Multiquip Quarries

ABN: *44 101 930 714*

Ardmore Park Quarry

Landscape Management Plan

Prepared by

R.W. Corkery & Co. Pty Limited

and

Kevin Mills & Associates Pty Ltd

September, 2010

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Landscape Management Plan

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CONTENTS

Page

CONTENTS

Page

CONTENTS

Page

APPENDICES

FIGURES

CONTENTS

Page

TABLES

PREAMBLE

This Landscape Management Plan (LMP) has been prepared to satisfy *Condition 3(20)* of Project Approval (PA) 07_0155 which is as follows.

The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Director-General. This plan must:

(a) be prepared in consultation with DECCW by suitably qualified expert/s whose appointment/s have been approved by the Director-General, and be submitted to the Director-General for approval prior to the commencement of quarrying operations; and

(b) include a:

- *Rehabilitation Management Plan; and*
- *a Quarry Closure Plan.*

Note: The Department accepts that the initial Landscape Management Plan may not include a detailed Quarry Closure Plan. However, the initial plan must include an outline and a timetable for completion of the detailed Quarry Closure Plan.

Kevin Mills and Associates Pty Ltd (KMA) and R.W. Corkery & Co. Pty Limited (RWC) have been commissioned by Multiquip Quarries to prepare the Rehabilitation Management Plan and Quarry Closure Plan components of the LMP respectively. Accordingly, the LMP has been divided into two parts as follows.

Part 1: Rehabilitation Management Plan. This part, prepared by KMA, includes:

- a summary of rehabilitation objectives;
- a description of the rehabilitation activities to be implemented in the short, medium and long term;
- performance and completion criteria for the site rehabilitation;
- a description of the rehabilitation procedures to be implemented;
- rehabilitation monitoring plans; and
- a summary of relevant risks to successful rehabilitation and the nomination of responsible and accountable positions relevant to site rehabilitation.

Part 2: Quarry Closure Plan. This part, prepared by RWC, includes:

- the quarry closure objectives and criteria;
- a description of the current conceptual final landform design and proposed geotechnical assessment of landform stability;
- a description of the ongoing investigations to be undertaken to refine the final landform and land use; and
- a description of the post-closure management and monitoring to ensure that the nominated quarry closure objectives and criteria are achieved.

The LMP in its entirety was reviewed and compiled by RWC.

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PART 1: REHABILITATION MANAGEMENT PLAN

1. INTRODUCTION

1.1 BACKGROUND

Kevin Mills & Associates Pty Ltd (KMA) has been commissioned by Multiquip Quarries (Multiquip) to prepare a Rehabilitation Management Plan for the Ardmore Park Quarry ("the quarry"). The quarry is located on the eastern side of Oallen Ford Road, near the intersection with Lumley Road, approximately 4km south of the village of Bungonia in the NSW southern highlands (see **Figure 1**). It has significant resources of basalt and sand that will be progressively extracted (generally from the south towards the north). The total area of resource extraction is approximately 47ha, with a further 14ha to be developed for sand and hard rock processing, stockpiling and ancillary infrastructure (see **Figure 2**). In accordance with commitments made by Multiquip, the company will construct and operate a private haul road between Oallen Ford Road and Mountain Ash Road to by-ass the village of Bungonia ("the by-pass road").

A flora and fauna assessment completed by KMA in 2008 concluded that the impact of the quarry (and associated by-pass road) on native flora and fauna will be minimal. Impacts related to the development of the quarry would be limited to the clearing and modification of grazing land dominated by introduced pasture species and weeds. The main trees affected by the Project are planted pines and other trees in the vicinity of the two processing areas (see **Figure 2**). There are only two native trees that would be removed on the site of proposed extraction activities. The grassland on the proposed areas of disturbance is almost entirely exotic grassland, with a few patches of native pasture, predominantly outside the area of proposed disturbance.

Project Approval (PA) 07_0155 was issued for the quarry by the NSW Minister for Planning on 20 September 2009 and included conditions (*Conditions 3(20) to 3(22)*) requiring the preparation of a Landscape Management Plan (LMP). Part 1 of the LMP addresses *Condition 3(21)* of PA 07_0155, i.e. the preparation of a Rehabilitation Management Plan (see Section 1.2).

1.2 REQUIREMENTS FOR THE REHABILITATION MANAGEMENT PLAN

The requirements for the RMP are provided by *Condition 3(21)* of PA 07_0155. **Table 1** outlines the relevant conditions of PA 07_0155 related to the preparation of a Rehabilitation Management Plan and the section within this document where each is addressed.

The RMP has been prepared in accordance with these requirements of PA 07_0155 and builds on the commitments made in the *Environmental Assessment* for the quarry (RWC, 2008) which are as follows.

1. Adopt a progressive approach to rehabilitation to ensure that completed areas are quickly shaped and vegetated to provide a stable landform.
2. Stabilise earthworks, drainage lines and disturbed areas no longer required for quarry-related activities.

Table 1

PA 07_0155 Conditions Relevant to the Preparation of the Rehabilitation Management Plan

PA 07_0155 Conditions	Section
21. The Rehabilitation Management Plan must include:	
(a) the rehabilitation objectives for the site;	1.3
(b) a description of the short, medium, and long term measures that would be implemented to: - rehabilitate the site; and - maintain and enhance existing site vegetation outside the disturbance area;	4.2
(c) detailed performance and completion criteria for the site rehabilitation;	4.3
(d) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:	
• progressively rehabilitating disturbed areas;	5.2
• protecting vegetation and soil outside the disturbance areas;	5.3
• rehabilitating creeks and drainage lines on the site to ensure no net loss of stream length and aquatic habitat;	5.5
• undertaking pre-clearance surveys;	5.6
• managing impacts on fauna;	5.7
• landscaping the site to minimise visual impacts, including a landscape plan for the visual/noise bund and other boundaries of the site;	5.8
• conserving and reusing topsoil;	5.3
• VENM quality assurance;	5.16
• collecting and propagating seed for rehabilitation works;	5.12
• salvaging and reusing material from the site for habitat enhancement;	5.9
• controlling weeds and feral pests;	5.13
• controlling access; and	5.3.1
• bushfire management	5.15
(e) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;	6.2
(f) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and	6.3
(g) details of who would be responsible for monitoring, reviewing, and implementing the plan.	7.1

3. Blend the created landform with the surrounding land fabric.
4. Maintain a number of water storages to facilitate the subsequent use of the land for agricultural purposes.
5. Replant native vegetation along reinstated drainage lines and lower lying areas of the Project Site totalling approximately 14.7 hectares.

6. Utilise native tree, shrub and grass species that would promote the re-establishment of the endangered ecological community White Box Yellow Box Blakely's Red Gum Woodland, and link existing areas of native vegetation to the southeast and northwest of the Project Site.
7. Retain cleared trees and branches for use in stabilising slopes identified for rehabilitation with native woodland communities.
8. Report each year's rehabilitation within an Annual Environmental Management Report (AEMR).
9. Undertake a targeted weed spraying programs, to eliminate or control noxious weeds currently occurring on the Project Site.

1.3 REHABILITATION OBJECTIVES

The key objectives of the RMP are to:

- describe the environment and biota of the project area to provide a firm basis for management;
- identify, describe and assess significant features on the project area and the requirements for their protection;
- provide for the rehabilitation of the quarry such that a stable final landform able to support a range of alternative final land uses is created;
- provide for the re-establishment of areas of native vegetation, particularly areas of the endangered ecological community White Box Yellow Box Blakely's Red Gum Woodland, and link existing areas of native vegetation to the southeast and northwest of the quarry;
- provide procedures for ongoing environmental management that will minimise the impacts on quarrying activities and maximise the potential for successful rehabilitation;
- identify performance and completion criteria for the site rehabilitation; andestablish a monitoring regime such that the success of progressive rehabilitation can be assessed.

2. THE MANAGEMENT AREA

2.1 LOCATION AND CHARACTER OF THE AREA

The "Ardmore Park" property (Lot 24, DP 1001312) is located within the Goulburn Mulwaree Local Government Area (LGA) and within land zoned 1(a) General Rural under the Mulwaree Local Environmental Plan 1995. The site is about 4km to the south of Bungonia. The property covers an area of 288 hectares and prior to the approval of the quarry was used for grazing with the extraction of topsoil undertaken over a two to four week campaign each year. Most of the property has been cleared, leaving only a few patches of bushland and occasional paddock trees. There are several minor drainage lines, but no creeks, and the property is watered by 17 farm dams.

The quarry would incorporate an extraction area of approximately 46.8ha, with additional disturbance associated with the construction of processing areas, water management structures and an internal road network increasing this area of disturbance to 61ha (see **Figure 2**). The extracted sand and hard rock (basalt) resources would be processed on site to produce various quality sand, aggregate and road building materials for use in the growing construction markets of Sydney, Canberra, the South Coast and Goulburn.

The component activities of the quarry are shown on **Figure 2**.

- The southern sand extraction area.
- The basalt and central sand extraction area (including a borrow area for basalt to be used in internal road construction).
- Sand and hard rock processing areas (including a borrow area for overburden to be used in the construction of bund walls).
- Water storage and sediment settling dams.
- Other water management structures.
- The quarry entrance and site access road.
- Quarry Services Area.
- Site administration area.
- Rehabilitation areas.

Although the planned total area of disturbance over the life of the quarry would be 61ha, the area of active disturbance at any one time would be much less, given the progressive development of the extraction areas and rehabilitation of the completed areas.

2.2 GEOLOGY AND SOILS

The geology of the "Ardmore Park" property consists of Tertiary basalt across the southeast and Devonian sediments across the northwest. The vegetation over the basalt is almost completely cleared and used for grazing and other farming pursuits. The sediments still retain some of the original native forest, particularly on several low knolls. The southern part of the quarry site is underlain by a deep layer of sand.

2.3 CLIMATE

The climate at nearby Bungonia is classified as temperate with moderately dry winters and wetter summers. The annual rainfall distribution in the vicinity of the meteorology stations in Goulburn and Bungonia is based on 147 and 121 years of record, respectively. The average annual rainfall at the two stations is relatively similar with an average of 665.7 mm per year recorded at Goulburn and 645.4mm at Bungonia.

The Ardmore Park area generally experiences warm to hot summers and cool winters. A mean maximum temperature between 26ºC and 28ºC is experienced between December and February and a mean minimum of between 1.3ºC and 2.5ºC during the months of June, July and August. Autumn and spring are generally mild. Mean diurnal temperature variations are lowest during the winter months at approximately 10ºC and greatest during summer months ate approximately 15ºC. The driest months are July, August and September, with mean monthly rainfall of 43.6mm, 45.9mm and 46.9mm, respectively. The highest average rainfalls are in January, February and March, the figure being 66.8mm, 61.8mm and 64.9mm, respectively.

The area is characterised by frequent moderate to strong winds, predominantly from the north and northwest. The highest wind speeds occur in July, August and September.

3. THE BIOLOGICAL ENVIRONMENT

3.1 PLANT SPECIES

Introduced plants dominate the quarry site, with native plant species diversity and abundance being very low. Few native plant species were recorded in the grazing paddocks, and many of the species were low in number. The only area where native plants were common or dominated was in the remnant forest on the knolls in the northern and northeastern parts of the property. Notably, these areas will not be disturbed by the quarry. A list of the plant species recorded within the property is provided in **Appendix 1**. This list is to be used as the basis for plant species selection for rehabilitating parts of the quarry site.

3.2 PLANT COMMUNITIES

3.2.1 Vegetation Patterns

Originally, the knolls and ridges of sedimentary rocks located in the northwest of the Property would have been covered by Stringybark - Silvertop Ash - Scribbly Gum Forest. This forest is still in evidence today, mainly on the knolls on, and adjacent to, the northern part of the ”Ardmore Park” property where, the soils are rocky and poorer than the adjacent basalt soils, and have not been cleared for agricultural pursuits.

The high quality soils developed on the basalt of the central and southeast parts of the property would once have supported Yellow Box *Eucalyptus melliodora* - Red Gum *Eucalyptus tereticornis*/*Eucalyptus amplifolia* – Manna Gum *Eucalyptus viminalis* Forest/Woodland. This area has been almost completely cleared as a result of its good quality soils and there are only scattered trees of the above species, plus some areas of understorey grassland (secondary grassland) remaining.

