occasionally taller). These areas were not sprayed post seeding due to prolonged water-logging. As a result, the Rye Grass completed its annual life cycle and has left considerable biomass (**Plate 45**). Influences of Rye Grass completion and aspect may have also impacted on the S-SP LMU located in the isolated north eastern paddock (**Plate 46**).



Plate 44: Rye Grass evident in Semi-Wet L LMU, January 2018



**Plate 45: Patchy germination in the north eastern paddock S-SP LMU, January 2018**

Patchy germination on the upper slopes of the steep southern facing S-SP section may be attributable to slope and rocky substrate. Placement of seed at depth was jeopardised by the angle of the seeder on the slope and interference from sub surface rocks (previously explained in **section 2.3.1.6**). All areas classified as average will require infill planting.

#### **3.3.8.4 Poor Vegetation Health**

Rocky gravels exhibit the lowest frequency of germination with individual seedlings observed approximately every 10 meters. Failure of seeding may be attributable to the later than anticipated sowing period for which seeding was halted.

Areas including A1 drainage zone (**Plate 45**), white sand and the central hill (**Plate 46**) all have high weed coverage. Competition from weeds is the most likely cause of failure at these sites. Seeding of shallow gravels will be complete in 2018 and failing areas will receive infill planting.



**Plate 46: Weed burden evident in A1 LMU, January 2018**



**Plate 47: Weed burden evident on central hilltop within the S-SP LMU, January 2018**

## 4 Conclusion

To achieve the goals and objectives of the project, five phases were identified:

1. technical planning;
2. fencing;
3. site preparation;
4. initial restoration and revegetation execution; and
5. monitoring and reporting.

During the 2017 reporting period, GA has progressed phases one, three, four and five with the responsibility for phase two being assumed by NBG. Milestones within the listed phases has included:

- Phase 1: Preparation of safety compliance documents, capturing a range of baseline data and preparation and submission of the Project Execution Plan.
- Phase 3: Planning, procurement and testing of all project seed and the preparation of site for direct seeding through weed control and soil preparation. Remnant vegetation management activities included a baseline survey, weed control and habitat creation through direct seeding.
- Phase 4: Completion of post seeding weed control activities, 83% completion of direct seeding and the establishment of recalcitrant species within nursery rows.
- Phase 5: Establishment of routine monitoring and inspections and the submission of the 2017 annual report.

Priority activities for the future include the immediate commencement of annual monitoring following the acceptance of the monitoring strategy outlined in the PEP, completion of the direct seeding program, species review and revised timeline for infill planting and implementation of rehabilitation strategies within remnant vegetation. Ongoing works will include feral animal control and weed control in both remnant vegetation and rehabilitated agricultural zones informed by routine monitoring.

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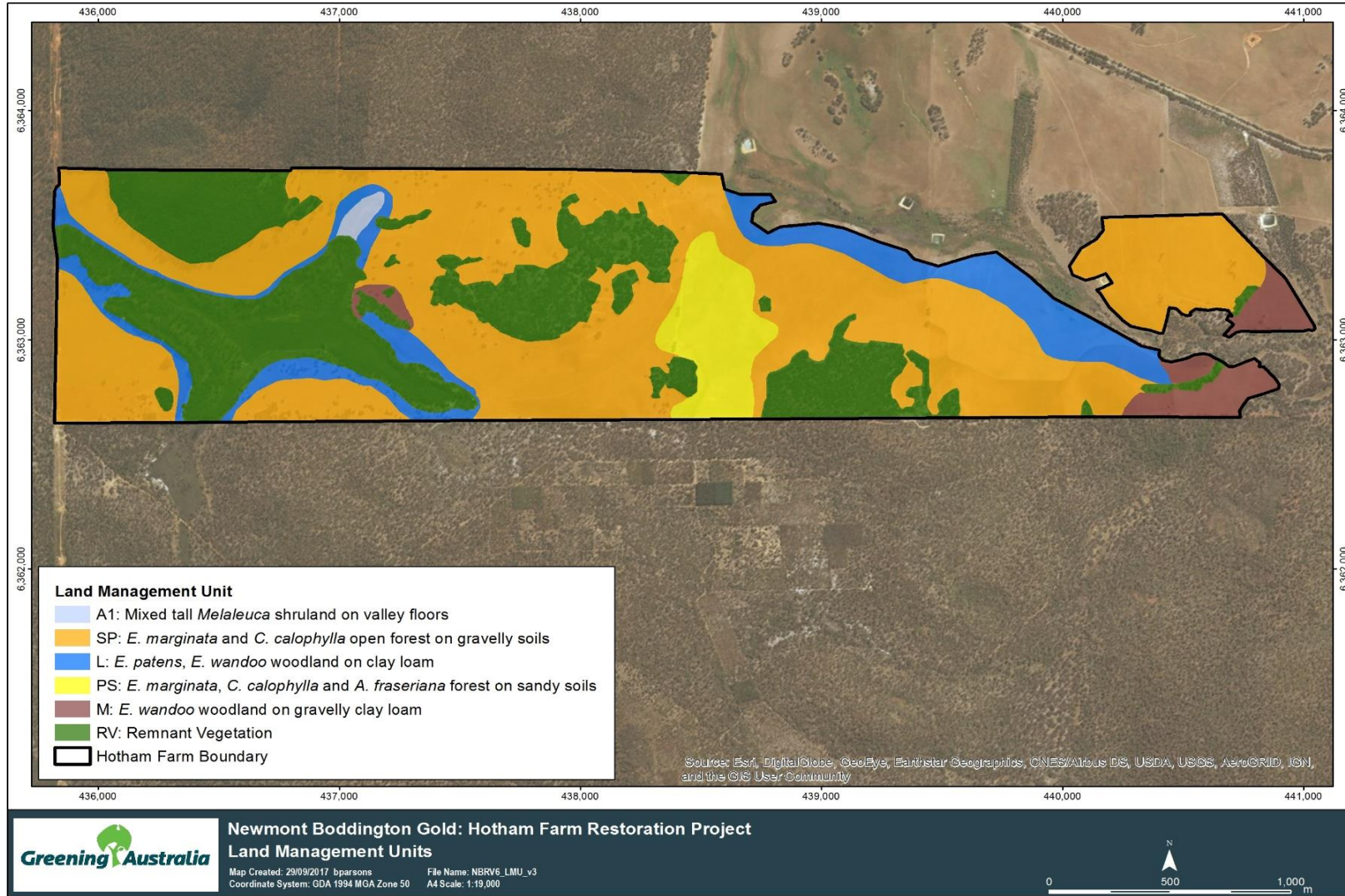
## 6 Appendices

### Appendix 1: Land Management Units Identified Within the Project Area

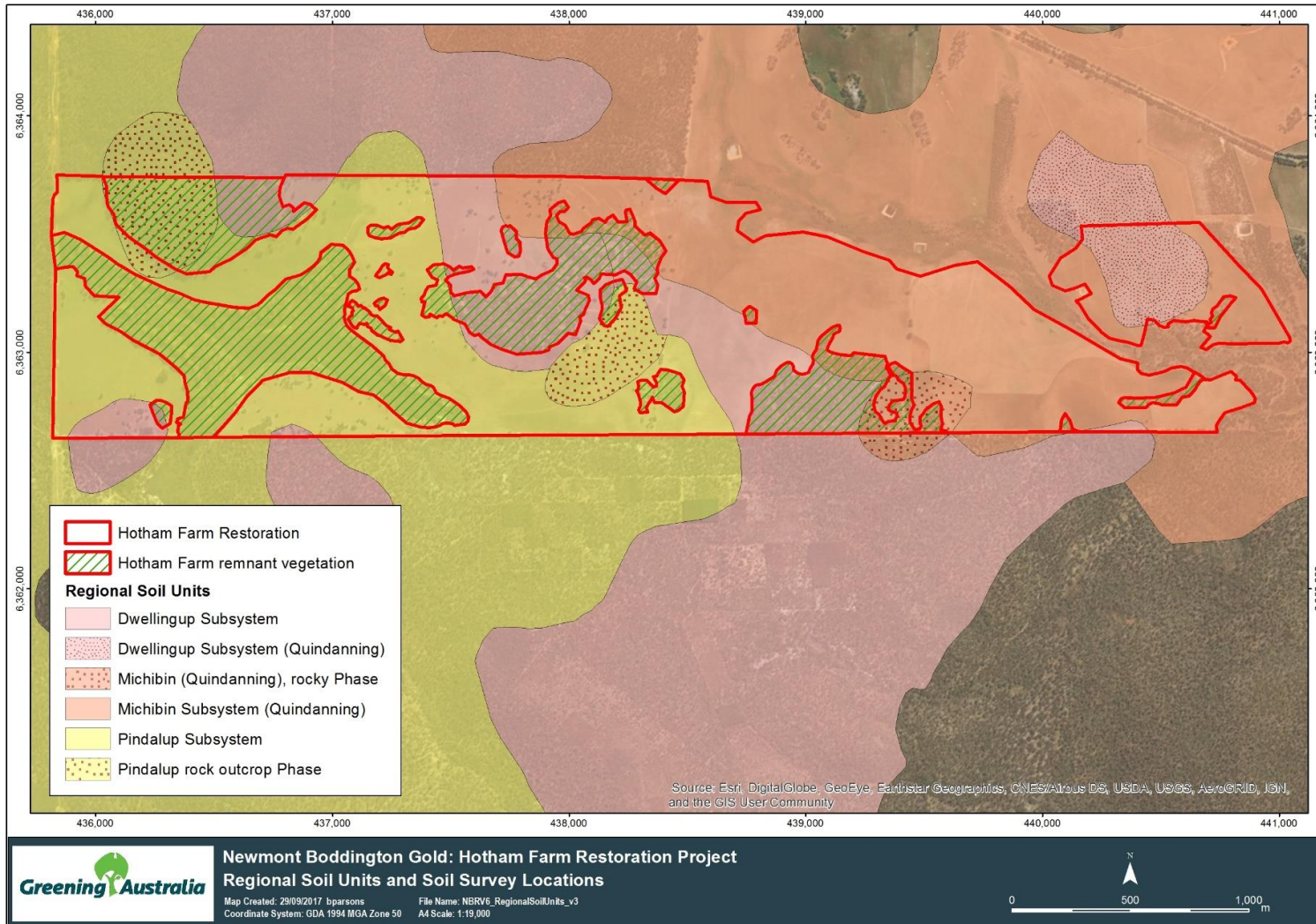
Topographic Position	Soil Unit (DAFWA 2017)	Local Soil Type	Local soil description	Vegetation (Mattiske (2013))	LMU Code	Area, ha (% of Project Area)
Lower to upper slopes, hillcrests	255DpDW Dwellingup Subsystem	Deep Yellow Sand (DS)	Yellow sands greater than 80 cm deep, absence of laterite rocks and pebbles at < 40 cm	PS: Open forest of <i>Allocasuarina fraseriana</i> , <i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> and <i>Banksia grandis</i> over <i>Adenanthos barbiger</i> , <i>Leucopogon capitellatus</i> .	PS	24 (5.1)
Lower to upper slopes, hillcrests	253QdDW Dwellingup Subsystem (Quindanning)	Shallow Gravel (SG)	Ironstone gravel soil over cemented gravels (ferricrete), rock or other hard or permanently cemented layers at 80 cm; grey/yellow shallow sand over rocky, sandy loam.	S: Open forest of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> with admixtures of <i>Allocasuarina fraseriana</i> , <i>Banksia grandis</i> and <i>Persoonia longifolia</i> over <i>Acacia celastrifolia</i> , <i>Hovea chorizemifolia</i> , <i>Daviesia preissii</i> , <i>Leucopogon capitellatus</i> and <i>Styphelia tenuiflora</i> on sandy-gravels on slopes and ridges  SP: Open forest of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> with admixtures of <i>Allocasuarina fraseriana</i> , <i>Banksia grandis</i> and <i>Persoonia longifolia</i> over <i>Acacia celastrifolia</i> , <i>Hovea chorizemifolia</i> , <i>Daviesia preissii</i> , <i>Daviesia decurrens</i> , <i>Lasiopetalum cardiophyllum</i> , <i>Leucopogon capitellatus</i> and <i>Styphelia tenuiflora</i> , <i>Trymalium ledifolium</i> .	S-SP	243 (51.6)
Upper slopes	253QdMnr Michibin (Quindanning), rocky Phase	Loamy Gravel (LG)	Ironstone gravel soil, with a predominantly loamy matrix, often grading to clay at >30 cm; grey/yellow shallow sand over red/yellow-brown loamy gravel soils with some rocky areas.			
Lower slopes	255DpPNr Pindalup rock outcrop Phase					
Lower slopes, valley floor	255DpPN Pindalup Subsystem	Shallow Grey Sand (SGS)	Grey windblown shallow sand topsoil over gravels and sandy gravels on slopes, absence of laterite rocks and pebbles at < 40 cm.	A1: Mixed tall shrubland of <i>Melaleuca viminea</i> , <i>Melaleuca lateritia</i> , <i>Taxandria linearifolia</i> , <i>Astartea scoparia</i> over <i>Baumea juncea</i> and <i>Lepidosperma tetraquetrum</i> with occasional patches of <i>Banksia littoralis</i> and <i>Melaleuca raphiophylla</i> over low herbs on seasonally water-logged clays and clay loams on valley floors	A1	2 (0.4)
		Semi-wet soil (SW)	Non-saline soils, seasonally waterlogged to 30-80 cm with thin sandy topsoil and dark grey/brown silty/sandy clay loams.			

Topographic Position	Soil Unit (DAFWA 2017)	Local Soil Type	Local soil description	Vegetation (Mattiske (2013))	LMU Code	Area, ha (% of Project Area)
			Non-saline soils, seasonally waterlogged to 30-80 cm with sandy topsoil and dark grey/brown silty/sandy clay loam soils.	L: Open woodland of <i>Eucalyptus patens</i> with some <i>Eucalyptus wandoo</i> over <i>Xanthorrhoea preissii</i> , <i>Macrozamia riedlei</i> , <i>Trymalium ledifolium</i> , <i>Acacia saligna</i> and <i>Hakea prostrata</i>	L	46 (9.8)
		Shallow Gravel (SG)	Ironstone gravel soil over cemented gravels (ferricrete), rock or other hard or permanently cemented layers at 80 cm.	M: Open woodland of <i>Eucalyptus wandoo</i> over <i>Trymalium ledifolium</i> , <i>Macrozamia riedlei</i> and <i>Hakea lissocarpha</i> .	M	18 (3.8)
Hillslopes	253QdMN Michibin Subsystem (Quindanning)	Clay Loam (CL)	Brown/grey sand over non-alkaline sandy clay loam to clay at 30-80 cm with gravel in some areas.	M: Open woodland of <i>Eucalyptus wandoo</i> over <i>Trymalium ledifolium</i> , <i>Macrozamia riedlei</i> and <i>Hakea lissocarpha</i> .		
N/A				Remnant Vegetation	RV	138 (29.3)

## APPENDIX 2: Location of Land Management Units Within the Project Area



### APPENDIX 3: Regional Soil Units (DAFWA 2017) Within the Project Area



## APPENDIX 4: CSBP Soil Analysis Data

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### ANALYSIS REPORT

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Lab No		KTS17007	KTS17008	KTS17009	KTS17010	KTS17011	KTS17012	KTS17013	KTS17014
Name		L1S1	L1S2	L1S3	L1S4	L1S5	L1S6	L1S7	L1S8
Code		H.F	H.F	H.F	H.F	G.B	G.B	G.B	G.B
Customer		Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia
Depth		0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10
Colour		GRBR	GRBR	BRGR	GRBR	LTGR	DKGR	GRBR	LTGR
Gravel	%	5-10	5	5	5	10-15	5	10-15	15-20
Texture		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Ammonium Nitrogen	mg/Kg	6	5	4	5	6	4	4	3
Nitrate Nitrogen	mg/Kg	2	2	< 1	2	< 1	< 1	< 1	< 1
Phosphorus Colwell	mg/Kg	15	21	11	12	5	3	2	2
Potassium Colwell	mg/Kg	49	32	17	18	43	49	36	37
Sulphur	mg/Kg	3.5	4.1	3.3	3.5	15.7	4.3	3.3	3.4
Organic Carbon	%	3.24	2.73	1.60	2.49	3.56	3.94	2.31	2.63
Conductivity	dS/m	0.044	0.025	0.019	0.022	0.033	0.036	0.030	0.024
pH Level (CaCl2)	pH	5.1	4.7	4.6	4.8	3.9	4.9	5.1	4.7
pH Level (H2O)	pH	6.1	5.9	5.6	5.9	4.8	6.0	5.9	5.9
DTPA Copper	mg/Kg	0.21	0.18	0.58	0.34	0.40	0.25	0.24	0.22
DTPA Iron	mg/Kg	41.11	31.22	28.66	37.23	112.26	27.76	27.17	25.18
DTPA Manganese	mg/Kg	6.22	11.08	7.22	10.47	8.97	63.36	28.34	42.79
DTPA Zinc	mg/Kg	0.49	0.47	0.59	0.65	0.46	0.35	0.34	0.47
Exc. Aluminium	meq/100g	0.163	0.401	0.592	0.379	1.958	0.291	0.105	0.470
Exc. Calcium	meq/100g	5.76	3.25	0.89	3.51	1.05	7.09	4.20	2.40
Exc. Magnesium	meq/100g	0.67	0.29	0.11	0.45	0.25	1.96	0.86	0.75
Exc. Potassium	meq/100g	0.09	0.03	0.02	0.03	0.07	0.09	0.05	0.04
Exc. Sodium	meq/100g	0.12	0.03	0.03	0.04	0.11	0.12	0.04	0.07
Boron Hot CaCl2	mg/Kg	0.30	0.20	0.14	0.25	0.69	0.41	0.27	0.30



ANALYSIS REPORT

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Lab No	KTS17015	KTS17016	KTS17017	KTS17018	KTS17019	KTS17020	KTS17021	KTS17022
Name	L2S1	L2S2	L2S3	L2S4	L2S5	L2S6	L2S7	L2S8
Code	H.F	H.F	H.F	H.F	G.B	G.B	G.B	G.B
Customer	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia
Depth	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10
Colour	GRBR	GRBR	GRYW	GRYW	GRBR	BRGR	BRGR	BRGR
Gravel	%	5	5	5	5	5	5	5
Texture		1.5	1.5	1.5	1.5	1.5	2.0	2.5
Ammonium Nitrogen	mg/Kg	4	4	5	5	7	33	20
Nitrate Nitrogen	mg/Kg	2	1	3	2	< 1	4	2
Phosphorus Colwell	mg/Kg	4	4	7	5	2	3	< 2
Potassium Colwell	mg/Kg	41	21	19	16	83	305	315
Sulphur	mg/Kg	5.0	4.9	5.7	5.6	7.3	12.2	13.4
Organic Carbon	%	1.84	1.81	2.00	2.01	3.31	5.60	5.65
Conductivity	dS/m	0.025	0.023	0.024	0.030	0.053	0.262	0.139
pH Level (CaCl2)	pH	4.5	4.4	4.2	4.3	4.7	4.9	5.1
pH Level (H2O)	pH	5.7	5.4	5.1	5.4	5.7	5.6	6.0
DTPA Copper	mg/Kg	0.15	0.21	0.13	0.76	0.27	0.80	0.92
DTPA Iron	mg/Kg	51.13	57.62	83.79	61.43	95.30	175.88	121.16
DTPA Manganese	mg/Kg	14.70	12.83	16.87	16.57	35.64	100.49	148.43
DTPA Zinc	mg/Kg	0.24	0.24	0.25	0.43	0.33	0.82	1.83
Exc. Aluminium	meq/100g	0.524	0.958	1.135	0.907	0.314	0.196	0.100
Exc. Calcium	meq/100g	1.38	0.66	0.61	1.14	4.50	9.44	7.99
Exc. Magnesium	meq/100g	0.31	0.15	0.12	0.18	1.96	8.23	9.45
Exc. Potassium	meq/100g	0.08	0.03	0.02	0.03	0.17	0.73	0.75
Exc. Sodium	meq/100g	0.07	0.05	0.06	0.08	0.30	1.01	1.16
Boron Hot CaCl2	mg/Kg	0.26	0.28	0.22	0.24	0.57	1.33	1.50



