



Appendix O

Austen Quarry Silver-leaved Mountain Gum Management Plan

Prepared for RW Corkery & Co Pty Ltd

October 2016

Document control

Project no.: 2916

Project client: RW Corkery & Co Pty Ltd

Project office: NSW South

Document description: Appendix O. Silver-leaved Mountain Gum Management Plan

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Internal review: Rhidian Harrington

Document status: Revision 3

Document address: P:\Projects\2000s\2900s\2916 Austen Quarry Biodiversity Offset Strategy and BioBanking Agreement\Report\Silver-leaved Gum MP

Local Government Area: Lithgow

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Document revision status

Author	Revision number	Internal review	Date issued
Nathan Smith	Rev0	Rhidian Harrington	3 May 2016
Nathan Smith	Rev1	Rhidian Harrington	7 June 2016
Nathan Smith and Luke Baker	Rev2	Rhidian Harrington	14 June 2016
Sian Griffiths	Rev3		19 August 2016

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Cover photograph: View north-west from the BOA

Executive summary

Niche Environment and Heritage Pty Ltd was commissioned by RW Corkery & Co Pty Ltd, on behalf of Hy-Tec Industries, to deliver a Silver-leaved Mountain Gum Management Plan for the Austen Quarry Stage 2 Extension, as required for NSW and Commonwealth approval.

The management plan prescribes actions to rehabilitate and maintain areas within the disturbance footprint of the Stage 2 Extension that will be revegetated using silver-leaved mountain gum (*Eucalyptus pulverulenta*) tubestock and other locally native species. This document also prescribes actions that conserve, improve and maintain the remaining intact local population of silver-leaved mountain gum within the BOA to the east of the disturbance footprint.

The actions described in this document will be maintained within both the Biodiversity Offset Area and rehabilitated areas in perpetuity, are complimentary with the objectives and targets of the *Landscape and Rehabilitation Plan* (RWC 2016) and the *Biodiversity Offset Management Plan* (Niche 2016) and are in accordance with the approved conservation advice for silver-leaved mountain gum (DoE 2008).

Key actions that will meet all NSW and Commonwealth priorities will be implemented and include:

1. Continued management of all previously planted and retained occurrences of silver-leaved mountain gum within the quarry lease.
2. Restoration of local native vegetation types including the replanting of silver-leaved mountain gum at appropriate densities, within areas of future landscape rehabilitation of the Stage 2 disturbance footprint.
3. In-perpetuity security, management and funding of the remnant silver-leaved mountain gum core population and also non-core occurrences, within the Biodiversity Offset Area.
4. A program for monitoring silver-leaved mountain gum population size and distribution within the Biodiversity Offset Area.

A program to evaluate the performance of the management actions within both the quarry area and the Biodiversity Offset Area against objectives, targets and responsibilities was formulated (Section 5.4). This incorporates a prescription of remedial actions to enable adaptive management should performance targets and objectives not be met.

Glossary and abbreviations

BIA	Biodiversity Impact Assessment
BOA	Biodiversity Offset Area
DoE	Commonwealth Department of Environment
DPE	NSW Department of Planning & Environment
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
KTP	Key threatening process as listed on the TSC and/or EPBC Acts
Local occurrence	Refers to the distribution of an ecological community within the study area and continuous with it
Local population	The population of a particular threatened species that occurs in the locality
Locality	The area within 10 km of the study area
MNES	Matters of national environmental significance, from the EPBC Act
NW Act	NSW <i>Noxious Weeds Act 1993</i>
OEH	NSW Office of Environment and Heritage
TEC	Threatened Ecological Community
Threatened biodiversity	Threatened species, populations and ecological communities as listed on the TSC and/or EPBC Acts
TSC Act	NSW <i>Threatened Species Conservation Act 1995</i>

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1. Introduction

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by RW Corkery & Co Pty Ltd (RWC) to prepare a Silver-leaved Mountain Gum Management Plan (SLMGMP) for the Austen Quarry Stage 2 Extension, as required by approvals granted by the NSW Department of Planning & Environment (DPE) and Commonwealth Department of Environment and Energy (DoEE). Austen Quarry is operated by Hy-Tec Industries Pty Ltd (Hy-Tec) and is located approximately 3.5 kilometres south of Hartley in NSW (Figure 1, Figure 2).

1.1 Aim of the Silver-leaved Mountain Gum Management Plan (SLMGMP)

The aim of the SLMGMP is to provide a framework for the implementation of management actions that will mitigate the impacts of the Stage 2 Extension, increase the local population and secure remnant intact populations of silver-leaved mountain gum (*Eucalyptus pulverulenta*). The SLMGMP applies to the areas of the Stage 2 Extension to be rehabilitated (RWC 2016) and also the adjacent Biodiversity Offset Area (BOA).

1.2 Legislative and planning framework

Niche conducted a Biodiversity Impact Assessment (BIA) to assess impacts on terrestrial ecology as a result of the Stage 2 Extension (Niche 2014), which formed part of the EIS for the project (RWC 2014). The report concluded that the proposed Stage 2 Extension would result in a residual and unavoidable impact to 29.0 hectares of native vegetation (direct removal of 26.5 hectares and edge effects to 2.5 hectares) which is habitat for a suite of threatened fauna. Furthermore, 721 (being 631 previously planted by Hy-Tec and 90 non core) individuals of silver-leaved mountain gum would be removed by the Stage 2 Extension. Silver-leaved mountain gum is listed as vulnerable on both the TSC and EPBC Acts.

The SLMGMP has been prepared in accordance with Condition 2 (and relevant components of Conditions 3 and 4) of EPBC Act Approval 2013/6967 (EPBC 2013/6967) issued by the DoEE on 19 October 2015, as well as to address specific requirements of Conditions 25, 26 and 29 of SSD-6084 issued by the DPE on 15 July 2015. Both the DoEE and DPE conditions relate to the in-perpetuity security and management of the BOA and the conservation, management and monitoring of the local silver-leaved mountain gum population. The conditions relate to both the rehabilitation of the Stage 2 Extension area and the management of the BOA. **Appendix C** identifies the relevant section where each conditional requirement is addressed in the SLMGMP.

1.3 Previous assessments

Terrestrial ecological surveys were undertaken by Niche in February 2012 and June 2013 as part of the BIA (Niche 2014). Ecological data collected at various locations within the Stage 2 Extension area included floristic composition, vegetation structure, BioBanking site attributes, weed distribution, forest age and an assessment of ecosystem resilience. Transect counts were conducted for silver-leaved mountain gum and population estimates were extrapolated in core areas of habitat for the species.

2. Description of the site

2.1 Location

Austen Quarry is approximately 3.5 kilometres south-southwest of the village of Hartley and 10 kilometres south of Lithgow within the Lithgow Local Government Area in NSW (Figure 1, Figure 2).

Initial extraction and processing operations at the Austen Quarry (Stage 1) were restricted to Lot 1, DP1005511. The Stage 2 Extension constitutes an extension onto Lot 2, DP1005511 and Lot 31, DP1009967. The Quarry Access Road is located predominantly on Lot 31, DP1009967 with a small section on Lot 4, DP876394 as it approaches Jenolan Caves Road (Figure 2). The BOA is located across parts of Lots 1 and 2, DP1005511 and Lot 31, DP1009967 and includes Conservation Area H (DA 103 194) (Figure 2).

Each of the four lots are owned by the Hartley Pastoral Corporation Pty Ltd (HPC), with whom Hy-Tec holds a lease for the purpose of the Austen Quarry.

2.2 Threatened biodiversity

No Threatened Ecological Communities (TECs) listed on the TSC and/or EPBC Acts were recorded within the BIA study area (Niche 2014). No TECs will be affected by the Stage 2 Extension.

Silver-leaved mountain gum was common within the BIA study area, identified based on density as core and non-core occurrences. Silver-leaved mountain gum will be affected by the Stage 2 Extension (refer to Section 3). No other threatened flora were recorded (Niche2016). Black gum (*Eucalyptus aggregata*) was considered to have a moderate likelihood of occurrence but was not detected.

Five threatened fauna as listed on the TSC and/or EPBC Acts were recorded during the field survey by Niche (2016), including Gang-gang Cockatoo, Powerful Owl, Scarlet Robin, Eastern Bentwing-bat and Large-eared Pied Bat. Additional threatened fauna recorded during previous studies within the BIA study area included Hooded Robin, Flame Robin and Varied Sitella. In total, eight threatened fauna were recorded within the BIA study area. Habitat for each of these species is affected by the proposal but will be offset through the implementation of the Biodiversity Offset Strategy, which will conserve and manage an area of native vegetation that is habitat for these species. No species specific offsets are required in relation to threatened fauna.

2.3 Condition of native vegetation

The Austen Quarry, including the Stage 2 Extension, is adjacent to the Coxs River on the west fall of the Blue Mountains. Land to the south, east and west of the Quarry Site consists mainly of wooded ridges and predominantly cleared valleys. Land to the north is mainly gently undulating grazing land.

The native vegetation within the BIA study area forms part of a larger patch of adjacent remnant vegetation that is greater than 500 hectares. This native vegetation remnant is in moderate to good condition and is connected to vegetation within the Blue Mountains Wilderness area to the east and partially fragmented vegetation in the Little Hartley area to the north.

The existing extraction and associated processing area is devoid of native vegetation, due to on-going quarrying activities.

The vegetated areas along the mid-upper slopes and ridges of the Stage 2 Extension area of the Quarry Site are in good condition with little evidence of significant past disturbance, except for some tracks and edge disturbances, timber harvesting and light grazing. Fire seems to have been largely excluded. A high level of

resilience is apparent throughout most of these areas, which is demonstrated by the diversity of native herbs and ground cover, negligible weed cover and an unaltered soil profile.

The vegetation occurring on the mid-lower slopes of the Stage 2 Extension area of the Quarry Site has been historically cleared and thinned and has led to decreased diversity of under-storey and ground cover species. Whilst grazing has continued under management by HPC, stocking rates are likely to be much lighter than in the past leading to improvements in habitat quality within this area.

The Coxs River was found to be in good condition and plays an important role within the region as a vegetated corridor promoting connectivity. The vegetation along the Coxs River has been impacted by previous clearing, flooding and weed invasion.

Vegetation on the lower lying areas and gentle slopes within the Stage 2 Extension area of the Quarry Site had been impacted by clearing, resulting in a sparse canopy, mid and lower strata layers.

2.4 Size and connectivity

The disturbance footprint of the proposed Stage 2 Extension covers 57.7 hectares and is located within the broader Stage 2 Site covering approximately 144 hectares (Figure 2, Figure 3). Of this 57.7 hectares, 26.5 hectares is native vegetation that would be removed. The BOA also includes a significant amount of native vegetation to the immediate east of the Stage 2 Extension and is 94.3 hectares in area. Through the provision of the BOA, 94.3 hectares of native vegetation and 1,850 individuals of silver-leaved mountain gum will be secured, managed and monitored in perpetuity.

