



July 2023

Landscape and Rehabilitation Management Plan for Hodgson Quarries and Plant Pty Ltd Roberts Road Quarry, Maroota NSW



Summary Table	
Consent Number	267-11-99
Name of Quarry	Robert Road Quarry
Name of Quarry Operator (s)	Hodgson Quarries and Plant Pty Ltd
Name and Contact Details of the Quarry Manager	Martin Hodgson PO Box 355 Glenorie NSW 2157 (02) 4372 1649
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Revision Table

Date	Version	Author	Reviewed	Approved
20/6/2016	R0 Updated OEMP 2011 for changes in extraction sequence and additional modifications in EA 2016	LT/TO	MH/SR	LT
29/06/2017	R1 As required by consent condition 60 Mod 2 (LRMP to be submitted by 30/6/17)	LT/TO	MH/SR	H. Reed, Resource Assessments, 22/8/18
18/07/2023	R2-Tracked Updated due to Mod 4 approval and IEA 2023	LT Approved 2/11/21 By J. Evans Resource Assessments	MH/SR	

NOTE – This is a tracked version – with changes from version R1 given in [blue text](#).

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1 Introduction

Hodgson Quarries and Plant Pty Ltd are obliged to prevent and minimise harm to the environment throughout the life of the project. All practicable measures will be taken to prevent and minimise harm that may result from the construction, operation and decommissioning of the development.

All activities on the site, including those undertaken by contractors and sub-contractors will be carried out generally in accordance with the EIS, Modifications 1 to 4 and the conditions of the development consent. This plan will be implemented to ensure that all activities on the premises will be carried out in a manner that will minimise disturbance and maximise rehabilitation at the premises.

This Landscape and Rehabilitation Management Plan is intended to be included in the OEMP.

1.1 SITE DESCRIPTION

Hodgson Quarries and Plant Pty Ltd (the client) operate a sand quarry on Roberts Road at Maroota, NSW. The site comprises lots 1 and 2 DP 228308 and lot 2 DP 312327 in The Hills Shire Council (see Figure One in the OEMP). The development application number 267-11-99 was for extraction and on-site processing of sand, clay, and pebble; and construction of a bund wall.

The development has been in operation continuously since the 1970's.

1.2 SCOPE

A modification (Mod 2) to the consent DA 267-11-99 approved in March 2016 has resulted in the requirement for the preparation of a Landscape and Rehabilitation Management Plan in accordance with condition 60.

This replaced the Interim Rehabilitation Plan submitted as Sub-Plan F of the 2016 Operational Environmental Management Plan.

The current Mod 4 consent was approved 13th August 2021 and this plan has been updated to comply with the new conditions.

2 Statutory Requirements

2.1.1 Department of Planning and Environment

~~The development consent issued by Minister for Urban Affairs and Planning (Ref S98/00772) on 31 May, 2000, and updated (NSW Department of Planning and Environment, March 2016) outlines the rehabilitation objectives (condition 58) and the requirement for progressive rehabilitation (condition 59).~~

The following table lists all relevant conditions from the Mod 4 Schedule 2 conditions with numbering in accordance with the Notification of Modification dated 13/08/2021.

Table 1. Relevant Consent Conditions

Schedule 2 Consent Condition	Where Addressed
Limits on Approval	
9A. The Applicant must not: (b) receive more than 320,000 tonnes of VENM and ENM (in total) at the site in any calendar year; (c) import more than 3 million tonnes of VENM and ENM to the site; and (d) import VENM and ENM beyond 31 May 2030.	Section 6.5
Environmental Management Plan	
20. The Operational EMP shall include, but not be limited to:	
(h) the Rehabilitation Plan (Condition 29);	This report

Schedule 2 Consent Condition	Where Addressed												
Importation of VENM and ENM													
26. the applicant must:	Section 6.5												
a) ensure only verified VENM and ENM is received at the site.													
b) collect data on the VENM and ENM received including detail of the origin, date, and quantity received; and	Section 6.5												
c) include a copy of this data in the Annual Review.	Section 6.5												
27. No other materials classified as waste under the EPA's Waste Classification Guidelines 2009 (or its latest version) may be received or processed on the site, except as expressly permitted in an applicable EPL, specific resource recovery order or exemption under the <i>Protection of the Environment Operations (Waste) Regulation 2014</i>	Section 6.5												
Landscape and Rehabilitation													
Rehabilitation Objectives													
60. The applicant shall rehabilitate the site in a manner that is generally consistent with the final landform designs in Appendix 1, to the satisfaction of the Secretary. All rehabilitation must comply with the Objectives in Table 1:	Section 3 Section 8												
Table 1: Rehabilitation Objectives													
<table> <tr> <th>Feature</th><th>Objective</th></tr> <tr> <td>Site (as a whole)</td><td> - Safe, stable and non-polluting. - Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land. </td></tr> <tr> <td>Surface Infrastructure</td><td> - Decommissioned and removed unless the Secretary agrees otherwise. </td></tr> <tr> <td>Quarry Pit Floor</td><td> - Landscaped and revegetated using improved pasture species, native trees and understory species. </td></tr> <tr> <td>Final Void</td><td> - Minimise the height and slope of batters. - Minimise the drainage catchment. </td></tr> <tr> <td>Community</td><td> - Ensure public safety. - Minimise the adverse socio-economic effects of quarry closure. </td></tr> </table>	Feature	Objective	Site (as a whole)	- Safe, stable and non-polluting. - Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land.	Surface Infrastructure	Decommissioned and removed unless the Secretary agrees otherwise.	Quarry Pit Floor	Landscaped and revegetated using improved pasture species, native trees and understory species.	Final Void	- Minimise the height and slope of batters. - Minimise the drainage catchment.	Community	- Ensure public safety. - Minimise the adverse socio-economic effects of quarry closure.	
Feature	Objective												
Site (as a whole)	- Safe, stable and non-polluting. - Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land.												
Surface Infrastructure	Decommissioned and removed unless the Secretary agrees otherwise.												
Quarry Pit Floor	Landscaped and revegetated using improved pasture species, native trees and understory species.												
Final Void	- Minimise the height and slope of batters. - Minimise the drainage catchment.												
Community	- Ensure public safety. - Minimise the adverse socio-economic effects of quarry closure.												
59. The Applicant shall rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active, and which are not ready for final rehabilitation <i>Note: it is accepted that parts of the site that are progressively rehabilitated may be subject to further disturbance in the future.</i>	Section 6.7 Section 7.2.1												
Landscaping and Rehabilitation Management Plan													
60. The Applicant shall prepare a Landscape and Rehabilitation Management Plan for the development to the satisfaction of the Secretary. This plan must: (a) be submitted to the Secretary for approval by 30 June 2017, unless otherwise agreed by the Secretary;	This report												