On the southern section of the property, where the basalt has been weathered exposing significant sand deposits of approximately 50 million years old, Manna Gum *Eucalyptus viminalis* Forest would have occurred, judging by the few trees that are left.

The above vegetation patterns are exhibited by the remaining bushland of the property and the remnant native trees in the paddocks and along ephemeral water courses. Very little of the Yellow Box - Red Gum community remains, a community of conservation significance because it is part of the White Box - Yellow - Box Blakely's Red Gum listed endangered ecological community complex under both NSW and Commonwealth legislation.

3.2.2 Vegetation Communities

As previously stated, most of the property, and the area of the quarry in its entirety, has been cleared, probably many years ago. Because of grazing and pasture improvement, little regeneration has occurred. Most of the vegetation of the property is now exotic grassland, with occasional native trees. Remnant forest remains only on a few of the knolls. This sub-section describes the two dominant vegetation communities, other vegetation identified and the vegetation of the proposed area of disturbance (see also **Figure 3**).

Remnant Forest

The forest on the knolls of the northern and western parts of the property and on adjacent land is dominated by Silvertop Ash *Eucalyptus sieberi*, Red Stringybark *Eucalyptus macrorhyncha*, Inland Scribbly Gum *Eucalyptus rossii* and occasional Blue-leaved Stringybark *Eucalyptus agglomerata*. The understorey is quite open with much bare ground.

Characteristic understorey species include Prickly Moses *Acacia ulicifolia*, Common Bracken *Pteridium esculentum*, Long-hair Plume-grass *Dichelachne crinita,* Grey Guinea Flower *Hibbertia obtusifolia,* Poa Tussock *Poa sieberiana*, Nodding Blue Lily *Stypandra glauca* and Common Cassinia *Cassinia aculeate.*

These patches of forest are now being managed for their conservation values, having been fenced off to prevent stock grazing the understorey and to allow regeneration to occur. Given more time, the floristic diversity in these areas would increase and their habitat value would improve.

In the vicinity of the watercourse in the northeastern corner of this Study Area and extending westwards along the watercourse, there are scattered trees of Manna Gum *Eucalyptus viminalis*, Yellow Box *Eucalyptus melliodora*, Cabbage Gum *Eucalyptus amplifolia* and Brittle Gum *Eucalyptus mannifera*. The tree wattles *Acacia decurrens* and *Acacia mearnsii* also occur in the remnant forest in the northeast corner of the Study Area.

Other than these stands of trees, the property has been almost completely cleared, with only occasional trees and patches of understorey grassland remaining.

Grassland with Occasional Trees

The majority of the quarry-related disturbance will occur in grassy paddocks, well away from the remnant forest described above. Most of these paddocks have been pasture improved, so they are dominated by introduced herbaceous species suitable for grazing. Native pasture species are also present, but are uncommon, usually on small areas of rocky ground that evaded pasture improvement. The pasture improved grassland is dominated by introduced pasture species, such as Ryegrass *Lolium* sp., Barley Grass *Hordeum* sp., Clover *Trifolium* sp., Capeweed *Arctotheca calendula* and Phalaris *Phalaris aquatica*. Occasional natives also occur in the grassland, such as Red-leg Grass *Bothriochloa macra*, Weeping Grass *Microlaena stipoides* and Windmill Grass *Chloris truncata*. Small to relatively large patches of the native Tall Spear-grass *Stipa bigeniculata* also occur; this species commonly recolonises pastures.

Other Vegetation

There is a row of large Radiata Pine, *Pinus radiata,* trees planted as a wind break to the east of the quarry area. To the east of these pines, there is a copse of native trees within a fenced area. The native trees are about 18 to 20 metres tall, typically with a diameter at chest height (dch) of about 60cm. The branches of the largest trees have occasional hollows. These have been fenced off to exclude grazing stock and allow regeneration to occur. There are about 25 native trees within the fenced area, the majority of which are Cabbage Gum *Eucalyptus amplifolia*. There are also a few Brittle Gum *Eucalyptus mannifera*, a couple of Yellow Box *Eucalyptus melliodora*, a Red Stringybark *Eucalyptus macrorhyncha*, Green Wattle *Acacia*

decurrens, a couple of dead trees and two rows of planted Radiata Pine *Pinus radiata* trees about two metres tall. The understorey is exotic grassland dominated by the introduced grass Phalaris *Phalaris aquatica*.

Some small areas of rocky ground on the elevated area of the northeastern part of the property support small areas of native pasture. Here, the grassland is composed of a mixture of introduced and native species. The natives recorded in this area were Tall Spear-grass *Stipa bigeniculata*, Red-leg Grass *Bothriochloa macra*, Swamp Dock *Rumex brownii*, Wallaby Grass *Danthonia* sp., Stonecrop *Crassula sieberiana*, Weeping Grass *Microlaena stipoides* and Lovegrass *Eragrostis* sp.

Vegetation within the Area of Quarry Disturbance

The vegetation within the areas of disturbance associated with the development and operation of the quarry (see **Figure 2**), consists almost entirely of exotic grassland with scattered patches of native pasture. With the exception of two remnant trees, there is no natural vegetation.

3.3 FAUNA

3.3.1 Fauna Habitat

The type of habitat in an area influences which animals occur there, as well as fauna diversity and abundance. Habitat assessment therefore, plays an important role in predicting whether threatened fauna are likely to occur in an area.

The habitat of the property mainly consists of exotic grassland with occasional trees, some secondary grassland, and remnant stands of forests on hillier terrain. This vegetation is described above.

Exotic grassland attracts only a few native fauna species, usually the more adaptable species, such as the Eastern Grey Kangaroo, Australian Magpie, Australian Raven, Magpie-lark and Pied Currawong. Because exotic grassland provides little food and virtually no shelter, it is a hostile environment for most native fauna species.

The most valuable habitat is the remnant forest associated with the knolls in the northern and northeastern parts of the property. Here, the native forest is largely unaffected by farming pursuits, and has in fact been fenced to exclude stock. Although these patches of forest are only small, they have a fairly natural structure and species composition so they probably attract a large number of species. Having been fenced off to exclude grazing stock, the quality of this habitat should continue to improve in the years ahead. Most of the bird species recorded on the property by KMA (2008) were found in or near these patches of forest on the property.

Paddock trees and small patches of native trees play an important role in providing wildlife habitat, a seed source for regeneration, and in reducing the risk of salinity and erosion. Many of the paddock trees of the property are large old trees with hollows, available to native birds for breeding. The dams and patches of rocky ground provide small areas of potential habitat for birds, frogs and reptiles.

3.3.2 Fauna Species

The fauna species recorded on the property by KMA (2008) (including surveys conducted in June 2003, June 2004 and November 2007) have been listed in **Appendix 2**.

Two native and four introduced mammal species, 45 bird species (including two introduced bird species) two frog species and one reptile species were recorded during the surveys of the property. These species are generally common and widespread on the Southern Tablelands. Other species would be likely to be identified within the property at different times, mainly in the remnant forest.

Two threatened bird species were recorded and these are discussed in Section 5.2.

3.4 SIGNIFICANT FEATURES

3.4.1 Plants

No significant plant species have been located on the quarry site and none are expected to occur there. The presence of such species on the grazing land to be utilised by the quarry is very slim.

3.4.2 Fauna

Within the property, two threatened birds, the Speckled Warbler and the Diamond Firetail, were recorded during the fauna survey of 2004 (KMA, 2008). Forest edges, particularly where shrubs occur, is the habitat that is important for the Speckled Warbler. The Diamond Firetail occurs in grassland and woodland, requiring shrubby vegetation to breed. Thus the important areas for these species are stands of forest and woodland with shrubby understorey vegetation, although the Diamond Firetail occurs widely in grassland, including exotic grassland, but does not breed there unless shrubs are available. Suitable breeding habitat does not occur within the areas of the property to be developed and operated as the quarry. A small flock of Diamond Firetails were in fact recorded around the house on *Ardmore Park*, where planted shrubs and trees occur. Minor upgrading of the roads of the transport route would not impact on this type of habitat in any significant way.

3.4.3 Endangered Ecological Communities

Endangered ecological communities (EEC) are listed under the TSC Act (Schedule 1, Part 3) and under the EPBC Act. The native vegetation remnants on some of the basalt soils are part of the Yellow Box - Red Gum Woodland that originally occurred on the property. This is a part of the community complex known as White Box - Yellow Box - Blakely's Red Gum Woodland, listed as an endangered ecological community under the TSC Act, and the Grassy White Box community listed as an endangered ecological community under the EPBC Act.

The remnants of the above endangered community within the project area consists of small patches of semi-natural grassland (mainly native pasture) and scattered Yellow Box and Forest Red Gum/Cabbage Gum trees. Manna Gum and Coast Grey Box also occur on the property, the former being quite common.

4. REHABILITATION MANAGEMENT

4.1 FINAL LANDFORM AND LAND USE

4.1.1 Final Landform

It remains Multiquip's long-term objective to return the Project Site to a landform with comparable topographical features, albeit lower in elevation to that which currently exists. As noted above, achieving this landform would require the importation and incorporation of increased volumes of VENM.

Figure 4 presents the final landform objective of the quarry illustrating a moderately sloping and free draining surface oriented to the south. By following the natural dip in the base of the sand and basalt resource, specifically at the northwestern, western and southern perimeters of the extraction area, as well as through the location of silt cells and final placement of overburden, the final landform would largely replicate the gentle to moderate slopes of the existing topography.

Multiquip will also re-establish areas of native woodland on the property and ultimately link existing remnant stands of native vegetation to the southeast and northwest of the quarry. Trees will also be planted around the water storage dams retained in the final landform to create a natural shelter for grazing stock that might be carried on the final landform.

Drainage of the final landform will direct water to Dam 7, retained initially to ensure surface water exiting the quarry site is free of elevated levels of suspended sediments and subsequently for the proposed final land use of agriculture. This internal drainage will be controlled along three separate drainage channel.

(i) The western channel – directing surface water down the southwestern slope of the final landform along the southern perimeter of the quarry site (effectively along the orientation of the southern diversion bank) and into Dam 7.

(ii) The central channel – directing surface water from the north and northwest of the extraction area down the final slope of the landform and towards Dam 7 through the centre of the completed and rehabilitated extraction area.

(iii) The eastern channel – directing surface water from the southeastern corner of the final landform in westerly direction to Dam 7. It is likely that given the small catchment to this channel, it may simply provide for sheet flow over a well grassed paddock.

The drainage channels, along with the other elements of the final landform described, are illustrated on **Figure 4**.

4.1.2 Final Land Use

The final landform (see **Figure 4**) will make the site amenable to one or more forms of agriculture, possibly medium intensity grazing as is currently undertaken on the "Ardmore Park" and surrounding properties. The internal drainage created and the resultant water storage dams in the final landform will add to the value of the land for future agricultural uses.

4.2 REHABILITATION STRATEGY

4.2.1 Short Term – Six Months

The short term goal is to have in place the procedures for rehabilitating the site to the standards outlined in this plan. Measures such as fencing, equipment availability, staff training, arrangements for obtaining plants and the like, should be completed within six months of the project starting.

4.2.2 Medium Term – Six Months to Three Years

The medium term goal is to maintain progress with the rehabilitation in line with the completion of quarry areas and to complete works in other areas.

4.2.3 Long Term – After Three Years

The long term goal is to rehabilitate the site in accordance with the accompanying plan (see **Figure 2**). This includes rehabilitating grazing pasture to the majority of the land, and native vegetation to those areas identified on the plan. This will not be completed by the three year time horizon of this plan. However, at that time, the rehabilitation will be completed for the quarry areas worked up to that point.

4.2.4 Plant Species for use in Revegetation

Appendix 1 provides a list of indigenous plant species for the project area. All of these species are suitable for planting in the project area. Those species used will depend upon availability at the time. The key plantings should be of tree species, other species will colonise the planting areas once stock have been removed and tree cover begins to develop.