2.5 Vegetation and habitat condition

The vegetation communities within the BOA defined by Niche include:

- Brittle Gum - Broad-leaved Peppermint open forest;
- silver-leaved mountain gum mallee woodland;
- Forest Red Gum grassy open forest;
- Forest Red Gum native grassland;
- Forest Red Gum exotic grassland;
- River Oak riparian open forest; and
- Rough-barked Apple gully forest.

The distribution of these vegetation communities is illustrated in **Table 1** which lists each of these vegetation types as defined by Niche, and also provides the area of each within the BOA.

Table 1. Vegetation communities within the BOA

Vegetation Community Unit (Niche)	Vegetation Type (Niche)	BOA (ha)
c1	Brittle Gum - Broad-leaved Peppermint open forest	46.3
c2	Silver-leaved Mountain Gum mallee woodland	1.9
c3	Forest Red Gum grassy open forest	22.8
c3a	Forest Red Gum native grassland	0.8
c3b	Forest Red Gum exotic grassland	9.7
c4	Rough-barked Apple gully forest	2.4
c6	River Oak riparian open forest	10.4
<i>Total native vegetation</i>		94.3

Brittle Gum – Broad-leaved Peppermint open forest is the most prominent vegetation type, accounting for approximately half of the BOA and occurs mostly on the higher slopes and ridgelines. A high level of resilience is apparent throughout most of these areas, demonstrated by the diversity of native herbs and ground cover, negligible weed cover and an unaltered soil profile.

Silver-leaved Mountain Gum mallee woodland occupies a patch on a north-facing slope within the BOA, containing the threatened *Eucalyptus pulverulenta*. The community was in good condition, with all layers intact and with minimal disturbance. Niche conducted an assessment of the adequacy of the BOA in relation to its provision of habitat for *Eucalyptus pulverulenta*. The BOA provides both core areas of natural remnant habitat dominated by the species and non-core areas of natural remnant habitat where the species is common, but not dominant. Together, these core and non-core areas contain a population of 1,850 individuals of the species.

Forest Red Gum grassy open forest occurs on the lower lying areas and gentle slopes of the BOA. The native grassland and exotic grassland variants (c3a and c3b respectively) contained a sparse canopy layer, mid and lower strata due to clearing. The main difference in the two variants is that the native grassland contains more than 50 % of native ground cover present.

Rough-barked Apple gully forest occurs in a steep gully towards the northern and central portion of the BOA.

River Oak riparian open forest occurs in a strip along the Coxs River within the BOA. The community does not occur in the impact area of the Stage 2 Extension. This community was in moderate to good condition but has been impacted by previous clearing, flooding and weed invasion. The Coxs River was found to be in good condition and plays an important role within the region as a vegetated corridor promoting connectivity.

2.6 Disturbance history

Existing disturbance to native vegetation within the Stage 2 Extension area of the Quarry Site includes historical clearing events (evident from even-aged canopy cohorts) and grazing. The BOA is relatively undisturbed, other than a patch of exotic pasture adjacent to the Coxs River in the northern portion. Serrated tussock (*Nasella trichotoma*) is the main weed species throughout the site and is the most obvious symptom of disturbance.

Previous fire events were not clearly evident throughout the site. It is obvious however, from the open forest and woodland structure and the dry sclerophyll composition of the vegetation (fire-adapted groups such as grasses, sedges, peas, eucalypts and other Myrtaceae), that fire would be an inherent and important component of the ecology of the area. Section 4.9 describes an appropriate fire regime for the management of silver-leaved mountain gum, both within the BOA and the rehabilitation areas.

2.7 Key Threatening Processes

Section 5.1.2 of Niche (2014) lists the Key Threatening Processes (KTPs) as listed on the TSC and/or EPBC Acts that potentially operate or will be exacerbated by the Stage 2 Extension. The Stage 2 Extension constitutes, or is likely to exacerbate, the following four KTPs due to unavoidable or unmitigated impacts of the Stage 2 Extension:

1. Clearing of native vegetation.
2. Climate change (human-caused).
3. Loss of hollow-bearing trees.
4. Removal of dead wood and dead trees.

It is anticipated that, through the implementation of the management actions in the BOMP, each of these KTPs will be managed such that their effects are negligible.

Invasion of native plant communities by exotic perennial grasses is listed as a KTP on the TSC Act. African lovegrass (*Eragrostis curvula*) and serrated tussock (*Nassella trichotoma*) are both exotic perennial grasses and are known to occur on the site, and as such should be managed to reduce numbers and extent wherever possible. Serrated tussock is also a noxious weed (see below).

2.8 Noxious and environmental weeds

Weeds as listed under the NSW *Noxious Weeds Act 1993* (NW Act) are declared in control areas (usually LGAs). If a weed is declared a noxious weed, management of such a weed is the responsibility of the landowner. The weeds listed in **Table 2** were recorded in the BIA study area and are listed as noxious on the NW Act for the Lithgow LGA. The presence of these species has implications for the on-going management of native vegetation within the BIA study area and BOA. In a more general sense, grass weeds (Poaceae) and daisies (Asteraceae) were dominant, as would be expected, within the grassy open forests and degraded pastures. African boxthorn (*Lycium ferrocissimum*) and serrated tussock have been previously subject to management at the site (OnSite 2011). African boxthorn was not recorded during the current field survey though it is acknowledged as likely to be present.

Table 2. Noxious weeds recorded within the BIA study area

Noxious Weed	Class	Legal requirements
<i>Eragrostis curvula</i> African lovegrass	4	The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its reproduction
<i>Rubus fruticosus</i> agg. spp. Blackberry		
<i>Nassella trichotoma</i> Serrated tussock		
<i>Conium maculatum</i> Hemlock		
<i>Onopordum</i> spp. Scotch, Stemless, Illyrian and Taurian thistles		
<i>Hypericum perforatum</i> St. John's wort		
<i>Rosa rubiginosa</i> Sweet briar		

3. Silver-leaved mountain gum – baseline ecological data

3.1 Estimate within core population areas

Two areas of densely populated core habitat were identified within the BOA in February 2012. The majority of these individuals broadly coincided with the area mapped as silver-leaved mountain gum core area with a minor extension to the north of this area and also a separate area north of that again (**Figure 4**). Due to the density of the population and the potential for double-counting, the most reliable method of estimating the population was considered to be plot-based counts, which could then be extrapolated to estimate their density. For the population estimate, three 20 x 20 metre plots were established and two counts conducted in each (one each by Nathan Smith and Luke Baker). The results of these counts are provided in Table 3.

Table 3. Population estimate for *E. pulverulenta* core habitat areas, February 2012

Site Number	N. Smith (Plants per 400 m ²)	L. Baker (Plants per 400 m ²)
031	27	40
038	29	24
039	27	25
TOTAL Plants per 1200 m²	83	89

An average of 86 plants were recorded over the 1,200 square metres surveyed, which equates to 716 plants per hectare. The total area of core habitat for *E. pulverulenta* within the BIA study area is 2.8 hectares. On this basis, it is estimated that 2,004 individuals are present within the core habitat areas (716 x 2.8). Conservation Area H (pink hatching on (**Figure 4**) is under prior management and accounts for 0.4 hectares of this core population. As per conditions of consent, Conservation Area H would be included within the proposed BOA.

Two additional core habitat areas were located just to the north of the existing pit in the June 2013 surveys which are represented as silver-leaved mountain gum core areas in **Figure 4**. These two areas have not been included in the estimate above, but amount to an additional 0.39 hectares of habitat. Therefore, this component of the core population is estimated at an additional 279 individuals (0.39 x 716 plants per hectare). Neither of these areas are the subject of this assessment as they would remain undisturbed throughout the life of the Austen Quarry.

A total of 2,283 individuals in core habitat are estimated to exist within the Austen Quarry lease, 1,718 of which fall within the BOA for the Stage 2 Extension. None of these individuals would be impacted by the Stage 2 Extension.

3.2 Isolated natural occurrences within the BIA study area

Clumped and isolated occurrences of silver-leaved mountain gum within the BIA study area were counted and spatially located with a Garmin GPS in their entirety. During the June 2013 surveys, nine additional individuals were recorded in natural habitat within the BIA study area, none of which fall within either the Stage 2 Extension area of impact or BOA. The total number of isolated individuals in non-core remnant areas within the BIA study area is 231. Of these, 90 would be impacted by the Stage 2 Extension and 132 fall within the BOA.

3.3 Occurrence within rehabilitation areas

In June 2013, in addition to further vegetation and habitat condition surveys (and at the request of Hy-Tec), silver-leaved mountain gum counts were carried out in the previously un-assessed rehabilitation areas (i.e., counts of installed tubestock). These areas are mapped as Rehabilitation Areas A-L in **Figure 4**. The results of these counts are provided in **Table 4** and show that, as at June 2013, 1,386 individuals of silver-leaved mountain gum tubestock had been successfully planted in the rehabilitation areas of the Austen Quarry. 631 individuals of silver-leaved mountain gum planted by Hy-Tec in the rehabilitation areas will be removed as a result of the Stage 2 extension and will be offset within the BOA.

Table 4. Silver-leaved mountain gum installed in rehabilitation areas (displayed in Figure 4)

Niche Veg Code	Niche Veg Type	Rehab area	Area (ha)	E. pulverulenta count
rh	Rehab Area	A	0.23	48
rh	Rehab Area	B	0.16	12
rh	Rehab Area	C	0.83	13
rh	Rehab Area	D	0.32	62
rh	Rehab Area	E	0.11	60
rh	Rehab Area	F	0.60	221
rh	Rehab Area	G	1.22	20
rh	Rehab Area	H	1.64	370
rh	Rehab Area	I	0.32	320
rh	Rehab Area	J	0.28	186
rh	Rehab Area	K	0.81	74
rh	Rehab Area	L	0.10	0
Total			6.62	1,386

3.4 Estimated existing and projected population

The total number of silver-leaved mountain gum within the Austen Quarry boundary and proposed offset area is estimated at 3,815 individuals (2,283 core + 146 non-core + 1,386 planted) (**Table 5**). The approximate locations of this population is displayed on Figure 4. Of these, 721 individuals (90 non-core + 631 planted) will be removed as a result of the Stage 2 Extension and are required to be offset. The total number of existing individuals in the BOA is estimated at 1,850 (1,718 core + 132 non-core). A further 1,000 individual tubestock will be planted within the Replanting Areas (Figure 3). It is estimated that once the BOA is secured and additional replanting completed that 2,942 individuals would be conserved within the BOA and Replanting Areas. This assumes a 5% increase within the BOA to 1,942 individuals over 20 years (brought about through management for conservation), plus the replanting of 1,000 individuals through managed revegetation.