Schedule 2 Consent Condition	Where Addressed
(b) provide details of the conceptual final landform and associated land uses for the site	Section 4
(c) describe the short, medium and long-term measures that would be implemented to ensure compliance with the rehabilitation objectives and progressive rehabilitation obligations in this consent	Section 5.4 & Section 5.5
(d) include a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3-year period following the 3 years covered by the initial approval of the plan) including the procedures to be implemented for:	Section 5.4, Section 5.5, 6
maximising the salvage of environmental resources within the approved disturbance area for beneficial reuse;	Section 5.5.4 & 6
protecting vegetation and fauna habitat outside the approved disturbance area on-site	Section 5.4.3, Section 7.2.4
minimising the impacts on native fauna	Section 7.2.4
landscaping the site to minimise visual and lighting impacts	Section 6.4 and Section 7.2.10
reviewing improved pasture species and application rates	Section 6.6
controlling weeds and feral pests	Section 7.2.5, Section 9.4, Section 9.5
controlling erosion	Section 7.2.1 & Surface Water Management Plan.
controlling access; and	Section 7.2.11
bushfire management	Section 7.2.8
(e) include a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;	Section 8 & 9
(f) include a mass balance calculation to ensure that appropriate volumes of material are available to implement the final landform as described in this plan	Section 5.5.5
(g) provide for the construction and maintenance of the process water dam in accordance with the approved design and construction criteria (see Condition 42 [sic 44 b) of Mod 4] b));	Section 0
(h) identify the potential risks to the successful rehabilitation of the site, and include a description of the contingency measures that would be implemented to mitigate these risks	Section 7.1, Section 7.2 & Section 10
(i). include details of who would be responsible for monitoring, reviewing, and implementing the plan. The applicant shall implement the management plan as approved from time to time by the Secretary.	Section 14
Management Plan Requirements	
65. The Applicant shall ensure that the management plans required under this Consent are prepared in accordance with any relevant guidelines, and include:	-
(a) detailed baseline data;	Not applicable
(b) a description of:	-

Schedule 2 Consent Condition	Where Addressed
the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 2
any relevant limits or performance measures/criteria;	Section 8
the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	Section 8
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 5, Section 6, Section 7, Section 9, Section 10, Section 12 and Section 13
(d) a program to monitor and report on the:	-
impacts and environmental performance of the development;	Section 9 and Section 12
effectiveness of any management measures (see c above);	Section 9 and Section 12
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 10
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 13
(g) a protocol for managing and reporting any:	-
incidents;	Section 12
complaints;	Section 12
non-compliances with statutory requirements; and	Section 12
exceedances of the impact assessment criteria and/or performance criteria; and	Section 12
(h) a protocol for periodic review of the plan.	Section 13

2.1.2 Environment Protection Authority (EPA)

The EPA issued a variation dated 1/06/2023 to permit the importation of waste material i.e., VENM and ENM in accordance with the Mod 4 consent. The variation includes the following conditions regarding importation of waste.

Table 2. EPL Waste Conditions

Scheduled Activity	Fee Based Activity	Scale
Crushing, grinding or separating	Crushing, grinding or separating	> 100000 - 500000 T annual processing capacity
Extractive activities	Extractive activities	> 100000 - 500000 T annually extracted or processed
Waste disposal (application to land)	Waste disposal by application to land	Any capacity

L2 Waste

- L2.1 The licensee must not:
- (a) receive more than 320,000 tonnes of VENM and ENM (in total) at the site in any calendar year;
 - (b) import more than 3 million tonnes of VENM and ENM to the site;
 - (c) import VENM and ENM beyond 31 May 2030.
- L2.2 No other materials classified as waste under the NSW EPA's Waste Classification Guidelines 2009 (or its latest version) may be received or processed on the site, except as expressly permitted in this licence or a specific resource recovery order or exemption under the Protection of the Environment Operations (Waste) Regulation 2014.

2.2 CONSULTATION AND REVIEW

The following summarises the consultation undertaken in preparation of this report.

Table 3. Landscape and Rehabilitation Management Plan Consultation

Date	Originator	Recipient	Description	Where addressed in this Plan
20/06/2016	VGT	DPE	R0- Updated OEMP 2011 for changes in extraction sequence and additional modifications in EA 2016	-
29/06/2017	VGT	DPE	R1- As required by consent condition 60. Consultation with OEH and the Hills Shire Council undertaken to provide comment on draft report. OEH declined to comment. Council comments: - Additional information is required to be provided on Part (c), dot point 3, in regard to planting around the conservation area. <i>planting around the conservation area to further buffer this area and enhance its long-term viability as a bushland ecosystem;</i> - Additional information is required to be provided on Part (c), dot point 4, in regard to improving connectivity of existing and future vegetation. In this regard the information provided refers only to separation distances between vegetation and does not adequately address how areas will be linked, actions required to be undertaken such as additional planting, and on-going management. <i>connection of existing areas and future areas of revegetation to form a network of wildlife corridors throughout site and to adjoining lands to facilitate species recruitment through natural immigration;</i>	This Report Section 7.2.4
8/8/2017	Newport Technical	DPIE	Independent Environmental Audit found no non-compliances related to the LRMP. Consultation included EPA, DPE, DPI-Water, OEH and Hills Shire Council. Council raised the provision and maintenance of bunding and landscape screening around the site and resultant visual impact from external properties.	Section 6.3 and Section 6.4

An independent audit undertaken in 2023 triggered a review of all management plans. The Non-Compliances listed in the 2023 IEA that are relevant to this plan are given in *Table 4*.