4.3 REHABILITATION PERFORMANCE AND CLOSURE CRITERIA

4.3.1 Rehabilitation Performance Criteria

The success of the enhancement and rehabilitation programs will be measured using the following criteria.

- Invasive weeds are controlled and do not hinder the wellbeing of the adjacent forested areas or regeneration of the plantings to be undertaken as described in Sections 4.2.4 and 5.10.
- All plantings are successfully growing and providing a high level of cover and are progressing towards the structure and diversity of a natural forest.
- Fences or other barriers are maintained in necessary areas such that no vehicles or stock are impacting in a negative way on the retained forest or plantings.
- All on-site staff have been inducted and are aware of the environmental management requirements of the site.

Table 2 presents a list of indicators of rehabilitation success that would be considered and reported upon (annually – see Section 6.2).

Table 2
Rehabilitation Performance Criteria

Issue	**Performance Criteria**
a. Evidence of tree death	No tree death occurs.
b. Invasive exotic species	Significant exotic plant invasion does not occur.
c. Health of plantings	Plantings are healthy and if not are replaced.
d. Constraining development	No development activities impinge upon the protected area.
e. Stability of quarry edge	Pond embankment does not erode or slump.
f. Wetland plants are colonising	Plants successfully colonising whole edge of the pond.

Should any of the above be causing or likely to cause a significant impact on the adjacent forest, the problem must be addressed immediately.

4.3.2 Rehabilitation Completion (Quarry Closure) Criteria

Assuming maximum production for 75% of years and 75% production for the remaining years, the approximate life of the Ardmore Park Quarry would be at least 30 years. At that time, all but the final quarry stage will have been rehabilitated. Final closure of the quarry will be achieved through the rehabilitation of this last stage with the same criteria used as nominated in Section 4.3.1.

It is proposed that more detailed quarry closure criteria would be developed closer to the closure date of the quarry, to ensure that final land use objectives of the site are duly accounted for. Part 2 (Quarry Closure Plan) considers the development of quarry closure criteria in more detail.

5. MANAGEMENT ISSUES AND PROCEDURES

5.1 INTRODUCTION

The following sub-sections provide a detailed description of the rehabilitation measures and procedures that would be implemented over the next 3 years.

5.2 PROGRESSIVE REHABILITATION

5.2.1 Introduction

The progressive rehabilitation of the quarry will involve four distinct areas of the quarry, namely:

(i) silt cells within the extraction area;

(ii) the quarry floor and walls;

(iii) bund walls; and

(iv) quarry processing and ancillary areas, i.e. hardstands, roads, office and workshop areas.

The progressive rehabilitation[1] of each of these areas is outlined in Sections 5.2.2 to 5.2.5.

5.2.2 Silt Cell Rehabilitation

Silt generated from the sand washing plant will be stored on the quarry floor in a series of silt cells. These will be approximately 5m deep and constructed using by-products of the extraction and processing operations (as well as VENM – see Section 5.16).

On reaching storage capacity, each silt cell will be drained of surface water and progressively capped with approximately 2m of imported VENM and then covered with an additional 1m to 1.5m of oversize and overburden material. The duration of the period to cap each silt cell will be dependent upon the size grading of the silts in each cell and the rainfall pattern during the capping period.

After the silt cells are capped, and providing they are not required for any other land use, the capped surface will be covered with a layer of subsoil up to 0.4m in depth and topsoil to a depth of approximately 0.15m. Where practicable, this soil will be directly transferred from an active stripping area elsewhere within the quarry. This area will then be sown using native seed and tubestock as nominated in **Table 3** or a range of pasture species. It is envisaged that the vegetation progressively established on the silt cells will provide for bands of native vegetation interspersed with open areas that would be suitable for future agricultural use.

[1] Notably, the quarry processing and ancillary areas cannot be progressively rehabilitated as they will be required for the entire life of the quarry.

5.2.3 Quarry Floor and Walls

A significant proportion of the quarry floor will be covered by the silt cells and as a result rehabilitation of the quarry floor will be undertaken in a similar fashion to that described in Section 5.2.2. In those areas where silt cells are not present, the following procedures will be adopted.

(i) Imported VENM will be unloaded on the quarry floor and a bulldozer used to profile this material into the proposed final landform. Progressively greater volumes of VENM will be unloaded and spread as extraction moves closer to the extraction limit such that the proposed moderate 1:3 (V:H) slope (18°) is created.

(ii) Overburden and/or oversize material will then be used to create a final 1m to 2m cover over the profiled VENM.

(iii) A subsoil cover of up to 0.4m and topsoil cover of approximately 0.15m will be placed over the profiled ground.

(iv) The final landform will be lightly ripped and reseeded with pasture species interspersed with the planting of tubestock along drainage lines, on the more steeply sloped sections of the final landform and those areas identified in **Figure 4** for the re-establishment of native vegetation.

5.2.4 Acoustic Bund Walls

At the cessation of extraction and processing activities, the acoustic bund walls will not be required.

Dependent on the success of vegetation establishment, these may be retained. However, if the success of vegetation establishment has been limited, or if the final land use dictates, these would be removed as follows.

- The topsoil cover and any vegetation will be scavenged using a front-end loader or excavator.
- The overburden material will then either be pushed into the completed extraction area with a bulldozer, or loaded into trucks for use as fill material or capping material elsewhere in the completed extraction area.
- The salvaged topsoil will then be re-spread over areas of the final landform, as required.

5.2.5 Processing and Ancillary Areas

Following the completion of all activities on the quarry site, those areas not required for future land use activities, eg. buildings, workshops, will be ripped, top-dressed with available topsoil and seeded with native pasture species to quickly re-establish a vegetative cover over the exposed areas. Once the grass has been established, the area may be rehabilitated further in accordance with the nominated final vegetation type (see **Figure 4**).

5.3 PROTECTING REMNANT VEGETATION AND SOILS

5.3.1 Protection of Remnant Vegetation

The existing fences around the natural forest and woodland associated with the knolls on the property will be maintained. These stands of bushland are the habitat of at least two threatened bird species and provide the most diverse and natural habitat on the property for native plants and animals.

The integrity of the existing fences will be regularly inspected with repairs undertaken as required.

5.3.2 Protection of Soil Resources

The topsoil of the quarry site, particularly those soils which are formed on the Tertiary basalt, is well structured and naturally fertile. Subsoils vary between heavy clays formed on the Tertiary basalt and loamy sands of the southern sand extraction area. Whilst the soils of the Tertiary basalt would be of greatest rehabilitation value all topsoils and subsoils would be stripped, stockpiled and used to rehabilitate the Project Site.

Controls over the management of the soil resources of the quarry site, to protect against degradation and maximise the usefulness for site rehabilitation have been categorised as:

(i) soil stripping;

(ii) soil stockpiling;

(iii) erosion and sediment control; and

(iv) soil respreading.

Soil Stripping Controls

- Mobile equipment operators will be given clear instructions to keep the topsoil and subsoil separate.
- Topsoil will be stripped to a depth of 15cm to 20cm with a further 50cm stripped as subsoil.
- All pasture vegetation will be stripped with the topsoil.
- The heavy textured topsoils of the Tertiary basalt will be ripped prior to being pushed up by dozer. The subsoils will also be ripped prior to stripping.
- Only those areas required for immediate construction or extraction activities will be stripped, thereby reducing the time required for soil stockpiling.

Soil Stockpiling Controls

- The locations for topsoil and subsoil of will be clearly identified on a plan to ensure differentiation for future works.
- The soil will only be stockpiled in the nominated soil stockpile areas, and away from natural surface drainage lines.

- Any stockpile retained for in excess of 3 months will be seeded with cereal and pasture species.
- Any long-term subsoil stockpiles will be topsoiled to assist revegetation.
- The batters of soil stockpiles will not exceed 1:3 (V:H).
- A diversion bank will be constructed upstream and sediment fence downstream of any stockpile.

Soil Erosion and Sediment Controls

Soil erosion and sediment controls are described in the Water Management Plan for the quarry (Report No. 625/08).

Soil Respreading Controls

- Surfaces to be respread with topsoil will be scarified along the contour line to a depth of 50mm to 100mm.
- A subsoil layer of up to 500mm will be respread followed by a layer of topsoil of at least 75mm, but preferably 150mm thick.
- Agricultural lime will be added to elevate the pH of the soil (as required).

5.4 FINAL LANDFORM REVEGETATION

The areas to be revegetated to woodland vegetation are shown on **Figure 4.** These areas will be planted progressively as quarrying is completed.

Tree planting is to be undertaken on the quarry site to:

(i) screen the proposed extraction area and associated facilities from view;

(ii) stabilise the soils and drainage lines; and

(iii) provide habitat for native fauna.

To maximise the habitat value of the plantings, only locally occurring native trees be planted. **Table 3** presents the recommended species to be included in the planting mix.

Rehabilitation of the pasture land will also occur progressively, this will return the land to its current grazing use.

5.5 MANAGEMENT OF CREEKS AND DRAINAGE LINES

Minor drainage lines cross the quarry site. The drainage lines interrupted by the quarrying operations will be re-instated in the final landform and replanted using the ‘drainage line’ species nominated in **Table 3** progressively following completion of quarrying operations within the relevant section of the site. These areas will be fenced.

Table 3
Plant Species for Rehabilitation

General Area	Species
General plantings	Green Wattle *Acacia decurrens*, Black Wattle *Acacia mearnsii*, Red Stringybark *Eucalyptus macrorhyncha*, Brittle Gum *Eucalyptus mannifera*, Yellow Box *Eucalyptus melliodora*, Cabbage Gum *Eucalyptus amplifolia*, Forest Red Gum *Eucalyptus tereticornis,* Coast Box *Eucalyptus bosistoana*, Manna Gum *Eucalyptus viminalis*.
Drainage lines	Green Wattle *Acacia decurrens*, Black Wattle *Acacia mearnsii*, Yellow Box *Eucalyptus melliodora*, Cabbage Gum *Eucalyptus amplifolia*, Forest Red Gum *Eucalyptus tereticornis,* Manna Gum *Eucalyptus viminalis*.
Hills and ridges	Green Wattle *Acacia decurrens*, Black Wattle *Acacia mearnsii*, Red Stringybark *Eucalyptus macrorhyncha*, Silvertop Ash *Eucalyptus sieberi*, Blue-leaved Stringybark *Eucalyptus agglomerata* and Brittle Gum *Eucalyptus mannifera*.

5.6 PRE-CLEARING SURVEYS

Pre-clearing surveys are often undertaken to identify any significant flora and fauna that could be salvaged or moved from the area. In this case, the grazing land to be used for the quarry has no native habitat value and so such surveys are not required.

5.7 MANAGING POTENTIAL IMPACTS ON FAUNA

No special habitat for native fauna is to be removed or modified in this project. Two measures to minimise the impact on fauna will be undertaken. As noted above, the fences around the existing woodland stands will be maintained to exclude grazing stock. Secondly, traffic speed on the property will be kept to 40kph to reduce the risk of road kill.

5.8 LANDSCAPING

Landscaping of the site, as opposed to revegetation of identified areas, aims to minimise visual impacts. This will include building and planting visual/noise bunds to the west of the processing infrastructure of the quarry.

These bunds will be immediately sown with a sterile cover crop, eg. Japanese millet or oats, to stabilize the soil and ‘camouflage’ the bunds against the surrounding pasture vegetation. Following the establishment of the cover crop, plantings of vegetation as nominated in **Table 3** (general plantings) will be undertaken. Trees would be planted at approximately 2m centres and shrubs at 1m centres (see Section 5.9).

5.9 SALVAGE AND RE-USE OF NON-PRODUCTION RESOURCES

5.9.1 Organic material

The quarry manager will ensure that any organic material, eg. logs, tree trunks, mulch and soil, useful in the revegetation program is appropriately stored and re-used to best advantage for revegetating the identified areas or the grazing land.

The vegetation removed from the site will, where practical, be used to assist in the establishment of the planting areas. The top 20cm of soil (containing seeds and other propagation material), logs and timber debris are all useful in re-establishing forest habitat on the presently cleared land that is dominated by exotic plants. Section 5.2.2 discussed the controls that will be implemented to manage soil resources maximising the beneficial use of these resources for quarry rehabilitation.