Rehabilitation Areas within the Austen Quarry boundary that are not impacted by the Stage 2 Extension would conserve 755 planted individuals (1,386 less 631). However, as these plantings are a component of a previous approval they cannot formally contribute to the offsetting strategy for silver-leaved mountain gum in relation to the Stage 2 Extension.

Table 5. Estimated population of silver-leaved mountain gum

	Total Individuals with Quarry Site Boundary and BOA	Disturbance Area (i.e. individuals to be removed)	Individuals retained in Rehabilitation Areas	Existing individuals in Offset Area	Individuals to be planted in Replanting Areas (Figure 3)
Core	2,283			1,718	
Non-core	146	90		132	
Planted	1,386	631	755	-	1,000
Total	3,815	721	755	1,850	1,000

3.5 Update of baseline data

Following approval of the SLMGMP, the monitoring program would commence (see Section 5.1) and include an additional baseline survey of silver-leaved mountain gum individuals prior to the proposed rehabilitation planting works. This will ensure the baseline data is as current and as accurate as possible.

4. Management actions and specifications

4.1 Threats and management priorities

DoE (2008) and OEH (2016) describe the main threats to the conservation of silver-leaved mountain gum as trampling and grazing by domestic stock and/or feral goats, fire trail widening and maintenance, catastrophic natural events, altered fire regimes, fragmentation and loss of habitat, illegal seed collection, gold mining activities impacting on stands of the species and a lack of current and future conservation-based land use for the species.

DoE (2008) and OEH (2016) also describe the regional and local priority actions as including (amongst other things) monitoring of known populations and the progress of recovery, identification of important populations, management of threats to known populations, ensure road widening activities do not impact on the species, use formal conservation arrangements to secure populations, weed management, stock and feral herbivore management, development of suitable fire regimes and an elevation of awareness for landowners and conservation groups.

Management actions that specifically relate to the conservation of silver-leaved mountain gum are described here and relate to threats and actions identified in DoE (2008) and OEH (2016). The management described below relates to:

1. all previously planted and retained occurrences of silver-leaved mountain gum within the Quarry lease;
2. replanting of silver-leaved mountain gum within areas of Quarry disturbance rehabilitation; and
3. management of the remnant silver-leaved mountain gum core population and also non-core occurrences, within the BOA.

Section 5 describes the monitoring and performance evaluation program that will be implemented.

4.2 Security and tenure of the BOA

Hy-Tec proposes to secure the BOA, including Conservation Area H (DA 103 194), through a Nature Conservation Trust agreement (NCT). This will ensure the security of the remnant silver-leaved mountain gum population.

The Biodiversity Offset Management Plan or BOMP (Niche 2016) will prescribe standard management actions related to access controls, stock exclusion, weed management (maintenance levels in this case), replanting of exotic pasture areas, ecological burning and feral animal control. Each of these actions will be beneficial to the in-perpetuity conservation of silver-leaved mountain gum within the BOA.

Responsibility for the management of the BOA as a NCT agreement will lie with Hy-Tec for the life of the quarry operations and then be relinquished to the landowner after quarry operations cease.

4.3 Fencing and stock exclusion

The BOA and, therefore the remnant silver-leaved mountain gum population, will be protected by existing fences that exclude stock from the Austen Quarry. It is not anticipated that a fence will be required along the eastern boundary of the BOA (Coxs River) which is secure due to its steepness and inaccessibility. The existing fences are a four strand post-and-wire fence. It is considered that fencing the BOA with new fences on its boundary would cause more environmental harm than is gained, given stock cannot currently access the Quarry or BOA. Signs will be erected to highlight the ecological sensitivity of the BOA to contractors and staff.

The remaining lease area is well gated and fenced. These access restrictions will be maintained throughout the operational life of the quarry, and in perpetuity.

4.4 Track management

Vehicular tracks are largely absent from the BOA.

No degraded tracks that require rehabilitation are present within the BOA.

The widening of existing tracks at the Austen Quarry will be wherever possible, avoided where potential impacts on planted silver-leaved mountain gum may occur.

4.5 Collection and propagation of locally native seed

The collection and propagation of locally native and provenance seed will be carried out as the initial task in the installation of silver-leaved mountain gum tubestock and associated native species. Seed collection is not contingent on staging of other works but will be carried out by a suitably qualified provider such that the genetic integrity, structure and composition of native vegetation within the locality is maintained. This is particularly important given the presence and conservation significance of silver-leaved mountain gum.

Seed will be sourced as close as possible to the site and from the same general habitat. Propagules from a target range of five kilometres from the site is considered satisfactory, however it is anticipated that collection of silver-leaved mountain gum seed will occur from previously planted areas within the quarry lease and that most of the other local native species can be sourced from within or adjacent to the site. Illegal seed collection is viewed as a threat to silver-leaved mountain gum and therefore seed collection will have regard to standard industry practices including licencing (collection within threatened species habitat and EECs) and guidelines such as Florabank.

A lag of between 12 and 18 months may be required depending on the timing of on-ground works. This is to allow the supplier adequate time to collect seed (depending on season of commencement), propagate and harden-off tubestock (up to six months).

Appendix A provides a planting schedule for the rehabilitation areas and was determined with reference to the flora species recorded for the BIA (Niche 2014) and with a view to reinstating the structure of the local vegetation which provides competition for weed incursions that may threaten the planted silver-leaved mountain gum. However, other local species may well be appropriate for collection, propagation and installation, depending on seasonal availability.

Seed collection and propagation should be mindful of Peters *et al.* (1990).

4.6 Replanting of rehabilitation areas

4.6.1 Container sizes and labelling

Species listed in **Appendix A** will be supplied as tubestock and/or hiko-cells.

At least one plant of each species or variety in a batch will be labelled with a durable, readable tag. All hiko-cell forestry tube trays will contain only a single species which is labelled. The label will be able to withstand transit without erasure or misplacement.

4.6.2 Health and vigour

Plants delivered to site will be hardened off to suit the conditions that could reasonably be anticipated to exist on site at the time of delivery. Suitable root development will be present such that the root ball does not disintegrate on removal from the tray or forestry tube. The root mass will be well proportioned in

relation to the size of the plant material, conducive to successful installation, free of any indication of having been restricted or damaged and, in the case of hiko-cells, be air-pruned.

Plants will be supplied with foliage size, texture and colour at time of delivery consistent with the size, texture and colour shown in healthy specimens of the nominated species.

4.6.3 Freedom from pests and disease

Plants will be delivered to site that are free from pests or disease. Where attack is evident, plant supply will be restricted to those specimens with evidence of attack to less than 15 per cent of the foliage and ensure absence of actively feeding insects.

4.6.4 Storage

Tubestock will be delivered to the site on a day to day basis, and planted immediately after delivery.

4.6.5 Planting preparation and conditions

Holes will be dug on the day of installation to a depth appropriate to the size of the tubestock being installed (i.e. hiko-cell or tube). Depending on timing of planting, prevailing weather conditions and soil moisture, holes will be watered prior to planting.

Plants will be watered-in on the day of planting to the rim-level of the dish around each plant and then twice a week for the ensuing month if dry weather prevails (i.e., if weekly rainfall drops below 10 mm during that period).

Ideally planting will be programmed to coincide with cool, inclement weather. Planting will ideally be carried out during the months of March/April to allow good bedding of the root system over the ensuing winter and spring and also to minimise watering needs. Plants can, alternatively be planted in September or October but may require regular watering over the first spring and summer after installation, particularly if drought conditions prevail.

Planting in winter or summer may be appropriate when soil and climatic conditions are suitable.

4.6.6 Watering

Plants will be watered before planting, immediately after planting and as required to maintain growth rates free of stress. All plants will be watered-in immediately after planting to stabilise root-balls and remove air-pockets.

4.6.7 Fertilising

Apart from the slow release fertiliser likely to be used in the potting mixes of the tube stock, no additional fertiliser will be required. However, the possibility of using water crystals if planting must occur in very dry and hot conditions, or the application of trace elements such as iron chelates where clear deficiencies are present, will be considered.

4.6.8 Placing

Plants will be removed from forestry tubes or hiko-cells with minimal disturbance to the root ball and it will be ensured that the root ball is moist and placed in the centre of the hole and plumb. Plants will be installed in a small dish-shaped depression (i.e. not flush with but just below the surface of the topsoil) such that any subsequent rains result in a temporary pooling of water around the root-ball. This method increases tubestock survival in dry environments.

4.6.9 Mulching and organic matting

It is not anticipated that mulch will be required. Pinned coir-fibre organic mesh will be installed if the gradient is steeper than 1V:5H.

4.6.10 Tree guarding

The necessity of tree guards will be assessed prior to the planting of tubestock. The requirement will be based on whether seasonal conditions are favourable to the clear presence of herbivores that may pose a threat to the plantings (especially silver-leaved mountain gum tubestock). Tree guards are typically used for tree and shrub species only.

Damaged tree guards should be replaced as required. After 18 months, the contractor will remove all installed tree guards and stakes or at any time earlier where the plant is deemed to be sufficiently well established.

4.6.11 Maintenance program

The contractor will provide a maintenance program and amend it as required until approved. The program will specify the frequency and timing for all tasks described as part of the maintenance requirements.

Throughout the planting establishment period, the contractor will be required to carry out maintenance work including, watering, plant and tree guard replacements, rubbish removal and pest and disease control.

The contractor will provide an efficient, consistent and reliable maintenance service, undertaking all of the required tasks applicable for the requirements as per the agreed works program.

4.6.12 Completion of planting

Completion of the planting works includes, but is not limited to, the establishment of plants, replacement of plants which have failed and mulching. The contractor will allow for additional plantings of the same species to be replaced.

4.6.13 Insect and disease control

The contractor will be responsible for the control of any pest or disease that may affect the plants. Once a problem has been correctly identified, then a suitable form of treatment should be engaged until the problem has been eliminated. Should the use of chemical spray be required, strict adherence to the manufacturer's recommended rates and handling must occur.

4.6.14 Replacements

Failed, damaged or stolen plants will be replaced within seven days of each maintenance inspection, or as soon as suitable tubestock is available.

4.7 Weed management

The BOA will be subject to a biannual maintenance weed management regime.

Weed maintenance will consist of spot spraying sweeps through the BOA at regular intervals by a trained bush regenerator skilled at native and exotic plant identification. Weed incursions are minor in the BOA but it is important to the sustainability of the remnant silver-leaved mountain gum population that this remains the case. All potential weed incursions should be appropriately treated but key target species will include the noxious weeds recorded on the site, including African lovegrass, blackberry, serrated tussock, hemlock, Scotch thistle (and other *Onopordum* spp.), St. John's wort and sweet briar. Most of these species exist in the degraded paddocks of the mining lease, however due diligence will be taken to ensure they remain largely excluded from the BOA. African boxthorn was not recorded during the field surveys by Niche but will

also constitute a key focus species as it has been targeted in previous management regimes within the quarry lease.