Table 4. Changes made 2023

Change	Section
NC-05 The Landscape and Rehabilitation Plan has not been updated each 3-year period or following approval of DA 267-11-99 Mod 4. A process should be implemented to ensure that the Landscape and Rehabilitation Plan is 3 yearly as required by 60(d) and following changes to conditions of approval.	This report has been updated in 2023. Section 13
NC-06 A Conservation and Rehabilitation Bond has not been lodged with the Department.	Section 11
NC-13 • All chemical and hydrocarbon containers should be stored in a bunded area. • Waste material stored on site should be gathered and removed by the licenced contractor. • Metal parts stored in various locations on site should be sorted and stored in a single location in a neat and tidy manner. • Consider reducing the quantity of containers on site to enable storage within the existing bunded facility. Metals are to be sorted into those that are required for spare parts and repairs, and that which can be recycled or otherwise disposed of. An additional bund will be built in accordance with the relevant Australian Standard to house additional chemicals and hydrocarbons and replace the oil sock around the drums in the workshop. Stock of chemicals and oils will be run down. Empty drums and unused tyres will be picked up by a licenced contractor.	Section 7.2.9

3 Rehabilitation Objectives

The rehabilitation objectives from the consent are reproduced in the table below.

Table 5. Rehabilitation Objectives from the Consent

Feature	Objective	Where Addressed
Site (as a whole)	• Safe, stable and non-polluting. • Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land.	Section 6, Section 7, Section 8, Section 9 and Section 10
Surface Infrastructure	• Decommissioned and removed unless the Secretary agrees otherwise.	Section 6.8, Section 8,
Quarry Pit Floor	• Landscaped and revegetated using improved pasture species, native trees and understory species.	Section 4, Section 6, Section 7
Final Void	• Minimise the height and slope of batters. • Minimise the drainage catchment.	Section 4, Section 6, Section 7
Community	• Ensure public safety. • Minimise the adverse socio-economic effects of quarry closure.	Section 4, Section 7.2.11

4 Post Quarrying Land Use

4.1 CONCEPTUAL FINAL LANDFORM

From the SoEE (Umwelt 2019):

‘Two conceptual final landforms have been developed to account for possible variability of available backfill material. The two landforms are based on:

- 1,200,000 m3 available backfill material (refer to **Figure 4.2** [Figure One in this report])*
- 2,000,000 m3 available backfill material (refer to **Figure 4.3** [Figure Two in this report]).*

Both conceptual final landscapes are designed to be free draining. A final dam that drains to the Cooper Creek Catchment to the north would be retained in the vicinity of the current Processing Area Dam 1. The dam would be located at 190 m RL and therefore will be above the wet weather high groundwater level (185m RL) and the required 2 m freeboard mark. All other dams as well as any existing tracks and all infrastructure items, besides the existing Nursery in the north, would be removed and rehabilitated.

The landform reshaped with 1,200,000 m3 fill material would have slopes ranging from 6° (approximately 9.5 Horizontal: 1 Vertical (9.5H: 1V)) in the eastern sections to 11° (approximately 5H: 1V) in the western sections of the final landform over a flat floor and dam which drains to the north. The landform reshaped with 2,000,000 m3 fill material would produce slopes of approximately 6° to 8° across the whole landform over a final dam which drains to the north. Currently, the proposed final landform includes the retention of the amenity bunds to be constructed along Old Northern Road and Roberts Road. It is expected these are to be located in the 30 m buffer strip between the final landform and Old Northern Road and are expected to have established native woodland vegetation at the completion of Quarry operations. Subject to the preparation of a Quarry closure plan, these bunds could be removed and the replanted with native woodland species. The final land use of the site remains to be established, however, it would be suitable for native biodiversity conservation, the current approved rehabilitation strategy, as well as recommencement of agricultural or horticultural activities. ‘

~~The majority of the site is to be revegetated with locally occurring native species. The existing site facilities and unimproved pasture will remain in the north west of the site and the process dam is to be retained.~~

~~The final landform is to slope gently from the native trees screens along Old Northern Road and from the planted bunds along Roberts Road to the dam in the north-eastern corner.~~

~~The final landform is contingent however on discussions with DPI Water as to the agreed wet weather high groundwater level which is currently under investigation. The final landform must be 2 metres above this designated level and according to the current data this would result in an undulating floor due to the variations of the groundwater levels. It is possible that the final floor level will be much higher than originally considered in the EIS.~~

~~The impact of a variation in the final floor height may also influenced by the presence of clay lenses up to several metres thick within the extraction area as noted in the current extraction face to the south west. The combination of both the clay lenses and the wet weather high groundwater level may result in extraction in certain areas of the pit being uneconomical. This also present a difficulty on determining the mass balance of materials required for rehabilitation to the final landform as required by consent condition 60 f) and this is discussed in Section 5.5.5.~~

4.2 PROPOSED FINAL LAND USES

As the Quarry is rehabilitated in accordance with the modified final landform, the Proposed Modification is likely to provide for a beneficial impact on the final land use of the Quarry Site by leaving a landform more conducive to a continuation of agricultural and horticultural activities. Furthermore, by creating a free draining landform, the availability of water to land downstream of the Quarry Site would be improved which would generate a beneficial effect on land uses downstream.