5.9.2 Soil Resources

See Section 5.3.2 and the Site Water Management Plan.

5.9.3 Overburden

The thin layer of overburden above the basalt and sand resources will be removed by ripping and pushing up into stockpiles using a D9 bulldozer followed by the loading of this material by front-end loader to 30t capacity haul trucks. As the thickness of the overburden increases, an excavator would become a more efficient means of removing the overburden either by direct transfer to awaiting haul trucks or to stockpiles from which a front-end loader will load the haul trucks.

The overburden will be used to create the final landform through targeted placement within the completed sections of the extraction area. Prior to the establishment of significant areas of the extraction area for overburden emplacement, any overburden produced will be used to construct dam walls, water management structures, acoustic bund walls and internal haul roads.

5.10 PLANTING METHODS

Table 4 provides the proposed planting methods to be implemented at the quarry.

5.11 MAINTENANCE

The planted areas will require ongoing maintenance for the life of the quarry, although the maintenance requirements will decrease over time. Weed infestation may be severe to begin with, when larger areas of disturbed ground are present, so initially there will be a need for an active weed management approach (see Section 5.12). Some plants may die and need to be replaced.

The following maintenance activities will be undertaken.

- Inspections of fencing will be undertaken to ensure these remain intact.
- Weed control will be undertaken (see Section 5.12).
- Plants will be watered on initial planting and then as required based on stress levels.
- Dead plants will be replaced to maintain the vegetation density nominated in **Table 4**.
- Rubbish, eg. roadside litter, will be removed.

Table 4
Planting Methods

Aspect	Method
Plant Spacing	• Trees and shrubs will be planted at a spacing of no more than about two (2) metre centres on average. • Plantings will be arranged randomly and not in straight lines. • On the foreshore, smaller plants can be planted at about 0.5 metres centres.
Plant Protection	• The staking of individual plants will be avoided (as it requires much effort and may be detrimental to the plant, which should be left to grow naturally). • Plastic bags or 'Grow Tubes' will be placed around each plant (a process documented to improve the success rate) to protect the plant from grazing animals, reduce weed competition, reduce wind and frost effects, and lower evaporation rates around the plant. • It is acknowledged that the bagging of individual plants is high maintenance, however, this will increase the probability of successful rehabilitation.
Plant Size	• Tubestock or similar sized plants will be used for all plantings. • Advanced plants, which are not usually successful in this type of project, will be avoided.
Planting Configuration	• The plants will not be planted in rows, lines or grid patterns. • The plantings will be random, with an average density as set out above.
Individual Planting Method	• Each plant will be placed in a hole of suitable size. • Two slow-release fertiliser tablets will be placed at the bottom of the hole, and a handful of water-holding crystals placed around the plant as the hole is filled in. • A tree guard will be placed around the planted trees and shrubs. • Each plant will be watered immediately after planting. • The area around the plant will be mulched as soon as possible after planting.

- Drainage lines, stockpiles and exposed surfaces will be inspected for signs of erosion and should areas of erosion will be identified and remediated immediately.
- The occurrence of pest species, eg. rabbits, will be monitored and appropriate actions taken as noted in Section 5.12.

5.12 OBTAINING AND USING PROPAGATION MATERIAL

The native plants used for the revegetation program will be obtained from a local source. A local source is classified as being from within the southern tablelands region and in reasonable vicinity of the property.

5.13 PEST SPECIES

5.13.1 Weeds

Weed control in the early stages of quarry development and rehabilitation will be crucial. For new plantings in previously grassed areas, the growth of plantings will be severely retarded if the dense sward of grass is not controlled.

Weed control will be achieved by a combination of several methods, depending upon the weeds present and their abundance. These methods will include mowing, removal by hand, the use of thick mulch and judicious spraying with herbicide. Weed control effort will focus on species that are adversely affecting the plantings and the forest, particularly weeds declared noxious under the *Noxious Weeds Act, 1993* (NSW).

5.13.2 Feral Animals

Several species of feral animal occur on the property that have the potential to impact on revegetation areas, most particularly Rabbits. These animals will be controlled in accordance with legislative requirements or where needed to ensure the success of the quarry rehabilitation.

5.14 ACCESS

Access to the site will be restricted to the designated access roads. Vehicles will be prohibited from rehabilitation areas once they have been planted and fenced.

5.15 BUSHFIRE

The bushfire hazard assessment determined that the hazard on the “Ardmore Park” property is low. No special measures are required to protect the facilities from bushfire.

5.16 VENM MANAGEMENT

VENM will be trucked to site, generally as a backload of product delivering trucks, tipped and profiled using the site bulldozer. The use of VENM is an important component of the quarry rehabilitation allowing for the final landform to more closely resemble the pre-quarry environment.

Acceptance of the VENM to the site will be subject to the following management procedures.

- A chain of custody procedure will be implemented whereby the source, type and quantity of material is recorded and a form signed by the driver. The form will require confirmation that the material being imported does not contain and contaminating or polluting substances, eg. hydrocarbons, pesticides or asbestos.
- The driver will be directed to the active tipping location on site, which will also be recorded on the form and the Multiquip’s VENM management database.

- The contents of each load will be tipped and inspected by the quarry manager or nominated representative. Once satisfied that the material does not contain any polluting or contaminating substances, the material will be pushed and profiled to create the designated structure or landform.
- At any time, the quarry manager or nominated representative may refuse the acceptance of the material if not satisfied that it is inert and free of contaminating material. Similarly, if on inspection there is a suspicion that the material may be contaminated, the quarry manager or nominated representative may order the excavation and reloading to the truck.
- Multiquip will periodically (at least six-monthly) collect a representative sample of the received and tipped material for laboratory analysis to confirm the inert nature of the VENM.

6. TIMING, MONITORING AND RESPONSIBILITIES

6.1 PROJECT TIMING

This RMP has been prepared to address rehabilitation requirements for the life of the quarry. However, the RMP should be reviewed and updated at least every three years to ensure that the effectiveness of progressive rehabilitation can be considered and methods varied, plans can take into account any changes to final land use or landform, and methods can incorporate any improvements in rehabilitation management identified in the intervening years between RMP updates.

6.2 MONITORING PERFORMANCE

Rehabilitation monitoring will be undertaken in consultation with Goulburn Mulwaree Council and reported annually in each Annual Environmental Management Report (AEMR) prepared for the quarry.

Monitoring the success or otherwise is an important component of rehabilitation management. Day to day monitoring of the quarry operations (including rehabilitation) will be carried out by the earthworks contractor and Multiquip quarry management personnel. The following will be inspected regularly and a log created to document the results of these inspections.

- Condition of fencing.
- Condition of the planted areas.
- Condition of the rehabilitated pasture areas.
- Confirmation that disturbance is limited to the approved areas of operation.

A qualified botanist will be commissioned to undertake monitoring of the rehabilitation (and general condition of vegetation on the quarry site). Based on the monitoring undertaken, an annual rehabilitation report will be prepared which will include the following key matters.

- General condition of the retained forest, with particular reference to the Swamp Sclerophyll Forest area.
- General condition of each planted area.
- Results of inspections of the bund wall and drainage line plantings.
- A discussion of matters relevant to the success of the project, particularly weed invasion. A map showing the distribution of important weeds will be updated annually.
- The condition of the quarry/forest boundary and any remedial works required.
- Relevant photographs to demonstrate the results of the monitoring described above.
- Updated map that shows the areas planted and any other relevant information.

The performance criteria nominated in **Table 2** will be also be considered and included in the annual monitoring report.

6.3 REHABILITATION RISKS AND CONTINGENCIES

Table 5 provides a summary of the identified risks to successful rehabilitation and the contingency measures that will be implemented should these occur.

Table 5
Rehabilitation Risks and Contingency Measures

Page 1 of 2

Risk to Successful Rehabilitation	**Contingency Measure**
Soil resources have chemical or physical parameters detrimental to vegetation establishment and growth.	• Soil testing will be undertaken and appropriate soil conditioning agents or ameliorants added to improve soil properties for growth. • In the event that the soil properties cannot be ameliorated by addition of such agents, the soil will be removed and encapsulated within the final landform.
Insufficient soil resources available for the rehabilitation of the site.	• A soil inventory will be maintained and annual comparisons of soil resource availability and requirement completed. Should a reduction in the available soil resource occur as a result of the identification of unacceptable soil properties or contamination, Integra will obtain supplementary soil resources from an external source, eg. VENM. • In the event that an external soil source is required, Multiquip will ensure that this has been scalped and sprayed to minimise the potential for the import of weed species to the site.
Excessive erosion and compromised drainage.	• Regular inspections of rehabilitation will identify eroding surfaces and as these are identified, they will be immediately remediated. • In the most extreme circumstances, remedial works may be required to realign or construct additional drainage to prevent the reoccurrence of erosion.
Low rainfall resulting in poor vegetation germination and establishment.	• Reseeding of areas affected by drought conditions will be undertaken during the next available seeding season. • If groundcover has established, but tree and shrub seedlings are absent, tubestock planting will be undertaken.
Disease affecting growth of vegetation.	• A qualified botanical / horticultural professional will be commissioned to identify the type, source and affect of any such disease. • The advice of the qualified botanical / horticultural professional will be followed.

Table 5 (cont'd)
Rehabilitation Risks and Contingency Measures

Risk to Successful Rehabilitation	**Contingency Measure**
Unexplained or patchy vegetation establishment.	• Soil testing will be undertaken to identify if there are any underlying soil parameters affecting the establishment of vegetation. • Fertiliser and/or other soil conditioning agents will be added as dictated by the results of soil testing. • If still unexplained, a qualified botanical / horticultural professional will be commissioned to identify if any other underlying factors may be contributing to the varied success of rehabilitation. • Supplementary seeding or tubestock planting will be undertaken at the first opportunity following the completion of investigations.
Establishment of vegetation community with a poor species diversity, eg. restricted number of dominant species.	• A qualified botanical / horticultural professional will be consulted. • As advised, Multiquip will undertake to reduce the number of the dominant species(s) and increase the number or introduce other species of the vegetation community targeted for re-establishment.
Dominance of exotic or weed species.	• Additional and targeted weed spraying will be undertaken to reduce the number and distribution of identified weeds. The weed spraying will be undertaken following appropriate consultation with a Council Weeds Officer. • Reseeding or tubestock planting will be undertaken at the first opportunity to reduce the affects of erosion which may be exacerbated following the removal of the dominant groundcover.
Bushfire impacts on establishing vegetation.	• Regrowth following fire will be monitored and supplementary seeding and tubestock planting undertaken (in accordance with the contingency measures noted in relation to the poor species diversity).

7. RESPONSIBILITY FOR PLAN IMPLEMENTATION AND REVIEW

7.1 RESPONSIBILITIES AND ACCOUNTABILITIES

Table 6 provides a summary of the specific responsibilities of key personnel in relation to the implementation of the RMP and management of rehabilitation at the quarry.

Table 6
Responsible Positions and Accountable Tasks Related to the Rehabilitation Management Plan

Position	Accountable Task
Quarry Manager[1]	- Retains overall responsibility for all activities and personnel, including compliance with all applicable laws, regulations, licences, approvals and achievement of the desired environmental outcomes. - Manage delegation of individual responsibilities related to the implementation of the RMP. - Ensure that adequate provisions are available for implementation of all component activities of the RMP (as described by this plan). - Authorise finalisation, distribution and implementation of RMP. - Ensure personnel and contractors are aware of, and appropriately trained to undertake, individual responsibilities in relation to the implementation of the RMP. - Review and approve education programs for personnel and contractors appropriately to undertake, individual responsibilities in relation to the implementation of the RMP. - Conduct an annual review (or authorise a review by an external party) of the RMP. - Ensure that rehabilitation implementation is undertaken in accordance with the schedules nominated in this plan.
Earthworks Contractor Project Manager	- Retains day to day responsibility for all activities and personnel within the Mine Site, including compliance with all applicable laws, regulations, licences, approvals and achievement of the desired environmental outcomes. - Ensure that adequate operational resources are provided for the implementation of the rehabilitation activities of the RMP (as described by this plan).
Nominated Environmental Officer	– Ensure the management / implementation of the monitoring activities identified in the RMP. – Review and analyse results of monitoring programs identified in the RMP. – Report on results of monitoring and rehabilitation and offset management as nominated in the RMP. – Advise on ongoing compliance with *Condition 3(21)* of PA 07_0155 and other approvals, licences and/or leases. – Plan and coordinate the rehabilitation monitoring (as described by this plan). - Train personnel and contractors appropriately to undertake, individual responsibilities in relation to the implementation of the RMP.
Note 1: Though retaining the responsibilities identified above, the Quarry Manager and/or Project Manager may, at their discretion, delegate specific tasks to suitably qualified and/or experienced operational personnel and/or consultants.	