A regular program of maintenance weed management will commence upon completion of planting of tubestock throughout the replanting areas. Noxious weeds, environmental weeds and perennial exotic grasses are considered the greatest threat to the re-establishment and improvement of native revegetation projects, and in this case for the establishment of silver-leaved mountain gum from tubestock. Regular maintenance weeding activities (once a month through late winter, spring and wet summers) will be undertaken for the first three years after installation of tubestock in these areas and then twice yearly.

A list of standard weed treatments for species identified on-site prior to works has been provided in **Appendix B**.

4.8 Feral animal management

Three feral animal species were recorded on site by Niche (2014); red fox, wild dog and black rat. None of these species are likely to constitute a threat to the conservation and management of silver-leaved mountain gum, either within the BOA or the replanting areas. Feral cat and wild pig have the potential to be present on the site but are unlikely to present a threat to either remnant or planted silver-leaved mountain gum specimens.

Though not recorded previously, it is considered likely that feral goats, rabbits and brown hare (feral herbivores) have the potential to occur on the site and negatively impact both the remnant silver-leaved mountain gum population in the BOA and also the planted tubestock. As described in Section 5, the presence of feral herbivores and their potential effects on silver-leaved mountain gum will be monitored. Remedial action(s) will be taken should effects of these species be considered a substantial threat to the conservation of silver-leaved mountain gum.

4.9 Fire regime

It is obvious from the dry sclerophyll forest and woodland structure and the composition of the vegetation that fire would be an inherent and natural ecological process within the locality. The vegetation of the Austen Quarry site falls broadly within the grassy woodland and dry sclerophyll NSW vegetation formations (Keith 2004). NPWS (2004) prescribes a fire interval of five to 40 years for grassy woodlands and five to 50 years for dry sclerophyll forests.

Silver-leaved mountain gum is a mallee and resprouts from a lignotuber (enlarged underground stem), an adaptation to fire. The species is listed in the NSW Threatened Species Hazard Reduction list (RFS 2004) as requiring no fire more than once every fifteen years.

Therefore, no part of the BOA, which contains intact remnant native vegetation and a population of silver-leaved mountain gum, will be subject to fire less than 15 years, or more than 40 to 50 years, from the previous fire event in that particular area.

The first managed fire event within the BOA will occur within five years of approval of this SLMGMP, take place in late summer or early autumn (to allow regeneration prior to the next spring flowering season) and be targeted at the lower slopes and part of the core population of silver-leaved mountain gum. These lower areas of native vegetation appear to be senescent and more in need of a burning event than the high plateau ground, while the silver-leaved mountain gum specimens within the core populations were quite large and mature (i.e. had not likely been burnt within the last 15 years). No more than a third of the extent of silver-leaved mountain gum core areas will be burnt, and no one third within the same 15 year timeframe. Subsequent managed burns within adjacent areas of the BOA will not be burnt less than five

years from the previous managed event in the adjacent area and will only be prescribed where monitoring of the silver-leaved mountain gum population has demonstrated a clear positive outcome as a result of fire from the first managed burn.

It is considered unlikely that wildfires within the district would extend to and burn the BOA. The Quarry itself, the managed trails and Quarry roads, the adjacent paddocks and the Coxs River effectively represent a fire-break to the north and west. Further, wildfire is unlikely to emanate within the locality from the sheltered southern and eastern slopes of the BOA, although this is not impossible. In any case, attempts will be made to exclude hot summer wildfires that might impact on the BOA, though it is accepted that this may be beyond the Quarry's control in some circumstances.

The location of the BOA, and the silver-leaved mountain gum occurrences within it, will be made known to RFS for inclusion in bushfire risk management plans, risk register and/or operations maps.

Managed burning will be excluded from all rehabilitation areas. Where senescence of mature planted silver-leaved mountain gum within the rehabilitation areas is detected, affected plants will be pruned back to ground level and the subsequent vegetative response monitored. Pruning to ground level is an established method used in fire prone areas to rejuvenate and extend the life of senescing plants with a lignotuber.

4.10 Exclusion zones and contractor awareness

Clearly delineated conservation exclusion zones within and around the existing Quarry and Stage 2 Extension (as identified on Figure 3) will be implemented to exclude movement of vehicles, plant and staff within rehabilitation areas and the BOA, other than for management activities related to the SLMGMP or the BOMP. A compulsory component of the site induction process will be to highlight all conservation exclusion areas and the BOA in its entirety on a map of the site.

5. Monitoring and performance evaluation

A monitoring and performance evaluation program will be implemented to ensure the stabilisation of the site during and post-construction, and the success of the management of the site to an improved and sustainable level.

5.1 Monitoring of silver-leaved mountain gum population within the BOA

The core population and non-core occurrences of silver-leaved mountain gum within the BOA will be subject to a simple yet rigorous monitoring system. An initial monitoring event will occur following approval of the SLMGMP and be repeated biennially in spring thereafter for the life of the quarry. The monitoring program will involve five key components:

1. Mapping of the distribution and extent of the core and non-core populations using a differential GPS (every second year).
2. Population estimates utilising the method as described in Niche (2014) of 20 x 20 metre plot counts within the core areas and exact counts and differential GPS locating of the non-core occurrences (every second year).
3. An assessment of health including the following attributes at predefined and fixed locations (once a year):
 - A qualitative assessment of condition of plants, e.g., good/moderate/poor (including observations of senescence or disease),
 - Evidence of herbivory or other physical disturbance and an assessment of the severity of such where it occurs,
 - Evidence of recruitment (i.e. naturally occurring saplings),
 - Per cent foliage cover within core areas, at 10 locations along a 50 metre transect as per OEH (2014),
 - The percentage of fruiting plants within the BOA, and
 - Seed viability (i.e., from trials of collected seed, refer to Section 4.5).
4. An estimate of the percentage foliage cover of weed species in all structural layers should be undertaken within 20 x 20 metre plots. A list of problematic species would be recorded for management purposes.
5. An assessment of the condition of the conservation exclusion measures, i.e., condition of fencing, gates and signage (minimum fortnightly inspections by Quarry staff).
6. Photographs of specimen plants at each of the predefined locations as nominated in Point 2 above.

5.2 Monitoring of silver-leaved mountain gum response to fire management regime

A monitoring program to determine the impact of the proposed fire management regime on the population of silver-leaf mountain gum would be implemented in line with the timing of the proposed fire regime. The

monitoring program aims to record and track the response of silver-leaved mountain gum to burning in core areas, and provide a base-line, post-fire assessment of the condition of the areas and specimens affected.

The monitoring program would involve the following key components:

1. Base-line survey of the number of plants of silver-leaved mountain gums within the area proposed for prescribed burn. Population estimates utilising the method as described in Niche (2014) of 20 x 20 metre plot counts within the core areas.
2. Base-line survey of the health of silver-leaved mountain gum including the following attributes at fixed locations prior to prescribed burn:
 - A qualitative assessment of condition of plants, e.g., good/moderate/poor (including observations of senescence or disease),
 - Evidence of recruitment (i.e. naturally occurring saplings).
3. Three months after the prescribed burn, the areas surveyed as part of the baseline surveys at point 1 and 2 above would be resurveyed using the same methods to determine number of plants of silver-leaf mountain gum and the health of the plants post fire. Response of the plants to fire would be noted in terms of evidence of epicormic growth, where plants do not appear to be resprouting and seedling recruitment post fire.
 - Follow-up surveys would be conducted at six months and 1 year after the prescribed burn, then repeated every five years for the life of the approval.
 - Results of the monitoring would be analysed to determine the effect of prescribed burning on the population of silver-leaved mountain gum in the BOA and reported to OEH after first year of monitoring, then every five years for the first cycle of fire management.
 - The area proposed for the first prescribed burn is shown in Figure 4.

5.3 Monitoring of replanted silver-leaved mountain gum

Monitoring of replanted silver-leaved mountain gum within the Replanting Area and the Rehabilitation Areas will take place at three, six and 12 months post planting during the first year by the Hy-Tec Quarry Production Manager and in spring biennially thereafter and will mostly be based on visual inspection of survival rates and photographic evidence. Planted areas will be surveyed and number of deceased tubestock would be recorded. Should tubestock survival rates fall below 85%, remedial planting would be undertaken. Management of the planted areas would be reviewed if tubestock survival rates consistently do not meet performance targets. Monitoring would continue for the life of the approval.

The specific performance evaluation measures for replanting of silver-leaved mountain gum are contained in Section 5.4.

5.4 Performance evaluation and adaptive management

A performance evaluation program will be implemented to:

- ensure the actions as prescribed in this management plan are monitored against known targets;
- outline adaptive and remedial actions should the targets not be met; and
- provide details of who will be responsible for implementing and reviewing the actions and monitoring program.

Table 6 aligns key performance criteria to the relevant management actions. The Quarry Production Manager, or his/her nominee will be responsible for the monitoring program and implementing the SLMGMP. The NSW Quarry Operations Manager will be responsible for coordinating review of the management plans.

Table 6. Performance criteria for silver-leaved mountain gum management

Management action	Performance targets	Risks	Mitigation measures	Triggers	Remedial actions if target not achieved	Responsible party	
						Quarry life	Post quarry
1. Security of BOA	Nature Conservation Trust agreement or other agreed process implemented for BOA, including Conservation Area H (DA 103 194), within 2 years of consent.	n/a	n/a	n/a	n/a	Hy-Tec through agreement with landowner.	Landowner
2. Fencing and stock exclusion	<p>The BOA will be protected by existing fences that exclude stock from the Austen Quarry. The fence is a four strand post-and-wire. Signs will be erected highlighting the ecological sensitivity of the BOA.</p> <p>Maintenance of Quarry gates and fences throughout the operational life of the quarry and in perpetuity.</p> <p>Exclusion of stock, staff, contractors, plant and machinery from the BOA and rehabilitation areas except where required for maintenance and inspection purposes.</p>	Failure of quarry gates and fences leading to undesired access.	Inspection of fences and gates on a monthly basis	Inappropriate access to the BOA by stock, staff, contractors, plant or machinery.	<p>Removal of stock from sensitive areas if required.</p> <p>Staff and contractor education where transgression has occurred. Disciplinary action will be commenced as per Hy-Tec's guidelines for further transgressions (other than for approved access).</p> <p>Failed or damaged fencing or gates to be replaced as soon as practical following detection.</p>	Quarry Production Manager or their delegate.	Landowner
3. Track management	<p>No degraded tracks requiring rehabilitation exist within the BOA and therefore avoiding the establishment of new tracks will be a key performance objective.</p> <p>No widening of existing tracks within the quarry area where potential impacts on planted silver-leaved mountain gum may occur.</p>	Formation of informal tracks or widening of existing tracks impacting the BOA	Control access to the BOA through the use of fencing, signage and gates.	Creation of new tracks within the BOA.	<p>Remediation of tracks with native revegetation strategies should the BOA be compromised.</p> <p>Replanting of silver-leaved mountain gum will occur should plants be removed.</p>	Quarry Production Manager or their delegate.	Landowner