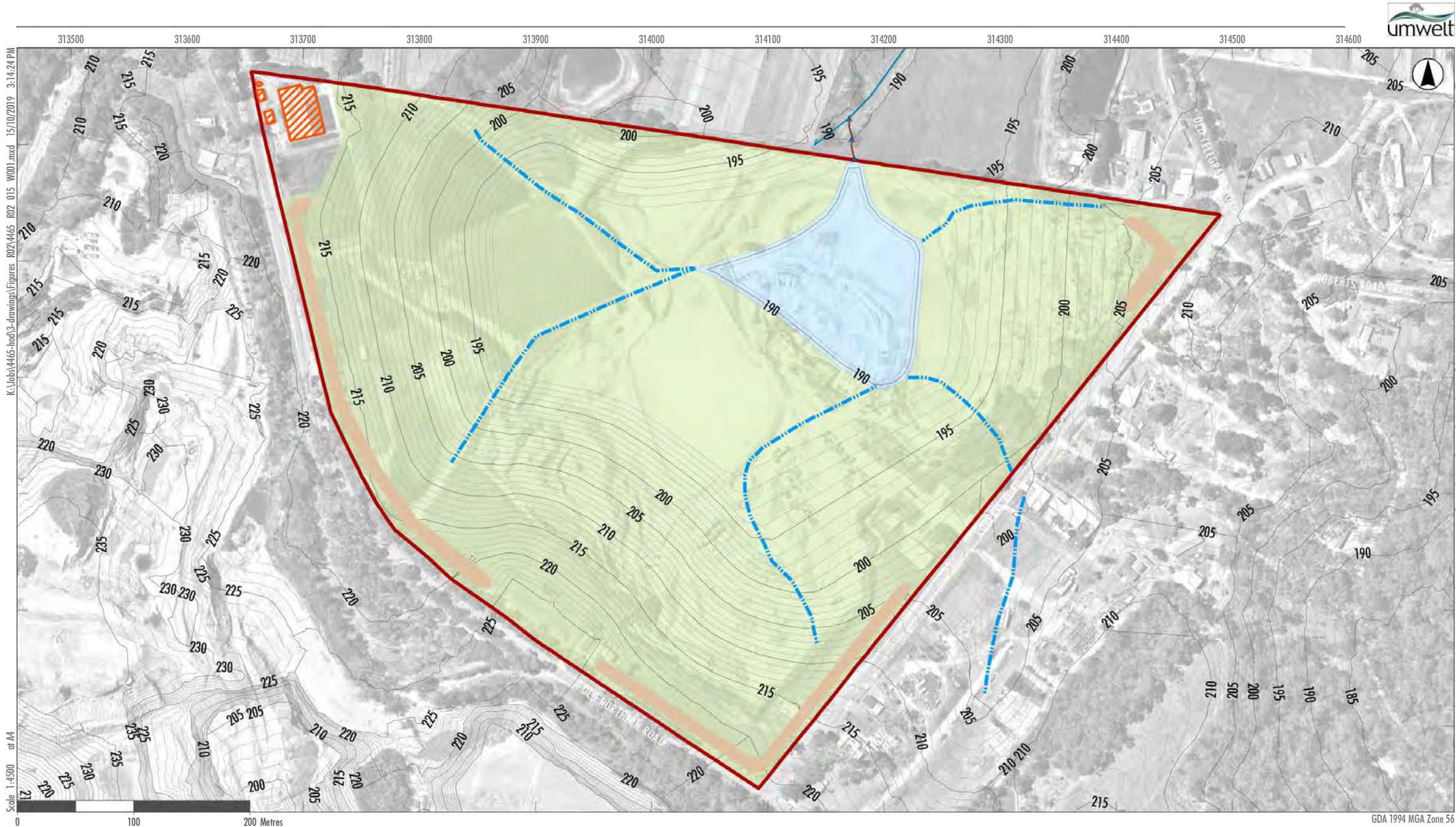
The final land use has been described in the Environmental Assessment (Nexus Environmental Planning Pty Ltd, September 2015):

- ~~• Indigenous native vegetation to the majority (70 %) of the site~~
- ~~• Unimproved pasture/existing facilities to remain (23 %)~~
- ~~• Dams (7 %).~~

Figure One. Final Landform 1,200,000 m³ Fill

Plan of:	Environmental Management Plan/Landscape & Rehabilitation Plan 2023 for the Sand Quarry, Roberts Road, Maroota - Final Landform 1,200,000m3 Fill	Location:	Maroota Quarry, Roberts Road, Maroota, NSW	Source:	Umwelt Mod 4 SoEE Figure 4.2 Proposed Final Landform - 2,000,000m3 Fill	Plan By:	TO/JD
Figure:	ONE	Council:	Hills Shire Council	Survey:	Not Applicable	Project Manager:	LT
Version/Date:	V0 26/06/2023	Tenure:	Not Applicable	Projection:	GDA2020/MGA Zone 56 EPSG:7856		
Our Ref:	12521_HMA_EMP2023_LRP_Q001_V0_F1	Client:	Hodgson Quarries & Plant Pty Ltd	Contour Interval:	Not Applicable		

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- Legend**

 - Quarry Site
 - Sediment Dam 1 Discharge Drain
 - Existing Watercourse
 - Retained Nursery Infrastructure
 - Bundwall (indicative)
 - Internal Drainage Lines (indicative)
- Final Landform / landuse**

 - Revegetated Area
 - Final Dam
- Option 1 - Final Landform**

 - Major Countours (5m)
 - Minor Countours (1m)

Image Source: Nearmap (December 2018) Data source: Umwelt (2019); NSW LPI DTDB/DCDB (2018)

FIGURE 4.2
Proposed Final Landform – 1,200,000 m3 Fill

Figure Two. Final Landform 2,000,000 m³ Fill

Plan of:	Environmental Management Plan/Landscape & Rehabilitation Plan 2023 for the Sand Quarry, Roberts Road, Maroota - Final Landform 2,000,000m3 Fill	Location:	Maroota Quarry, Roberts Road, Maroota, NSW	Source:	Umwelt Mod 4 SoEE Figure 4.3 Proposed Final Landform - 2,000,000m3 Fill	Plan By:	TO/JD
Figure:	TWO	Council:	Hills Shire Council	Survey:	Not Applicable	Project Manager:	LT
Version/Date:	V0 26/06/2023	Tenure:	Not Applicable	Projection:	GDA2020/MGA Zone 56 EPSG:7856		
Our Ref:	12521_HMA_EMP2023_LRP_Q002_V0_F2	Client:	Hodgson Quarries & Plant Pty Ltd	Contour Interval:	Not Applicable		