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Lab No		KTS17023	KTS17024	KTS17025	KTS17026	KTS17027	KTS17028	KTS17029	KTS17030
Name		L5S1	L5S2	L5S3	L5S4	L5S5	L5S6	L5S7	L5S8
Code		H.F	H.F	H.F	H.F	G.B	G.B	G.B	G.B
Customer		Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia
Depth		0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10
Colour		BRGR	BRGR	BRGR	BRGR	BRGR	BRYW	BRYW	BRGR
Gravel	%	5	5	5	5	0	0	0	0
Texture		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Ammonium Nitrogen	mg/Kg	3	3	2	2	3	3	3	3
Nitrate Nitrogen	mg/Kg	1	3	2	1	< 1	< 1	< 1	< 1
Phosphorus Colwell	mg/Kg	43	43	65	45	3	3	< 2	3
Potassium Colwell	mg/Kg	26	22	17	15	22	34	26	21
Sulphur	mg/Kg	5.7	5.6	4.0	4.7	4.0	2.9	3.3	4.1
Organic Carbon	%	1.90	1.73	1.54	1.50	1.92	1.35	1.34	1.78
Conductivity	dS/m	0.013	0.022	0.015	0.016	0.020	0.021	0.016	0.020
pH Level (CaCl2)	pH	4.7	4.8	4.6	4.8	4.6	4.9	4.6	4.2
pH Level (H2O)	pH	5.9	6.1	5.7	6.0	5.7	6.0	5.6	5.4
DTPA Copper	mg/Kg	0.35	0.29	0.33	0.52	0.44	0.22	0.20	0.21
DTPA Iron	mg/Kg	28.02	22.93	27.04	23.78	50.61	31.84	35.28	40.41
DTPA Manganese	mg/Kg	1.97	2.19	1.79	1.58	4.24	3.54	3.07	3.41
DTPA Zinc	mg/Kg	0.41	0.36	0.48	0.48	0.36	0.24	0.11	0.17
Exc. Aluminium	meq/100g	0.413	0.329	0.345	0.294	0.451	0.147	0.320	0.479
Exc. Calcium	meq/100g	1.18	1.29	1.07	1.03	1.44	1.78	0.95	1.04
Exc. Magnesium	meq/100g	0.19	0.14	0.08	0.11	0.42	0.50	0.29	0.31
Exc. Potassium	meq/100g	0.02	0.03	0.02	0.03	0.04	0.06	0.02	0.03
Exc. Sodium	meq/100g	0.03	0.05	0.03	0.04	0.10	0.04	0.06	0.03
Boron Hot CaCl2	mg/Kg	0.17	0.19	0.16	0.16	0.20	0.22	0.22	0.24



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Lab No	KTS17031	KTS17032	KTS17033	KTS17034	KTS17035	KTS17037	KTS17038	KTS17039	
Name	L7S1	L7S2	L7S3	L7S4	L7S5	L7S6	L7S7	L7S8	
Code	H.F	H.F	H.F	H.F	G.B	G.B	G.B	G.B	
Customer	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	
Depth	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	
Colour	GR	GR	GR	GR	DKGR	BRGR	GRBR	BRGR	
Gravel	%	15-20	15-20	15-20	10-15	5	25-30	15-20	5-10
Texture		1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0
Ammonium Nitrogen	mg/Kg	13	9	13	11	16	9	7	4
Nitrate Nitrogen	mg/Kg	3	3	2	2	< 1	1	< 1	< 1
Phosphorus Colwell	mg/Kg	43	43	70	58	6	< 2	< 2	2
Potassium Colwell	mg/Kg	134	82	97	179	435	176	121	214
Sulphur	mg/Kg	11.0	9.5	12.2	9.4	6.1	6.2	4.4	3.4
Organic Carbon	%	5.00	4.65	4.85	4.70	4.90	4.25	4.50	3.37
Conductivity	dS/m	0.036	0.025	0.038	0.039	0.042	0.044	0.034	0.021
pH Level (CaCl2)	pH	4.5	4.6	4.4	4.7	4.6	5.1	5.3	5.4
pH Level (H2O)	pH	5.4	5.8	5.4	5.8	5.7	6.0	6.3	6.4
DTPA Copper	mg/Kg	1.00	1.40	1.18	1.03	0.55	0.38	0.37	0.35
DTPA Iron	mg/Kg	76.38	54.00	87.25	67.52	109.54	39.51	36.68	27.43
DTPA Manganese	mg/Kg	9.63	8.83	13.08	11.63	11.15	11.68	7.96	3.91
DTPA Zinc	mg/Kg	0.76	0.53	0.80	1.14	0.66	0.45	0.87	0.19
Exc. Aluminium	meq/100g	1.321	0.843	1.457	0.583	1.389	0.138	0.093	0.095
Exc. Calcium	meq/100g	3.33	4.08	3.09	5.39	7.98	8.01	9.57	4.61
Exc. Magnesium	meq/100g	0.56	0.55	0.44	1.03	3.84	2.82	2.84	2.18
Exc. Potassium	meq/100g	0.23	0.14	0.18	0.36	0.97	0.34	0.22	0.46
Exc. Sodium	meq/100g	0.12	0.12	0.15	0.12	0.63	0.19	0.17	0.15
Boron Hot CaCl2	mg/Kg	0.56	0.47	0.55	0.64	1.10	0.89	0.53	0.53



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Lab No	KTS17040	KTS17041	KTS17042	KTS17043	KTS17044	KTS17045	KTS17046	KTS17047
Name	L8S1	L8S2	L8S3	L8S4	L8S5	L8S6	L8S7	L8S8
Code	H.F	H.F	H.F	H.F	G.B	G.B	G.B	G.B
Customer	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia	Greening Australia
Depth	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10
Colour	BR	BR	BR	BR	BR	BR	BRGR	LTBR
Gravel	%	5	5	5	5	5	5	5
Texture		3.0	3.0	2.5	3.0	3.0	3.0	2.5
Ammonium Nitrogen	mg/Kg	7	14	11	9	5	5	6
Nitrate Nitrogen	mg/Kg	3	4	4	3	< 1	< 1	< 1
Phosphorus Colwell	mg/Kg	14	47	34	21	< 2	2	5
Potassium Colwell	mg/Kg	44	32	39	127	161	232	295
Sulphur	mg/Kg	8.3	15.2	10.9	10.6	6.0	4.8	8.8
Organic Carbon	%	4.75	5.10	5.20	5.40	4.40	4.70	4.95
Conductivity	dS/m	0.029	0.034	0.031	0.046	0.027	0.023	0.254
pH Level (CaCl2)	pH	4.9	4.6	4.6	4.7	5.2	5.3	5.4
pH Level (H2O)	pH	6.1	5.6	5.7	5.6	6.4	6.3	6.1
DTPA Copper	mg/Kg	1.32	1.68	1.33	1.34	0.66	0.49	0.54
DTPA Iron	mg/Kg	52.37	103.00	98.40	84.26	26.72	25.28	39.59
DTPA Manganese	mg/Kg	6.44	11.25	10.44	8.17	5.44	5.22	11.85
DTPA Zinc	mg/Kg	0.40	0.72	0.79	0.66	0.36	0.16	0.30
Exc. Aluminium	meq/100g	0.482	1.147	0.806	0.596	0.125	0.115	0.085
Exc. Calcium	meq/100g	8.39	6.60	7.12	6.87	5.89	6.37	14.37
Exc. Magnesium	meq/100g	1.04	0.88	0.87	0.91	1.65	1.69	4.28
Exc. Potassium	meq/100g	0.09	0.07	0.09	0.27	0.32	0.45	0.68
Exc. Sodium	meq/100g	0.21	0.26	0.25	0.27	0.36	0.29	1.59
Boron Hot CaCl2	mg/Kg	0.62	0.79	0.84	0.83	0.68	0.83	1.51



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Lab No	KTS17048	KTS17049
Name	LMU T2S6	LMU T2S6
Code	H.F	H.F
Customer	Greening Australia	Greening Australia
Depth	0-5	5-10
Colour	GRBR	BRGR
Gravel	%	5-10
Texture		25-30
Ammonium Nitrogen	mg/Kg	1.5
Nitrate Nitrogen	mg/Kg	13
Phosphorus Colwell	mg/Kg	4
Potassium Colwell	mg/Kg	8
Sulphur	mg/Kg	18
Organic Carbon	%	55
Conductivity	dS/m	24
pH Level (CaCl2)	pH	7.4
pH Level (H2O)	pH	3.9
DTPA Copper	mg/Kg	0.61
DTPA Iron	mg/Kg	54.53
DTPA Manganese	mg/Kg	30.76
DTPA Zinc	mg/Kg	12.96
Exc. Aluminium	meq/100g	1.78
Exc. Calcium	meq/100g	0.56
Exc. Magnesium	meq/100g	0.518
Exc. Potassium	meq/100g	5.79
Exc. Sodium	meq/100g	4.81
Boron Hot CaCl2	mg/Kg	0.32
		0.19

**APPENDIX 5: 2017 Seed Procurement List**

Species name	Total amount required (g)	Nindethana supplied seed NSC (g)	Use of NBG seed stock (g)	Total seed acquired (g)	Amount not sourced (g)	Seed Stock	Batch NS/Seed ID	Batch Qty	No. Seeds/g	Viability	Viable Seeds/g	Germination test results	Provenance	Coll. Date	Pot Trials	Treatment
<i>Acacia alata</i>	1,455	1,455	-	1,455	-											Scarification (Hot water)
<i>Acacia alata</i>						NSC	44,584	531	85	1	60		Keats/Young	Jan-16		
<i>Acacia alata</i>						NSC	44,530	924	85	1	78		Keats/Young	Dec-13		
<i>Acacia browniana</i>																
<i>Acacia celastrifolia</i>	620	1,713	-	1,713	-											Scarification (Hot water)
<i>Acacia celastrifolia</i>						NSC	44,749	2,000	57	1	57		Saddleback	Dec-13		
<i>Acacia celastrifolia</i>						NSC	45,655	530	51	1	49		Saddleback	Dec-14		
<i>Acacia celastrifolia (direct drilling)</i>	10,000	10,317	-	10,317	-	NSC	45,111	9,500	55	1	53		George	Dec-16		
<i>Acacia dentifera</i>	660	720	-	720	-	NSC	44,601	720	102	1	102		Godfrey	Jan-10		Scarification (Hot water)
<i>Acacia drummondii ssp candolleana</i>	5,220	5,220	-	5,220	-											Scarification (Hot water)
<i>Acacia drummondii ssp candolleana</i>						NSC	43,796	882	264	1	264		Marrinup	Dec-15		
<i>Acacia drummondii ssp candolleana</i>						NSC	43,945	728	390	1	312		Bednall	Dec-13		
<i>Acacia drummondii ssp candolleana</i>						NSC	45,110	1,660	336	1	323		Marradong	Nov-16		
<i>Acacia drummondii ssp candolleana</i>						NSC	45,109	1,950	336	1	336		George	Nov-16		
<i>Acacia drummondii ssp drummondii</i>	2,760	2,760	-	2,760	-	NSC	44,744	2,760	576	1	564		Marradong	Jan-12	*	Scarification (Hot water)
<i>Acacia extensa</i>	2,110	2,110	-	2,110	-											Scarification (Hot water)
<i>Acacia extensa</i>						NSC	45,112	810	90	1	86		Marradong	Dec-16		
<i>Acacia extensa</i>						NSC	45,112	1,196	90	1	86		Marradong	Dec-16		
<i>Acacia extensa</i>						NSC	45,210	104					Holmes	Dec-15		
<i>Acacia gilbertii</i>	-	-	-	-	-											
<i>Acacia incurva</i>																
<i>Acacia lateriticola</i>																
<i>Acacia microbotrya</i>	1,500	1,500	-	1,500	-	NSC	44,603	1,500	37	1	37		Saddleback	Jan-10		Scarification (Hot water)
<i>Acacia nervosa</i>	1,858	-	1,475	1,475	383											Scarification (Hot water)
<i>Acacia nervosa</i>						NBG stock	1,496	93					Sotico	Dec-03		
<i>Acacia nervosa</i>						NBG stock	1,284	37					Boddington			
<i>Acacia nervosa</i>						NBG stock	1,365	351	56			0	Sotico			
<i>Acacia nervosa</i>						NBG stock	1,057	629	63			0	Boddington			
<i>Acacia nervosa</i>						NBG stock	1,294	167								

Species name	Total amount required (g)	Nindethana supplied seed NSC (g)	Use of NBG seed stock (g)	Total seed acquired (g)	Amount not sourced (g)	Seed Stock	Batch NS/Seed ID	Batch Qty	No. Seeds/g	Viability	Viable Seeds/g	Germination test results	Provenance	Coll. Date	Pot Trials	Treatment
<i>Acacia nervosa</i>						NBG stock	1,150	198								
<i>Acacia preissiana</i>	-	-	-	-	-											
<i>Acacia pulchella var glaberrima</i>	6,038	6,040	-	6,040	-											Scarification (Hot water)
<i>Acacia pulchella var glaberrima</i>						NSC	45,113	3,000	120	1	120		Marradong	Dec-16		
<i>Acacia pulchella var glaberrima</i>						NSC	45,113	3,040	120	1	120		Marradong	Dec-16		
<i>Acacia pulchella var glaberrima (direct drilling)</i>	10,000	10,000		10,000	-	NSC	45,113	10,000	121	1	121		Marradong	Dec-16		
<i>Acacia saligna</i>	100	100	-	100	-	NSC	44,604	100	74	1	68		Saddleback	Jan-10		Scarification (Hot water)
<i>Acacia stenoptera</i>	-	-	-	-	-											
<i>Acacia willdenowiana</i>																
<i>Adenanthos barbiger</i>																
<i>Agrostocrinum hirsutum</i>																
<i>Agrostocrinum scabrum</i>	200	200	-	200	-											Dry smoke
<i>Agrostocrinum scabrum</i>						NSC	42,593	117	138	1	132		Saddleback	Dec-14		
<i>Agrostocrinum scabrum</i>						NSC	42,604	83	142	1	136		Saddleback	Dec-14		
<i>Allocasuarina fraseriana</i>	9,450	9,450	-	9,450	-											Dry smoke
<i>Allocasuarina fraseriana</i>						NSC	45,416	5,870	238	1	133		Waterous	Mar-17		
<i>Allocasuarina fraseriana</i>						NSC	45,327	949	200	1	168		Saddleback	Feb-17		
<i>Allocasuarina fraseriana</i>						NSC	45,415	1,681	224	1	125		Banksiadale	Mar-17		
<i>Allocasuarina fraseriana</i>						NSC	45,415	950	224	1	125		Banksiadale	Mar-17		
<i>Allocasuarina huegeliana</i>	4,535	4,535	-	4,535	-											Dry smoke
<i>Allocasuarina huegeliana</i>						NSC	45,138	4,035	518	1	497		Marradong	Jan-17		
<i>Allocasuarina huegeliana</i>						NSC	45,114	500	518	1	497		Marradong	Jan-17		
<i>Allocasuarina humilis</i>	5,820	873	-	873	4,947											Dry smoke
<i>Allocasuarina humilis</i>						NSC	45,545	436	580	0	232		Tunnel Rd	May-17		
<i>Allocasuarina humilis</i>						NSC	45,531	198	500	0	240		Bannister	May-17		
<i>Allocasuarina humilis</i>						NSC	45,637	239					Bannister	May-17		
<i>Amphipogon amphipogonoides</i>	-	-	-	-	-											
<i>Amphipogon turbinatus</i>	250	30	-	30	220		45,440	30	436	1	401		Godfrey	Nov-15		
<i>Anigozanthos manglesii</i>	1,655	1,700	-	1,700	-											Dry smoke
<i>Anigozanthos manglesii</i>						NSC	42,519	206	1,200	1	1,200		Cobiac/Randall	Dec-14		
<i>Anigozanthos manglesii</i>						NSC	44,964	134	1,400	1	1,330		Geddes	Dec-13		

Species name	Total amount required (g)	Nindethana supplied seed NSC (g)	Use of NBG seed stock (g)	Total seed acquired (g)	Amount not sourced (g)	Seed Stock	Batch NS/Seed ID	Batch Qty	No. Seeds/g	Viability	Viable Seeds/g	Germination test results	Provenance	Coll. Date	Pot Trials	Treatment
<i>Anigozanthos manglesii</i>						NSC	44,965	360	1,450	1	1,305		Geddes	Dec-14		
<i>Anigozanthos manglesii</i>						NSC	45,275	602	1,284	1	1,233		Darrell/Palmer	Jan-17		
<i>Anigozanthos manglesii</i>						NSC	45,276	398	1,260	1	1,235		Palmer	Jan-17		
<i>Astartea scoparia</i>	660	660	-	660	-											Fresh seed, dry smoke
<i>Astartea scoparia</i>						NSC	44,550	521	4,000	1	3,880		Saddleback	May-16		
<i>Astartea scoparia</i>						NSC	44,550	139	4,000	1	3,880		Saddleback	May-16		
<i>Asteridea pulveralenta</i>	1,500	1,500	-	1,500	-	NSC	45,459	1,500	~780 germinants/gram				Saddleback	Jan-13		Dry smoke
<i>Astroloma ciliatum</i>			Emu mix	Emu mix	-	NSC										Rapid ageing (dry smoke)
<i>Astroloma compactum</i>			Emu mix	Emu mix	-	NSC										Rapid ageing (dry smoke)
<i>Astroloma epacridis</i>	5,279	9,250	275	9,525	-											Rapid ageing (dry smoke)
<i>Astroloma epacridis</i>						NBG stock	1,462	275					Sotico	Dec-04		
<i>Astroloma epacridis</i>						NSC	Emu mix	9,250								
<i>Astroloma pallidum</i>																
<i>Austrostipa campylachne</i>	929	929	-	929	-	NSC	45,392	929	148	1	118		Boddington	Nov-16		
<i>Austrostipa compressa</i>																
<i>Austrostipa mollis</i>	500	500	-	500	-											
<i>Austrostipa mollis</i>						NSC	44,899	442	200	1	170		Boddington	Jan-15		
<i>Austrostipa mollis</i>						NSC	45,441	58	182	1	146		Morgan	Dec-16		
<i>Babingtonia camphorosmae</i>																
<i>Baeckea camphorosmae</i>	1,000	995	-	995	-	NSC	44,295	995	Difficult and slow to germinate				Boddington	Mar-16		Dry smoke
<i>Banksia dallanneyi ssp. sylvestris</i>	-	-	-	-	-											
<i>Banksia fraseri var. fraseri</i>	-	-	-	-	-											
<i>Banksia grandis</i>	14,650	8,384	6,266	14,650	-											*
<i>Banksia grandis</i>						NSC	43,263	4,537	13	1	13		Curara&Balmoral/Windsor	Feb/Mar-15		
<i>Banksia grandis</i>						NSC	43,283	2,784	13	1	13		Curara&Balmoral/Windsor	Feb/Mar-15		
<i>Banksia grandis</i>						NSC	45,431	1,063	14	1	13		Trees	Feb-17		
<i>Banksia grandis</i>						NBG stock	1,349	3,470	12	1	12	1	Marradong	2003		
<i>Banksia grandis</i>						NBG stock	GH#18117	1,000	12	1	12	1	Inglehope	May-08		
<i>Banksia grandis</i>						NBG stock	1,401	1,118	12	1	12		Marradong	2003		
<i>Banksia grandis</i>						NBG stock	1,669	491	12	1	12		Saddleback			