Management action	Performance targets	Risks	Mitigation measures	Triggers	Remedial actions if target not achieved	Responsible party	
						Quarry life	Post quarry
4. Collection and propagation of seed	<p>Appointment of a suitably qualified provenance plant supplier such that the genetic integrity, structure and composition of native vegetation and silver-leaved mountain gum is maintained within the locality.</p> <p>Supply of healthy tubestock to site as per specification (Section 4.6) and list in Appendix B.</p>	Supply of healthy, local provenance tubestock compromised.	Collection of additional reserve local provenance seed to be stored and germinated should initial germination fail.	Healthy, local provenance tubestock in required densities not available.	Contract with supplier to be renegotiated should provenance plants of the species listed in Appendix B, or closely related local surrogates, not be supplied.	Contractor	Landowner Contractor
5. Replanting of silver-leaved mountain gum in Replanting Areas	<p>Installation of tubestock to specification (Section 4.6) and regular inspections for first month. Inspection thereafter would occur at three, six and 12 months post planting during the first year and in spring every second year thereafter for the life of the approval.</p> <p>85% survival of tubestock after one year.</p> <p>Maintain 85% survival rate of plantings in subsequent years.</p>	Tubestock fail.	As above, additional local provenance seed would be collected so additional tubestock can be germinated to replace losses.	Tubestock survival rate drops below 85%.	<p>Failed, damaged or stolen plants will be replaced within seven days of each maintenance inspection, or as soon as suitable tubestock is available.</p> <p>Replacement of tubestock to necessary levels if survival rate drops below 85%.</p>	<p>Quarry Production Manager or their delegate for regular inspections in first 12 months</p> <p>Contractor for biennial inspections.</p>	Landowner Contractor
6. Weed management	<p>Weed maintenance would occur twice yearly</p> <p>Engagement of suitably qualified contractor to implement maintenance weed management, prioritising noxious weed and perennial exotic grass control.</p> <p>Citation of relevant</p>	Weed maintenance not successful and weed density increases.	Review of weed control methods and frequency if satisfactory weed suppression (less than 5% PFC in all structural layers) is not achieved and maintained by year three.	Weed density increases or not maintained at less than 5% PFC in all structural layers by year three.	<p>Weed management activities to be reviewed and increased in frequency until target of less than 5% PFC in all structural layers is achieved and maintained.</p> <p>Contract with supplier to be renegotiated should not be achieved satisfactorily.</p>	<p>Quarry Production Manager or their delegate.</p> <p>Contractor</p>	Landowner Contractor

Management action	Performance targets	Risks	Mitigation measures	Triggers	Remedial actions if target not achieved	Responsible party	
						Quarry life	Post quarry
	<p>qualifications and experience.</p> <p>Suppression of noxious weeds and perennial exotic grasses on an on-going basis to less than 5% of percentage foliage cover (PFC) in all structural layers.</p>						
7. Feral animal monitoring	Negligible impacts from feral herbivores on native vegetation silver-leaved mountain gum either within the BOA or in the rehabilitation areas.	Herbivory activities impact on plant success and germination/ recruitment in BOA or rehabilitation areas.	Consultation with the land owner and as required Central Tablelands Local Land Services or OEH in regards to regional baiting programs.	Successful establishment of tubestock falls below 85% and herbivory is a major contributor to failure.	Trapping and removal, or shooting, of feral herbivores from site if detected and impacting on native vegetation and/or silver-leaved mountain gum specimens	Quarry Production Manager or their delegate.	Landowner Contractor
8. Management of native fauna habitat	<p>Logs and large trees salvaged from disturbance area utilised to augment habitat in existing and future rehabilitation areas. Materials not required for BOA.</p> <p>There is no requirement for ongoing fauna surveys or fauna monitoring in the BOA, as offsets are not required for threatened fauna.</p>	Rehabilitation areas are not suitable fauna habitat areas.	Suitably qualified and experienced ecologist engaged to conduct pre-clearing surveys	<p>Useful habitat features not salvaged and not utilised to improve fauna habitat in rehabilitation areas.</p> <p>Pre clearing surveys not conducted prior to any clearing activity</p>	Ensure engagement of suitably qualified and experienced ecologist to conduct pre-clearing surveys and supervise placement of logs and large trees.	<p>Quarry Production Manager or their delegate.</p> <p>Contract Ecologist</p>	-

Management action	Performance targets	Risks	Mitigation measures	Triggers	Remedial actions if target not achieved	Responsible party	
						Quarry life	Post quarry
9. Fire regime	<p>Clear positive outcome for silver-leaved mountain gum demonstrated from first managed burn.</p> <p>Exclusion of wildfire and provide information to RFS for inclusion of silver-leaved mountain gum locations in bushfire risk management plans, risk register and/or operations maps.</p> <p>Managed burning will be excluded from all rehabilitation areas.</p>	<p>Managed fire regime has negative impact on silver-leaved mountain gum population</p> <p>Wildfire or prescribed burn not contained to planned burn area.</p>	Engaged and consult with RFS on all prescribed burns.	Monitoring of first managed burn indicates that implemented fire regime (described in Section 4.9) is not producing a positive outcome for the silver-leaved mountain gum population.	<p>A qualified ecologist will be commissioned to review the regime and recommend changes.</p> <p>Should wildfire effect the site, closely monitor response of remnant core and non-core silver-leaved mountain gum occurrences.</p> <p>Replant silver-leaved mountain gum if individuals in rehabilitation areas are destroyed by wildfire</p>	<p>Quarry Production Manager or their delegate</p> <p>RFS</p> <p>Contract Ecologist</p>	<p>RFS</p> <p>Contract Ecologist</p>
10. Exclusion zones and contractor awareness	Exclusion of stock, staff, contractors, plant and machinery from BOA and rehabilitation areas except where required for maintenance and inspection purposes.	Inappropriate access or activities undertaken within BOA and rehabilitation areas	Control access to the BOA through the use of fencing, signage and gates.	Evidence or inappropriate access or activities undertaken within BOA and rehabilitation areas.	Staff and contractor education where transgression has occurred. Disciplinary action will be commenced as per Hy-Tec's guidelines for further transgressions (other than for approved access)..	Quarry Production Manager or their delegate	Landowner

Management action	Performance targets	Risks	Mitigation measures	Triggers	Remedial actions if target not achieved	Responsible party	
						Quarry life	Post quarry
11. Monitoring of silver-leaved mountain gum within BOA	<p>Engage suitably qualified and experienced ecologist to implement monitoring program as specified in Section 5.1.</p> <p>Ecologist to report to DoEE on results for each monitoring event, continuing for the life of the approval.</p> <p>Maintenance of healthy remnant population in the BOA. Performance target tied to stable or increasing population of silver-leaved mountain gum within BOA and the health of the plants.</p>	Failure to maintain a healthy remnant population in the BOA.	Appropriate changes to relevant management plans in consultation with OEH to achieve stable or increasing population of silver-leaved mountain gum within BOA.	Monitoring program shows decreasing population of silver-leaved mountain gum.	Appropriate remedial action to be determined in consultation with OEH and DoEE upon detection of a decline in the silver-leaved mountain gum population.	<p>Quarry Production Manager or their delegate</p> <p>Contract Ecologist</p> <p>DoEE and OEH</p>	<p>Landowner</p> <p>Contract Ecologist</p> <p>DoEE and OEH</p>

6. Conclusion

This document, the Silver-leaved Mountain Gum Management Plan (SLMGMP), has been prepared in accordance with Condition 2 (and 3) of EPBC Act Approval 2013/6967 issued by the DoEE on 19 October 2015, as well as to address specific requirements of Condition 29 of SSD-6084 issued by the DPE on 15 July 2015, for the Austen Quarry Stage 2 Extension.

An ecological assessment of the site was completed by Niche in 2014 as part of the EIS for the Stage 2 Extension. During the ecological surveys for the EIS, a significant local population of silver-leaved mountain gum (*Eucalyptus pulverulenta*) was identified, of which 721 individuals (631 previously planted and 90 remnant) will be removed as a result of the Stage 2 Extension and are required to be offset. This offset is located on the adjacent bushland where 1,850 individuals will be conserved into perpetuity in the Biodiversity Offset Area (BOA). An estimated 755 previously planted individuals will continue to be conserved in existing locations throughout the quarry lease and a further 1,000 individuals are required to be planted.

This SLMGMP describes the actions that will be undertaken to ensure the security, protection, conservation, management and monitoring of both the remnant and planted occurrences of silver-leaved mountain gum throughout the BOA and the quarry area. These actions include:

- Securing the BOA, including Conservation Area H (DA 103 194), under a Nature Conservation Trust agreement or other agreed arrangement;
- Maintenance of existing fences to exclude stock from the BOA;
- Permanent exclusion of stock, staff contractors, plant and equipment from both the BOA and the rehabilitation areas except where required for maintenance and inspection purposes;
- Collection and propagation of locally native tubestock;
- Planting within rehabilitation areas to a defined specification (refer to Section 4.6 and **Appendix A**);
- On-going weed management targeting noxious weeds and exotic perennial grasses;
- Monitoring the BOA and rehabilitation areas for feral herbivores;
- Implementation of an ecological burning regime to suit the native vegetation of the site and the on-going conservation of silver-leaved mountain gum; and
- Monitoring of the health of the remnant core and non-core occurrences of silver-leaved mountain gum within the BOA.