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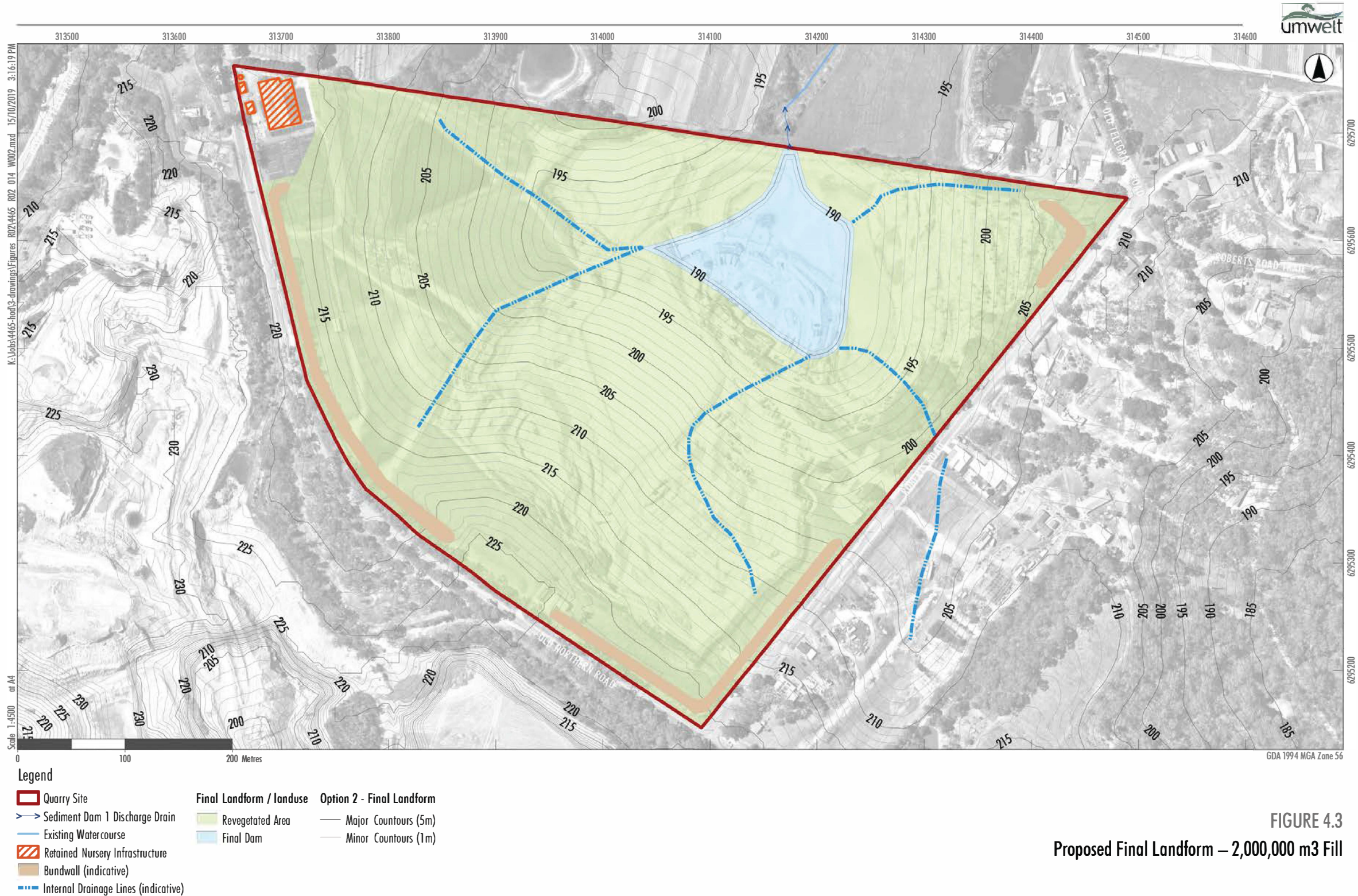


FIGURE 4.3
Proposed Final Landform – 2,000,000 m3 Fill

5 Rehabilitation Planning and Management

5.1 SITE ACCESS CONTROL

Access to the site is currently controlled using barbed wire fencing around the perimeter. The gate is located adjacent to the weighbridge and office. The landowner will retain this external fencing, and add internal fencing as required for public safety as well as protection of rehabilitated areas. Areas under active rehabilitation will be marked and locations included in the induction for staff and contractors.

5.2 DOMAIN SELECTION

The NSW Resources Regulator updated the rehabilitation cost estimate tool in July 2022. Rehabilitation risks and processes have been designed in line with the guidelines, policies and tools described on their website: <https://www.resourcesregulator.nsw.gov.au/news-articles/updated-rehabilitation-cost-estimate-tool>.

Based on the NSW Planning and Environment Resources and Energy division *ESG3: Mining Operations Plan guidelines* (NSW Trade & Investment, ESU, Sept 2013), the site has been divided into Primary Domains (Operational) as listed in *Table 6* and illustrated on *Figure Three* and Secondary Domains (Post Mining Land Use) as listed in *Table 7*. The numbering is taken from the ESG3 guidelines and not all domains listed in the guidelines apply to this site.

The application of these domains assists in the planning of the rehabilitation and provides a clear picture of the progress of the site over time. At present the site comprises of only primary domains.

5.2.1 Primary Domains

Table 6. Operational Domain Codes

Code	Primary Domains (Operational)
1	Infrastructure Area
3	Water Management Area
4	Overburden Emplacement Area
6	Void (open cut void)
9	Native Vegetation Conservation Area

5.2.1.1 Domain 1: Infrastructure

This domain includes the buildings (office, workshop, lunchroom, weighbridge, storage hard-stand, and nursery) and plant, car parks and haul roads, and stockpile areas.

5.2.1.2 Domain 3: Water Management Areas

This domain consists of the Process Dam, the drying areas and sediment dams within the active quarry, and the two dams used by the landowner.

5.2.1.3 Domain 4: Overburden Emplacement Areas

Overburden and topsoil have been previously emplaced on the perimeter of the property as visual and acoustic bunds and in stockpiles. All perimeter bund walls are vegetated with a mix of pasture and native trees. Temporary bunds are pushed up around each extraction area. The bunds should be vegetated with temporary pasture species within 10-20 days as described in the Surface Water Management Plan ^{Ref 6}.

The emplacement area in the north-east of the site has some temporary vegetation and some uncovered stone and sand.

5.2.1.4 Domain 6: Open Cut Void

This domain consists of active walls surrounding the edge of the active extraction area. All of the inner pit walls are un-vegetated.

5.2.1.5 Domain 9: Native Vegetation Conservation Areas

These are areas of remnant native vegetation that are required to remain undisturbed.

5.2.2 Secondary Domains

Table 7. Post Mining Land Use Domain Codes

Code	Secondary Domains (Post Mining)
A	Infrastructure
B	Water Management Area
C	Rehabilitation Area- Grassland
E	Rehabilitation Area- Woodland
J	Native Vegetation Conservation Area

5.2.2.1 Domain A- Infrastructure

This domain incorporates the site access road and haul roads to be retained for future property access.

5.2.2.2 Domain B Water Management Area

This domain incorporates the remaining final landform water body to be retained for future land uses.