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<i>Banksia grandis</i>						NBG stock	1,489	187					Sotico	Feb-04		
<i>Banksia littoralis</i>	250	27	167	194	56											
<i>Banksia littoralis</i>						NSC	45,234	27		57	1	57	Willowdale	Mar-16		
<i>Banksia littoralis</i>						NBG stock	1,200	30								
<i>Banksia littoralis</i>						NBG stock	1,597	137								
<i>Banksia sessilis</i>	5,860	86	38	124	5,736											*
<i>Banksia sessilis</i>						NSC	45,330	44		60	1	59	Sotico/Saddleback	Feb-17		
<i>Banksia sessilis</i>						NSC	45,368	42		63	1	63	Bell	Jan-16		
<i>Banksia sessilis</i>						NBG stock	BGM4	38					Saddleback	Feb-09		
<i>Banksia sphaerocarpa var. sphaerocarpa</i>	750	150	435	585	165											
<i>Banksia sphaerocarpa var. sphaerocarpa</i>						NSC	45,139	150		29	1	29	Saddleback	Oct-16		
<i>Banksia sphaerocarpa var. sphaerocarpa</i>						NBG stock	1,692	237					Saddleback			
<i>Banksia sphaerocarpa var. sphaerocarpa</i>						NBG stock	1,650	55					Saddleback			
<i>Banksia sphaerocarpa var. sphaerocarpa</i>						NBG stock	KMV-10	100								
<i>Banksia sphaerocarpa var. sphaerocarpa</i>						NBG stock	1,681	43					Marradong			
<i>Banksia squarrosa ssp squarrosa</i>	1,215	502	608	1,110	105											*
<i>Banksia squarrosa ssp squarrosa</i>						NSC	45,331	502		122	1	122	Hedges	Feb-17		
<i>Banksia squarrosa ssp squarrosa</i>						NBG stock	1,682	309		113			1 Saddleback			
<i>Banksia squarrosa ssp squarrosa</i>						NBG stock	KMV-12	100		107			1			
<i>Banksia squarrosa ssp squarrosa</i>						NBG stock	NS 36118	49					Saddleback	Jan-10		
<i>Banksia squarrosa ssp squarrosa</i>						NBG stock	NS 36793	150		115			1 Saddleback, ex. Karafil	Jan-10		
<i>Baumea juncea</i>																
<i>Billardiera fusiformis</i>	1,000	768	-	768	232											Dry smoke
<i>Billardiera fusiformis</i>						NSC	45,092	500		270	1	270	Marradong	Nov-16		
<i>Billardiera fusiformis</i>						NSC	43,919	215		420	1	315	Marradong	Nov-15		
<i>Billardiera fusiformis</i>						NSC	44,605	53		344	1	330	Marradong	Nov-15		
<i>Billardiera varifolia</i>	-	-	-	-	-											Dry smoke
<i>Boronia crenulata</i>	-	-	-	-	-											
<i>Boronia fastigiata</i>	25	25	-	25	-	NSC	45,328	25		460	1	423	Hedges	Dec-16		Dry smoke
<i>Bossiaea eriocarpa</i>	1,280	1,280	-	1,280	-		44,606	1,280		560	1	560	Godfrey	Jan-13		Scarification (Hot water)

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<i>Bossiaea ornata</i>	4,860	1,581	3,279	4,860	-										*	Scarification (Hot water)
<i>Bossiaea ornata</i>						NSC	44,837	121	376	1	353		Saddleback	Nov-12		
<i>Bossiaea ornata</i>						NSC	44,837	1,460	376	1	353		Saddleback	Nov-12		
<i>Bossiaea ornata</i>						NBG stock	844	1,035	378			0	BGM			
<i>Bossiaea ornata</i>						NBG stock	908	813								
<i>Bossiaea ornata</i>						NBG stock	1,260	621								
<i>Bossiaea ornata</i>						NBG stock	1,477	459					Boddington	Dec-03		
<i>Bossiaea ornata</i>						NBG stock	BGM2	351					Saddleback	Dec-08		
<i>Bossiaea pulchella</i>	90	90	-	90	-	NSC	42,738	90	51	1	49		Sotico/Hedges	Nov-14		Scarification (Hot water)
<i>Brachyscome iberidifolia</i>																
<i>Burchardia congesta</i>																
<i>Burchardia multiflora</i>																
<i>Caesia micrantha</i>	25	-	-	-	-											
<i>Caesia micrantha</i>																
<i>Caladenia flava</i>																
<i>Caladenia sp. Brookton</i>																
<i>Calothamnus quadrifidus</i>	1,000	1,000	-	1,000	-	NSC	45,116	1,000	~600 germinants/gram				Sotico	Jan-17		Dry smoke
<i>Calothamnus sanguineus</i>	1,000	893	-	893	107											Dry smoke
<i>Calothamnus sanguineus</i>						NSC	45,117	612	1,470	1	1,352		Saddleback	Jan-17		
<i>Calothamnus sanguineus</i>						NSC	45,163	31	1,470	1	1,352		Saddleback	Jan-17		
<i>Calothamnus sanguineus</i>						NSC	45,163	250	1,470	1	1,352		Saddleback	Jan-17		
<i>Chamaescilla corymbosa</i>	120	122	-	122	-											
<i>Chamaescilla corymbosa</i>						NSC	42,609	99	2,100	1	2,016		Arklow	Dec-14		
<i>Chamaescilla corymbosa</i>						NSC	45,537	23	2,550	1	2,550		Marradong	Nov-16		
<i>Chorizandra enodis</i>																
<i>Clematis pubescens</i>	1,385	1,500	-	1,500	-										*	Dry smoke
<i>Clematis pubescens</i>						NSC	44,896	1,203	383	1	287		George	Dec-15		
<i>Clematis pubescens</i>						NSC	45,049	297	383	1	287		George	Dec-15		
<i>Comesperma calymega</i>																
<i>Comesperma virgatum</i>																
<i>Conostylis pusilla</i>																
<i>Conostylis setigera</i>	-	-	-	-	-											Pot trial
<i>Corymbia calophylla</i>	21,630	-	24,512	24,512	-	NBG stock	1,422	27,800	8			1			*	Dry smoke
<i>Corymbia calophylla (direct drilling)</i>	10,000	-	10,000	10,000	-	NBG stock	1,346	6,712								

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<i>Craspedia variabilis</i>	141	141	-	141	-	NSC	42,532	141	380	1	365		Taree	Dec-14		
<i>Cyathochaeta avenacea</i>	-	-	-	-	-											pot trial
<i>Dampiera alata</i>	-	-	-	-	-											
<i>Dampiera linearis</i>																
<i>Darwinia citriodora</i>	-	-	-	-	-											Dry smoke
<i>Daucus glochidiatus</i>																
<i>Daviesia cordata</i>	1,082	1,082	-	1,082	-	NSC	44,969	1,082	31	1	31		Geddes	Dec-14		Scarification (Hot water)
<i>Daviesia decurrens</i>	500	500	-	500	-	NSC	42,595	500	47	1	42		Boonerring	Dec-14		Scarification (Hot water)
<i>Daviesia divaricata</i>	-	-	-	-	-											
<i>Daviesia horrida</i>	-	-	-	-	-											
<i>Daviesia longifolia</i>	50	-	-	50	-											Scarification (Hot water)
<i>Daviesia longifolia</i>							Tranen	Tranen	50	229	1	229	Boddington	2007		
<i>Daviesia preissii</i>	500	500	-	500	-	NSC	44,607	500	37	1	31		Saddleback	Jan-09		Scarification (Hot water)
<i>Daviesia rhombifolia</i>	500	237	-	237	263											Scarification (Hot water)
<i>Daviesia rhombifolia</i>							NSC	38,943	98	34	1	32	Godfrey	Nov-11		
<i>Daviesia rhombifolia</i>							NSC	40,133	77	39	1	37	Saddleback	Dec-12		
<i>Daviesia rhombifolia</i>							NSC	45,366	20	38	1	35	Saddleback	Jan-08		
<i>Daviesia rhombifolia</i>							NSC	45,367	42	41	1	38	Saddleback	Dec-08		
<i>Desmocladius fasciculatus</i>																
<i>Dianella revoluta</i>	-	-	-	-	-											
<i>Dianella revoluta</i>																
<i>Dichopogon capillipes</i>	500	285	-	285	215	NSC	45,268	285	660	1	634		Godfrey	Jan-17		
<i>Drosera gigantea</i>																
<i>Drosera menziesii</i>																
<i>Drosera platystigma</i>																
<i>Drosera scorpioides</i>																
<i>Eriostemon spicatus</i>	-	-	-	-	-											
<i>Eriostemon spicatus</i>																
<i>Eucalyptus marginata</i>	46,350	46,350	-	46,350	-											*
<i>Eucalyptus marginata</i>							NSC	40,857	30,684	23	1	17	Ernest	Jul-13		
<i>Eucalyptus marginata</i>							NSC	40,857	4,556	23	1	17	Ernest	Jul-13		
<i>Eucalyptus marginata</i>							NSC	40,858	4,343	26	1	13	Federal	Jun-13		
<i>Eucalyptus marginata</i>							NSC	45,604	4,820	17	1	13	Saddleback	Jan-17		

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<i>Eucalyptus marginata (direct drilling)</i>	10,000	10,000	-	10,000	-	NSC	40,857	10,000	23	1	17		Ernest	Jul-13		
<i>Eucalyptus megacarpa</i>	500	219	-	219	281	NSC	45,442	219	25	1	23		Duncan	May-16		Dry smoke
<i>Eucalyptus patens</i>	1,825	1,825	-	1,825	-											
<i>Eucalyptus patens</i>						NSC	45,460	1,100	27 germinants/gram				Saddleback	Mar-17		
<i>Eucalyptus patens</i>						NSC	45,460	725	27 germinants/gram				Saddleback	Mar-17		
<i>Eucalyptus rudis</i>	1,825	1,165	736	1,901	-											
<i>Eucalyptus rudis</i>						NSC	45,332	1,100	360	1	324		Sotico/Saddleback	May-16		
<i>Eucalyptus rudis</i>						NSC	45,332	65	360	1	324		Sotico/Saddleback	Jun-16		
<i>Eucalyptus rudis</i>						NBG stock	1,479	199					Sotico	Feb-04		
<i>Eucalyptus rudis</i>						NBG stock	1,223	235								
<i>Eucalyptus rudis</i>						NBG stock	1,513	302					Sotico	Feb-04		
<i>Eucalyptus wandoo</i>	9,720	9,572	331	9,903	-											
<i>Eucalyptus wandoo</i>						NSS	45,307	1,512	210	1	210		Sotico	Jun-16		
<i>Eucalyptus wandoo</i>						NSS	45,026	388	160	1	144		Boddington	Jan-17		
<i>Eucalyptus wandoo</i>						NSS	45,025	427	104	1	100		Marradong	Jan-17		
<i>Eucalyptus wandoo</i>						NSS	45,546	5,020	180	1	180		Newmarket Rd & Sotico	May-17		
<i>Eucalyptus wandoo</i>						NSS	45,554	611	180	1	180		Newmarket Rd & Sotico	May-17		
<i>Eucalyptus wandoo</i>						NSS	45,532	472	190	1	190		Bannister	May-17		
<i>Eucalyptus wandoo</i>						NSS	45,554	1,080	180	1	180		Newmarket Rd & Sotico	May-17		
<i>Eucalyptus wandoo</i>						NSS	44,758	62	160	1	144		Marradong	Jan-12		
<i>Eucalyptus wandoo</i>						NBG stock	1,235	331								
<i>Gastrolobium bilobum</i>	2,076	2,076	-	2,076	-	NSC	39,241	2,076	132	1	127		Godfrey	Jan-12		Scarification (Hot water)
<i>Gastrolobium calycinum</i>	11,070	6,767	4,070	10,837	233										*	Scarification (Hot water)
<i>Gastrolobium calycinum</i>						NSC	45,371	239	66	1	58		Boddington	Jan-04		
<i>Gastrolobium calycinum</i>						NSC	45,530	6,528	67	1	62		Bindoon	Nov-13		
<i>Gastrolobium calycinum</i>						NBG stock	1,506	2,024					Old Soldiers Rd	Dec-03		
<i>Gastrolobium calycinum</i>						NBG stock	1,539	1,005	60			1	Sotico			
<i>Gastrolobium calycinum</i>						NBG stock	1,169	1,041								
<i>Gastrolobium ebracteolatum</i>	15	15	-	15	-	NSC	45,400	15	500	1	305		Saddleback	Jan-17		Scarification (Hot water)
<i>Gastrolobium spinosum</i>	1,375	827	-	827	548	NSC	45,382	827	80	1	77		Hadfield	Jan-06		Scarification (Hot water)

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<i>Glischrocaryon aureum</i>																
<i>Gompholobium capitatum</i>	-	-	-	-	-											
<i>Gompholobium cyaninum</i>	-	-	-	-	-											
<i>Gompholobium knightianum</i>	-	-	-	-	-											
<i>Gompholobium marginatum</i>	1,465	1,500	-	1,500	-											Scarification (Hot water)
<i>Gompholobium marginatum</i>						NSC	43,922	1,190	600	1	540		Marradong	Nov-15		
<i>Gompholobium marginatum</i>						NSC	45,050	310	725	1	696		George	Dec-16		
<i>Gompholobium polymorphum</i>	-	-	-	-	-											
<i>Gompholobium preissii</i>	185	185	-	185	-											Scarification (Hot water)
<i>Gompholobium preissii</i>						NSC	44,971	35	805	1	741		Holmes	Nov-11		
<i>Gompholobium preissii</i>						NSC	45,333	150	850	1	850		Marradong	Dec-16		
<i>Gonocarpus cordiger</i>	-	-	-	-	-											
<i>Grevillea bipinnatifida</i>	-	-	-	-	-											Dry smoke, scarify
<i>Grevillea monticola</i>	5,540	4,027	851	6,263	-											Dry smoke
<i>Grevillea monticola</i>						NSC	34,686	828	24	1	24		Sotico	Jan-07		
<i>Grevillea monticola</i>						NSC	45,033	3,199	24	1	24		Sotico	Jan-07		
<i>Grevillea monticola</i>						Tranen	Tranen	488	22	1	20		Boddington	2007		
<i>Grevillea monticola</i>						Tranen	Tranen	897	22	1	18		Huntly	2008		
<i>Grevillea monticola</i>						NBG stock	1,233	209		1						
<i>Grevillea monticola</i>						NBG stock	1,612	167		1			Hedges			
<i>Grevillea monticola</i>						NBG stock	1,395	475		1			Sotico	2002		
<i>Grevillea quercifolia</i>	250	-	65	65	185											Dry smoke
<i>Grevillea quercifolia</i>						NBG stock	1,676	24					Saddleback			
<i>Grevillea quercifolia</i>						NBG stock	KMV-13	41								
<i>Haemodorum laxum</i>	-	-	-	-	-											
<i>Haemodorum paniculatum</i>	420	420	-	420	-	NSC	44,900	420	200	1	192		Godfrey	Jan-15		
<i>Haemodorum simplex</i>	450	420	-	420	30											
<i>Haemodorum simplex</i>						NSC	44,630	110	280	1	269		Bannister	Jan-17		
<i>Haemodorum simplex</i>						NSC	45,443	310	300	1	288		Gyngoorda	Dec-15		
<i>Hakea amplexicaulis</i>	2,300	2,300	-	2,300	-											Dry smoke

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<i>Hakea amplexicaulis</i>						NSC	43,924	1,483	20	1	20		Marrinup	Jan-16		
<i>Hakea amplexicaulis</i>						NSC	44,592	497	21	1	21		Keats/Young	Jan-16		
<i>Hakea amplexicaulis</i>						NSC	44,972	320	17	1	17		Plavins	Jan-13		
<i>Hakea cyclocarpa</i>	200	200	-	200	-	NSC	45,372	200	14	1	14		Dwellingup	Jan-08		Dry smoke
<i>Hakea incrassata</i>	200	-	278	278	-											Dry smoke
<i>Hakea incrassata</i>						NBG stock	1,535	149	22	1	22	0	Sotico			
<i>Hakea incrassata</i>						NBG stock	1,657	86					Sotico			
<i>Hakea incrassata</i>						NBG stock	1,571	43					Wells	Jan-03		
<i>Hakea lissocarpha</i>	3,090	972	-	972	2,118											Dry smoke
<i>Hakea lissocarpha</i>						NSC	41,227	312	55	1	55		Saddleback	Jan-13		
<i>Hakea lissocarpha</i>						NSC	44,430	302	46	1	44		Waroona (Forest Block)	Apr-16		
<i>Hakea lissocarpha</i>						NSC	44,281	300	48	1	48		Waroona (Forest Block)	Mar-16		
<i>Hakea lissocarpha</i>						NSC	45,280	58	45	1	44		Waroona	May-16		
<i>Hakea prostrata</i>	2,970	587	238	825	2,145											Dry smoke
<i>Hakea prostrata</i>						NSC	45,384	471	21	1	21		Cooke	Jan-15		
<i>Hakea prostrata</i>						NSC	41,053	46	19	1	19		Cobiac	Oct-13		
<i>Hakea prostrata</i>						NSC	45,434	70	18	1	18		Waroona	Apr-17		
<i>Hakea prostrata</i>						NBG stock	BGM7	238					Sotico	Jan-09		
<i>Hakea ruscifolia</i>	100	89	-	89	11											Dry smoke
<i>Hakea ruscifolia</i>						NSC	45,281	28	53	1	53		Waroona	May-16		
<i>Hakea ruscifolia</i>						NSC	45,435	61	50	1	50		Waroona	Apr-17		
<i>Hakea trifurcata</i>	-	-	-	-	-											Dry smoke
<i>Hakea undulata</i>	2,218	2,002	216	2,218	-											Dry smoke
<i>Hakea undulata</i>						NSC	44,886	361	74	1	74		Waroona (Forest Block)	Apr-16		
<i>Hakea undulata</i>						NSC	44,975	745	54	1	54		Cobiac	Jan-15		
<i>Hakea undulata</i>						NSC	43,383	179	72	1	72		Boddington	May-15		
<i>Hakea undulata</i>						NSC	44,974	78	64	1	64		Cobiac	Mar-16		
<i>Hakea undulata</i>						NSC	45,436	294	75	1	75		Waroona	Apr-17		
<i>Hakea undulata</i>						NSC	45,533	345	70	1	70		Geddes	Apr-17		
<i>Hakea undulata</i>						NBG stock	BGM8	216					Saddleback	Dec-08		

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<i>Hakea varia</i>	220	154	97	251	-											Dry smoke
<i>Hakea varia</i>						NSC	44,638	154	80	1	74		Driver	Jan-16		
<i>Hakea varia</i>						NBG stock	1,518	80					Sotico	Jan-04		
<i>Hakea varia</i>						NBG stock	1,525	17					Bombala	Jul-03		
<i>Hemiandra pungens</i>																
<i>Hemigenia ramosissima</i>	689	-	701	701	-	NBG stock	393	701								Rapid ageing (dry smoke)
<i>Hemigenia rigida</i>	100	-	119	119	-											Rapid ageing (dry smoke)
<i>Hemigenia rigida</i>						NBG stock	671	19					Huntly	1998		
<i>Hemigenia rigida</i>						NBG stock	NS 36794	34					Sotico	Dec-07		
<i>Hemigenia rigida</i>						NBG stock	NS 36585	66					Sotico	Jan-09		
<i>Hibbertia amplexicaulis</i>	250	250	-	250	-											Dry smoke
<i>Hibbertia amplexicaulis</i>						NSC	45,334	209	162	1	154		George	Dec-16		
<i>Hibbertia amplexicaulis</i>						NSC	45,393	41	162	1	154		George	Dec-16		
<i>Hibbertia commutata</i>	-	-	-	-	-											
<i>Hibbertia diamesogenos</i>																
<i>Hibbertia hypericoides</i>	-	-	-	-	-											
<i>Hibbertia pilosa</i>	8	-	8	8	-	NBG stock	1,153	8								Rapid ageing (dry smoke)
<i>Hibbertia serrata</i>	1,500	1,500	-	1,500	-											
<i>Hibbertia serrata</i>						NSC	45,034	1,200	116	1	110		George	Dec-10		Rapid ageing (dry smoke)
<i>Hibbertia serrata</i>						NSC	45,034	300	116	1	110		George	Dec-10		Dry smoke
<i>Hibbertia silvestris</i>																
<i>Homalosciadium homalocarpum</i>																
<i>Hovea chorizemifolia</i>	-	-	-	-	-											
<i>Hovea trisperma</i>	250	250	-	250	-											Scarification (Hot water)
<i>Hovea trisperma</i>						NSC	45,221	56	46	1	40		Windsor	Dec-15		
<i>Hovea trisperma</i>						NSC	45,385	194	43	1	43		Marrinup	Jan-14		
<i>Hyalosperma cotula</i>	242	242	-	242	-											
<i>Hyalosperma cotula</i>						NSC	44,631	112	9,000	1	8,640		George	Dec-15		
<i>Hyalosperma cotula</i>						NSC	45,394	130	8,000	1	7,840		Quind/Saddleback	Nov-16		
<i>Hybanthus floribundus</i>	-	-	-	-	-											