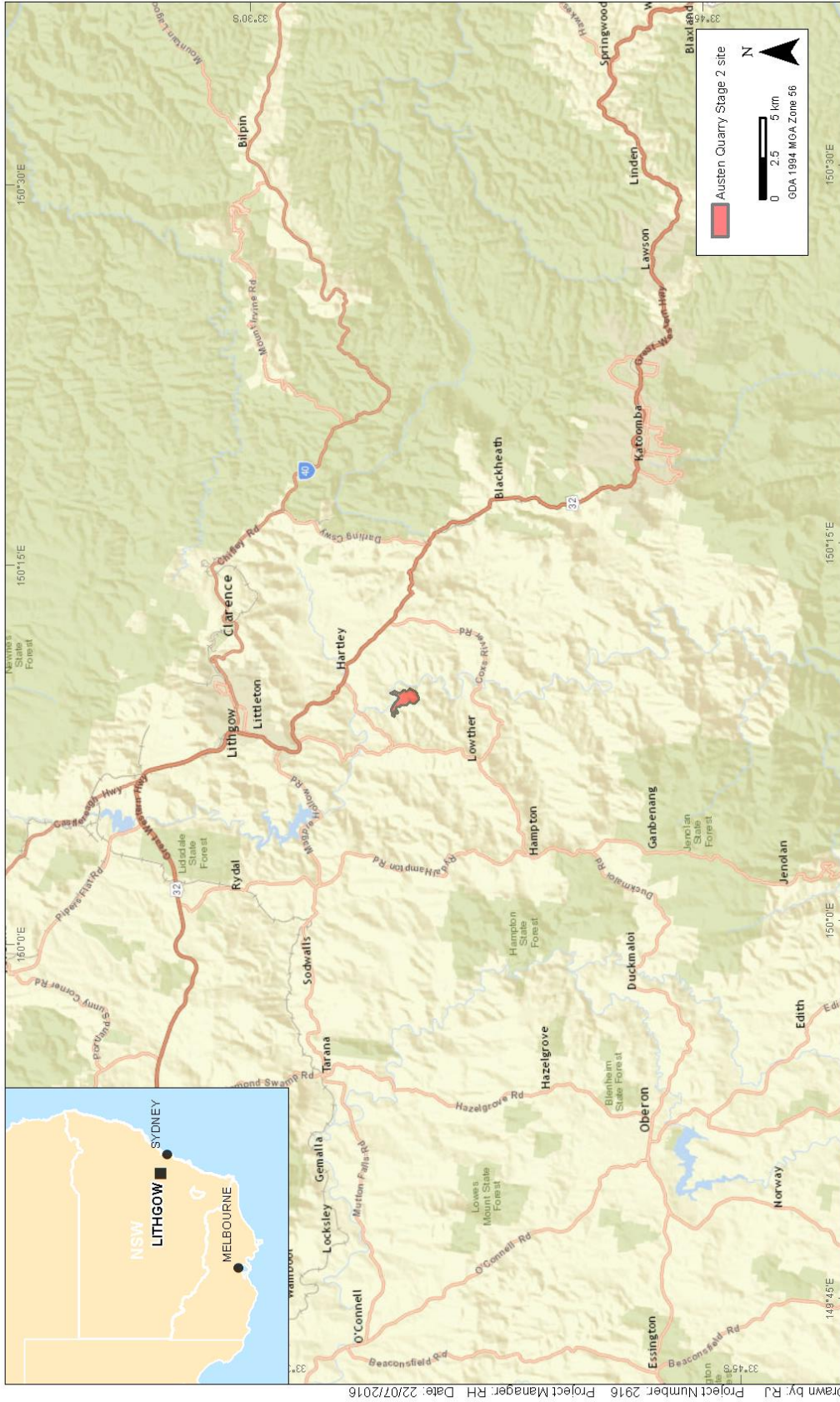
Each of these actions will be evaluated against relevant performance targets and assigned to various parties for implementation.

Implementation of this SLMGMP will ensure the long-term conservation of silver-leaved mountain gum within the locality.

References

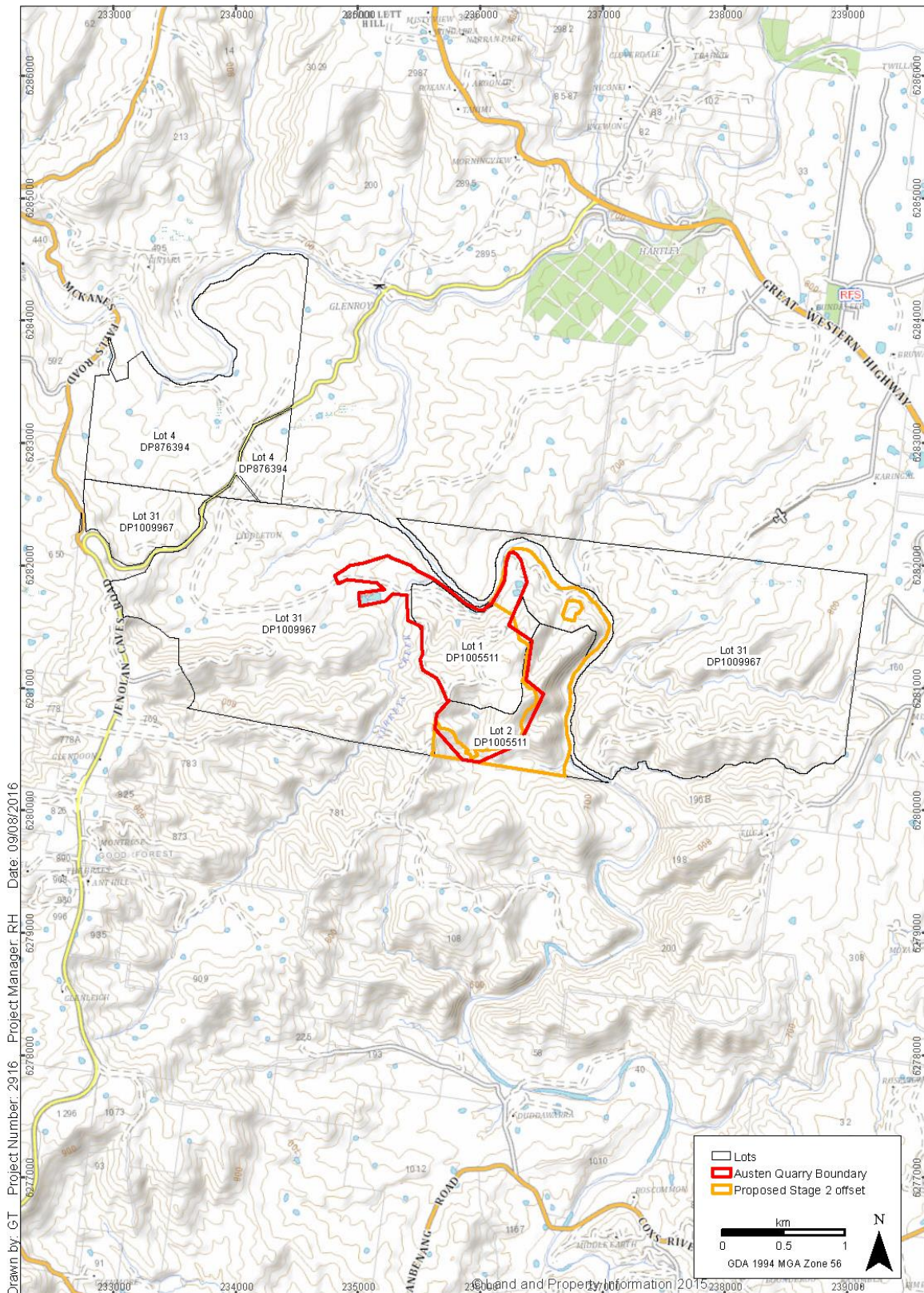
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FIGURES



Location of Austen Quarry in a regional context
Austen Quarry Stage 2 Extension Silver-leaved Mountain Gum Management Plan
FIGURE 1