An ecologist will undertake an annual inspection and provide a report on quarry rehabilitation, including consideration of the matters set out in **Section 6.2**.

7.2 RMP REVIEW

An internal review of this program will occur annually during the preparation of the AEMR for the quarry, or in the event of changes to the operation which significantly impact on the final landform or rehabilitation objectives. This maximum period for which this RMP will remain active will be three years from the commencement of construction at the quarry site. After 3 years, an updated version of the RMP will be prepared.

PART 2: QUARRY CLOSURE PLAN

8. INTRODUCTION

8.1 REQUIREMENTS FOR THE QUARRY CLOSURE PLAN

The requirements for the Quarry Closure Plan (QCP) are provided by *Condition 3(22)* of PA 07_0155. **Table 7** outlines the relevant conditions of PA 07_0155 related to the preparation of the QCP and the section within this document where each is addressed.

Table 7
PA 07_0155 Conditions Relevant to the Preparation of the Quarry Closure Plan

PA 07_0155 Conditions		Section
22. The Quarry Closure Plan must:		
(a)	include provision for certification from a qualified geotechnical engineer that the final proposed landform is stable;	9.2
(b)	define the objectives and criteria for closure of the quarry:	8.2, 8.3
(c)	investigate options for the future use of the site, including any final void;	10
(d)	describe the measures that would be implemented to minimise or manage the ongoing (post closure) environmental effects of the project; and	11.1
(e)	describe how the performance of these measures would be monitored over time.	11.2

8.2 QUARRY CLOSURE OBJECTIVES

The key quarry closure objectives adopted by Multiquip are as follows.

- To produce a safe and stable final landform, designed and constructed to suit the nominated final land use.
- To ensure the final landform is free of contaminants, and therefore poses no ongoing pollution hazard to the local environment.
- To ensure that post-closure, the final landform maintains a stable and functional drainage system (even under extreme rainfall events) and provides for a neutral or beneficial effect on local water quality.
- To establish areas of native vegetation, particularly areas of the endangered ecological community White Box Yellow Box Blakely's Red Gum Woodland, with linkage to existing areas of native vegetation to the southeast and northwest of the Project Site.
- To establish areas of pasture land and a number of water storages to facilitate the subsequent use of the land for agricultural purposes.

8.3 QUARRY CLOSURE CRITERIA

8.3.1 General Quarry Closure Criteria

General quarry closure criteria have been taken from the guideline document "*Strategic Framework for Mine Closure"* (ANZMEC, 2000). Each of the criteria, along with reference to how each has been or will be achieved, are as follows.

1. **Rehabilitation and rehabilitation outcomes consistent with the EIS (Environmental Assessment) which formed the basis of approval.**

   The planned rehabilitation identified in Part 1 and presented on **Figure 4** reflects the concepts and designs initially presented in the *Environmental Assessment*. Section 4.3.1 provides more specific rehabilitation criteria, and measurement of performance of the mine against these.

2. **Based on closure criteria and rehabilitation outcomes developed through stakeholder consultation.**

   The quarry closure objectives (outcomes) identified in Section 8.2 have been developed following consideration of the surrounding landscape and feedback received through the environmental assessment process for the quarry.

   Continued consultation with local land holders and the surrounding community, Goulburn-Mulwaree Council, relevant NSW government agencies will be undertaken by Multiquip as it investigates future land use options. Preferred rehabilitation and quarry closure outcomes will be further defined as part of this process and included in future versions of the LMP.

3. **Integrates rehabilitated native vegetation with undisturbed native vegetation to provide larger areas and wildlife corridors.**

   Figure 4 illustrates the planned use of native vegetation establishment on the rehabilitated quarry site to create linkages with remnant native vegetation to the southeast of the quarry.

4. **Suitable for an agreed subsequent land use as far as possible compatible with the surrounding land fabric and land use requirements.**

   The current conceptual final landform and land use provides for a continuation of agricultural activities on the quarry site post-closure. This land use is consistent with the land uses on the properties surrounding the quarry.

   Should the preferred final land use be modified as a result of ongoing investigations (see Section 10), future versions of this LMP will demonstrate compatibility of any modification to the final land use with surrounding land fabric and land use requirements.

5. **Addresses limitations on the use of rehabilitated land.**

   With the exception of the proposed areas of native vegetation establishment and conservation, there are no limitations on the use of the final rehabilitated landform.

6. **Sustainable in terms of that land use.**

   Based on the current final landform and land use concept, the rehabilitated land will be restricted to sustainable agriculture and native vegetation establishment and conservation.

7. **Stable and permanent landforms, with soils, hydrology, and ecosystems with maintenance needs no greater than those of surrounding land. (may include waste emplacements, voids, pits and water-bodies providing that they are part of the accepted final outcome).**

   The current conceptual final landform will have slopes no greater than 18º, i.e. comparable to the slopes of the surrounding topography. Slopes of 18º are generally considered to be stable, provided they are well protected from erosion and sedimentation by water management structures and vegetation.

   Native vegetation will be established and linked to remnant vegetation to the southeast of the quarry site. Linking the native vegetation on the quarry site with that of the quarry site will reduce the possibility of isolated events such as fire or disease wiping out this vegetation, i.e. the vegetation will be sustainable in the long-term having land management requirements no greater than those of the surrounding areas of native vegetation.

   Surface water structures within the rehabilitated areas will be constructed and revegetated in a manner that will ensure that water will flow at non-erosive velocities and these structures will be regularly inspected to ensure that they are performing adequately and that they do not require maintenance that is greater than the maintenance required for the surrounding undisturbed land.

8. **Securely and safely contain waste substances that have the potential to affect land use or result in pollution.**

   No such materials have been identified within the quarry site. However, should ongoing analysis of waste material identify any such materials, they will be managed appropriately.

9. **Not present a hazard to persons, stock or native fauna.**

   The final landform will be created with moderate and stable slopes and, as such, will not present a greater than normal risk to persons, stock or native fauna when compared to elements of the existing landform.

10. **Addresses threatened species issues.**

    The long-term conservation of native vegetation on the quarry site will contribute to preservation of threatened species.

11. **Addresses heritage issues.**

    No sites of heritage significance will be disturbed as a result of quarry operations.

12. **Clean and tidy, and free of rubbish, metal and derelict equipment/structures, except for heritage and other agreed features.**

    All non-production waste materials generated will be disposed of off-site by waste contractors licensed for this function. All infrastructure no longer required for ongoing mining operations will be removed and rehabilitated prior to lease relinquishment.

13. Free from unacceptable air and water pollution, and other environmental effects outside the disturbed area.

The Ardmore Park Quarry will be operated in accordance with conditions imposed by PA 07_0155 and the Environment Protection Licence (EPL). Monitoring programs for air quality, noise, surface water and groundwater have been prepared and provided to the relevant government agencies. These programs will be implemented to verify compliance with consent and EPL conditions.

8.3.2 Specific Quarry Closure Criteria

Specific quarry closure criteria will be developed following the establishment of a final landform and land use (Section 9 discusses the current conceptual final landform and land use and Section 10 discusses the development of a final land use plan for the quarry site). The preparation of specific quarry closure criteria will be progressive and will take into account the following.

- Changes to the final landform and land use.
- Government and other stakeholder expectations, legislative requirements, the conditions of PA 05_0155 and final Statement of Commitments.
- Best practice rehabilitation methodologies and realistic community expectations.
- Management of exotic plants (weeds) and introduced (feral) animals.
- Development of suitable monitoring programs to demonstrate satisfaction with criteria.

The establishment of rehabilitation criteria will be divided into two stages as follows.

- Preliminary quarry closure criteria. Criteria developed based on the objectives nominated in Section 8.2.
- Final rehabilitation criteria. Refinement of the preliminary rehabilitation criteria based on changes to final land use requirements of the final landform, the results of the rehabilitation monitoring programs, research trials that may be undertaken and consideration of stakeholder feedback.

The preliminary quarry closure criteria, considered by area of the quarry site, are presented in **Table 8**.

Table 8
Preliminary Quarry Closure Criteria

Page 1 of 3

Domain	Environmental Aspect	Preliminary Rehabilitation Criteria
Extraction Area	Landform	• Complete backfill of the extraction area to create final slopes not exceeding 18º. • Validate the geotechnical stability of the final landform (by qualified geotechnical engineer). • No acid forming, or potentially acid forming material is to be placed within the extraction area without the implementation of specific management measures to minimise the potential for surface or sub-surface contamination.

Table 8 Cont'd
Preliminary Quarry Closure Criteria

Page 2 of 3

Domain	Environmental Aspect	Preliminary Rehabilitation Criteria
Extraction Area (Cont'd)	Landform	• Contour banks will be progressively installed at approximately 20m (vertical) intervals. • Surface layer to be free of any hazardous materials.
	Soil	• A subsoil layer of approximately 200m to 300mm thick, followed by a topsoil layer of between 75mm and 125mm thick will be established over the final landform. • The surface of the soil covered landform will be even but roughened, with contour lines ripped and compacted and/or smooth surfaces broken up. • Previously cleared vegetation will be spread over the areas to be rehabilitated following soil placement or mulched and incorporated within the topsoil. • pH to be in the range of analogue sites. • Electrical conductivity within the range suitable for plant growth. • Macro- and micro-nutrient levels sufficient to ensure that trees do not experience nutrient deficiencies.
	Drainage and Water Resources	• Contour banks are stable and there is no evidence of overtopping or significant scouring as a result of runoff • No significant erosion is present that compromises the capability of supporting the end land use.
	Vegetation	• The topsoiled surface are stabilised with a cover crop. • Weed species do not dominate the understorey. • Revegetation of those areas designated for native vegetation conservation will contain flora species assemblages and characteristic of the desired native woodland community.
	Fauna	• The rehabilitated landform provides habitat for native fauna species, eg. trees (with hollows, bark, etc), shrubs, ground cover, developing litter layer etc.
	Visual Amenity	• Exposed (unvegetated) surface are minimised. • A final landform that blends with the surrounding topography.
Water Management Structures	Landform	• Banks and side slopes will be less than 1:3 (V:H).
	Soil	• A subsoil layer of approximately 200mm to 300mm thick, followed by a topsoil layer of between 75mm and 125mm thick will be established over the final landform.
	Drainage and Water Resources	• No significant erosion is present that compromises the capability of supporting the end land use.
	Vegetation	• The topsoiled surfaces are stabilised with a cover crop. • Revegetation areas contain a flora species assemblage characteristic of the desired community. • Weed species do not dominate the understorey.
	Fauna	• The rehabilitated landform provides habitat for native fauna species.

Table 8 Cont'd
Preliminary Quarry Closure Criteria

Page 3 of 3

Domain	Environmental Aspect	Preliminary Rehabilitation Criteria
Other Hardstand Surfaces	Landform	• Undulating slopes with gradients of generally less than 18º. • Surface layer to be free of any hazardous materials.
	Soil	• A subsoil layer of approximately 200mm to 300mm thick, followed by a topsoil layer of between 75mm and 125mm thick will be established over the final landform. • The surface of the soil covered landform will be even but roughened, with contour lines ripped and compacted and/or smooth surfaces broken up. • Previously cleared vegetation will be spread over the areas to be rehabilitated following soil placement or mulched and incorporated within the topsoil. • pH to be in the range of analogue sites. • Electrical conductivity within the range suitable for plant growth. • Macro- and micro-nutrient levels sufficient to ensure that trees do not experience nutrient deficiencies.
	Water Resources	• No significant erosion is present that compromises the capability of supporting the end land use.
	Vegetation	• The topsoiled surfaces are stabilised with a cover crop. • Revegetation areas contain a flora species assemblage characteristic of the desired community. • Weed species do not dominate the understorey.
	Fauna	• The rehabilitated landform provides habitat for native fauna species.
	Visual Amenity	• Exposed (unvegetated) surface are minimised. • A final landform that blends with the surrounding topography.