Species name	Total amount required (g)	Nindethana supplied seed NSC (g)	Use of NBG seed stock (g)	Total seed acquired (g)	Amount not sourced (g)	Seed Stock	Batch NS/Seed ID	Batch Qty	No. Seeds/g	Viability	Viable Seeds/g	Germination test results	Provenance	Coll. Date	Pot Trials	Treatment
<i>Hybanthus floribundus</i>																
<i>Hypocalymma angustifolium</i>	7,425	7,425	-	7,425	-										*	
<i>Hypocalymma angustifolium</i>						NSC	45,136	5,581	1,784	1	1,427		Saddleback	Dec-16		
<i>Hypocalymma angustifolium</i>						NSC	44,977	1,121	1,140	1	1,094		Geddes	Jan-15		
<i>Hypocalymma angustifolium</i>						NSC	45,136	723	1,600	1	1,472		Saddleback	Dec-16		
<i>Isolepis cyperoides</i>																
<i>Isopogon dubius</i>	250	200	27	227	23											Dry smoke
<i>Isopogon dubius</i>						NSC	45,369	200	176	1	132		Jarrahdale	Jan-14		
<i>Isopogon dubius</i>						NBG stock	1,145	27								
<i>Isopogon sphaerocephalus</i>	-	-	-	-	-											Dry smoke
<i>Isopogon sphaerocephalus</i>																
<i>Isotoma hypocrateriformis</i>																
<i>Isotoma scapigera</i>																
<i>Jacksonia alata</i>	241	-	241	241	-											Scarification (Hot water)
<i>Jacksonia alata</i>						NBG stock	SW7976	166	912			0	Saddleback			
<i>Jacksonia alata</i>						NBG stock	SW7765	75					Saddleback			
<i>Jacksonia furcellata</i>	-	-	-	-	-											Scarification (Hot water)
<i>Jacksonia sternbergiana</i>	-	-	-	-	-											Scarification (Hot water)
<i>Juncus pallidus</i>																
<i>Kennedia coccinea</i>	2,910	577	2,333	2,910	-											Scarification (Hot water)
<i>Kennedia coccinea</i>						NSC	45,364	577	63	1	60		Palmer	Jan-17		
<i>Kennedia coccinea</i>						NBG stock	1,691	110					Saddleback			
<i>Kennedia coccinea</i>						NBG stock	1,598	1,621		1		1				
<i>Kennedia coccinea</i>						NBG stock	1,576	602		1		1	Bombala	Jan-03		
<i>Kennedia prostrata</i>	3,090	3,090	-	3,090	-											Scarification (Hot water)
<i>Kennedia prostrata</i>						NSC	44,760	954	39	1	37		Saddleback	Dec-08		
<i>Kennedia prostrata</i>						NSC	45,286	2,136	45	1	41		George	Jan-17		
<i>Kunzea recurva</i>	640	640	-	640	-	NSC	45,335	640	~1200 germinants/gram				Saddleback	Feb-17		
<i>Labichea punctata</i>	500	314	-	459	41											Scarification (Hot water), dry smoke
<i>Labichea punctata</i>						NSC	44,978	137	25	1	25		Holmes	Dec-15		
<i>Labichea punctata</i>						NSC	44,978	29	25	1	25		Holmes	Dec-15		
<i>Labichea punctata</i>						NSC	45,220	148	26	1	26		Holmes	Nov-17		

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<i>Labichea punctata</i>							Tranen	Tranen	145	18	1	9	Marrinup	2016		
<i>Lagenophora huegelii</i>	250	147	-	147	103	NSC	44,986	147	900	1	810		Marradong	Nov-16		
<i>Lasiopetalum cardiophyllum</i>																
<i>Lasiopetalum floribundum</i>																
<i>Laxmannia squarrosa</i>																
<i>Lechenaultia biloba</i>	78	78	-	78	-	NSC	45,091	78	584	1	327		Bednall	Dec-16		
<i>Lepidosperma leptostachyum</i>	-	-	-	-	-											
<i>Lepidosperma squamatum</i>	-	-	-	-	-											
<i>Lepidosperma tenue</i>	-	-	-	-	-											
<i>Leptoceras menziesii</i>																
<i>Leptomeria cunninghamii</i>	-	-	-	-	-											
<i>Leptospermum erubescens</i>	640	640	-	640	-	NSC	44,624	640	24 germinants/gram				Saddleback	May-16		Dry smoke
<i>Leucopogon australis</i>																
<i>Leucopogon capitellatus</i>	1,492	1,492	-	1,492	-	NSC	45,149	1,492	133	1	106		Saddleback	Jan-09		Rapid ageing (dry smoke)
<i>Leucopogon nutans</i>	1,545	1,121	-	1,121	424											Rapid ageing (dry smoke)
<i>Leucopogon nutans</i>						NSC	43,200	323	30	1	24		Marradong	Jun-13		
<i>Leucopogon nutans</i>						NSC	44,901	548	21	1	19		Bannister	Jan-15		
<i>Leucopogon nutans</i>						NSC	Emu mix	250								
<i>Leucopogon propinquus</i>	1,545	1,050	-	1,050	-											
<i>Leucopogon propinquus</i>						NSC	45,395	1,000	20	1	19		George	Sep-16		
<i>Leucopogon propinquus</i>						NSC	Emu mix	50								
<i>Leucopogon verticillatus</i>	-	-	-	-	-											
<i>Levenhookia pusilla</i>																
<i>Linum marginale</i>																
<i>Lobelia anceps</i>																
<i>Lomandra brittanii</i>	-	-	-	-	-											
<i>Lomandra caespitosa</i>	-	-	-	-	-											
<i>Lomandra hermaphrodita</i>	-	-	-	-	-											
<i>Lomandra integra</i>	-	-	-	-	-											
<i>Lomandra micrantha</i>	-	-	-	-	-											
<i>Lomandra nigricans</i>	-	-	-	-	-											
<i>Lomandra preissii</i>	-	-	-	-	-											

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<i>Lomandra purpurea</i>	-	-	-	-	-											
<i>Lomandra sericea</i>	-	-	-	-	-											
<i>Lomandra sonderi</i>	500	-	-	-	500											Ferment fruit
<i>Lomandra spartea</i>	-	-	-	-	-											
<i>Luzula meridionalis</i>	-	-	-	-	-											
<i>Macrozamia riedlei</i>	10,000	10,000	-	10,000	-	NSC	45,031	10,000		0	1	0	Holmes	Sep-16		
<i>Marianthus bicolor</i>	1,304	1,304	-	1,304	-											Dry smoke
<i>Marianthus bicolor</i>						NSC	43,210	204		240	1	216	Saddleback	Dec-12		
<i>Marianthus bicolor</i>						NSC	45,439	1,100		290	1	267	Marradong	Jan-15		
<i>Melaleuca holosericea</i>	-	-	-	-	-											
<i>Melaleuca incana</i>	1,100	1,200	-	1,200	-	NSC	45,122	1,200					Saddleback	Jan-17		Dry smoke
<i>Melaleuca lateritia</i>	139	139	-	139	-	NSC	45,370	139					Dwellingup	Jan-15		Dry smoke
<i>Melaleuca preissiana</i>																
<i>Melaleuca radula</i>	500	508	-	508	-											Dry smoke
<i>Melaleuca radula</i>						NSC	45,121	197					Boddington	Jan-17		
<i>Melaleuca radula</i>						NSC	45,336	311					Boddington	Jan-17		
<i>Melaleuca raphiophylla</i>	1,760	1,920	-	1,920	-	NSC	45,141	1,920					Saddleback	Jan-17		Dry smoke
<i>Melaleuca scabra</i>	-	-	-	-	-											
<i>Melaleuca tuberculata var tuberculata</i>	1,500	1,500	-	1,500	-	NSC	28,120	1,500					Saddleback	Sep-05		Dry smoke
<i>Melaleuca viminea</i>	1,100	1,100	-	1,100	-	NSC	45,123	1,100					Saddleback	Jan-17		Dry smoke
<i>Microlaena stipoides</i>	500	96	-	96	404	NSC	45,396	96		132	1	112	George	Dec-16		Need fresh seed (freeze to hold viability)
<i>Millotia tenuifolia</i>																
<i>Neurachne alopecuroidea</i>	1,604	1,604	-	1,604	-											
<i>Neurachne alopecuroidea</i>						NSC	44,633	446		320	1	179	Boddington	Jan-16		
<i>Neurachne alopecuroidea</i>						NSC	44,635	123		320	0	128	Boddington	Dec-16		
<i>Neurachne alopecuroidea</i>						NSC	45,223	669		336	0	148	Balmoral	Nov-16		
<i>Neurachne alopecuroidea</i>						NSC	44,192	366		350	0	140	Darrell	Feb-16		
<i>Opercularia echinocephala</i>	-	-	-	-	-											
<i>Opercularia vaginata</i>	250	250	-	250	-	NSC	45,338	250		2,540	1	1,778	Marradong	Dec-16		Dry smoke

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<i>Orthrosanthus laxus</i>	250	250	-	250	-	NSC	45,522	250	520	1	520		Bednall	Dec-16		
<i>Patersonia babianoides</i>																
<i>Patersonia occidentalis</i>	750	750	-	750	-											Dry smoke
<i>Patersonia occidentalis</i>						NSC	44,902	63	376	1	361		Balmoral	Jan-15		
<i>Patersonia occidentalis</i>						NSC	44,902	615	376	1	361		Balmoral	Jan-15		
<i>Patersonia occidentalis</i>						NSC	45,474	72	384	1	307		Balmoral	Dec-16		
<i>Patersonia pygmaea</i>	-	-	-	-	-											
<i>Patersonia rudis</i>																
<i>Pentapeltis peltigera</i>																
<i>Pericalymma ellipticum</i>	-	-	-	-	-											
<i>Persoonia elliptica</i>	-	-	-	-	-											
<i>Persoonia longifolia</i>	5,000	5,048	-	5,048	-											Rapid ageing (dry smoke)
<i>Persoonia longifolia</i>						NSC	45,035	4,998	5	1	5		Saddleback	Sep-14		
<i>Persoonia longifolia</i>						NSC	Emu mix	50								
<i>Petrophile heterophylla</i>	2,500	2,500	-	2,500	-											Dry smoke
<i>Petrophile heterophylla</i>						NSC	44,790	2,500	320	0	115		Saddleback	Mar-17		
<i>Petrophile serruriae</i>	-	-	-	-	-											
<i>Petrophile serruriae</i>																
<i>Petrophile striata</i>																
<i>Phyllangium divergens</i>																
<i>Phyllanthus calycinus</i>	5,820	5,820	-	5,820	-											Dry smoke
<i>Phyllanthus calycinus</i>						NSC	45,036	2,515	620	1	620		George	Nov-16		
<i>Phyllanthus calycinus</i>						NSC	45,036	3,305	620	1	620		George	Nov-16		
<i>Pimelea ciliata</i>	1,466	1,466	-	1,466	-											
<i>Pimelea ciliata</i>						NSC	45,052	438	260	1	234		Bell	Jan-13		
<i>Pimelea ciliata</i>						NSC	45,339	1,028	252	1	242		Bednall	Dec-16		
<i>Pimelea preissii</i>	1,465	743	-	743	722	NSC	45,340	743	260	0	78		Marradong	Dec-16		Dry smoke
<i>Pimelea suaveolens</i>																
<i>Pimelea sylvestris</i>	-	-	-	-	-											
<i>Podolepis canescens</i>	1,000	1,000	-	1,000	-											
<i>Podolepis canescens</i>						NSC	44,351	570	~800 germinants/gram				Saddleback	Dec-14		
<i>Podolepis canescens</i>						NSC	44,847	430	~1120 germinants/gram				Marradong	Dec-15		

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<i>Podolepis gracilis</i>	250	250	-	250	-	NSC	45,446	250	~400 germinants/gram				George	Jan-17		
<i>Podolepis lessonii</i>	500	500	-	500	-	NSC	45,381	500	~1000 germinants/gram				Marradong	Dec-16		Dry smoke
<i>Ptilotus drummondii</i>	-	-	-	-	-											Dry smoke
<i>Ptilotus manglesii</i>	500	500	-	500	-	NSC	45,108	500	75	0	9		Bell	Jan-17		Dry smoke
<i>Ranunculus colonorum</i>	25	25	-	25	-	NSC	45,341	25	184	1	175		George	Dec-16		
<i>Rhodanthe citrina</i>																
<i>Rytidosperma caespitosa</i>	500	500	-	500	-											Dry smoke
<i>Rytidosperma caespitosa</i>						NSC	42,850	136	1,740	1	1,392		Marradong	Dec-14		
<i>Rytidosperma caespitosa</i>						NSC	44,889	345	1,520	1	1,444		Leona/Geddes/Hakea	Dec-15		
<i>Rytidosperma caespitosa</i>						NSC	45,161	19	1,500	1	1,380		George	Nov-16		
<i>Samolus junceus</i>																
<i>Scaevola calliptera</i>																
<i>Scaevola striata</i>																
<i>Schoenus nanus</i>																
<i>Senecio hispidulus</i>																
<i>Sowerbaea laxiflora</i>																
<i>Sphaerolobium medium</i>	250	163	83	246	-											Scarification (Hot water)
<i>Sphaerolobium medium</i>						NSC	45,269	163	1,144	1	1,144		Bell	Dec-16		
<i>Sphaerolobium medium</i>						NBG stock	1,158	26								
<i>Sphaerolobium medium</i>						NBG stock	1,165	11								
<i>Sphaerolobium medium</i>						NBG stock	1,563	46					Boddington	Oct-03		
<i>Stackhousia monogyna</i>	1,545	1,500	-	1,500	45	NSC	45,095	1,500	410	1	410		Bell	Dec-16		Dry smoke
<i>Stackhousia scoparia</i>	2,789	686	-	686	2,103	NSC	45,398	686	352	1	310		Sotico	Dec-16		
<i>Stirlingia latifolia</i>	2,192	-	1,246	1,246	946											Rapid ageing (dry smoke)
<i>Stirlingia latifolia</i>						NBG stock	1,425	978					Bannister	2002		
<i>Stirlingia latifolia</i>						NBG stock	1,101	248								
<i>Stirlingia latifolia</i>						NBG stock	1,104	20								
<i>Stirlingia simplex</i>	820	820	-	820	-	NSC	45,399	820	192	0	46		Saddleback	Dec-16		
<i>Stylidium affine</i>	500	341	-	341	159	NSC	45,001	341	1,400	1	1,400		Godfrey/Hillman	Dec-16		Dry smoke
<i>Stylidium amoenum</i>																
<i>Stylidium calcaratum</i>																
<i>Stylidium carnosum</i>																
<i>Stylidium ciliatum</i>																
<i>Stylidium hispidum</i>																
<i>Stylidium piliferum</i>																

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<i>Stylidium uniflorum</i>	-	-	-	-	-											
<i>Styphelia tenuiflora</i>	500	400	-	400	100	NSC	Emu mix	400								Rapid ageing (dry smoke)
<i>Taxandria linearifolia</i>	-	-	-	-	-											
<i>Templetonia drummondii</i>	-	-	-	-	-											
<i>Tetrarrhena laevis</i>																
<i>Tetradlea hirsuta</i>																
<i>Tetradlea nuda</i>	-	-	-	-	-											
<i>Tetradlea virgata</i>	-	-	-	-	-											
<i>Thelymitra crinita</i>																
<i>Thelymitra macrophylla</i>																
<i>Thysanotus fastigiatus</i>																
<i>Thysanotus multiflorus</i>	45	45	-	45	-	NSC	35,720	45	312	1	281		Teesdale	Dec-09		Dry smoke
<i>Thysanotus patersonii</i>	-	-	-	-	-											
<i>Thysanotus tenellus</i>																
<i>Thysanotus thyrsoides</i>																
<i>Trachymene pilosa</i>	103	103	-	103	-	NSC	43,928	103	1,250	1	1,050		George	Dec-15		
<i>Trichocline spathulata</i>	-	-	-	-	-											
<i>Trichocline spathulata</i>																
<i>Tricoryne elatior</i>	200	200	-	200	-	NSC	45,523	200	158	1	139		George	Dec-16		
<i>Tricoryne humilis</i>																
<i>Tripterococcus brunonis</i>	649	649	-	649	-											Dry smoke
<i>Tripterococcus brunonis</i>						NSC	42,524	502	162	1	84		Randall/Cooke	Nov-14		
<i>Tripterococcus brunonis</i>						NSC	42,571	147	192	0	84		Randall/Cooke	Nov-14		
<i>Trymalium ledifolium</i>	15,450	15,450	-	15,450	-										*	Dry smoke
<i>Trymalium ledifolium</i>						NSC	45,125	14,602	920	0	368		George	Dec-16		
<i>Trymalium ledifolium</i>						NSC	45,125	848	920	0	368		George	Dec-16		
<i>Trymalium odoratissimum ssp odoratissimum</i>	900	1,197	-	1,197	-											Dry smoke
<i>Trymalium odoratissimum ssp odoratissimum</i>						NSC	45,126	1,097	1,097	1	658		George	Dec-16		
<i>Trymalium odoratissimum ssp odoratissimum</i>						NSC	45,126	100	1,097	1	658		George	Jan-17		
<i>Utricularia inaequalis</i>																
<i>Velleia trinervis</i>	450	450	-	450	-	NSC	45,535	450	728	1	641		Balmoral	Dec-16		
<i>Verticordia densiflora</i>	110	500	-	500	-	NSC	45,373	500	350	0	154		Kalamunda	Jan-15		
<i>Viminaria juncea</i>	1,760	1,760	-	1,760	-										*	Scarification (Hot water), dry smoke

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<i>Viminaria juncea</i>						NSC	44,615	370	183	1	172		Godfrey	Jan-15		
<i>Viminaria juncea</i>						NSC	43,105	681	166	1	159		Occidental	Jan-13		
<i>Viminaria juncea</i>						NSC	44,615	709	180	1	166		Godfrey	Jan-15		
<i>Wurmbea dioica</i>																
<i>Xanthorrhoea gracilis</i>	8,250	8,250	-	8,250	-										*	Dry smoke
<i>Xanthorrhoea gracilis</i>						NSC	43,990	3,036	79	1	77		George	Jan-16		
<i>Xanthorrhoea gracilis</i>						NSC	43,989	3,181	68	1	67		Nanga	Jan-16		
<i>Xanthorrhoea gracilis</i>						NSC	45,270	2,033	72	1	71		Samson	Feb-17		
<i>Xanthorrhoea preissii</i>	9,270	9,173	-	9,173	97										*	Dry smoke
<i>Xanthorrhoea preissii</i>						NSC	42,911	2,551	63	1	62		Curara	Mar-15		
<i>Xanthorrhoea preissii</i>						NSC	44,228	4,729	61	1	60		Boddington	Jan-16		
<i>Xanthorrhoea preissii</i>						NSC	42,811	1,893	61	1	61		Curara	Feb-15		
<i>Xanthosia atkinsoniana</i>																
<i>Xanthosia candida</i>																
<i>Xylomelum occidentale</i>	250	250	-	250	-	NSC	44,981	250	4	1	4		Balmoral	Feb-15		Dry smoke