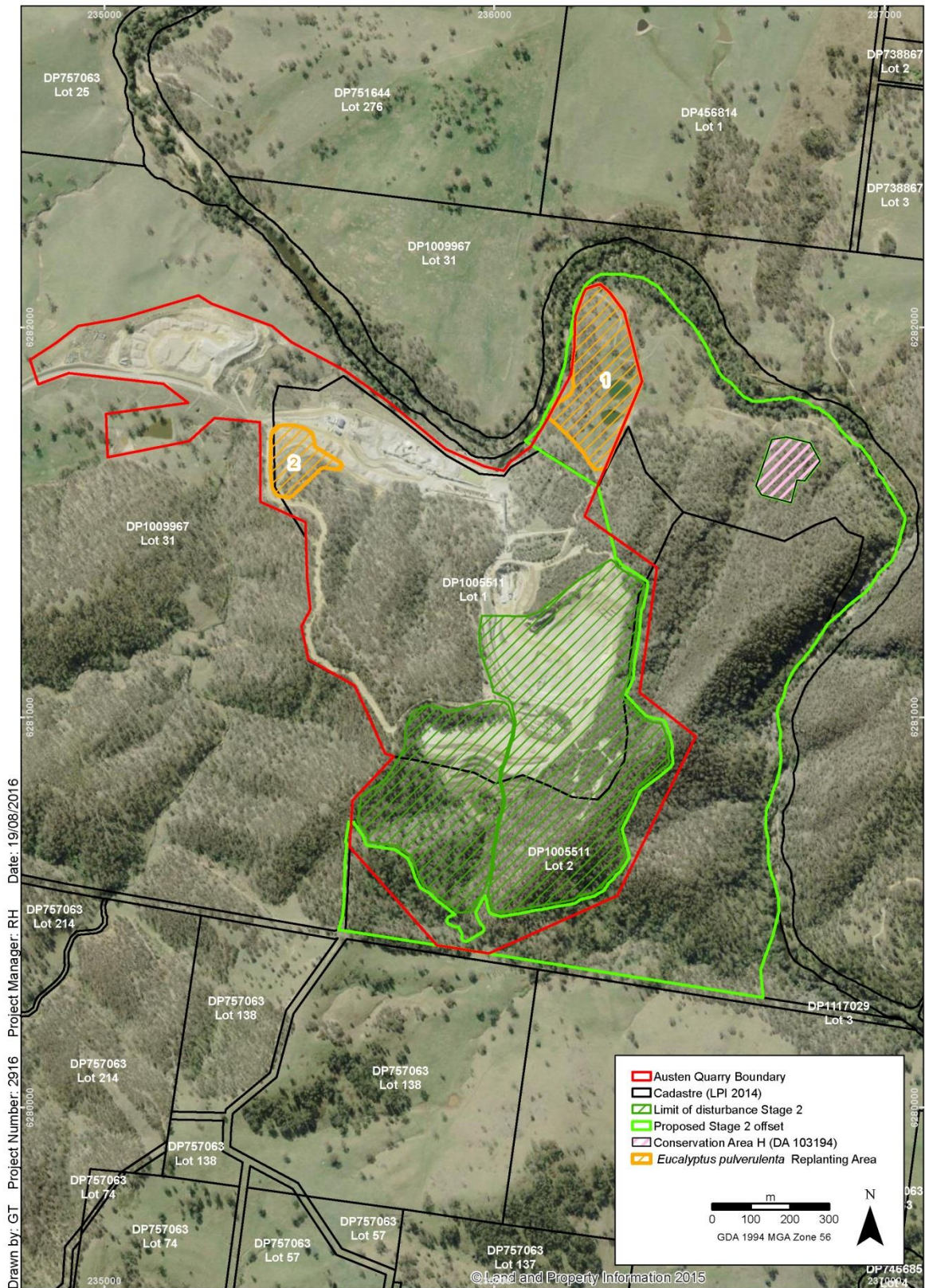
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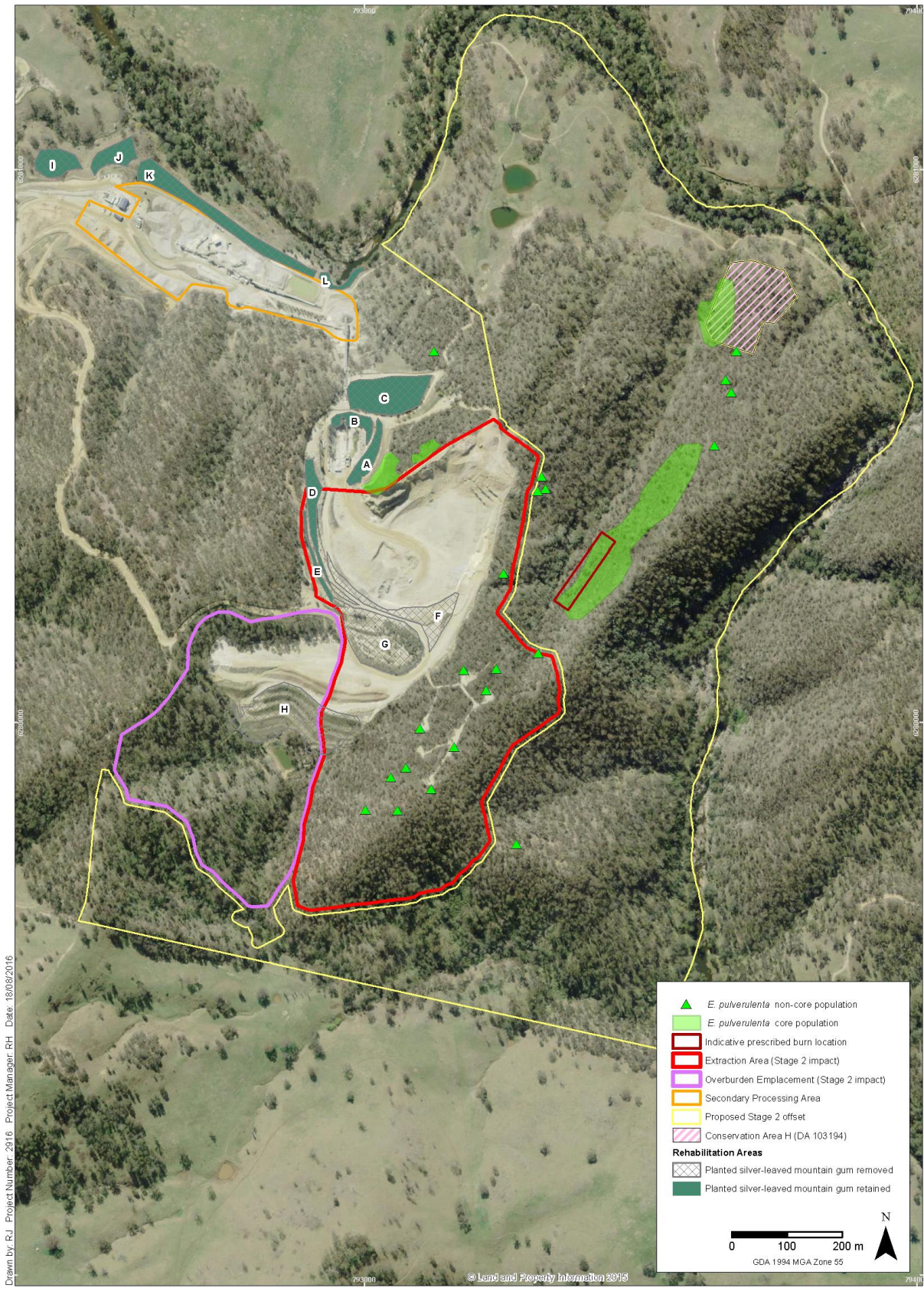
Drawn by: GT Project Number: 2916 Project Manager: RH Date: 09/08/2016

Subject Area and access
Austen Quarry BOMP

FIGURE 2



Proposed silver-leaved mountain gum replanting (from Schedule 2 DoEE conditions)
Austen Quarry Stage 2 Extension Silver-leaved Gum Management Plan

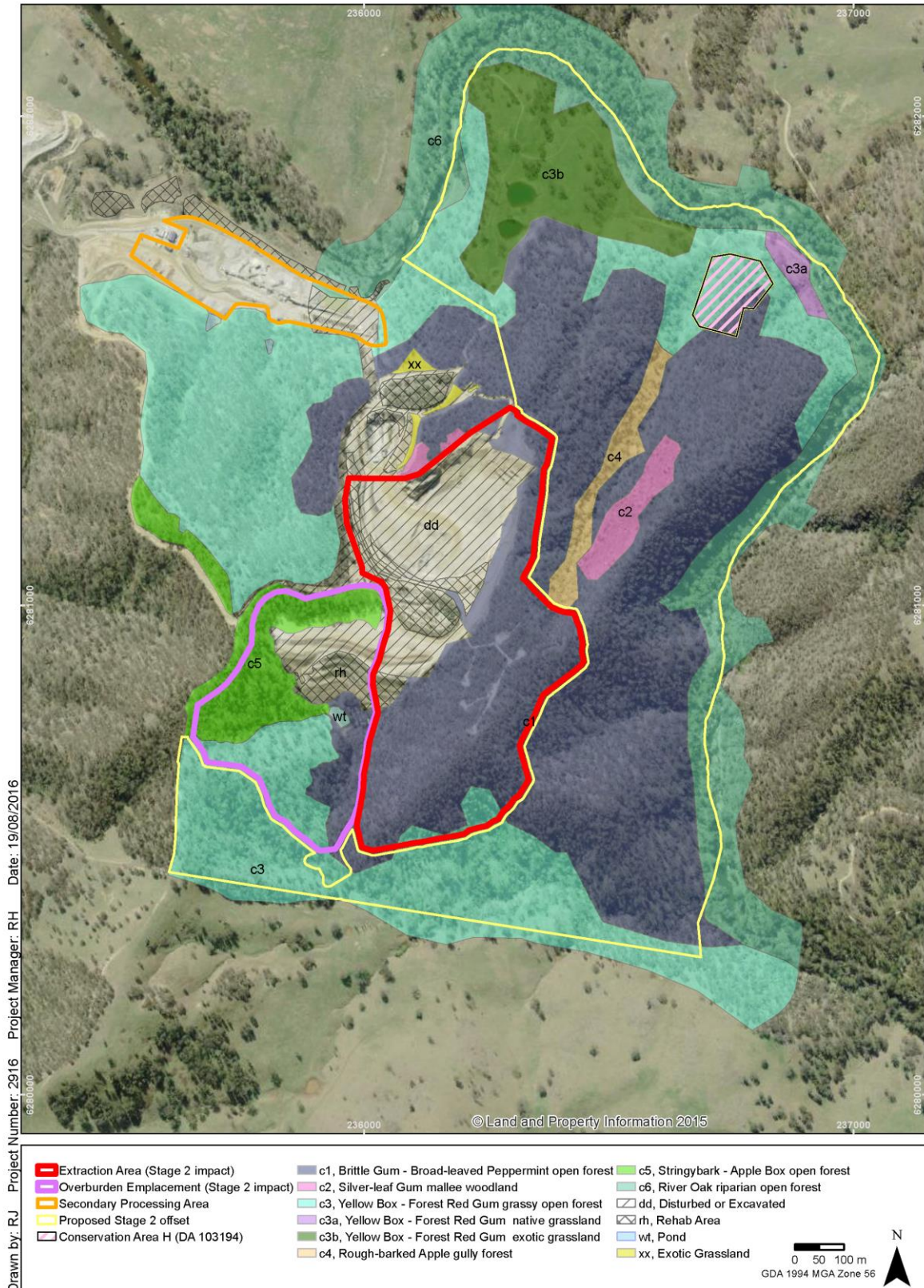


Remnant and planted silver-leaved mountain gum occurrences within the BOA and Quarry

Austen Quarry Stage 2 Extension Silver-leaved Gum Management Plan

FIGURE 4

Imagery: (c) LPI 2013-09-03



Drawn by: RJ Project Number: 2916 Project Manager: RH Date: 19/08/2016

Native vegetation of Austen Quarry and the BOA
Austen Quarry SLMGMP

APPENDICES

Appendix A: Planting schedule for rehabilitation areas

Family	Species	Common name
Trees (1 plant per 25 m², 5m x 5m)		
Myrtaceae	<i>Eucalyptus pulverulenta</i>	Silver-leaved mountain gum
Shrubs (1 plant per 1 m²)		
Fabaceae (Faboideae)	<i>Daviesia acicularis</i>	
Fabaceae (Faboideae)	<i>Hovea linearis</i>	
Fabaceae (Mimosoideae)	<i>Acacia buxifolia</i>	Box-leaved wattle
Asteraceae	<i>Ozothamnus diosmifolius</i>	White dogwood
Ground covers and grasses (2 per 1 m²)		
Chenopodiaceae	<i>Einadia hastata</i>	Berry saltbush
Cyperaceae	<i>Carex appressa</i>	Tall sedge
Cyperaceae	<i>Lepidosperma laterale</i>	Variable sword-sedge
Geraniaceae	<i>Geranium homeanum</i>	
Geraniaceae	<i>Geranium solanderi</i>	Native geranium
Haloragaceae	<i>Gonocarpus teucroides</i>	Germander raspwort
Juncaceae	<i>Juncus usitatus</i>	
Lamiaceae	<i>Plectranthus parviflorus</i>	
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed mat-rush
Phormiaceae	<i>Dianella caerulea</i> var. <i>producta</i>	Blue flax-lily
Poaceae	<i>Austrodanthonia tenuior</i>	A wallaby grass
Poaceae	<i>Austrostipa scabra</i>	Speargrass
Poaceae	<i>Bothriochloa macra</i>	Red grass
Poaceae	<i>Cymbopogon refractus</i>	Barbed wire grass
Poaceae	<i>Imperata cylindrica</i>	Blady grass
Poaceae	<i>Microlaena stipoides</i>	Weeping grass
Poaceae	<i>Poa sieberiana</i>	Snowgrass
Poaceae	<i>Themeda australis</i>	Kangaroo grass