5.2.2.3 Domain C Rehabilitation Area- Grassland

This domain incorporates areas within the mine that were formerly extraction areas and other infrastructure not to be retained at completion of extraction activities. The grassland areas will consist of native grasses and shrubs as well as some tree species and is located within the gently sloped floor of the final landform leading to the final landform water body.

5.2.2.4 Domain E Rehabilitation Area- Woodland

This domain incorporates all remaining rehabilitated areas. It is noted that the vegetation re-established within this domain will be generally comparable with the species composition of the existing community, however, vegetation structure will vary and may not specifically classify as the existing community. The woodland areas are located around the perimeter of the property and the steeper slopes in the final landform.

5.2.2.5 Domain J Native Vegetation Conservation Area

This domain consists of the remnant native vegetation that will not be disturbed.

Figure Three. Existing Site

5.3 REHABILITATION PHASES

Rehabilitation phases will be used to describe the current rehabilitation status of the site and future progress of the rehabilitation. The rehabilitation phases vary depending on the rehabilitation objectives for each domain. For the purposes of this report, Relinquished Lands, refers to a particular domain having reached the rehabilitation objectives set and the final landform has been approved by the Secretary.

Table 8. Summary of Current Rehabilitation Phases (by Domain)

Domain/ Rehabilitation Phase	Infrastructure/ Infrastructure (1A)	Infrastructure/ Grassland (1C)	Water Management/ Water Management (3B)	Water Management/ Grassland(3C)	Overburden Emplacement/ Grassland (4C)	Overburden Emplacement/ Woodland (4E)	Void/ Grassland (6C)	Void/ Woodland (6E)	Native Vegetation Area- (9J)
Active Mining Area	✓	✓	✓	✓	✓	✓	✓	✓	✓
Decommissioning	✗	✗	✗	✗	✗	✗	✗	✗	✓
Landform Establishment	✗	✗	✗	✗	✗	✗	✗	✗	✓
Growth Medium Development	✗	✗	✗	✗	✗	✗	✗	✗	✓
Ecosystem and Land Use Establishment	✗	✗	✗	✗	✗	✗	✗	✗	✓
Ecosystem and Land Use Sustainability	✗	✗	✗	✗	✗	✗	✗	✗	✗
Relinquished Lands	✗	✗	✗	✗	✗	✗	✗	✗	✗

5.4 ACTIVITIES PLANNED FOR SHORT TERM (3 YEARS)

5.4.1 Temporary Bundwall Construction

Temporary bundwalls will be created as required to prevent clean water running into the disturbed extraction and rehabilitation areas. These will be made using stripped topsoil, over burden and mid-burden, or ENM/VENM material and will be vegetated with grasses to stabilise and prevent dust impacts.

~~Extraction will initially be focused within Stages 1 and 2 in the first few years. This will require the construction of the temporary bunds as shown in **Error! Reference source not found.**~~

5.4.2 Progressive Rehabilitation

~~It is planned to extract from the areas shown on Figure Three over the next 3 years~~ eastern portion of Stage 1 to completion in the next few years. Once this area has been exhausted clay and overburden material won from the southwest extraction area, along with ENM/VENM, will be emplaced in order to create the final landform within the cell. The final contours will be graded to approximately 1H:3V and covered with 300mm of subsoil from the stockpiled subsoil. Topsoil to a depth of 100mm will be keyed in with layer of mulch up to 75mm depth placed on top prior to planting.

The backfilling of the north-eastern corner of the site will commence with VENM and ENM material. The final slopes will not be achieved in the short term and backfilling activities will continue for the life of the quarry.

~~The north-eastern portion of Stage 1 will continue to be re-worked in order for the Process Dam construction to continue and the final landform to be developed. As part of the dam construction, the area will be progressively filled with un-marketable sandstone and clay. It is envisaged that the backfilling of this area will continue for the life of the project, and it will not be ready to revegetate in the next few years.~~

5.4.3 Protection of Existing Vegetation

The focus of tree and vegetation protection is limited to the perimeter of the site, including the vegetated earth bunds, which were created as part of the initial approval of the extraction works. As extraction will not proceed beyond the bunds it is unlikely that these areas will be disturbed. Temporary fencing may be erected in target areas to prevent access if required.

The landscape plan within the EIS envisaged that native trees would be included in the plantings over the perimeter bunds. The local energy provider has removed seedlings from the perimeter bunds under power lines due to concerns with mature heights of the trees planted. It is therefore planned to vegetate these areas with shrubs rather than trees.

5.4.4 Process Dam Development

Key questions around the Process Dam have centred around whether there is any interaction between the dam water and the groundwater table, more specifically, does the base of the Process Dam intersect the groundwater level. As such previous consent conditions have required the Surface Water Management Plan (SWMP) to address design and construction criteria to prevent interaction with the groundwater should there be intersection. Studies undertaken on the depth of the Process Dam and the Groundwater Study have shown that the Process Dam is not only sealed effectively but is above the wet weather high groundwater level, therefore staged lining of the Process Dam is not required. Further details can be found in the SWMP.

~~Investigations will continue into the construction methodology of the process dam. This will include the determination of suitable on-site material for the lining and dam walls as well as the current depth and lining of the existing dam. An engineer will be engaged to assist with the design. It is anticipated that construction may commence within the next three years.~~

5.5 ACTIVITIES PLANNED FOR MEDIUM AND LONG TERM

5.5.1 Permanent Bundwall Construction

Construction of the permanent bundwalls on the perimeter of the site will commenced prior to the opening up of the current extraction area Stages 3 to 6. They were will be constructed from site material, including stockpiled subsoil material where available as per temporary bunds. Material from temporary bunding and clay may also be used.

5.5.2 Progressive Rehabilitation

Proposed landscape rehabilitation areas within the site can only occur when the active cells have been fully extracted to the site perimeter and are no longer being utilised by machinery to access further cells, or for stockpiling etc. Therefore, as soon as areas within the site have been fully extracted, these areas will be made available for rehabilitation and fenced off to allow for undisturbed regeneration. Rehabilitation treatment of these areas is described in Section 6.1 to 6.8 below.

5.5.3 Protection of Existing Vegetation

Protection of existing vegetation will continue over the life of the site as outlined in Section 5.4.3 above.

Process Dam Development

As discussed in Section 5.4.4, the development, design and management of the processing dam is ongoing and is expected to continue into the medium- and long-term life of the quarry.

5.5.4 Reuse Existing Resources

The site will seek to reuse onsite material to undertake rehabilitation works.