9. THE FINAL LANDFORM

9.1 LANDFORM DESIGN

As noted in Section 4.1.1, the final landform of the Project Site would be created to replicate (as far as possible) the topographic features of the pre-quarry environment. **Figure 4** presents the current conceptual plan of the final landform, illustrating a moderately sloping and free draining surface oriented to the south. In order to achieve the final landform presented in **Figure 4**, Multiquip would import increasing volumes of VENM (up to 70 000tpa per year).

Figure 4 has been purposefully prepared as a conceptual final landform. Given the extended life of the quarry (estimated to be 30 years), and the proposed use of imported VENM to create the final landform, it is likely that the conceptual landform design will change to accommodate final quarry depth and design, and imported VENM volume. The final landform design will therefore be updated every three years, coinciding with the updating of the LMP, to account for any changes in quarry design and/or VENM importation arrangements. It is also possible that the preferred final land use may require a different landform design, which would also necessitate the modification to the design presented in **Figure 4**.

9.2 GEOTECHNICAL ASSESSMENT OF THE FINAL LANDFORM

Acknowledging the main activity associated with the creation of the final landform would be the backfilling and consolidation of the quarry void with previously excavated overburden, silt and imported VENM, the potential for instability within the final landform exists.

While the proposed backfilling activities are relatively common at other sand and hard rock quarries, Multiquip will commission a qualified geotechnical engineer to inspect, assess and test the final landform and report on it's stability. Rather than wait until the completion of the final landform to undertake such a geotechnical investigation, Multiquip will undertake such inspections, tests and assessments at least every 5 years to identify if any stability issues are present (or have the potential to occur prior to quarry closure). This will allow Multiquip to modify final landform design accordingly to accommodate any identified stability concerns.

10. FINAL LAND USE

10.1 CURRENT LAND USE CONCEPTUAL PLAN

The current conceptual final landform (see **Figure 4**) has been designed to make the site amenable to one or more forms of agriculture, possibly medium intensity grazing as is currently undertaken on the "Ardmore Park" and surrounding properties. The internal drainage created and the resultant water storage dams in the final landform have been specifically designed to add value to a final agricultural land use.

Based on this final landform, Multiquip will also re-establish areas of native woodland and ultimately link existing remnant stands of native vegetation to the southeast and northwest of the Project Site. Trees would also be planted around the water storage dams retained in the final landform to create a natural shelter for grazing stock that might be carried on the final landform.

Based on the current conceptual final landform, there would be no final void retained.

10.2 FINAL LAND USE PLAN DEVELOPMENT

Over a period of 30 years, the estimated life of the quarry, the land use of the surrounding landscape may change. Accordingly the final landform and land use described in the QCP have purposefully been referred to as conceptual in design, with scope for modification to best serve the local area.

Over the life of the quarry, Multiquip will investigate options for the optimal use of the quarry site post-closure with the design of the final landform to be modified accordingly. Investigating the final land use options will include the following activities.

- Regular consultation with strategic planning officers of Goulburn-Mulwaree Council ("Council") to identify preferred land use options for the area surrounding the quarry. Multiquip will also review all strategic development information prepared by Council and provide input as appropriate to any forums, meetings or plan development within the local government area relevant to future land use planning.
- Regular consultation with the local Bungonia community and surrounding land holders. These discussions will focus on local expectations as to final land use(s) and possible integration of the final land use with those of the surrounding land holders.
- Consideration of regional and NSW strategic planning documents. For example, the Sydney-Canberra Corridor Strategy (DoP, 2008a, 2008b) identifies that increases in employment (up to 1650 new jobs) in the industries of transport logistics, warehousing and manufacturing are expected, with associated increased demand for residential dwellings (up to 2 150) and other infrastructure. The quarry site could potentially provide land for the establishment of such industries or residential dwellings. This potential will continue to be investigated, involving Council and the local community in investigations as appropriate, over the life of the quarry.

Multiquip will initially report on the progress of a final land use at three year intervals to coincide with the updating of the LMP. After 15 years, or following extraction of 50% of the resource, reporting on the development of the final land use plan will increase in frequency to every year, to coincide with annual reporting requirements.

11. POST-CLOSURE MANAGEMENT

11.1 POST-CLOSURE MANAGEMENT MEASURES

The preliminary and specific quarry closure criteria have and will be designed to minimise the potential for ongoing environmental effects following the closure of the quarry. Adverse impacts on the environment would generally be as a result of one or more of these criteria not being met. **Table 9** provides a summary of the identified risks to successful quarry closure and the contingency measures that will be implemented should these occur.

Table 9
Quarry Closure Risks and Contingency Measures

Page 1 of 2

Risk to Successful Quarry Closure	Contingency Measure
Soil resources have chemical or physical parameters detrimental to vegetation establishment and growth.	• Soil testing will be undertaken and appropriate soil conditioning agents or ameliorants added to improve soil properties for growth. • In the event that the soil properties cannot be ameliorated by addition of such agents, the soil will be removed, encapsulated within the final landform and replaced immediately.
Insufficient soil resources available for the rehabilitation of the site.	• A soil inventory will be maintained and annual comparisons of soil resource availability and requirement completed. Should a reduction in the available soil resource occur as a result of the identification of unacceptable soil properties or contamination, Integra will obtain supplementary soil resources from an external source. • In the event that an external soil source is required, Multiquip will ensure that this has been scalped and sprayed to minimise the potential for the import of weed species to the site.
Excessive erosion and compromised drainage.	• Regular inspections of rehabilitation will identify eroding surfaces and as these are identified, they will be immediately remediated. • In the most extreme circumstances, remedial works may be required to realign or construct additional drainage to prevent the reoccurrence of erosion.
Low rainfall resulting in poor vegetation germination and establishment.	• Re-seeding of areas affected by drought conditions will be undertaken during the next available seeding season. • If groundcover has established, but tree and shrub seedlings are absent, tubestock planting will be undertaken.
Disease affecting growth of vegetation.	• A qualified botanical / horticultural professional will be commissioned to identify the type, source and affect of any such disease. • The advice of the qualified botanical / horticultural professional will be followed.

Table 9 Cont'd
Quarry Closure Risks and Contingency Measures

Page 2 of 2

Risk to Successful Quarry Closure	Contingency Measure
Unexplained or patchy vegetation establishment.	• Soil testing will be undertaken to identify if there are any underlying soil parameters affecting the establishment of vegetation. • Fertiliser and/or other soil conditioning agents will be added as dictated by the results of soil testing. • If still unexplained, a qualified botanical / horticultural professional will be commissioned to identify if any other underlying factors may be contributing to the varied success of rehabilitation. • Supplementary seeding or tubestock planting will be undertaken at the first opportunity following the completion of investigations.
Establishment of vegetation community with a poor species diversity, eg. restricted number of dominant species.	• A qualified botanical / horticultural professional will be consulted. • As advised, Multiquip will undertake to reduce the number of the dominant species(s) and increase the number or introduce other species of the vegetation community targeted for re-establishment.
Dominance of exotic or weed species.	• Additional and targeted weed spraying will be undertaken to reduce the number and distribution of identified weeds. The weed spraying will be undertaken following appropriate consultation with a Council Weeds Officer. • Re-seeding or tubestock planting will be undertaken at the first opportunity to reduce the affects of erosion which may be exacerbated following the removal of the dominant groundcover.
Bushfire impacts on establishing vegetation.	• Bushfire is a natural feature of the vegetation community to be established. This notwithstanding, regrowth following fire will be monitored and supplementary seeding and tubestock planting undertaken (in accordance with the contingency measures noted in relation to the poor species diversity).

11.2 POST-CLOSURE MONITORING

Monitoring of rehabilitation will be continued until the final specific quarry closure criteria are satisfied. As a minimum, the long term monitoring program report will:

- compare results against quarry closure objectives and targets;
- identify possible trends and continuous improvement;
- assess effectiveness of environmental controls implemented;
- where required, identify modifications required for the monitoring program, rehabilitation practices or areas requiring research;
- compare flora species present against original seed mix and/or analogue sites;
- assess vegetation health;

- assess vegetation structure; and
- assess native fauna species diversity and the effectiveness of habitat creation for target fauna species.

Where necessary, rehabilitation procedures will be amended accordingly to continually improve rehabilitation standards and ensure the successful achievement of quarry closure objectives (see Section 8.2).

12. REFERENCES

R.W. Corkery & Co. Pty. Limited (RWC), 2008. Environmental Assessment for the Modified "Ardmore Park" Quarry Project, via Bungonia, Prepared on behalf of Multiquip.

Kevin Mills & Associates Pty Ltd (KMA), 2008. *Flora and Fauna Assessment of the Modified "Ardmore Park" Quarry Proposal,* Prepared on behalf of Multiquip.

ANZMEC, 2000 *Strategic Framework for Mine Closure.*

Department of Planning (DoP), 2008a. *Sydney–Canberra Corridor Regional Strategy*. State of New South Wales through the Department of Planning 2008.

Department of Planning (DoP), 2008b. *Fact Sheet │ July 2008 │ How The Sydney–Canberra Corridor Regional Strategy Will Help Goulburn Mulwaree*.

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Figures

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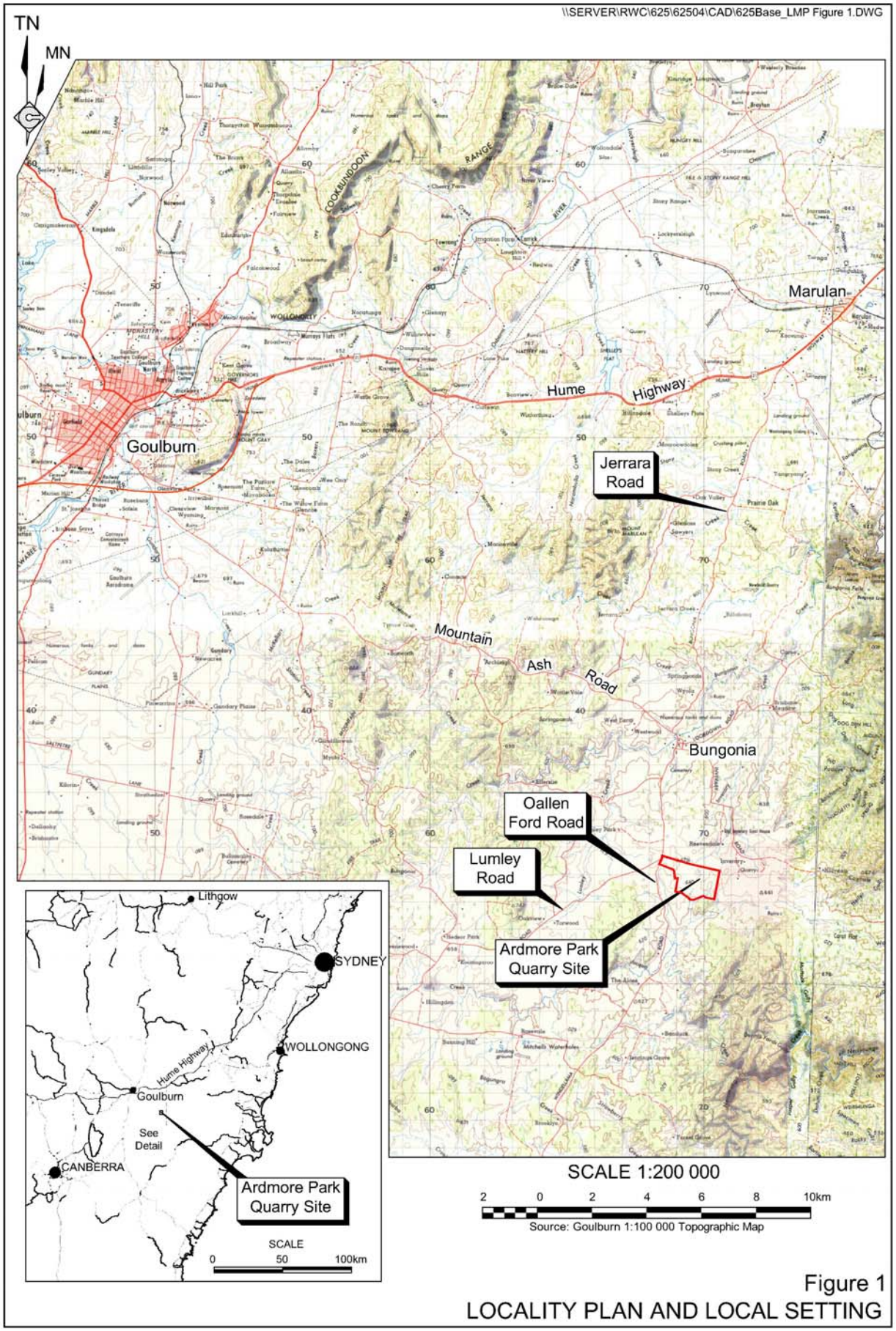