Appendix B: Standard treatments for key target weed species

Species	NW Act*	WONS**	Covered by KTP (Y/N)	Management		
				Primary	Secondary	Maintenance
<i>Cirsium vulgare</i> Spear Thistle	-	-	N	Handweed Spot Spray	Handweed Spot Spray	Spot Spray
<i>Cynodon dactylon</i> Couch	-	-	Y (exotic perennial grass)	Slash Spray	Slash Spray	Spray Handweed
<i>Echium plantagineum</i> Patersons Curse	4		N	Spot Spray Handweed	Spot Spray Handweed	Spot Spray Handweed
<i>Eragrostis curvula</i> African Love Grass	-	-	Y (exotic perennial grass)	Slash Spray Handweed Mechanical Removal	Spray	Handweed Spot Spray
<i>Erharta erecta</i> Panic Veldtgrass	-	-	N	Spray	Spray	Spray Handweed
<i>Hypericum perforatum</i> St Johns Wort	4		N	Spot Spray Handweed	Spot Spray Handweed	Spot Spray Handweed
<i>Lycium ferocissimum</i> African Boxthorn	4	X	N	Mechanical Removal Drill Scrape-and-paint stems Slash Spray	Cut-and-paint Spray	Handweed Spray
<i>Nasella trichotoma</i> Serrated Tussock	4	X	Y (exotic perennial grass)	Slash Spray Handweed Mechanical Removal	Spray	Handweed Spot Spray
<i>Onopordum</i> spp. Scotch Thistle	4	-	N	Cut-and-paint Spray	Spray	Spray
<i>Opuntia</i> spp. Prickly Pear	4	X	N	Biological (natural) Mechanical Removal	Handweed	Handweed
<i>Pennisetum clandestinum</i> Kikuyu	-	-	Y (exotic perennial grass)	Mechanical Removal Spray	Spray	Spray Handweed
<i>Rubus fruticosus</i> agg. Blackberry	4	X	Y (exotic vines and scramblers)	Slash Spray Mechanical Removal	Spray Handweed	Handweed
<i>Sida rhombifolia</i> Paddy's Lucerne	-	-	N	Cut-and-paint Handweed	Handweed	Spot Spray Handweed
<i>Silybum marianum</i> Variegated Thistle	-	-	N	Cut-and-paint Spray	Spray	Spray
<i>Solanum nigrum</i> Blackberry Nightshade	-	-	N	Handweed Spray	Handweed Spray	Handweed Spray
<i>Sonchus oleraceus</i> Common Sowthistle	-	-	N	Spray	Spray	Spot Spray Handweed
<i>Verbena bonariensis</i> Purple Top	-	-	N	Handweed Cut-and-paint Spray Slash	Spray Handweed	Handweed

Appendix C: Conditional requirements as addressed in the SLMGMP

Landscape Management and Rehabilitation Related Approval Conditions Matrix of SSD-6084

Condition	Section (SLMGMP)
Schedule 3	
<p>Condition 25 – Biodiversity Offset Strategy</p> <p>The Applicant shall implement the Biodiversity Offset Strategy, described in the EIS and including Conservation Area H, shown conceptually in Appendix 6, to the satisfaction of the Secretary.</p>	4.2*, Figure 2
<p>Condition 26 – Security of Offsets</p> <p>Within 2 years of this consent, unless otherwise agreed with the Secretary, the Applicant shall make suitable arrangements to provide appropriate long-term security for the Biodiversity Offset Strategy, to the satisfaction of the Secretary.</p> <p>Note: Mechanisms to provide appropriate long term security to the land within the Biodiversity Offset Strategy in accordance with the NSW Biodiversity Offset Policy for Major Projects 2014, including a BioBanking Agreement, Voluntary Conservation Agreement or an alternative mechanism that provides for a similar conservation outcome. Any mechanism must remain in force in perpetuity.</p>	4.2*
<p>Condition 29 – Landscape and Rehabilitation Management Plan</p> <p>The Applicant shall prepare and implement a Landscape and Rehabilitation Management Plan for the development to the satisfaction of the Secretary. This plan must:</p>	
(a) be prepared in consultation with OEH and be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless the Secretary agrees otherwise;	N/R#
(b) provide details of the conceptual final landform and associated land uses for the site;	N/R#
(c) describe how the implementation of the Biodiversity Offset Strategy would be integrated with the overall rehabilitation of the site;	N/R*
(d) include detailed performance and completion criteria for evaluating the performance of the Biodiversity Offset Strategy and rehabilitation of the site, including triggers for any necessary remedial action;	5.3* #
(e) describe the short, medium and long term measures that would be implemented to:	
<ul style="list-style-type: none"> • manage remnant vegetation and habitat on site, including within the Biodiversity Offset Strategy area; and • ensure compliance with the rehabilitation objectives and progressive rehabilitation obligations in this consent; 	4* 4.6#
(f) include a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3 year period following initial approval of the plan) including the procedures to be implemented for:	
<ul style="list-style-type: none"> • maximising the salvage of environmental resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse in the enhancement of the offset area or site rehabilitation; • restoring and enhancing the quality of native vegetation and fauna habitat in the biodiversity and rehabilitation areas through assisted natural regeneration, targeted vegetation establishment and the introduction of fauna habitat features; • protect, conserve, propagate, plant and/or regenerate Silver-leaved Mountain Gum (<i>Eucalyptus pulverulenta</i>) (including the propagation and planting of at least 1,000 individuals of this species); • protecting vegetation and fauna habitat outside the approved disturbance area on-site; • minimising the impacts on native fauna, including undertaking pre-clearance surveys; • establishing vegetation screening to minimise the visual impacts of the site on surrounding receivers; • ensuring minimal environmental consequences for threatened species, populations and habitats; • collecting and propagating seed; • controlling weeds and feral pests; • controlling erosion; • controlling access; and • managing bushfire risk; 	4.5 – 4.6# 4.6# 4* # N/R# N/R# N/R# 4* # 4.5# 4.7 – 4.8 N/R# 4.10# 4.9
(g) include a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;	5
(h) identify the potential risks to the successful implementation of the Biodiversity Offset Strategy, and include a	4.1, 5.3* #

description of the contingency measures that would be implemented to mitigate these risks; and	
(i) include details of who would be responsible for monitoring, reviewing, and implementing the plan.	5
Schedule 5	
Condition 2 – Management Plan Requirements	
The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
a) detailed baseline data;	3
b) a description of <ul style="list-style-type: none"> the relevant statutory requirements (including any relevant approval, licence or lease conditions); any relevant limits or performance measures/criteria; and the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; 	1.2 5.3 5.3
c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	4, 5
d) a program to monitor and report on the: <ul style="list-style-type: none"> impacts and environmental performance of the development; and effectiveness of any management measures (see (c) above); 	5
e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	5.3
f) a program to investigate and implement ways to improve the environmental performance of the development over time; <ul style="list-style-type: none"> a protocol for managing and reporting any: <ul style="list-style-type: none"> incidents; complaints; non-compliances with statutory requirements; and exceedances of the impact assessment criteria and/or performance criteria; and 	5.3
g) a protocol for periodic review of the plan. <i>Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.</i>	5.3
Note *: Refer also to Biodiversity Offset Management Plan	
Note #: Refer (also) to Landscape and Rehabilitation Management Plan	

Silver-leaved Mountain Gum Conditions Matrix of EPBC 2013/6967

Condition	Section (SLMGMP)
Condition 2	
To mitigate the impacts of the action on the Silver-leaved Mountain Gum, the approval holder must prepare and submit at least three (3) months prior to the commencement of the action, a mine site Silver-leaved Mountain Gum Management Plan (SLMGMP) for the Minister's approval. The SLMGMP must contain:	
a. Baseline data on the local Silver-leaved Mountain Gum population within the Austen Quarry Boundary, Disturbance area and Offset Area;	3
b. Measures to mitigate and manage impacts on the Silver-leaved Mountain Gum in the Disturbance area and Offset area that: <ol style="list-style-type: none"> are for the life of the approval; are complementary with the offsetting objectives and targets within the Biodiversity Offset Management Plan and other rehabilitation and offsetting activities within and adjacent to the Austen Quarry Boundary; in accordance with the approved Conservation Advice. <p>The SLMGMP should discuss, as a minimum, measures to avoid or manage impacts to Silver-leaved Mountain Gum relating to habitat loss, edge effects, disease prevention, feral pests, weed incursion, fire ecology and grazing; and action promoting regeneration.</p>	4
c. A program to monitor Silver-leaved Mountain Gum distribution and population size in the Offset Area;	5*
d. Details of remedial actions where objectives and targets are not being achieved; and	5.3*
e. Details of who will be responsible for monitoring, reviewing and implementing the SLMGMP. The approval holder must not commence the action until the SLMGMP is approved by the Minister in writing. The	5.3#

approved SLMGMP must be implemented.	
Note *: Refer also to Biodiversity Offset Management Plan Note #: Refer (also) to Landscape and Rehabilitation Management Plan	

Silver-leaved Mountain Gum Conditions Matrix of EPBC 2013/6967

Condition	Section (BOMP)
Condition 3 To compensate for the loss of 721 individuals of Silver-leaved Mountain Gum, the approval holder must prepare and submit at least three (3) months prior to the commencement of the action, a Biodiversity Offset Management Plan (BOMP) for the proposed Offset Area, for the Minister's approval. The BOMP must be prepared by a suitably qualified person and:	
a. Identify the land described as the Offset Area at Schedule 2 of this notice that is necessary to achieve the outcomes required by the Environmental Offset Policy 2012. This must include offset attributes, shapefiles, textual descriptions and maps to clearly define the location and boundaries of the Offset Area;	2#
b. Provide a survey and description of the current condition (prior to any management activities) of the Offset Area identified in Condition 3a:	2.5*
c. Detail management actions and regeneration and revegetation strategies to be undertaken on the Offset Area to increase the population of Silver-leaved Mountain Gum in this area, including:	
i. a description and timeframe of measures that would be implemented to improve the condition of the ecological communities on the site;	3
ii. performance and completion criteria for evaluating the management of the Offset Area, and criteria for triggering remedial action;	4
iii. a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;	4
iv. a description of potential risks to the successful implementation of the plan, a description of the measures that will be implemented to mitigate against these risks and a description of the contingency measures that will be implemented if the defined triggers arise; and	4
v. details of who would be responsible for monitoring, reviewing, and implementing the plan.	4
The approval holder must not commence the action until the BOMP is approved by the Minister in writing. The approved BOMP must be implemented	
Condition 4 To compensate for the loss of 721 individuals of Silver-leaved Mountain Gum, and ensure ongoing conservation of a viable population of Silver-leaved Mountain Gum in the Offset Area, within 18 months of the date of this approval, the approval holder must secure the land(s) identified as the Offset Area as a biodiversity offset by a legal instrument under relevant nature conservation legislation on the title of the land. This instrument must:	
a. provide enduring protection for the land that will survive transfer of ownership;	3.2
b. prevent any future development activities, including mining and mineral extraction;	3.2
c. ensure the active management of the land to achieve the outcomes identified; and:	4*
d. be provide to the Department within three (3) months of it being issued, as evidence of compliance with this condition.	noted
Note *: Refer also to Silver-leaved Mountain Gum Management Plan Note #: Refer (also) to Landscape and Rehabilitation Management Plan	

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