## APPENDIX 6: Species Distribution Across LMU for 2017 Restoration Effort

	Species	Occurrence in LMU				
		A1	L	M	PS	S,SP
1	<i>Acacia alata</i>		U	PU	PU	PU
2	<i>Acacia browniana</i>			P		P
3	<i>Acacia celastrifolia</i>		U			PU
4	<i>Acacia dentifera</i>	PU	PU			
5	<i>Acacia drummondii</i> ssp. <i>candolleana</i>		U	P		PU
6	<i>Acacia drummondii</i> ssp. <i>drummondii</i>		U	PU		PU
7	<i>Acacia extensa</i>	PU	PU		PU	PU
8	<i>Acacia gilbertii</i>			P		
9	<i>Acacia incurva</i>	P				
10	<i>Acacia lateriticola</i>					P
11	<i>Acacia microbotrya</i>		U		PU	
12	<i>Acacia nervosa</i>	PU	PU	PU		PU
13	<i>Acacia preissiana</i>				P	P
14	<i>Acacia pulchella</i> var. <i>glaberrima</i>	PU	PU	PU	PU	PU
15	<i>Acacia saligna</i>	PU	PU			
16	<i>Acacia stenoptera</i>				P	
17	<i>Acacia willdenowiana</i>					P
18	<i>Adenanthos barbiger</i>				P	
19	<i>Agrostocrinum hirsutum</i>					P
20	<i>Agrostocrinum scabrum</i>		U			PU
21	<i>Allocasuarina fraseriana</i>	PU	U		PU	PU
22	<i>Allocasuarina huegeliana</i>		U			PU
23	<i>Allocasuarina humilis</i>		U	PU	PU	PU
24	<i>Amphipogon amphipogonoides</i>				G	G
25	<i>Amphipogon turbinatus</i>				G	G
26	<i>Anigozanthos manglesii</i>	P	PU	PU	PU	PU
27	<i>Astartea scoparia</i>	PU	PU			
28	<i>Asteridea pulveralenta</i>		U		PU	PU
29	<i>Astroloma ciliatum</i>		PU		P	PU
30	<i>Astroloma compactum</i>		U			PU
31	<i>Astroloma epacridis</i>		U			PU
32	<i>Astroloma pallidum</i>			P		P
33	<i>Austrostipa campylachne</i>				G	G
34	<i>Austrostipa compressa</i>		G			
35	<i>Austrostipa mollis</i>			G	G	G
36	<i>Babingtonia camphorosmae</i>		P			P
37	<i>Baekkea camphorosmae</i>		U		PU	P
38	<i>Banksia dallanneyi</i> ssp. <i>sylvestris</i>			P	P	P
39	<i>Banksia fraseri</i> var. <i>fraseri</i>				P	P
40	<i>Banksia grandis</i>		U	P	PU	PU
41	<i>Banksia littoralis</i>	PU	PU			
42	<i>Banksia sessilis</i>		U		PU	PU

43	<i>Banksia sphaerocarpa</i> var. <i>sphaerocarpa</i>		U		PU	
44	<i>Banksia squarrosa</i> ssp. <i>squarrosa</i>		PU	P		PU
45	<i>Baumea juncea</i>	P	P			
46	<i>Billardiera fusiformis</i>	P	U		P	PU
47	<i>Billardiera varifolia</i>					P
48	<i>Boronia crenulata</i>				P	
49	<i>Boronia fastigiata</i>		U		P	PU
50	<i>Bossiaea eriocarpa</i>		U		PU	
51	<i>Bossiaea ornata</i>		U	P	P	PU
52	<i>Bossiaea pulchella</i>					P
53	<i>Brachyscome iberidifolia</i>	P				
54	<i>Burchardia congesta</i>	P				
55	<i>Burchardia multiflora</i>		P			
56	<i>Caesia micrantha</i>	P	P	P	P	P
57	<i>Caladenia flava</i>		P		P	P
58	<i>Calothamnus quadrifidus</i>	PU	PU		PU	PU
59	<i>Calothamnus sanguineus</i>		U		PU	
60	<i>Chamaescilla corymbosa</i>		PU	P	PU	PU
61	<i>Chorizandra enodis</i>	P				
62	<i>Clematis pubescens</i>		U	PU	P	PU
63	<i>Comesperma calymega</i>					P
64	<i>Comesperma virgatum</i>			P		P
65	<i>Conostylis pusilla</i>		P	P		P
66	<i>Conostylis setigera</i>			R	R	R
67	<i>Corymbia calophylla</i>	P	U	PU	PU	PU
68	<i>Craspedia variabilis</i>	P	U	PU		PU
69	<i>Cyathochaeta avenacea</i>		P			P
70	<i>Dampiera alata</i>			P		
71	<i>Dampiera linearis</i>		P		P	
72	<i>Darwinia citriodora</i>	P	P	P	P	P
73	<i>Daucus glochidiatus</i>					P
74	<i>Daviesia cordata</i>					PU
75	<i>Daviesia decurrens</i>	P	U	PU		PU
76	<i>Daviesia divaricata</i>	P	P	P		
77	<i>Daviesia horrida</i>					
78	<i>Daviesia longifolia</i>		U			PU
79	<i>Daviesia preissii</i>		U	PU		PU
80	<i>Daviesia rhombifolia</i>		U			PU
81	<i>Desmocladius fasciculatus</i>				P	
82	<i>Dianella revoluta</i>		P	P	P	P
83	<i>Dichopogon capillipes</i>	P	U	PU	PU	PU
84	<i>Eriostemon spicatus</i>				P	
85	<i>Eucalyptus marginata</i>	P	U	PU	PU	PU
86	<i>Eucalyptus megacarpa</i>	PU	P			
87	<i>Eucalyptus patens</i>	PU	PU			
88	<i>Eucalyptus rudis</i>	PU	PU			
89	<i>Eucalyptus wandoo</i>	PU	PU	PU	PU	

90	<i>Gastrolobium bilobum</i>	PU	U		U	
91	<i>Gastrolobium calycinum</i>	PU	PU	PU	PU	PU
92	<i>Gastrolobium ebracteolatum</i>	P	U			PU
93	<i>Gastrolobium spinosum</i>		U		PU	PU
94	<i>Gompholobium cyaninum</i>				P	P
95	<i>Gompholobium knightianum</i>				P	P
96	<i>Gompholobium marginatum</i>		PU	P	PU	PU
97	<i>Gompholobium polymorphum</i>			P	P	P
98	<i>Gompholobium preissii</i>		U		PU	PU
99	<i>Gonocarpus cordiger</i>				P	P
100	<i>Grevillea bipinnatifida</i>		P	P		
101	<i>Grevillea monticola</i>		U	PU		PU
102	<i>Grevillea quercifolia</i>		U			PU
103	<i>Haemodorum laxum</i>					
104	<i>Haemodorum paniculatum</i>		PU	PU	PU	P
105	<i>Haemodorum simplex</i>		PU			P
106	<i>Hakea amplexicaulis</i>		U		P	PU
107	<i>Hakea cyclocarpa</i>		U		PU	PU
108	<i>Hakea incrassata</i>		U			PU
109	<i>Hakea lissocarpha</i>		PU	PU	PU	PU
110	<i>Hakea prostrata</i>	PU	PU		PU	PU
111	<i>Hakea ruscifolia</i>		U		PU	PU
112	<i>Hakea trifurcata</i>					*
113	<i>Hakea undulata</i>		U	PU		PU
114	<i>Hakea varia</i>	PU	PU			
115	<i>Hemiandra pungens</i>				P	
116	<i>Hemigenia ramosissima</i>					P
117	<i>Hemigenia rigida</i>		U		PU	PU
118	<i>Hibbertia amplexicaulis</i>			R	R	R
119	<i>Hibbertia commutata</i>		P	P	P	P
120	<i>Hibbertia diamesogenos</i>		P			P
121	<i>Hibbertia hypericoides</i>			P	P	
122	<i>Hibbertia pilosa</i>		U			PU
123	<i>Hibbertia serrata</i>		U			PU
124	<i>Hibbertia silvestris</i>					P
125	<i>Homalosciadium homalocarpum</i>					P
126	<i>Hovea chorizemifolia</i>			P	P	P
127	<i>Hovea trisperma</i>		U	PU	PU	PU
128	<i>Hyalosperma cotula</i>	P	PU		PU	PU
129	<i>Hybanthus floribundus</i>		P		P	P
130	<i>Hypocalymma angustifolium</i>	PU	PU	PU	PU	PU
131	<i>Isolepis cyperoides</i>		P			
132	<i>Isopogon dubius</i>		U		PU	PU
133	<i>Isopogon sphaerocephalus</i>				P	P
134	<i>Isotoma hypocrateriformis</i>					P
135	<i>Isotoma scapigera</i>					P
136	<i>Jacksonia alata</i>		U	PU	PU	PU

137	<i>Jacksonia furcellata</i>				P	P
138	<i>Jacksonia sternbergiana</i>				P	
139	<i>Juncus pallidus</i>	P				
140	<i>Kennedia coccinea</i>		U	U	PU	PU
141	<i>Kennedia prostrata</i>	P	U	P	PU	PU
142	<i>Kunzea recurva</i>		U		PU	
143	<i>Labichea punctata</i>		U	P	PU	PU
144	<i>Lagenophora huegelii</i>		P	PU	P	P
145	<i>Lasiopetalum cardiophyllum</i>					P
146	<i>Lasiopetalum floribundum</i>				P	P
147	<i>Laxmannia squarrosa</i>				P	P
148	<i>Lechenaultia biloba</i>				R	R
149	<i>Lepidosperma apicola</i>					R
150	<i>Lepidosperma asperatum</i>					R
151	<i>Lepidosperma leptostachyum</i>		P	P	P	P
152	<i>Lepidosperma squamatum</i>				R	R
153	<i>Lepidosperma tenue</i>			R		R
154	<i>Leptoceras menziesii</i>	P				
155	<i>Leptomeria cunninghamii</i>			P		
156	<i>Leptospermum erubescens</i>		U		PU	
157	<i>Leucopogon australis</i>	P				
158	<i>Leucopogon capitellatus</i>		U	PU	P	PU
159	<i>Leucopogon nutans</i>		U	PU	U	PU
160	<i>Leucopogon propinquus</i>		U	PU	PU	PU
161	<i>Leucopogon verticillatus</i>				P	P
162	<i>Levenhookia pusilla</i>		P		P	P
163	<i>Linum marginale</i>					P
164	<i>Lobelia anceps</i>	P				
165	<i>Lomandra brittanii</i>			P	P	P
166	<i>Lomandra caespitosa</i>		P	P	P	P
167	<i>Lomandra hermaphrodita</i>			P	P	P
168	<i>Lomandra integra</i>			P	P	P
169	<i>Lomandra micrantha</i>			R	R	R
170	<i>Lomandra nigricans</i>			P	P	P
171	<i>Lomandra preissii</i>			P	P	P
172	<i>Lomandra purpurea</i>			P	P	P
173	<i>Lomandra sericea</i>			P	P	P
174	<i>Lomandra sonderi</i>			P	P	P
175	<i>Lomandra spartea</i>			P	P	P
176	<i>Luzula meridionalis</i>			P	P	P
177	<i>Macrozamia riedlei</i>		P	P	PU	PU
178	<i>Marianthus bicolor</i>		U			PU
179	<i>Melaleuca holosericea</i>				P	P
180	<i>Melaleuca incana</i>	PU	PU			
181	<i>Melaleuca lateritia</i>	PU	U			
182	<i>Melaleuca preissiana</i>	P				
183	<i>Melaleuca radula</i>		U			PU

184	<i>Melaleuca raphiophylla</i>	PU	PU			
185	<i>Melaleuca scabra</i>					P
186	<i>Melaleuca tuberculata</i> var. <i>tuberculata</i>		U		PU	PU
187	<i>Melaleuca viminea</i>	PU	PU			
188	<i>Microlaena stipoides</i>	G		G	G	G
189	<i>Millotia tenuifolia</i>				P	P
190	<i>Neurachne alopecuroidea</i>		G	G	G	G
191	<i>Opercularia echinocephala</i>		P	P	P	P
192	<i>Opercularia vaginata</i>		U		PU	PU
193	<i>Orthrosanthus laxus</i>		U		PU	PU
194	<i>Patersonia babianoidea</i>				P	
195	<i>Patersonia occidentalis</i>	PU	PU			PU
196	<i>Patersonia pygmaea</i>				P	P
197	<i>Patersonia rudis</i>		P			P
198	<i>Pentapeltis peltigera</i>			P	P	P
199	<i>Pericalymma ellipticum</i>				P	
200	<i>Persoonia elliptica</i>				P	P
201	<i>Persoonia longifolia</i>		U		PU	PU
202	<i>Petrophile heterophylla</i>		U			PU
203	<i>Petrophile serruriae</i>				P	P
204	<i>Petrophile striata</i>					P
205	<i>Phyllangium divergens</i>		P			P
206	<i>Phyllanthus calycinus</i>		U	PU	PU	PU
207	<i>Pimelea ciliata</i>		U		PU	PU
208	<i>Pimelea preissii</i>		U		PU	PU
209	<i>Pimelea suaveolens</i>				P	
210	<i>Pimelea suaveolens</i> ssp. <i>suaveolens</i>		P			
211	<i>Pimelea sylvestris</i>				P	P
212	<i>Podolepis canescens</i>				P	P
213	<i>Podolepis gracilis</i>		U	P	PU	PU
214	<i>Podolepis lessonii</i>		U		PU	PU
215	<i>Ptilotus drummondii</i>			P	P	P
216	<i>Ptilotus manglesii</i>		U	P	PU	PU
217	<i>Ranunculus colonorum</i>	P		PU		
218	<i>Rhodanthe citrina</i>				P	P
219	<i>Rytidosperma caespitosa</i>			G	G	G
220	<i>Samolus junceus</i>	P				
221	<i>Scaevola calliptera</i>				P	P
222	<i>Scaevola striata</i>				P	
223	<i>Schoenus nanus</i>					P
224	<i>Senecio hispidulus</i>					P
225	<i>Sowerbaea laxiflora</i>	P				
226	<i>Sphaerolobium medium</i>		U			PU
227	<i>Stackhousia monogyna</i>		PU	PU	PU	PU
228	<i>Stackhousia scoparia</i>		U	P	PU	PU
229	<i>Stirlingia latifolia</i>		U		PU	
230	<i>Stirlingia simplex</i>		U		PU	

231	<i>Stylidium affine</i>		U	PU		PU
232	<i>Stylidium amoenum</i>			P		P
233	<i>Stylidium calcaratum</i>				P	P
234	<i>Stylidium carnosum</i>		P			
235	<i>Stylidium ciliatum</i>			P		P
236	<i>Stylidium hispidum</i>				P	
237	<i>Stylidium piliferum</i>			P	P	P
238	<i>Stylidium uniflorum</i>			P		P
239	<i>Styphelia tenuiflora</i>		U	P	P	PU
240	<i>Taxandria linearifolia</i>	P	P			
241	<i>Templetonia drummondii</i>					P
242	<i>Tetaria apillaris</i>					R
243	<i>Tetaria octandra</i>					R
244	<i>Tetrarrhena laevis</i>			P	P	P
245	<i>Tetradlea hirsuta</i>			P		P
246	<i>Tetradlea nuda</i>				P	P
247	<i>Tetradlea virgata</i>		P		P	P
248	<i>Thelymitra crinita</i>		P		P	P
249	<i>Thelymitra macrophylla</i>		P		P	
250	<i>Thysanotus fastigiatus</i>			P		P
251	<i>Thysanotus multiflorus</i>		PU	P	P	PU
252	<i>Thysanotus patersonii</i>			P	P	P
253	<i>Thysanotus tenellus</i>		P			P
254	<i>Thysanotus thyrsoides</i>			P		P
255	<i>Trachymene pilosa</i>		U	P	P	PU
256	<i>Trichocline spathulata</i>			P	P	P
257	<i>Tricoryne elatior</i>		PU	P	PU	PU
258	<i>Tricoryne humilis</i>					P
259	<i>Tripterococcus brunonis</i>		U		PU	PU
260	<i>Trymalium ledifolium</i>		PU	PU	PU	PU
261	<i>Trymalium odoratissimum ssp. odoratissimum</i>	P		PU		P
262	<i>Utricularia inaequalis</i>		P			
263	<i>Velleia trinervis</i>		U			PU
264	<i>Verticordia densiflora</i>	PU	U			P
265	<i>Viminaria juncea</i>	PU	PU			
266	<i>Wurmbea dioica</i>	P				
267	<i>Xanthorrhoea gracilis</i>		PU		PU	PU
268	<i>Xanthorrhoea preissii</i>	P	PU	PU	PU	PU
269	<i>Xanthosia atkinsoniana</i>					P
270	<i>Xylomelum occidentale</i>		U		PU	
271	<i>Xanthosia candida</i>			P		P

- P Proposed species for LMU mix, not used in 2017  
 PU Proposed species for LMU mix, used in 2017  
 U Used in LMU mix in 2017, not originally  
 R Recalcitrant planting species (orange shading)  
 G Grass species, not seeded in 2017 (green shading)

## APPENDIX 7: Additional Species Suggested by Project Experts and Used in 2017

Species	LMU					Reason for Inclusion
	A1	L	M	PS	S,SP	
<i>Acacia dentifera</i>	1	1				Coloniser - N fixation
<i>Eucalyptus megacarpa</i>	1	1				Habitat Value
<i>Gastrolobium bilobum</i>	1	1				Habitat Value
<i>Gastrolobium spinosum</i>				1	1	Habitat Value
<i>Hakea cyclocarpa</i>				1	1	Habitat Value
<i>Hakea incrassata</i>					1	Habitat Value
<i>Hakea ruscifolia</i>				1	1	Habitat Value
<i>Hemigenia ramosissima</i>					1	Found across multiple soil types
<i>Hemigenia rigida</i>				1	1	Found across multiple soil types
<i>Hibbertia pilosa</i>					1	Found across multiple soil types
<i>Hibbertia serrata</i>					1	Found across multiple soil types
<i>Isopogon dubius</i>				1	1	Found across multiple soil types
<i>Jacksonia alata</i>			1	1	1	Found across multiple soil types
<i>Lepidosperma apricola</i>					1	Nursery Availability - recalcitrant planting
<i>Lepidosperma asperatum</i>				1	1	Nursery Availability - recalcitrant planting
<i>Lepidosperma squamatum</i>				1	1	Nursery Availability - recalcitrant planting
<i>Melaleuca tuberculata</i> var. <i>tuberculata</i>				1	1	Found across multiple soil types
<i>Orthrosanthus laxus</i>				1	1	Found across multiple soil types
<i>Stirlingia latifolia</i>				1		Found across multiple soil types
<i>Stirlingia simplex</i>				1		Found across multiple soil types
<i>Stylidium affine</i>			1		1	Found across multiple soil types
<i>Velleia trinervis</i>					1	Found across multiple soil types
<i>Verticordia densiflora</i>					1	Found across multiple soil types
<i>Viminaria juncea</i>	1	1				Coloniser - N fixation

## APPENDIX 8: LMU Species Composition, Rates, Treatment and Seed Size Batching Allocation, 2017

### 5.1 A1 LMU – Semi-Wet, 2.03 ha

Species List	Rate (g/ha)	Seed mix size (Coarse [C] / Fine [F])	Treatment
<b>Dominant</b>			
<i>Acacia dentifera</i>	32.7	C	Scarification (Hot water)
<i>Acacia extensa</i>	20.5	C	Scarification (Hot water)
<i>Acacia pulchella</i> var <i>glaberrima</i>	20.0	C	Scarification (Hot water)
<i>Allocasuarina fraseriana</i>	33.3	F	Dry smoke
<i>Astartea scoparia</i>	30.0	F	Fresh seed, dry smoke
<i>Eucalyptus patens</i>	50.0	C	
<i>Eucalyptus rudis</i>	50.0	F	
<i>Eucalyptus wandoo</i>	130.8	F	
<i>Gastrolobium calycinum</i>	14.0	C	Scarification (Hot water)
<i>Hakea prostrata</i>	1.0	C	Dry smoke
<i>Hakea varia</i>	11.4	C	Dry smoke
<i>Hypocalymma angustifolium</i>	27.1	F	
<i>Melaleuca incana</i>	54.5	F	Dry smoke
<i>Melaleuca raphiophylla</i>	87.3	F	Dry smoke
<i>Melaleuca viminea</i>	50.0	F	Dry smoke
<b>Adjunct</b>			
<i>Acacia nervosa</i>	0.7	C	Scarification (Hot water)
<i>Acacia saligna</i>	4.5	C	Scarification (Hot water)
<i>Anigozanthos manglesii</i>	3.1	F	Dry smoke
<i>Banksia littoralis</i>	8.8	C	
<i>Calothamnus quadrifidus</i>	7.9	F	Dry smoke
<i>Eucalyptus megacarpa</i>	10.0	F	Dry smoke
<i>Gastrolobium bilobum</i>	94.4	F	Scarification (Hot water)
<i>Haemodorum simplex</i>	19.1	C	
<i>Melaleuca lateritia</i>	6.3	F	Dry smoke
<i>Patersonia occidentalis</i>	16.1	F	Dry smoke
<i>Verticordia densiflora</i>	22.7	C	
<i>Viminaria juncea</i>	80.0	C	Scarification (Hot water), dry smoke