Figure 1
LOCALITY PLAN AND LOCAL SETTING

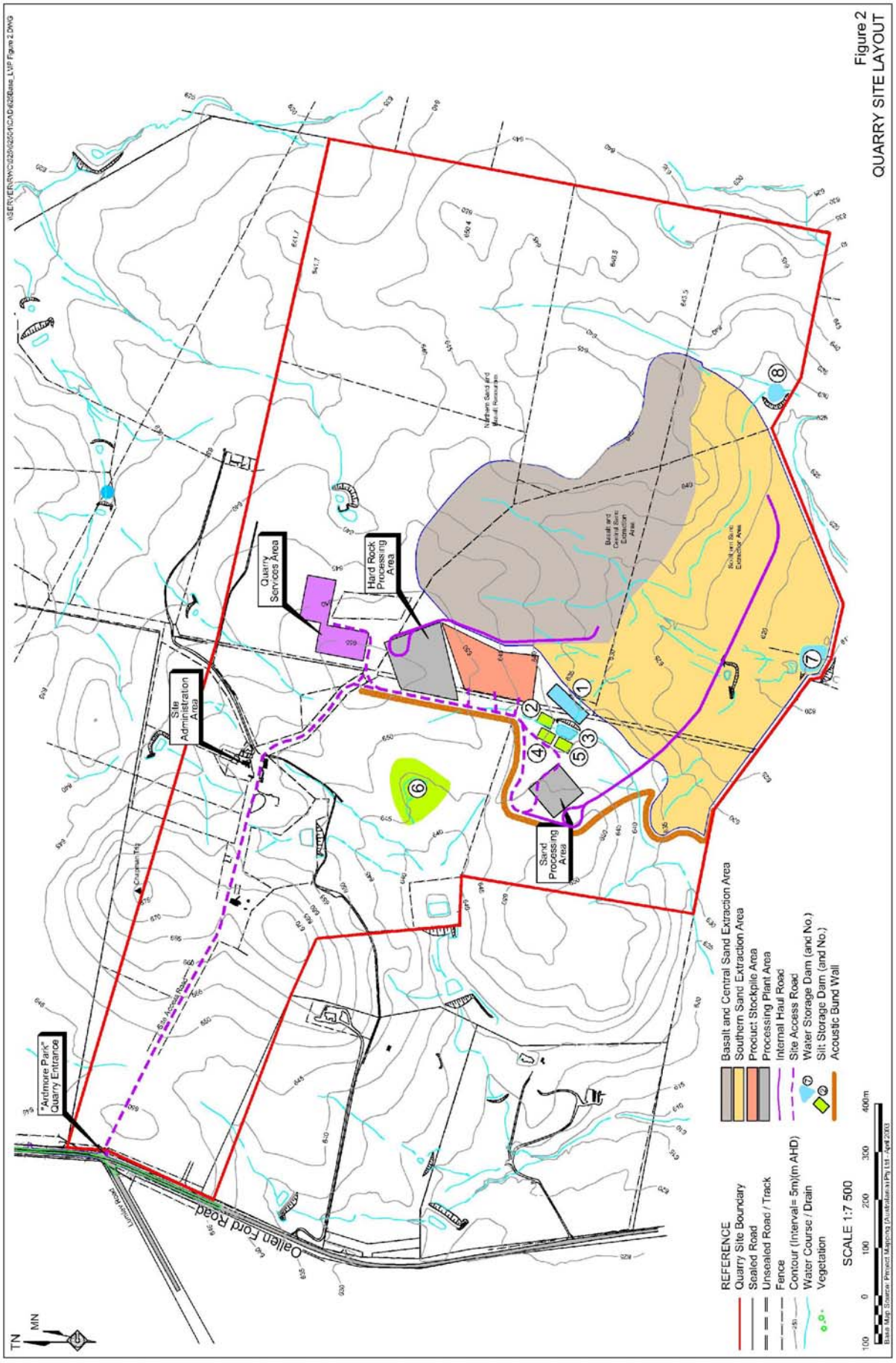
Figure 2
QUARRY SITE LAYOUT
Quarry Services Area
Hard Rock Processing Area
Site Administration Area
Sand Processing Area
"Ardmore Park" Quarry Entrance
Oallen Ford Road
Site Access Road
Basalt and Central Sand Extraction Area
Southern Sand Extraction Area
Product Stockpile Area
Processing Plant Area
Internal Haul Road
Site Access Road
Water Storage Dam (and No.)
Silt Storage Dam (and No.)
Acoustic Bund Wall
REFERENCE
Quarry Site Boundary
Sealed Road
Unsealed Road / Track
Fence
Contour (Interval= 5m)(m AHD)
Water Course / Drain
Vegetation
SCALE 1:7 500
TN
MN

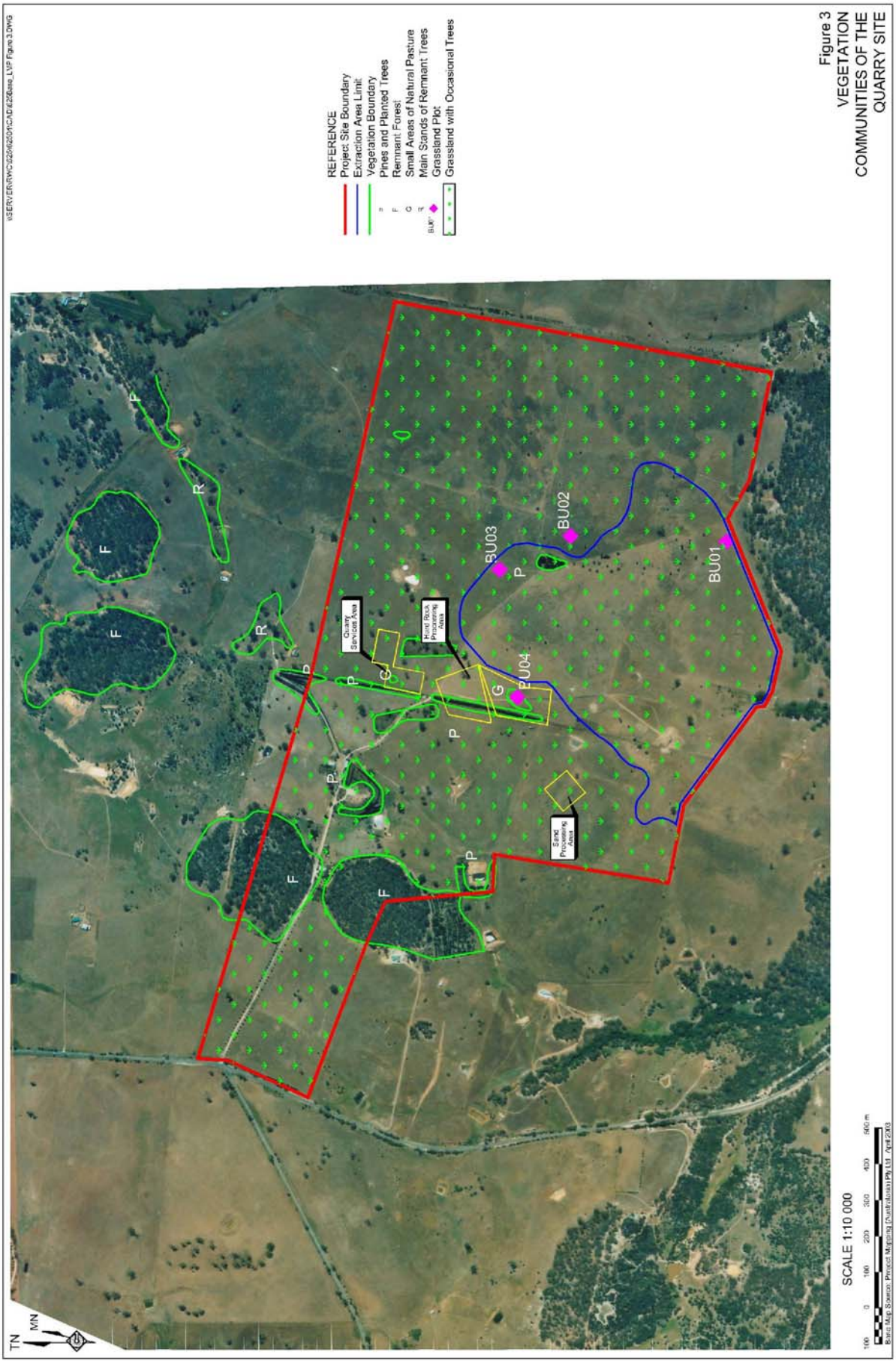

Figure 3
VEGETATION COMMUNITIES OF THE QUARRY SITE

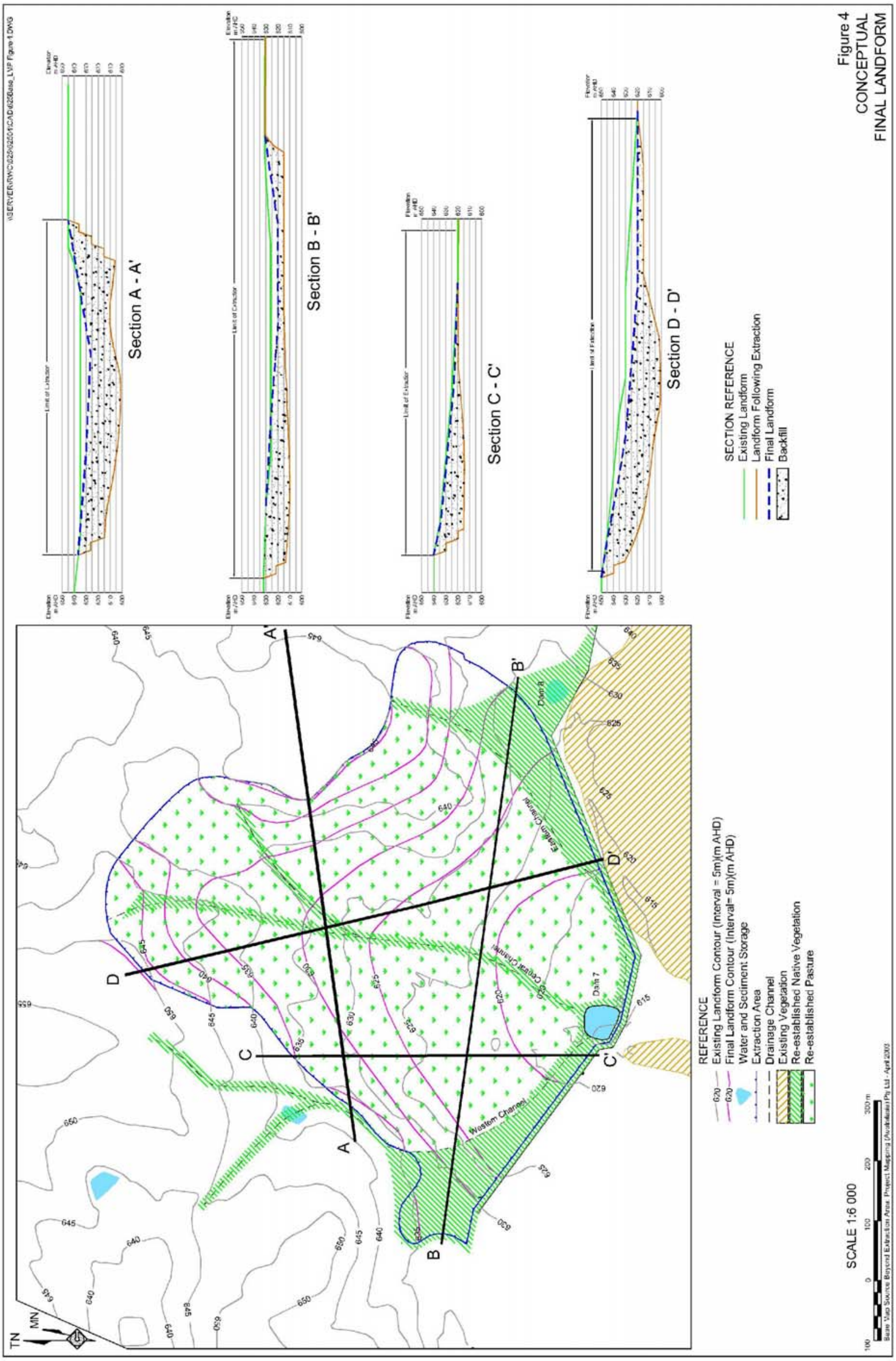
Figure 4
CONCEPTUAL
FINAL LANDFORM
Section A - A'
Section B - B'
Section C - C'
Section D - D'
SECTION REFERENCE
Existing Landform
Landform Following Extraction
Final Landform
Backfill
REFERENCE
Existing Landform Contour (Interval = 5m)(m AHD)
Final Landform Contour (Interval= 5m)(m AHD)
Water and Sediment Storage
Extraction Area
Drainage Channel
Existing Vegetation
Re-established Native Vegetation
Re-established Pasture
Eastern Channel
Central Channel
Western Channel
Dam 7
Dam 8
SCALE 1:6 000
TN
MN