Table 9. Re-Use of Site Resources

Resource	Potential Reuse
Overburden	Construct the bund walls
Topsoil and sub-surface soil	Used in rehabilitation and on the bund walls No contaminated or unsuitable material is to be allowed onto the site for use in rehabilitation.
Native seed	Collected from the surrounding area or purchased from a certified supplier to be used in rehabilitation
Turf	Stripped turf to be placed on temporary bund walls
Water in dams	Provide water for irrigation of vegetation in rehabilitation areas
Rocks	To be replaced in rehabilitation areas to provide habitat for native fauna.

5.5.5 Resource Mass Balance

The availability of topsoil for the rehabilitation of the site is contingent on the stripping of new cells. Depths of topsoil vary over the site but generally the top 100mm of soil provides a topsoil material. Below this, up to 500mm in depth provides a subsoil suitable for use as a growth medium. Topsoil reserves currently held on the site are stored in the perimeter bunds that are designated to remain in the final landform and are unavailable for rehabilitation under the current consent. Subject to the preparation of a Quarry closure plan and consent modification the Mod 4 SoEE considered that these bunds could be removed and replanted with native woodland species. There are minor reserves pushed up around the extraction area as temporary visual and acoustic bunds. The approved final landform

requires that areas to be revegetated are covered by 100mm of topsoil over 300mm of subsoil material. New permanent bundwalls are to be covered with 300mm of topsoil followed by jute matting and 75mm of mulch.

~~As discussed previously, the final landform is contingent however on discussions with DPI Water as to the agreed wet weather high groundwater level which is currently under investigation and the presence of clay lenses (waste) that may reduce the viability of economic extraction. The exposure of unexpected clay lenses, on the other hand may provide additional material for rehabilitation efforts that is difficult to quantify. Once agreement on the limit of extraction is reached, a mass balance for the volume of overburden required to reach the final landform will be undertaken.~~

The total rehabilitation area to be topsoiled according to the current approved landform is [approximately](#) 207,000m². The following table summarises the estimated volumes of material required, ~~and the estimated resource stockpiled or available on the site.~~ It excludes the permanent bunds from the calculation and excludes any material currently pushed up around the current extraction area.

Table 10. Soil Mass Balance

Material	Remaining Area to be stripped (m ²)	Stripping Depth (m)	Volume estimated to be won (m ³)	Volume required for Final Landform* (m ³)
Topsoil	53,638	0.1	5,364	20,685
Subsoil	53,638	0.5	26,819	62,054

*Note these figures may vary from the EA due to groundwater constraints.

From the above calculation it appears there may be a shortfall in the volume of topsoil and subsoil available. Waste clay material recovered as a by-product of the extraction may be stockpiled for future use a sub-soil material to make up the shortfall. Importation of topsoil material may be required if subsoils and waste clay material prove to be unsuitable as a substitute with amelioration measures.

The Mod 4 development considered 2 final landform options whereby VENM and ENM would be imported onto the site to backfill the voids. As discussed in [Section 4.1](#), the backfilled final landform options provide for a free draining landform that is above the wet weather high groundwater level and the required freeboard mark. The volume of material anticipated to be imported to the site will be of the order of 1,200,000m³ to 2,000,000m³. Some of this material may be suitable for use as topsoil, and will be segregated as such on importation.

5.5.6 Final Landform

The final landform will be achieved in the long term after the resource extraction has been exhausted from the site. This will occur in approximately ~~7~~ [9-4](#) years if current rates of extraction are maintained. Rehabilitation may take several years to complete after that time and full maturation of the vegetation and establishment of the ecosystem may take some decades after that.

5.5.7 Quarry Closure Plan

Once extraction operations have been completed a Quarry Closure Plan will be developed. This plan will include, as a minimum:

- Details of the final landform;
- Details of the final land use; and
- Progress towards achieving the sites rehabilitation objectives and closure criteria.

5.5.8 Minimising Socio-economic Effects of Closure

The quarry employees 5 employees, including the owner. Closure may result in the job losses of up to 4 individuals. According to the ABS in 2021 Maroota, NSW has a population of 616 people. If all employees live locally, this would

be an effect on 0.6% of the town. Some potential strategies to minimise the socio-economic effects of quarry closure will include:

5.5.8.1 Stakeholder Engagement

The operator will actively engage with relevant stakeholders, including local communities and sub-contractors, to understand their concerns and gather input. Potential impacts will be identified and mitigation measures will be developed accordingly.

5.5.8.2 Job Transition and Training Programs

Quarry closure could result in 4 job losses. There are several other quarries in the Maroota local area that could provide employment for displaced workers. To minimise the socio-economic impact, the operator will discuss with employees the need for a job transition program, to provide training and reemployment assistance to affected workers. This may include offering vocational training, job placement services, or support for entrepreneurship and small business development.

5.5.8.3 Environmental Rehabilitation and Land Reclamation

After quarry closure, the operator will prioritise environmental rehabilitation and land reclamation efforts, as required by the consent conditions. This will involve restoring the affected land to its natural state, implementing measures for soil erosion control, and promoting biodiversity conservation. Such efforts can potentially create new job opportunities in ecological restoration or eco-tourism.

5.5.8.4 Financial Assistance and Compensation

Providing financial assistance or compensation to affected individuals can help mitigate the short-term economic impact. This could involve offering severance packages to applicable workers.

5.5.8.5 Monitoring and Evaluation

Regular monitoring and evaluation of the closure process and its socio-economic impacts will be undertaken to determine the effectiveness of implemented measures discovered as part of the stakeholder engagement process, identify any emerging issues, and make necessary adjustments to the strategies. This will be reported in the Quarry Closure Plan.

6 Rehabilitation Implementation

Section 6 is reproduced from Section 4.5 in the *Rehabilitation Report* in the EA (Nexus Environmental Planning Pty Ltd, September 2015) which is [conceptually consistent with the Mod 4 consent](#).

6.1 TOPSOIL STRIPPING AND STORAGE

Areas of the site approved for extraction works shall have the topsoil level stripped and stockpiled for later re-use. Following the topsoil stripping, approximately 500mm of the next layer of soil, the sub-soil, shall also be stripped and stockpiled in a similar manner to the topsoil. The purpose stripping this additional layer of soil is for re-use on temporary and permanent bunding and to replicate the soil profile in rehabilitated areas as close to the existing growing conditions of the vegetation community to be re-established.