**5.2 L LMU – Semi-Wet L, 28.98 ha**

Species List	Rate (g/ha)	Seed mix size (Coarse [C] / Fine [F])	Treatment
<b>Dominant</b>			
<i>Acacia dentifera</i>	13.95	C	Scarification (Hot water)
<i>Acacia drummondii ssp candolleana</i>	7.73	F	Scarification (Hot water)
<i>Acacia drummondii ssp drummondii</i>	3.82	F	Scarification (Hot water)
<i>Acacia extensa</i>	13.29	C	Scarification (Hot water)
<i>Acacia pulchella var glaberrima</i>	18.32	C	Scarification (Hot water)
<i>Acacia saligna</i>	1.94	C	Scarification (Hot water)
<i>Allocasuarina fraseriana</i>	30.23	F	Dry smoke
<i>Astartea scoparia</i>	12.78	F	Fresh seed, dry smoke
<i>Banksia grandis</i>	28.12	C	
<i>Banksia littoralis</i>	3.76	C	
<i>Banksia sessilis</i>	0.18	C	
<i>Banksia squarrosa ssp squarrosa</i>	1.78	C	
<i>Bossiaea eriocarpa</i>	7.14	F	Scarification (Hot water)
<i>Corymbia calophylla</i>	43.18	C	Dry smoke
<i>Eucalyptus marginata</i>	53.55	F	
<i>Eucalyptus marginata</i>	27.41	C	
<i>Eucalyptus patens</i>	46.33	C	
<i>Eucalyptus rudis</i>	48.95	F	
<i>Eucalyptus wandoo</i>	73.94	F	
<i>Gastrolobium calycinum</i>	13.06	C	Scarification (Hot water)
<i>Grevillea monticola</i>	8.64	C	Dry smoke
<i>Hakea lissocarpha</i>	1.67	C	Dry smoke
<i>Hakea prostrata</i>	2.23	C	Dry smoke
<i>Hakea varia</i>	4.86	C	Dry smoke
<i>Hypocalymma angustifolium</i>	25.29	F	
<i>Kennedia coccinea</i>	2.47	C	Scarification (Hot water)
<i>Kennedia prostrata</i>	5.76	C	Scarification (Hot water)
<i>Kunzea recurva</i>	3.10	F	
<i>Leptospermum erubescens</i>	3.10	F	Dry smoke
<i>Melaleuca raphiophylla</i>	37.19	F	Dry smoke
<i>Melaleuca viminea</i>	21.31	F	Dry smoke
<i>Trymalium ledifolium</i>	27.44	F	Dry smoke
<i>Xanthorrhoea gracilis</i>	16.24	C	Dry smoke
<i>Xanthorrhoea preissii</i>	16.25	C	Dry smoke
<b>Adjunct</b>			
<i>Acacia alata</i>	2.83	C	Scarification (Hot water)
<i>Acacia celastrifolia</i>	1.95	C	Scarification (Hot water)
<i>Acacia microbotrya</i>	7.26	C	Scarification (Hot water)
<i>Acacia nervosa</i>	0.52	C	Scarification (Hot water)
<i>Agrostocrinum scabrum</i>	0.32	C	Dry smoke
<i>Allocasuarina huegeliana</i>	7.26	F	Dry smoke

Species List	Rate (g/ha)	Seed mix size (Coarse [C] / Fine [F])	Treatment
<i>Allocasuarina humilis</i>	1.76	F	Dry smoke
<i>Asteridea pulverulenta</i>	2.77	F	Dry smoke
<i>Astroloma ciliatum</i>	Emu mix	C	Rapid ageing (dry smoke)
<i>Astroloma compactum</i>	Emu mix	C	Rapid ageing (dry smoke)
<i>Astroloma epacridis</i>	14.83	C	Rapid ageing (dry smoke)
<i>Baekkea camphorosmae</i>	4.82	F	Dry smoke
<i>Banksia sphaerocarpa</i> var. <i>sphaerocarpa</i>	3.49	C	
<i>Billardiera fusiformis</i>	1.23		Dry smoke
<i>Boronia fastigiata</i>	0.02	C	Dry smoke
<i>Bossiaea ornata</i>	7.65	F	Scarification (Hot water)
<i>Calothamnus quadrifidus</i>	5.25	F	Dry smoke
<i>Calothamnus sanguineus</i>	4.32	F	Dry smoke
<i>Chamaescilla corymbosa</i>	0.22	F	
<i>Clematis pubescens</i>	1.92		Dry smoke
<i>Craspedia variabilis</i>	0.20	F	
<i>Daviesia decurrens</i>	0.69	C	Scarification (Hot water)
<i>Daviesia longifolia</i>	0.08	C	Scarification (Hot water)
<i>Daviesia preissii</i>	0.69	C	Scarification (Hot water)
<i>Daviesia rhombifolia</i>	0.34	C	Scarification (Hot water)
<i>Dichopogon capillipes</i>	0.49	F	
<i>Eucalyptus megacarpa</i>	4.24	F	Dry smoke
<i>Gastrolobium bilobum</i>	40.21	F	Scarification (Hot water)
<i>Gastrolobium ebracteolatum</i>	0.02	F	Scarification (Hot water)
<i>Gastrolobium spinosum</i>	1.75	F	Scarification (Hot water)
<i>Gompholobium marginatum</i>	2.95	F	Scarification (Hot water)
<i>Gompholobium preissii</i>	0.27	F	Scarification (Hot water)
<i>Grevillea quercifolia</i>	0.09	C	Dry smoke
<i>Haemodorum paniculatum</i>	1.36	C	
<i>Haemodorum simplex</i>	8.14	C	
<i>Hakea amplexicaulis</i>	3.68	C	Dry smoke
<i>Hakea cyclocarpa</i>	0.39	C	Dry smoke
<i>Hakea incrassata</i>	0.44	C	Dry smoke
<i>Hakea ruscifolia</i>	0.17	C	Dry smoke
<i>Hakea undulata</i>	3.29	C	Dry smoke
<i>Hemigenia rigida</i>	0.21	F	Rapid ageing (dry smoke)
<i>Hibbertia amplexicaulis</i>	0.48	C	Dry smoke
<i>Hibbertia pilosa</i>	0.01	C	Rapid ageing (dry smoke)
<i>Hibbertia serrata</i>	2.40		Rapid ageing (dry smoke)
<i>Hovea trisperma</i>	0.53	C	Scarification (Hot water)
<i>Hyalosperma cotula</i>	0.43	F	
<i>Isopogon dubius</i>	0.58	F	Dry smoke
<i>Jacksonia alata</i>	0.09	C	Scarification (Hot water)

Species List	Rate (g/ha)	Seed mix size (Coarse [C] / Fine [F])	Treatment
<i>Labichea punctata</i>	0.88	C	Scarification (Hot water) + dry smoke
<i>Lechenaultia biloba</i>	0.22	F	
<i>Leucopogon capitellatus</i>	2.09	C	Rapid ageing (dry smoke)
<i>Leucopogon nutans</i>	2.44	C	Rapid ageing (dry smoke)
<i>Leucopogon propinquus</i>	2.17	C	
<i>Marianthus bicolor</i>	1.93	C	Dry smoke
<i>Melaleuca incana</i>	23.24	F	Dry smoke
<i>Melaleuca lateritia</i>	2.69	F	Dry smoke
<i>Melaleuca radula</i>	0.75	F	Dry smoke
<i>Melaleuca tuberculata var tuberculata</i>	2.53	F	Dry smoke
<i>Opercularia vaginata</i>	0.45		Dry smoke
<i>Orthrosanthus laxus</i>	0.49	F	
<i>Patersonia occidentalis</i>	7.45	F	Dry smoke
<i>Persoonia longifolia</i>	9.43	C	Rapid ageing (dry smoke)
<i>Petrophile heterophylla</i>	3.93	C	Dry smoke
<i>Phyllanthus calycinus</i>	11.22		Dry smoke
<i>Pimelea ciliata</i>	2.69	C	
<i>Pimelea preissii</i>	1.41	C	Dry smoke
<i>Podolepis gracilis</i>	0.49	F	
<i>Podolepis lessonii</i>	1.03		Dry smoke
<i>Ptilotus manglesii</i>	0.99	F	Dry smoke
<i>Sphaerolobium medium</i>	0.36	F	Scarification (Hot water)
<i>Stackhousia monogyna</i>	2.63	F	Dry smoke
<i>Stackhousia scoparia</i>	1.19	F	
<i>Stirlingia latifolia</i>	6.03	C	Rapid ageing (dry smoke)
<i>Stirlingia simplex</i>	3.97	C	
<i>Stylidium affine</i>	0.44	F	Dry smoke
<i>Styphelia tenuiflora</i>	0.62	C	Rapid ageing (dry smoke)
<i>Thysanotus multiflorus</i>	0.07	F	Dry smoke
<i>Trachymene pilosa</i>	0.15	F	
<i>Tricoryne elatior</i>	0.27	F	
<i>Tripterococcus brunonis</i>	1.30	C	Dry smoke
<i>Velleia trinervis</i>	0.71	F	
<i>Verticordia densiflora</i>	9.69	C	
<i>Viminaria juncea</i>	34.09	C	Scarification (Hot water), dry smoke
<i>Xylomelum occidentale</i>	1.21	C	Dry smoke

## 5.3 L LMU – Semi-Wet L-M, 17.92 ha

Species List	Rate g/ha	Seed mix size (Coarse [C] / Fine [F])	Treatment
<b>Dominant</b>			
<i>Acacia dentifera</i>	13.92	C	Scarification (Hot water)
<i>Acacia drummondii ssp candolleana</i>	7.71	F	Scarification (Hot water)
<i>Acacia drummondii ssp drummondii</i>	4.43	F	Scarification (Hot water)
<i>Acacia extensa</i>	13.88	C	Scarification (Hot water)
<i>Acacia pulchella var glaberrima</i>	18.89	C	Scarification (Hot water)
<i>Acacia saligna</i>	1.93	C	Scarification (Hot water)
<i>Allocasuarina fraseriana</i>	31.14	F	Dry smoke
<i>Astartea scoparia</i>	12.76	F	Fresh seed, dry smoke
<i>Banksia grandis</i>	28.80	C	
<i>Banksia littoralis</i>	3.75	C	
<i>Banksia sessilis</i>	0.21	C	
<i>Banksia squarrosa ssp squarrosa</i>	1.77	C	
<i>Bossiaea ornata</i>	8.38	F	Scarification (Hot water)
<i>Corymbia calophylla</i>	45.55	C	Dry smoke
<i>Eucalyptus marginata</i>	56.50	F	
<i>Eucalyptus marginata</i>	29.05	C	
<i>Eucalyptus patens</i>	21.26	C	
<i>Eucalyptus rudis</i>	21.26	F	
<i>Eucalyptus wandoo</i>	142.22	F	
<i>Gastrolobium calycinum</i>	13.38	C	Scarification (Hot water)
<i>Grevillea monticola</i>	8.62	C	Dry smoke
<i>Hakea lissocarpha</i>	2.36	C	Dry smoke
<i>Hakea prostrata</i>	2.00	C	Dry smoke
<i>Hakea varia</i>	4.85	C	Dry smoke
<i>Hypocalymma angustifolium</i>	25.55	F	
<i>Kennedia coccinea</i>	2.64	C	Scarification (Hot water)
<i>Kennedia prostrata</i>	6.10	C	Scarification (Hot water)
<i>Kunzea recurva</i>	3.77	F	
<i>Leptospermum erubescens</i>	3.77	F	Dry smoke
<i>Melaleuca incana</i>	23.19	F	Dry smoke
<i>Melaleuca raphiophylla</i>	37.11	F	Dry smoke
<i>Melaleuca viminea</i>	21.26	F	Dry smoke
<i>Trymalium ledifolium</i>	29.22	F	Dry smoke
<i>Xanthorrhoea gracilis</i>	17.19	C	Dry smoke
<i>Xanthorrhoea preissii</i>	17.26	C	Dry smoke
<b>Adjunct</b>			
<i>Acacia alata</i>	3.02	C	Scarification (Hot water)
<i>Acacia celastrifolia</i>	1.94	C	Scarification (Hot water)
<i>Acacia microbotrya</i>	8.84	C	Scarification (Hot water)
<i>Acacia nervosa</i>	0.52	C	Scarification (Hot water)
<i>Agrostocrinum scabrum</i>	0.32	C	Dry smoke

Species List	Rate g/ha	Seed mix size (Coarse [C] / Fine [F])	Treatment
<i>Allocasuarina huegeliana</i>	7.24	F	Dry smoke
<i>Allocasuarina humilis</i>	1.79	F	Dry smoke
<i>Amphipogon turbinatus</i>	0.00		
<i>Anigozanthos manglesii</i>	4.99	F	Dry smoke
<i>Asteridea pulveralenta</i>	2.93	F	Dry smoke
<i>Astroloma ciliatum</i>	Emu mix	C	Rapid ageing (dry smoke)
<i>Astroloma compactum</i>	Emu mix	C	Rapid ageing (dry smoke)
<i>Astroloma epacridis</i>	17.00	C	Rapid ageing (dry smoke)
<i>Baeckea camphorosmae</i>	5.86	F	Dry smoke
<i>Banksia sphaerocarpa</i> var. <i>sphaerocarpa</i>	2.39	C	
<i>Billardiera fusiformis</i>	1.23		Dry smoke
<i>Boronia fastigiata</i>	0.03	C	Dry smoke
<i>Bossiaea eriocarpa</i>	6.03	F	Scarification (Hot water)
<i>Calothamnus quadrifidus</i>	5.48	F	Dry smoke
<i>Calothamnus sanguineus</i>	5.26	F	Dry smoke
<i>Chamaescilla corymbosa</i>	0.24	F	
<i>Clematis pubescens</i>	1.92		Dry smoke
<i>Craspedia variabilis</i>	0.20	F	
<i>Daviesia decurrens</i>	0.68	C	Scarification (Hot water)
<i>Daviesia longifolia</i>	0.08	C	Scarification (Hot water)
<i>Daviesia preissii</i>	0.68	C	Scarification (Hot water)
<i>Daviesia rhombifolia</i>	0.54	C	Scarification (Hot water)
<i>Dichopogon capillipes</i>	0.52	F	
<i>Eucalyptus megacarpa</i>	4.23	F	Dry smoke
<i>Gastrolobium bilobum</i>	40.13	F	Scarification (Hot water)
<i>Gastrolobium ebracteolatum</i>	0.03	F	Scarification (Hot water)
<i>Gastrolobium spinosum</i>	1.88	F	Scarification (Hot water)
<i>Gompholobium marginatum</i>	2.97	F	Scarification (Hot water)
<i>Gompholobium preissii</i>	0.22	F	Scarification (Hot water)
<i>Grevillea quercifolia</i>	0.09	C	Dry smoke
<i>Haemodorum paniculatum</i>	1.65	C	
<i>Haemodorum simplex</i>	8.12	C	
<i>Hakea amplexicaulis</i>	3.67	C	Dry smoke
<i>Hakea cyclocarpa</i>	0.41	C	Dry smoke
<i>Hakea incrassata</i>	0.48	C	Dry smoke
<i>Hakea ruscifolia</i>	0.18	C	Dry smoke
<i>Hakea undulata</i>	3.45	C	Dry smoke
<i>Hemigenia rigida</i>	0.22	F	Rapid ageing (dry smoke)
<i>Hibbertia amplexicaulis</i>	0.50	C	Dry smoke
<i>Hibbertia pilosa</i>	0.01	C	Rapid ageing (dry smoke)

Species List	Rate g/ha	Seed mix size (Coarse [C] / Fine [F])	Treatment
<i>Hibbertia serrata</i>	2.40		Rapid ageing (dry smoke)
<i>Hovea trisperma</i>	0.48	C	Scarification (Hot water)
<i>Hyalosperma cotula</i>	0.45	F	
<i>Isopogon dubius</i>	0.44	F	Dry smoke
<i>Jacksonia alata</i>	0.10	C	Scarification (Hot water)
<i>Labichea punctata</i>	0.91	C	Scarification (Hot water) + dry smoke
<i>Lechenaultia biloba</i>	0.14	F	
<i>Leucopogon capitellatus</i>	2.38	C	Rapid ageing (dry smoke)
<i>Leucopogon nutans</i>	2.57	C	Rapid ageing (dry smoke)
<i>Leucopogon propinquus</i>	2.22	C	
<i>Marianthus bicolor</i>	1.93	C	Dry smoke
<i>Melaleuca lateritia</i>	2.69	F	Dry smoke
<i>Melaleuca radula</i>	0.75	F	Dry smoke
<i>Melaleuca tuberculata</i> var <i>tuberculata</i>	2.61	F	Dry smoke
<i>Opercularia vaginata</i>	0.48		Dry smoke
<i>Orthrosanthus laxus</i>	0.49	F	
<i>Patersonia occidentalis</i>	7.77	F	Dry smoke
<i>Persoonia longifolia</i>	10.01	C	Rapid ageing (dry smoke)
<i>Petrophile heterophylla</i>	4.34	C	Dry smoke
<i>Phyllanthus calycinus</i>	11.06		Dry smoke
<i>Pimelea ciliata</i>	2.79	C	
<i>Pimelea preissii</i>	1.43	C	Dry smoke
<i>Podolepis gracilis</i>	0.52	F	
<i>Podolepis lessonii</i>	1.06		Dry smoke
<i>Ptilotus manglesii</i>	1.05	F	Dry smoke
<i>Sphaerolobium medium</i>	0.56	F	Scarification (Hot water)
<i>Stackhousia monogyna</i>	2.57	F	Dry smoke
<i>Stackhousia scoparia</i>	1.42	F	
<i>Stirlingia latifolia</i>	7.34	C	Rapid ageing (dry smoke)
<i>Stirlingia simplex</i>	4.83	C	
<i>Stylidium affine</i>	0.70	F	Dry smoke
<i>Styphelia tenuiflora</i>	0.72	C	Rapid ageing (dry smoke)
<i>Thysanotus multiflorus</i>	0.10	F	Dry smoke
<i>Trachymene pilosa</i>	0.24	F	
<i>Tricoryne elatior</i>	0.24	F	
<i>Tripterococcus brunonis</i>	1.37	C	Dry smoke
<i>Velleia trinervis</i>	0.71	F	
<i>Verticordia densiflora</i>	9.66	C	

Species List	Rate g/ha	Seed mix size (Coarse [C] / Fine [F])	Treatment
<i>Viminaria juncea</i>	34.02	C	Scarification (Hot water), dry smoke
<i>Xylomelum occidentale</i>	1.47	C	Dry smoke

#### 5.4 P LMU – Deep Sands – 24.13 ha

Species List	Main mix Rate (g/ha)	NR Rate (g/ha)	Seed mix size (Coarse [C] / Fine [F])	Treatment
<b>Dominant</b>				
<i>Acacia pulchella var glaberrima</i>	20.0	0.0	C	Scarification (Hot water)
<i>Allocasuarina fraseriana</i>	32.2	0.0	F	Dry smoke
<i>Banksia grandis</i>	44.5	98.4	C	
<i>Banksia sessilis</i>	0.0	1.6	C	
<i>Banksia sphaerocarpa var. sphaerocarpa</i>	14.1	56.3	C	
<i>Bossiaea eriocarpa</i>	35.6	80.0	F	Scarification (Hot water)
<i>Corymbia calophylla</i>	81.3	0.0	C	Dry smoke
<i>Eucalyptus marginata</i>	157.1	0.0	F	
<i>Eucalyptus wandoo</i>	130.6	0.0	F	
<i>Gastrolobium calycinum</i>	11.4	0.0	C	Scarification (Hot water)
<i>Hakea lissocarpa</i>	2.7	1.6	C	Dry smoke
<i>Hakea prostrata</i>	0.8	23.4	C	Dry smoke
<i>Hypocalymma angustifolium</i>	22.2	46.6	F	
<i>Kennedia coccinea</i>	5.8	0.0	C	Scarification (Hot water)
<i>Kennedia prostrata</i>	11.6	0.0	C	Scarification (Hot water)
<i>Kunzea recurva</i>	22.2	0.0	F	
<i>Trymalium ledifolium</i>	60.5	0.0	F	Dry smoke
<i>Xanthorrhoea gracilis</i>	32.5	0.0	C	Dry smoke
<i>Xanthorrhoea preissii</i>	34.2	0.0	C	Dry smoke
<b>Adjunct</b>				
<i>Acacia alata</i>	6.3	0.0	C	Scarification (Hot water)
<i>Acacia extensa</i>	20.5	0.0	C	Scarification (Hot water)
<i>Acacia microbotrya</i>	52.1	0.0	C	Scarification (Hot water)
<i>Allocasuarina humilis</i>	2.6	7.6	F	Dry smoke
<i>Amphipogon turbinatus</i>	*	0.0		
<i>Anigozanthos manglesii</i>	9.5	34.3	F	Dry smoke
<i>Asteridea pulveralenta</i>	5.7	0.0	F	Dry smoke