Appendix 1

Plant Species List

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APPENDIX 1

List of Native plant Species for the Project Area at Ardmore Park

Includes only those species suitable for planting on the site; some species were recorded nearby and not on the property.

Plant Group/Family Species	**Common Name**
ANGIOSPERMAE (Flowering Plants)	
ASTERACEAE	
Cassinia aculeata	Common Cassinia
Cassinia quinquefaria	Rosemary Cassinia
Chrysocephalum apiculatum	Common Everlasting
Gamochaeta falcata	Cudweed
Leucochrysum albicans	Hoary Sunray
Olearia microphylla	Bridal Daisy-bush
Olearia phlogopappa	Dusty Daisy-bush
Olearia viscidula	Brush Daisy-bush
Ozothamnus diosmifolius	Everlasting
CASUARINACEAE	
Allocasuarina distyla	Sheoak
Allocasuarina littoralis	Black Sheoak
CYPERACEAE	
Carex appressa	Tall Sedge
Eleocharis acuta	Common Spike-rush
Eleocharis sphacelata	Tall Spike-rush
Lepidosperma laterale	Variable Sword-sedge
DILLENIACEAE	
Hibbertia obtusifolia	Grey Guinea Flower
EPACRIDACEAE	
Astroloma humifusum	Cranberry Heath
Brachyloma daphnoides	Daphne Heath
Leucopogon virgatus	Beard-heath
Lissanthe strigosa	Peach Heath
Melichrus urceolatus	Urn Heath
FABACEAE	
FABOIDEAE (subfamily)	
Bossiaea buxifolia	Matted Bossiaea
Daviesia leptophylla	Narrow-leaf Bitter Pea
Daviesia mimosoides	Blunt-leaved Bitter-pea
Daviesia ulicifolia	Gorse Bitter Pea
Dillwynia sericea	Showy Parrot Pea
Hardenbergia violacea	Native Sarsaparilla

Indigofera australis	Austral Indigo
Jacksonia scoparia	Winged Broom-pea
Mirbelia platylobioides	Tableland Mirbelia
Podolobium cordifolium	Prickly Shaggy Pea
Pultenaea capitellata	Hard-head Bush Pea
**Genista monspessulana*	Montpellier Broom
**Melilotus* sp.	Melilot
**Trifolium arvense*	Haresfoot Clover
**Trifolium glomeratum*	Clustered Clover
**Trifolium striatum*	Knotted Clover
**Trifolium subterraneum*	Subterranean Clover

MIMOSOIDEAE (subfamily)

Acacia decurrens	Sydney Green Wattle
Acacia genistifolia	Early Wattle
Acacia mearnsii	Black Wattle
Acacia stricta	Straight Wattle
Acacia terminalis	Sunshine Wattle
Acacia ulicifolia	Prickly Moses

JUNCACEAE

Juncus australis	Austral Rush

LOMANDRACEAE

Lomandra longifolia	Spiny-headed Mat-rush
Lomandra multiflora	Many-flowered Mat-rush

MYRTACEAE

Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus bosistoana	Coast Grey Box
Eucalyptus bridgesiana	Apple Box
Eucalyptus cinerea	Argyle Apple
Eucalyptus dives	Broad-leaved Peppermint
Eucalyptus eugenioides	Thin-leaved Stringybark
Eucalyptus goniocalyx	Bundy
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus mannifera	Brittle Gum
Eucalyptus melliodora	Yellow Box
Eucalyptus pauciflora	Snow Gum
Eucalyptus rossii	Inland Scribbly Gum
Eucalyptus sieberi	Silvertop Ash
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus viminalis	Ribbon Gum
Kunzea ericoides	Burgan
Leptospermum myrtifolium	Teatree
Leptospermum obovatum	Sweet Teatree
Leptospermum trinervium	Paperbark Teatree
Melaleuca parvistaminea	Paperbark

PHORMIACEAE

Dianella longifolia	Smooth Flax-lily
Dianella revoluta	Spreading Flax-lily
Stypandra glauca	Nodding Blue Lily

PITTOSPORACEAE

Bursaria spinosa	Blackthorn

POACEAE

Aristida ramosa	Three-awned Speargrass
Austrostipa bigeniculata	Tall Speargrass
Austrostipa scabra	Corkscrew
Bothriochloa macra	Red-leg Grass
Chloris truncata	Windmill Grass
Cynodon dactylon	Couch Grass
Danthonia caespitosa	Wallaby Grass
Danthonia carphoides	Short Wallaby Grass
Dichelachne crinita	Long-hair Plume-grass
Echinopogon caespitosus	Tufted Hedgehog Grass
Entolasia stricta	Wiry Panic
Eragrostis sp.	Love-grass
Microlaena stipoides	Weeping Grass
Poa sieberiana	Poa Tussock
Themeda australis	Kangaroo Grass

PROTEACEAE

Persoonia linearis	Narrow-leaved Geebung
Persoonia mollis	Soft Geebung

RANUNCULACEAE

Clematis microphylla	Small-leaved Clematis

SANTALACEAE

Exocarpos cupressiformis	Native Cherry

THYMELAEACEAE

Pimelea glauca	Rice flower
Pimelea linifolia	Slender Rice-flower

XANTHORRHOEACEAE

Xanthorrhoea media	Forest Grass-tree

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Appendix 2

Fauna Species List

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Fauna Species recorded in or near the Quarry Site

Group / Species	Common name	6.2003	6.2004	11.2007
Mammals				
Common Brushtail Possum	*Trichosurus vulpecula*			◆
Common Wombat	*Vombatus ursinus*	◆	◆	◆
Eastern Grey Kangaroo	*Macropus giganteus*	◆	◆	◆
Cattle*	*Bos taurus*	◆	◆	
Fox*	*Vulpes vulpes*	◆		
Rabbit*	*Oryctolagus cuniculus*	◆	◆	◆
Sheep*	*Ovis aries*	◆	◆	
Birds				
Australasian Grebe	*Tachybaptus novaehollandiae*		◆	◆
Australian King-Parrot	*Alisterus scapularis*	◆		
Australian Magpie	*Gymnorhina tibicen*	◆	◆	◆
Australian Raven	*Corvus coronoides*	◆	◆	
Australian Wood Duck	*Chenonetta jubata*	◆	◆	◆
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*			◆
Brown Falcon	*Falco berigora*	◆		
Brown Thornbill	*Acanthiza pusilla*			◆
Buff-rumped Thornbill	*Acanthiza reguloides*	◆	◆	
Common Bronzewing	*Phaps chalcoptera*		◆	◆
Common Starling*	*Sturnus vulgaris*		◆	◆
Crested Pigeon	*Ocyphaps lophotes*		◆	
Crimson Rosella	*Platycercus elegans*	◆	◆	◆
Diamond Firetail	*Stagonopleura guttata*		◆	
Dusky Woodswallow	*Artamus cyanopterus*			◆
Eastern Rosella	*Platycercus eximius*	◆	◆	◆
Eastern Spinebill	*Acanthorhynchus tenuirostris*			◆
Eastern Yellow Robin	*Eopsaltria australis*		◆	
European Goldfinch*	*Carduelis carduelis*	◆		
Galah	*Cacatua roseicapilla*			◆
Golden Whistler	*Pachycephala pectoralis*		◆	
Grey Butcherbird	*Cracticus torquatus*	◆		
Grey Currawong	*Strepera versicolor*	◆		◆
Grey Fantail	*Rhipidura fuliginosa*		◆	◆
Grey Shrike-thrush	*Colluricincla harmonica*	◆	◆	◆
Grey Teal	*Anas gracilis*		◆	
House Sparrow*	*Passer domesticus*			◆
Jacky Winter	*Microeca fascinans*		◆	◆
Laughing Kookaburra	*Dacelo novaeguineae*	◆	◆	◆
Little Corella	*Cacatua sanguinea*	◆		
Little Raven	*Corvus mellori*	◆		
Magpie-lark	*Grallina cyanoleuca*	◆	◆	◆
Masked Lapwing	*Vanellus miles*		◆	◆
Nankeen Kestrel	*Falco cenchroides*	◆		
Noisy Friarbird	*Philemon corniculatus*			◆
Noisy Miner	*Manorina melanocephala*	◆	◆	◆

Pacific Black Duck	*Anas superciliosa*			◆
Pallid Cuckoo	*Cuculus pallidus*			◆
Pied Currawong	*Strepera graculina*	◆		◆
Red Wattlebird	*Anthochaera carunculata*	◆		◆
Red-browed Finch	*Neochmia temporalis*	◆	◆	
Red-rumped Parrot	*Psephotus haematonotus*	◆	◆	◆
Richard's Pipit	*Anthus novaeseelandiae*	◆	◆	◆
Rufous Whistler	*Pachycephala rufiventris*			◆
Speckled Warbler	*Chthonicola sagittata*		◆	
Spotted Pardalote	*Pardalotus punctatus*			◆
Striated Pardalote	*Pardalotus striatus*	◆	◆	◆
Sulphur-crested Cockatoo	*Cacatua galerita*	◆	◆	◆
Superb Fairy-wren	*Malurus cyaneus*	◆	◆	◆
Wedge-tailed Eagle	*Aquila audax*	◆		◆
Welcome Swallow	*Hirundo neoxena*			◆
White-browed Scrubwren	*Sericornis frontalis*		◆	
White-plumed Honeyeater	*Lichenostomus penicillatus*	◆	◆	
White-throated Gerygone	*Gerygone olivacea*			◆
White-throated Treecreeper	*Cormobates leucophaeus*	◆	◆	
White-winged Chough	*Corcorax melanorhamphos*	◆	◆	◆
White-winged Triller	*Lalage sueurii*			◆
Willie Wagtail	*Rhipidura leucophrys*			◆
Yellow-faced Honeyeater	*Lichenostomus chrysops*			◆
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	◆	◆	◆
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	◆	◆	
Frogs				
Common Eastern Froglet	*Crinia signifera*	◆		◆
Verreaux's Tree Frog	*Litoria verreauxii*	◆		
Reptiles				
Eastern Blue-tongued Lizard	*Tiliqua scincoides*	◆		
Jacky lizard	*Amphibolurus muricatus*			◆

*Introduced animal species.