Species List	Main mix Rate (g/ha)	NR Rate (g/ha)	Seed mix size (Coarse [C] / Fine [F])	Treatment
<i>Baeckea camphorosmae</i>	34.5	0.0	F	Dry smoke
<i>Calothamnus quadrifidus</i>	8.1	0.0	F	Dry smoke
<i>Calothamnus sanguineus</i>	31.0	0.0	F	Dry smoke
<i>Chamaescilla corymbosa</i>	0.5	0.0	F	
<i>Dichopogon capillipes</i>	1.0	0.0	F	
<i>Gastrolobium spinosum</i>	4.5	0.0	F	Scarification (Hot water)
<i>Gompholobium marginatum</i>	4.1	14.9	F	Scarification (Hot water)
<i>Gompholobium preissii</i>	0.0	4.6	F	Scarification (Hot water)
<i>Haemodorum paniculatum</i>	9.7	0.0	C	
<i>Hakea cyclocarpa</i>	0.8	0.0	C	Dry smoke
<i>Hakea ruscifolia</i>	0.3	0.0	C	Dry smoke
<i>Hemigenia rigida</i>	0.3	0.0	F	Rapid ageing (dry smoke)
<i>Hibbertia amplexicaulis</i>	0.0	6.0	C	Dry smoke
<i>Hovea trisperma</i>	0.0	8.2	C	Scarification (Hot water)
<i>Hyalosperma cotula</i>	0.7	0.0	F	
<i>Isopogon dubius</i>	0.0	11.3	F	Dry smoke
<i>Jacksonia alata</i>	0.2	0.0	C	Scarification (Hot water)
<i>Labichea punctata</i>	1.5	2.8	C	Scarification (Hot water) + dry smoke
<i>Lechenaultia biloba</i>	0.0	4.9	F	
<i>Leptospermum erubescens</i>	22.2	0.0	F	Dry smoke
<i>Leucopogon nutans</i>	2.8	8.4	C	Rapid ageing (dry smoke)
<i>Leucopogon propinquus</i>	3.3	9.7	C	
<i>Melaleuca tuberculata var tuberculata</i>	2.8	0.0	F	Dry smoke
<i>Opercularia vaginata</i>	0.9	0.0		Dry smoke
<i>Orthrosanthus laxus</i>	0.7	2.2	F	
<i>Persoonia longifolia</i>	19.3	0.0	C	Rapid ageing (dry smoke)
<i>Phyllanthus calycinus</i>	12.2	64.2		Dry smoke
<i>Pimelea ciliata</i>	3.7	0.0	C	
<i>Pimelea preissii</i>	1.5	7.0	C	Dry smoke
<i>Podolepis gracilis</i>	1.0	0.0	F	
<i>Podolepis lessonii</i>	1.4	5.7		Dry smoke
<i>Ptilotus manglesii</i>	2.0	0.0	F	Dry smoke
<i>Stackhousia monogyna</i>	2.0	14.5	F	Dry smoke
<i>Stackhousia scoparia</i>	2.1	0.4	F	
<i>Stirlingia latifolia</i>	43.3	0.0	C	Rapid ageing (dry smoke)
<i>Stirlingia simplex</i>	28.5	0.0	C	

Species List	Main mix Rate (g/ha)	NR Rate (g/ha)	Seed mix size (Coarse [C] / Fine [F])	Treatment
<i>Tricoryne elatior</i>	0.0	4.2	F	
<i>Tripterococcus brunonis</i>	1.8	5.5	C	Dry smoke
<i>Xylomelum occidentale</i>	8.7	0.0	C	Dry smoke

Key: Green = Nursery row species,

### 5.5 S, SP LMU - Shallow Gravel – 21.92 ha

Species List	Rate	Seed mix size (Coarse [C] / Fine [F])	Treatment
<b>Dominant</b>			
<i>Acacia celastriifolia</i>	22.7	C	Scarification (Hot water)
<i>Acacia drummondii ssp candolleana</i>	17.9	F	Scarification (Hot water)
<i>Acacia drummondii ssp drummondii</i>	6.6	F	Scarification (Hot water)
<i>Acacia pulchella var glaberrima</i>	16.4	C	Scarification (Hot water)
<i>Allocasuarina fraseriana</i>	26.6	F	Dry smoke
<i>Banksia grandis</i>	37.0	C	
<i>Banksia sessilis</i>	1.2	C	
<i>Bossiaea pulchella</i>	4.1	C	Scarification (Hot water)
<i>Corymbia calophylla</i>	50.7	C	Dry smoke
<i>Eucalyptus marginata</i>	81.7	F	
<i>Eucalyptus marginata</i>	45.9	C	
<i>Hakea lissocarpha</i>	0.2	C	Dry smoke
<i>Kennedia prostrata</i>	7.6	C	Scarification (Hot water)
<i>Trymalium ledifolium</i>	46.4	F	Dry smoke
<i>Xanthorrhoea preissii</i>	28.5	C	Dry smoke
<b>Adjunct</b>			
<i>Anigozanthos manglesii</i>	6.9	F	Dry smoke
<i>Asteridea pulverulenta</i>	4.6	F	Dry smoke
<i>Astroloma epacridis</i>	0.8	C	Rapid ageing (dry smoke)
<i>Boronia fastigiata</i>	0.6	C	Dry smoke
<i>Calothamnus quadrifidus</i>	5.8	F	Dry smoke
<i>Chamaescilla corymbosa</i>	0.4	F	
<i>Clematis pubescens</i>	6.8		Dry smoke
<i>Craspedia variabilis</i>	0.5	F	
<i>Daviesia cordata</i>	4.8	C	Scarification (Hot water)
<i>Daviesia decurrens</i>	1.6	C	Scarification (Hot water)
<i>Daviesia preissii</i>	1.6	C	Scarification (Hot water)
<i>Dichopogon capillipes</i>	1.0	F	
<i>Gompholobium marginatum</i>	3.3	F	Scarification (Hot water)
<i>Gompholobium preissii</i>	3.4	F	Scarification (Hot water)

Species List	Rate	Seed mix size (Coarse [C] /Fine [F])	Treatment
<i>Grevillea monticola</i>	20.3	C	Dry smoke
<i>Grevillea quercifolia</i>	0.3	C	Dry smoke
<i>Hemigenia ramosissima</i>	32.0	F	Rapid ageing (dry smoke)
<i>Hemigenia rigida</i>	0.4	F	Rapid ageing (dry smoke)
<i>Hyalosperma cotula</i>	0.6	F	
<i>Jacksonia alata</i>	0.2	C	Scarification (Hot water)
<i>Labichea punctata</i>	1.2	C	Scarification (Hot water) + dry smoke
<i>Leucopogon capitellatus</i>	2.9	C	Rapid ageing (dry smoke)
<i>Leucopogon nutans</i>	1.5	C	Rapid ageing (dry smoke)
<i>Leucopogon propinquus</i>	1.1	C	
<i>Marianthus bicolor</i>	4.4	C	Dry smoke
<i>Melaleuca radula</i>	1.8	F	Dry smoke
<i>Melaleuca tuberculata var tuberculata</i>	3.7	F	Dry smoke
<i>Opercularia vaginata</i>	0.8		Dry smoke
<i>Orthrosanthus laxus</i>	0.7	F	
<i>Persoonia longifolia</i>	12.7	C	Rapid ageing (dry smoke)
<i>Pimelea preissii</i>	1.4	C	Dry smoke
<i>Stackhousia monogyna</i>	3.0	F	Dry smoke
<i>Stackhousia scoparia</i>	1.4	F	
<i>Tricoryne elatior</i>	3.6	F	
<i>Velleia trinervis</i>	0.2	F	

Key: Green = Nursery row species, Red = Grass species seeded post 2017 at appropriate time after weed control

### 5.6 S-SP LMU – Loamy Gravel – 215.28 ha

Species List	Main mix Rate (g/ha)	NR Rate (g/ha)	Seed mix size (Coarse [C] /Fine [F])	Treatment
<b>Dominant</b>				
<i>Acacia drummondii ssp candolleana</i>	22.1	0.0	F	Scarification (Hot water)
<i>Acacia drummondii ssp drummondii</i>	7.9	30.0	F	Scarification (Hot water)
<i>Acacia extensa</i>	4.9	0.0	C	Scarification (Hot water)
<i>Acacia nervosa</i>	0.6	0.0	C	Scarification (Hot water)
<i>Acacia pulchella var glaberrima</i>	20.0	0.0	C	Scarification (Hot water)
<i>Allocasuarina fraseriana</i>	32.9	0.0	F	Dry smoke
<i>Banksia grandis</i>	44.9	99.6	C	
<i>Banksia sessilis</i>	0.04	3.5	C	
<i>Banksia squarrosa ssp squarrosa</i>	5.1	0.0	C	
<i>Bossiaea ornata</i>	18.2	36.3	F	Scarification (Hot water)

Species List	Main mix Rate (g/ha)	NR Rate (g/ha)	Seed mix size (Coarse [C] /Fine [F])	Treatment
<i>Eucalyptus marginata</i>	112.7	0.0	F	
<i>Eucalyptus marginata</i>	56.0	0.0	C	
<i>Gastrolobium calycinum</i>	15.7	0.0	C	Scarification (Hot water)
<i>Hakea lissocarpha</i>	0.4	31.9	C	Dry smoke
<i>Grevillea monticola</i>	24.7	0.0	C	Dry smoke
<i>Hakea prostrata</i>	1.2	18.6	C	Dry smoke
<i>Hypocalymma angustifolium</i>	22.4	43.8	F	
<i>Phyllanthus calycinus</i>	16.1	60.4		Dry smoke
<i>Trymalium ledifolium</i>	54.3	0.0	F	Dry smoke
<i>Xanthorrhoea gracilis</i>	33.4	0.0	C	Dry smoke
<i>Xanthorrhoea preissii</i>	32.8	0.0	C	Dry smoke
<b>Adjunct</b>				
<i>Acacia alata</i>	5.6	0.0	C	Scarification (Hot water)
<i>Acacia celastrifolia</i>	5.6	0.0	C	Scarification (Hot water)
<i>Agrostocrinum scabrum</i>	0.9	0.0	C	Dry smoke
<i>Allocasuarina huegeliana</i>	20.7	0.0	F	Dry smoke
<i>Allocasuarina humilis</i>	2.6	7.6	F	Dry smoke
<i>Anigozanthos manglesii</i>	0.0	36.7	F	Dry smoke
<i>Asteridea pulveralenta</i>	5.6	0.0	F	Dry smoke
<i>Astroloma ciliatum</i>	Emu mix	Emu mix	C	Rapid ageing (dry smoke)
<i>Astroloma compactum</i>	Emu mix	Emu mix	C	Rapid ageing (dry smoke)
<i>Astroloma epacridis</i>	31.6	106.5	C	Rapid ageing (dry smoke)
<i>Billardiera fusiformis</i>	3.5	0.0		Dry smoke
<i>Boronia fastigiata</i>	0.0	0.5	C	Dry smoke
<i>Calothamnus quadrifidus</i>	2.1	0.0	F	Dry smoke
<i>Chamaescilla corymbosa</i>	0.5	0.0	F	
<i>Clematis pubescens</i>	5.5	0.0		Dry smoke
<i>Corymbia calophylla</i>	90.9	0.0	C	Dry smoke
<i>Craspedia variabilis</i>	0.6	0.0	F	
<i>Daviesia cordata</i>	4.5	0.0	C	Scarification (Hot water)
<i>Daviesia decurrens</i>	2.0	0.0	C	Scarification (Hot water)
<i>Daviesia longifolia</i>	0.2	0.0	C	Scarification (Hot water)
<i>Daviesia preissii</i>	2.0	0.0	C	Scarification (Hot water)
<i>Daviesia rhombifolia</i>	0.0	9.8	C	Scarification (Hot water)
<i>Dichopogon capillipes</i>	1.0	0.0	F	
<i>Gastrolobium ebracteolatum</i>	0.0	0.6	F	Scarification (Hot water)
<i>Gastrolobium spinosum</i>	3.2	Emu mix	F	Scarification (Hot water)
<i>Gompholobium marginatum</i>	4.1	15.0	F	Scarification (Hot water)
<i>Gompholobium preissii</i>	0.0	4.0	F	Scarification (Hot water)
<i>Grevillea quercifolia</i>	0.3	0.0	C	Dry smoke
<i>Hakea amplexicaulis</i>	10.5	0.0	C	Dry smoke

Species List	Main mix Rate (g/ha)	NR Rate (g/ha)	Seed mix size (Coarse [C] /Fine [F])	Treatment
<i>Hakea cyclocarpa</i>	0.8	0.0	C	Dry smoke
<i>Hakea incrassata</i>	1.0	2.1	C	Dry smoke
<i>Hakea ruscifolia</i>	0.4	0.0	C	Dry smoke
<i>Hakea undulata</i>	8.6	8.3	C	Dry smoke
<i>Hemigenia rigida</i>	0.5	0.0	F	Rapid ageing (dry smoke)
<i>Hibbertia amplexicaulis</i>	0.0	9.0	C	Dry smoke
<i>Hibbertia pilosa</i>	0.04	0.0	C	Rapid ageing (dry smoke)
<i>Hibbertia serrata</i>	6.9	0.0		Rapid ageing (dry smoke)
<i>Hovea trisperma</i>	0.0	8.7	C	Scarification (Hot water)
<i>Hyalosperma cotula</i>	1.0	0.0	F	
<i>Isopogon dubius</i>	0.0	7.9	F	Dry smoke
<i>Jacksonia alata</i>	0.2	0.0	C	Scarification (Hot water)
<i>Kennedia coccinea</i>	4.8	0.0	C	Scarification (Hot water)
<i>Kennedia prostrata</i>	11.8	0.0	C	Scarification (Hot water)
<i>Labichea punctata</i>	1.4	2.8	C	Scarification (Hot water) + dry smoke
<i>Lechenaultia biloba</i>	0.0	2.6	F	
<i>Leucopogon capitellatus</i>	4.5	14.3	C	Rapid ageing (dry smoke)
<i>Leucopogon nutans</i>	3.9	13.3	C	Rapid ageing (dry smoke)
<i>Leucopogon propinquus</i>	3.0	10.9	C	
<i>Macrozamia riedlei</i>	clusters of 3 to 5 seed over 200 sites			
<i>Marianthus bicolor</i>	5.5	0.0	C	Dry smoke
<i>Melaleuca radula</i>	2.1	0.0	F	Dry smoke
<i>Melaleuca tuberculata</i> var <i>tuberculata</i>	6.1	0.0	F	Dry smoke
<i>Opercularia vaginata</i>	1.0	0.0		Dry smoke
<i>Orthrosanthus laxus</i>	0.7	2.1	F	
<i>Patersonia occidentalis</i>	0.0	16.2	F	Dry smoke
<i>Persoonia longifolia</i>	19.2	0.6	C	Rapid ageing (dry smoke)
<i>Petrophile heterophylla</i>	9.1	20.6	C	Dry smoke
<i>Pimelea ciliata</i>	6.2	0.0	C	
<i>Pimelea preissii</i>	2.0	8.2	C	Dry smoke
<i>Podolepis gracilis</i>	1.0	0.0	F	
<i>Podolepis lessonii</i>	1.2	7.5		Dry smoke
<i>Ptilotus manglesii</i>	2.0	0.0	F	Dry smoke
<i>Sphaerolobium medium</i>	0.0	10.1	F	Scarification (Hot water)
<i>Stackhousia monogyna</i>	4.2	13.6	F	Dry smoke
<i>Stackhousia scoparia</i>	1.7	8.7	F	
<i>Stylidium affine</i>	0.0	12.6	F	Dry smoke

Species List	Main mix Rate (g/ha)	NR Rate (g/ha)	Seed mix size (Coarse [C] /Fine [F])	Treatment
<i>Styphelia tenuiflora</i>	1.3	4.5	C	Rapid ageing (dry smoke)
<i>Thysanotus multiflorus</i>	0.0	1.9	F	Dry smoke
<i>Trachymene pilosa</i>	0.0	4.2	F	
<i>Tricoryne elatior</i>	0.0	4.4	F	
<i>Tripterococcus brunonis</i>	1.8	7.9	C	Dry smoke
<i>Velleia trinervis</i>	2.0	0.0	F	

Key: Green = Nursery row species

### 5.7 M LMU – Shallow Gravel – 1.8 ha

Species List	Rate g/ha	Seed mix size (Coarse [C] /Fine [F])	Treatment
<b>Dominant</b>			
<i>Acacia drummondii ssp candolleana</i>	22.07	F	Scarification (Hot water)
<i>Acacia drummondii ssp drummondii</i>	7.88	F	Scarification (Hot water)
<i>Acacia extensa</i>	4.89	C	Scarification (Hot water)
<i>Acacia pulchella var glaberrima</i>	20.00	C	Scarification (Hot water)
<i>Allocasuarina fraseriana</i>	32.94	F	Dry smoke
<i>Banksia grandis</i>	44.91	C	
<i>Banksia sessilis</i>	0.04	C	
<i>Banksia squarrosa ssp squarrosa</i>	5.08	C	
<i>Bossiaea ornata</i>	18.19	F	Scarification (Hot water)
<i>Corymbia calophylla</i>	90.95	C	Dry smoke
<i>Eucalyptus marginata</i>	112.65	F	
<i>Eucalyptus marginata</i>	55.97	C	
<i>Eucalyptus wandoo</i>	128.89	F	
<i>Gastrolobium calycinum</i>	15.72	C	Scarification (Hot water)
<i>Grevillea monticola</i>	62.01	C	Dry smoke
<i>Hypocalymma angustifolium</i>	22.39	F	
<i>Kennedia coccinea</i>	4.75	C	Scarification (Hot water)
<i>Kennedia prostrata</i>	11.84	C	Scarification (Hot water)
<i>Phyllanthus calycinus</i>	16.10		Dry smoke
<i>Trymalium ledifolium</i>	54.26	F	Dry smoke
<i>Xanthorrhoea gracilis</i>	33.45	C	Dry smoke
<i>Xanthorrhoea preissii</i>	32.77	C	Dry smoke
<b>Adjunct</b>			
<i>Acacia alata</i>	5.60	C	Scarification (Hot water)
<i>Acacia celastrifolia</i>	5.56	C	Scarification (Hot water)
<i>Acacia nervosa</i>	0.64	C	Scarification (Hot water)
<i>Agrostocrinum scabrum</i>	0.91	C	Dry smoke

Species List	Rate g/ha	Seed mix size (Coarse [C] /Fine [F])	Treatment
<i>Allocasuarina huegeliana</i>	20.74	F	Dry smoke
<i>Allocasuarina humilis</i>	2.63	F	Dry smoke
<i>Asteridea pulverulenta</i>	5.65	F	Dry smoke
<i>Astroloma ciliatum</i>	Emu mix	C	Rapid ageing (dry smoke)
<i>Astroloma compactum</i>	Emu mix	C	Rapid ageing (dry smoke)
<i>Astroloma epacridis</i>	31.65	C	Rapid ageing (dry smoke)
<i>Billardiera fusiformis</i>	3.51		Dry smoke
<i>Calothamnus quadrifidus</i>	2.13	F	Dry smoke
<i>Chamaescilla corymbosa</i>	0.46	F	
<i>Clematis pubescens</i>	5.49		Dry smoke
<i>Craspedia variabilis</i>	0.56	F	
<i>Daviesia cordata</i>	4.46	C	Scarification (Hot water)
<i>Daviesia decurrens</i>	1.96	C	Scarification (Hot water)
<i>Daviesia longifolia</i>	0.23	C	Scarification (Hot water)
<i>Daviesia preissii</i>	1.96	C	Scarification (Hot water)
<i>Dichopogon capillipes</i>	1.02	F	
<i>Gastrolobium spinosum</i>	3.18	F	Scarification (Hot water)
<i>Gompholobium marginatum</i>	4.10	F	Scarification (Hot water)
<i>Grevillea quercifolia</i>	0.27	C	Dry smoke
<i>Hakea amplexicaulis</i>	10.52	C	Dry smoke
<i>Hakea cyclocarpa</i>	0.81	C	Dry smoke
<i>Hakea incrassata</i>	1.04	C	Dry smoke
<i>Hakea lissocarpha</i>	0.35	C	Dry smoke
<i>Hakea prostrata</i>	1.16	C	Dry smoke
<i>Hakea ruscifolia</i>	0.37	C	Dry smoke
<i>Hakea undulata</i>	8.57	C	Dry smoke
<i>Hemigenia rigida</i>	0.46	F	Rapid ageing (dry smoke)
<i>Hibbertia pilosa</i>	0.04	C	Rapid ageing (dry smoke)
<i>Hibbertia serrata</i>	6.86		Rapid ageing (dry smoke)
<i>Hyalosperma cotula</i>	0.96	F	
<i>Jacksonia alata</i>	0.19	C	Scarification (Hot water)
<i>Labichea punctata</i>	1.44	C	Scarification (Hot water) + dry smoke
<i>Leucopogon capitellatus</i>	4.53	C	Rapid ageing (dry smoke)
<i>Leucopogon nutans</i>	3.88	C	Rapid ageing (dry smoke)
<i>Leucopogon propinquus</i>	3.04	C	
<i>Marianthus bicolor</i>	5.52	C	Dry smoke
<i>Melaleuca radula</i>	2.14	F	Dry smoke
<i>Melaleuca tuberculata var tuberculata</i>	6.12	F	Dry smoke
<i>Opercularia vaginata</i>	0.95		Dry smoke
<i>Orthrosanthus laxus</i>	0.72	F	
<i>Persoonia longifolia</i>	19.21	C	Rapid ageing (dry smoke)

Species List	Rate g/ha	Seed mix size (Coarse [C] /Fine [F])	Treatment
<i>Petrophile heterophylla</i>	9.14	C	Dry smoke
<i>Pimelea ciliata</i>	6.22	C	
<i>Pimelea preissii</i>	2.03	C	Dry smoke
<i>Podolepis gracilis</i>	1.01	F	
<i>Podolepis lessonii</i>	1.19		Dry smoke
<i>Ptilotus manglesii</i>	2.02	F	Dry smoke
<i>Stackhousia monogyna</i>	4.24	F	Dry smoke
<i>Stackhousia scoparia</i>	1.66	F	
<i>Styphelia tenuiflora</i>	1.33	C	Rapid ageing (dry smoke)
<i>Tripterococcus brunonis</i>	1.76	C	Dry smoke
<i>Trymalium odoratissimum ssp odoratissimum</i>	55.56	F	Dry smoke
<i>Velleia trinervis</i>	2.04	F	

### 5.8 M LMU –Sandy Duplex– 16.21 ha

Species List	Main mix Rate g/ha	NR Rate g/ha	Seed mix size (Coarse [C] /Fine [F])	Treatment
<b>Dominant</b>				
<i>Acacia drummondii ssp drummondii</i>	7.8	30.0	F	Scarification (Hot water)
<i>Acacia pulchella var glaberrima</i>	19.7	0.0	C	Scarification (Hot water)
<i>Corymbia calophylla</i>	80.2	0.0	C	Dry smoke
<i>Eucalyptus marginata</i>	147.5	0.0	F	
<i>Eucalyptus wandoo</i>	128.6	0.0	F	
<i>Gastrolobium calycinum</i>	16.1	0.0	C	Scarification (Hot water)
<i>Grevillea monticola</i>	24.3	0.0	C	Dry smoke
<i>Hakea lissocarpha</i>	0.4	16.0	C	Dry smoke
<i>Hypocalymma angustifolium</i>	4.1	13.1	F	
<i>Kennedia coccinea</i>	5.7	0.0	C	Scarification (Hot water)
<i>Phyllanthus calycinus</i>	12.9	54.3		Dry smoke
<i>Trymalium ledifolium</i>	56.4	0.0	F	Dry smoke
<i>Trymalium odoratissimum ssp odoratissimum</i>	75.2	0.0	F	Dry smoke
<i>Xanthorrhoea preissii</i>	27.0	0.0	C	Dry smoke
<b>Adjunct</b>				
<i>Acacia alata</i>	3.5	0.0	C	Scarification (Hot water)
<i>Acacia nervosa</i>	0.5	0.0	C	Scarification (Hot water)
<i>Allocasuarina humilis</i>	0.7	1.7	F	Dry smoke
<i>Anigozanthos manglesii</i>	9.4	42.3	F	Dry smoke
<i>Clematis pubescens</i>	10.3	0.0		Dry smoke
<i>Craspedia variabilis</i>	0.5	0.0	F	
<i>Daviesia decurrens</i>	2.4	0.0	C	Scarification (Hot water)
<i>Daviesia preissii</i>	2.4	0.0	C	Scarification (Hot water)

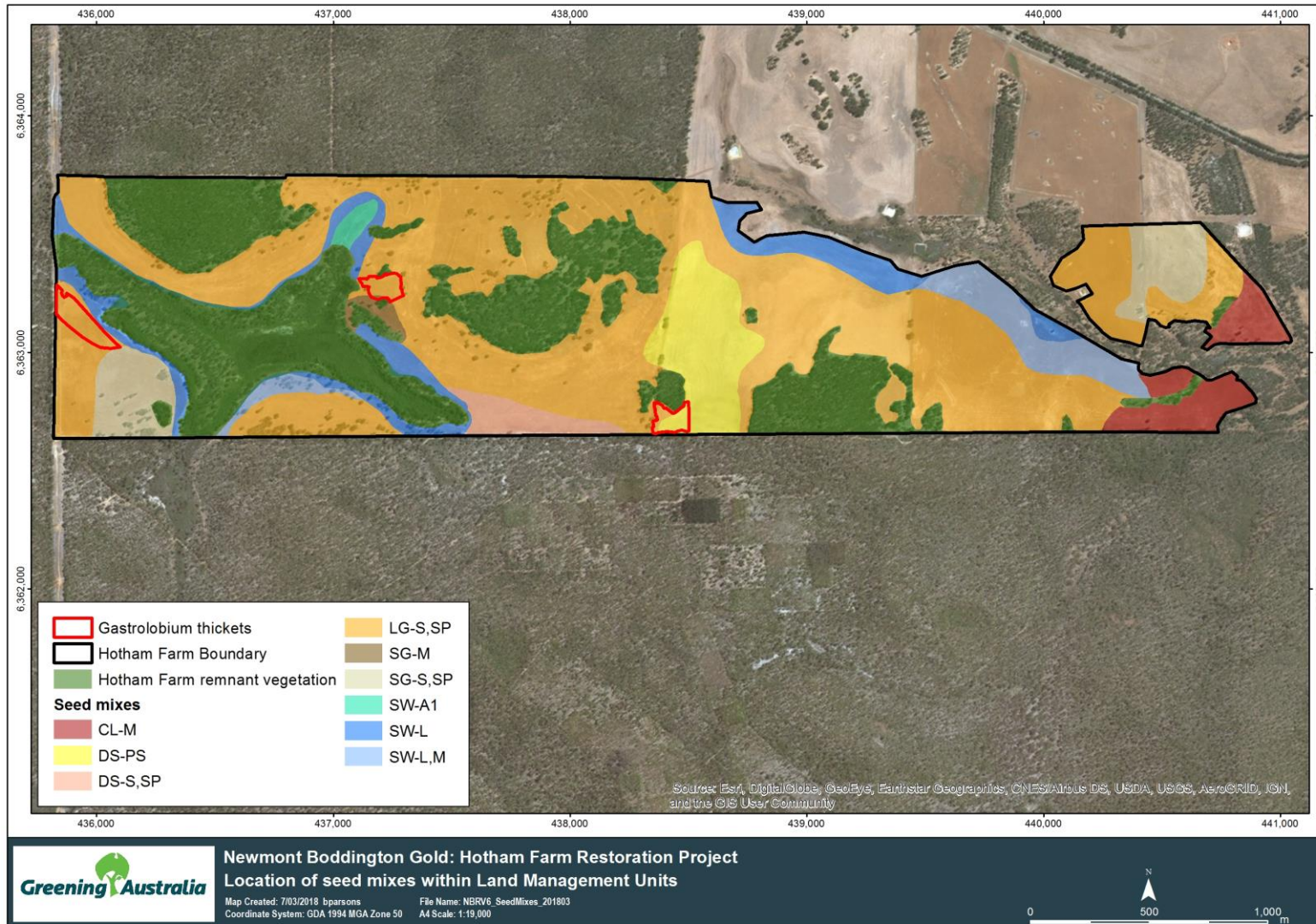
<i>Dichopogon capillipes</i>	0.8	0.0	F	
<i>Haemodorum paniculatum</i>	9.6	0.0	C	
<i>Hakea undulata</i>	7.7	3.7	C	Dry smoke
<i>Hibbertia amplexicaulis</i>	0.0	7.9	C	Dry smoke
<i>Hovea trisperma</i>	0.0	8.1	C	Scarification (Hot water)
<i>Jacksonia alata</i>	0.2	0.0	C	Scarification (Hot water)
<i>Lagenophora huegelii</i>	10.1	0.0	F	
<i>Leucopogon capitellatus</i>	4.4	15.3	C	Rapid ageing (dry smoke)
<i>Leucopogon nutans</i>	3.2	8.0	C	Rapid ageing (dry smoke)
<i>Leucopogon propinquus</i>	0.9	3.7	C	
<i>Ranunculus colonorum</i>	0.0	15.4	C	
<i>Stackhousia monogyna</i>	3.2	16.4	F	Dry smoke
<i>Stackhousia scoparia</i>	0.8	3.7	F	
<i>Stylidium affine</i>	0.0	21.0	F	Dry smoke

Key: Green = Nursery row species

### 5.9 Direct Drill Mix

Species List	Total grams	Treatment
<i>Acacia celastrifolia</i>	10,317	Scarification (Hot water)
<i>Acacia pulchella var glaberrima</i>	10,000	Scarification (Hot water)
<i>Corymbia calophylla</i>	10,000	Dry smoke
<i>Eucalyptus marginata</i>	10,000	

## APPENDIX 9: Location of Specific Seed Mixes Within LMUs



## APPENDIX 10: Total 2017 Direct Seeding Concentrate/Bulk Mix Volumes and Remaining Mix Volumes

LMU	Raw Seed Mix Quantities (g)	Total Concentrate Volumes (L)	Concentrate Mix Remaining (L)	Total Bulk Volumes (L)	Bulk mix Remaining (L)	Estimated Seed Remaining in Concentrate (g)	Estimated Seed remaining in Bulk mix (g)	Remaining Seed (g)
<b>Semi-Wet Soil A1</b>								
<b>Coarse</b>	579.5	10	0	38	0	0	0	<b>0.0</b>
<b>Fine</b>	1,321.2	10	0	25	0	0	0	<b>0.0</b>
<b>Semi-Wet Soil L</b>								
<b>Coarse</b>	13,653.2	135	35	541	0	3,536	0	<b>3,536</b>
<b>Fine</b>	16,087.1	135	48	354	0	5,711	0	<b>5,711</b>
<b>Semi-Wet Soil L, M</b>								
<b>Coarse</b>	7,455.4	83	69	332	0	6,151	0	<b>6,151</b>
<b>Fine</b>	10,418.6	83	30	216	0	3,730	0	<b>3,730</b>
<b>DS - MM (y)</b>								
<b>Coarse</b>	11,267.6	101	0	406	0	0	0	<b>0</b>
<b>Fine</b>	12,038.6	101	0	229	0	0	0	<b>0</b>
<b>DS NR (ynr)</b>								
<b>Coarse</b>	551.7	11	0	45	0	0	0	<b>0</b>
<b>Fine</b>	711.4	11	0	29	0	0	0	<b>0</b>
<b>DS - S, SP (WS)</b>								
<b>Coarse</b>	3,455.9	32	0	126	0	0	0	<b>0</b>
<b>Fine</b>	2,267.1	32	0	82	0	0	0	<b>0</b>
<b>DS - S, SP-NR</b>								
<b>Coarse</b>	369.9	4		14	0	0	0	<b>0</b>
<b>Fine</b>	222.1	4		9	0	0	0	<b>0</b>
<b>Shallow Gravel M</b>								

LMU	Raw Seed Mix Quantities (g)	Total Concentrate Volumes (L)	Concentrate Mix Remaining (L)	Total Bulk Volumes (L)	Bulk mix Remaining (L)	Estimated Seed Remaining in Concentrate (g)	Estimated Seed remaining in Bulk mix (g)	Remaining Seed (g)
<b>Coarse</b>	990.2	8	8.5	34	0	990	0	<b>990</b>
<b>Fine</b>	991.4	8	8.5	22	0	991	0	<b>991</b>
<b>Shallow Gravel S, SP (RG)</b>								
<b>Coarse</b>	5,917.7	102	0	408	62	0	888	<b>888</b>
<b>Fine</b>	5,165.7	102	0	265	135	0	2,598	<b>2,598</b>
<b>Loamy Gravel S, SP</b>								
<b>Coarse</b>	99,345.4	1,000	101	4,000	0	10,034	0	<b>10,034</b>
<b>Fine</b>	65,170.6	1,000	59	2,600	0	3,845	0	<b>3,845</b>
<b>Loamy Gravel S, SP (NR)</b>								
<b>Coarse</b>	10,617.3	101	0	402	0	0	0	<b>0</b>
<b>Fine</b>	6,374.7	101	0	263	0	0	0	<b>0</b>
<b>Deep Sandy Duplex M</b>								
<b>Coarse</b>	3,795.2	68	0	272	0	0	0	<b>0.0</b>
<b>Fine</b>	5,945.8	68	0	409	0	0	0	<b>0.0</b>
<b>Deep Sandy Duplex M Wandoo (NR)</b>								
<b>Coarse</b>	125.1	8	0	32	0	0	0	<b>0.0</b>
<b>Fine</b>	292.1	8	0	21	0	0	0	<b>0.0</b>
<b>Direct Drill</b>								
<b>Coarse</b>	40,319.0	905	120	3620	244	5,362	2,691	<b>8,054</b>
<b>Estimate of total seed remaining in secondary mixes (g) = 46,528</b>								

**Individual Species Remaining - not bulked**

<b>Species Name</b>	<b>Amount (g)</b>
<i>Acacia nervosa</i>	188
<i>Amphipogon turbinatus</i>	30
<i>Austrostipa campylachne</i>	929
<i>Austrostipa mollis</i>	500
<i>Gastrolobium calycinum</i>	6,528
<i>Jacksonia alata</i>	188
<i>Neurachne alopecuroidea</i>	1,604
<i>Rytidosperma caespitosa</i>	500
<b>Total</b>	<b>10,467</b>

## APPENDIX 11: Location of Rabbit Monitoring Transects Within Hotham Farm Restoration Area

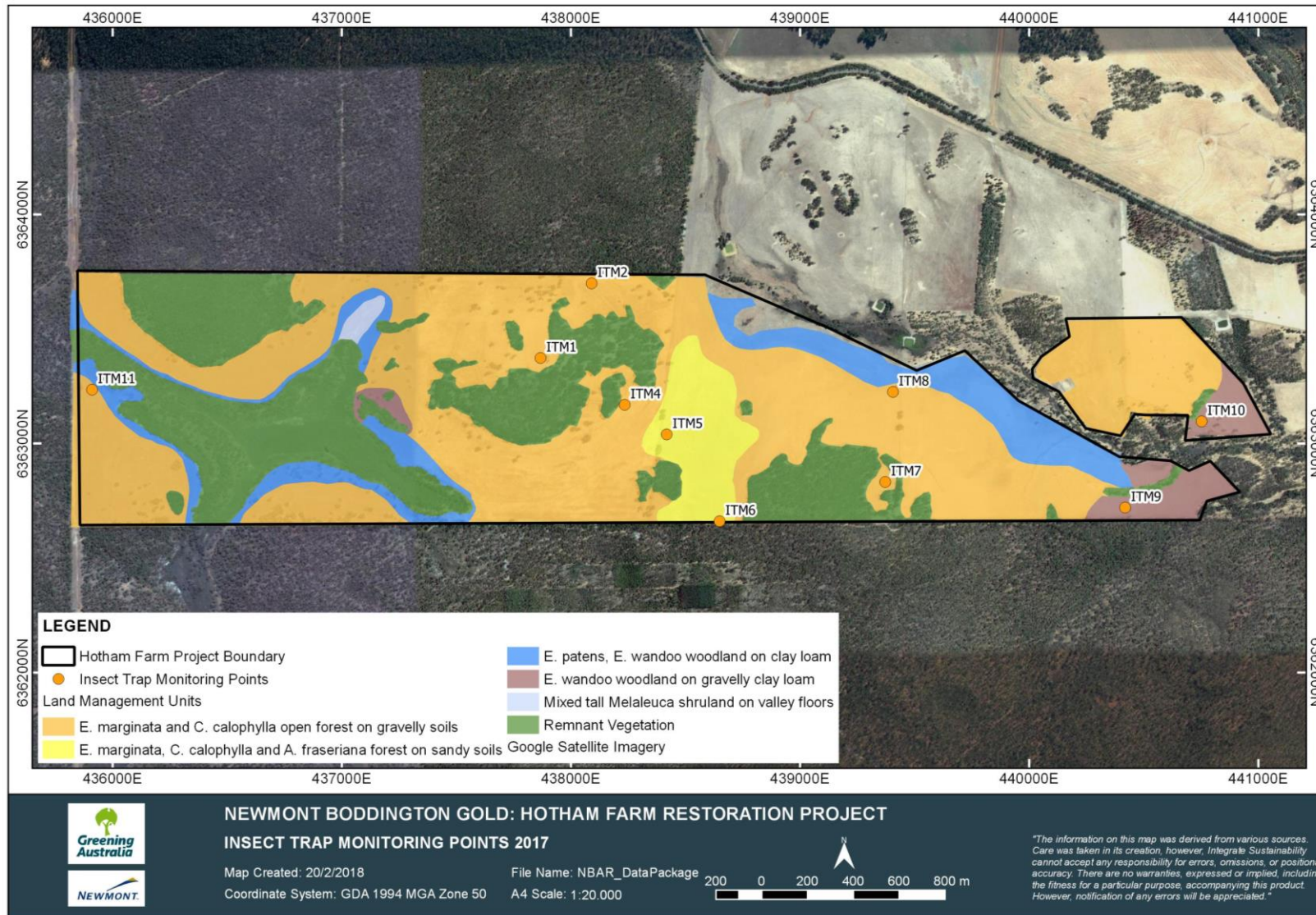


## APPENDIX 12: Plant Species Included in LMU Mixes to Match Habitat Requirements for Black Cockatoo Species

Species	Used for		
	Feeding	Roosting	Nesting
<i>Acacia saligna</i>			
<i>Allocasuarina fraseriana</i>			
<i>Allocasuarina huegeliana</i>			
<i>Allocasuarina humilis</i>			
<i>Banksia grandis</i>			
<i>Banksia littoralis</i>			
<i>Banksia sessilis</i>			
<i>Banksia squarrosa</i>			
<i>Corymbia calophylla</i>			
<i>Eucalyptus marginata</i>			
<i>Eucalyptus patens</i>			
<i>Eucalyptus rudis</i>			
<i>Eucalyptus wandoo</i>			
<i>Hakea amplexicaulis</i>			
<i>Hakea cyclocarpa</i>			
<i>Hakea incrassata</i>			
<i>Hakea lissocarpha</i>			
<i>Hakea prostrata</i>			
<i>Hakea ruscifolia</i>			
<i>Hakea undulata</i>			
<i>Hakea varia</i>			
<i>Persoonia longifolia</i>			
<i>Xanthorrhoea preissii</i>			

Adapted from Finn 2012 And DEC 2011

## APPENDIX 13: Location of Insect Monitoring Traps, Hotham Farm 2017



## APPENDIX 14: Location of Photo Monitoring Points, Hotham Farm 2017