It is proposed to stockpile the topsoil and subsoil in a convenient location which is both out the way of daily activity, however, easily accessed for re-use in the creation of bunds and for preparation of rehabilitation areas as necessary. The location of stockpiled material may change depending on the nature of the extraction works on site and the re-use of the stockpiled material will occur in line with extraction operations and timing schedules outlined in the EA.

A logbook will be maintained to record the volumes of material stripped, storage location and re-use volumes and locations.

6.2 SEED COLLECTION / CERTIFIED STOCK

It is unlikely that seed collection will be undertaken on the site due to the lack of suitable plants on the site. Plant material will be sourced from a local supplier, who is able to certify seed or plant stock has been locally sourced and grown.

Figure Four. Final Landscape and Rehabilitation Plan

Plan of:	Environmental Management Plan/Landscape & Rehabilitation Plan 2023 for the Sand Quarry, Roberts Road, Maroota - Final Rehabilitation Plan (EA Plan LPDA 15-94/4)	Location:	Maroota Quarry, Roberts Road, Maroota, NSW	Source:	Concept Landscape Architects/Nexus Environmental Planning Pty Ltd Proposed Rehabilitation of Existing Sand Mine/Final Rehabilitation Details/Section 75W Modification 2 Dwg No:LPDA 15-94/4 Rev D 7/09/2015	Plan By:	TO/JD
Figure:	FOUR	Council:	Hills Shire Council	Survey:	Not Applicable	Project Manager:	LT
Version/Date:	V0 26/06/2023	Tenure:	Not Applicable	Projection:	GDA2020/MGA Zone 56 EPSG:7856		
Our Ref:	12521_HMA_EMP2023_LRP_Q004_V0_F4	Client:	Hodgson Quarries & Plant Pty Ltd	Contour Interval:	Not Applicable		

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LEGEND

- FINAL DAM LOCATION AND EXTENTS - REFER ENGINEER'S PLANS
- EXISTING VEGETATION TO BE RETAINED AND PROTECTED
- STAGES 3, 4, 5 AND 6 BUND WALLS TO BE STABILISED WITH JUTE MATTING AND POCKET PLANTING - REFER DETAILS 4, 5 AND 6
- STAGES 3, 4, 5 AND 6 BUND WALLS TO BE REMOVED WHERE WITHIN FINAL EXCAVATION EXTENTS
- EXISTING VEGETATED BUND WALLS TO BE RETAINED
- EXISTING VEGETATED BUND WALLS TO BE REMOVED WHERE WITHIN FINAL EXCAVATION EXTENTS
- BOTTOM OF PIT TO BE HYDRO-MULCHED WITH NATIVE SEED MIX - REFER DETAIL 10
- 1V:3H GRADE EMBANKMENTS MASS PLANTED WITH ENDEMIC SPECIES - REFER DETAILS 07 AND 08
- EMBANKMENTS WITH FINAL SLOPES STEEPER THAN 1V:3H TO BE STABILISED WITH JUTE MATTING AND POCKET PLANTED WITH ENDEMIC SPECIES - REFER DETAILS 07 AND 11
- ENDEMIC SCREEN PLANTING WITHIN PERIMETER BUFFER SETBACKS - REFER DETAILS 07 AND 08
- STAGE 5B EXTRACTION ZONE TO BE USED FOR THE STOCKPIILING OF SITE TOPSOIL AND SUBSOIL, AND USED FOR FINAL REHABILITATION PLANTING PREPARATION WORKS - REFER DETAILS

THE FOLLOWING SHALL BE UNDERTAKEN TO ENSURE AVAILABLE MATERIAL FOR THE PLANTING PREPARATION OF THE FINAL REHABILITATED SITE:

- 300MM DEPTH TOPSOIL TO BE EXCAVATED AND STOCKPILED (WITHIN STAGE 5 EXCAVATION ZONE)
- SUBSOIL TO BE TO BE EXCAVATED AND STOCKPILED (WITHIN STAGE 5 EXCAVATION ZONE)

THIS MATERIAL SHALL BE EXCAVATED AND STOCKPILED PRIOR TO COMMENCEMENT OF THE EXTRACTION WORKS FOR EACH STAGE, AND SHALL BE STORED SEPARATELY TO STOCKPILED MATERIAL FOR BUND WALL CONSTRUCTION.

STOCKPILED MATERIAL SHALL BE USED PROGRESSIVELY AS AREAS OF THE SITE ARE EXCAVATED AND FINISHED IN THEIR FINAL FORM AND READY FOR REHABILITATION PLANTING WORKS.

STOCKPILES MUST BE CLEARLY LABELLED AND IDENTIFIABLE TO ENSURE CORRECT FUTURE USE. APPROPRIATE SEDIMENT AND EROSION CONTROL MEASURES SHALL BE UNDERTAKEN TO ENSURE NO MIXING, LEACHING, RUN-OFF OR CONTAMINATION OF STOCKPILES.

CONSULTANTS INFORMATION

- REFER TO PLANS, DETAILS, SPECIFICATION AND REPORTS PREPARED BY OTHER CONSULTANTS FOR ALL INFORMATION RELATING TO THAT PRACTICE, INCLUDING:
- NEXUS ENVIRONMENTAL PLANNING: PROJECT MANAGEMENT AND PLANNING
 - LYLE MARSHALL & ASSOCIATES: TRAFFIC AND ACCESS
 - AUSTRALIAN GROUNDWATER TECHNOLOGIES: GROUNDWATER MONITORING & MANAGEMENT
 - PETER DUNDON & ASSOCIATES: GROUNDWATER
 - VGT ENVIRONMENTAL COMPLIANCE SOLUTIONS: SITE LAYOUT AND EXTRACTION PLANS, MODIFIED DAM DESIGN, MODIFIED RESOURCE VOLUMES
 - WILKINSON MURRAY: ACOUSTIC IMPACT ASSESSMENT, AIR QUALITY ASSESSMENT



CANOPY TREE: ANGOPHORA COSTATA



CANOPY TREE: A. FLORIBUNDA



SMALL TREE: ACACIA PARRAMATTENSIS



SMALL TREE: ALLOCASUARINA LITTORALIS



NATIVE GRASS: LOMANDRA LONGIFOLIA



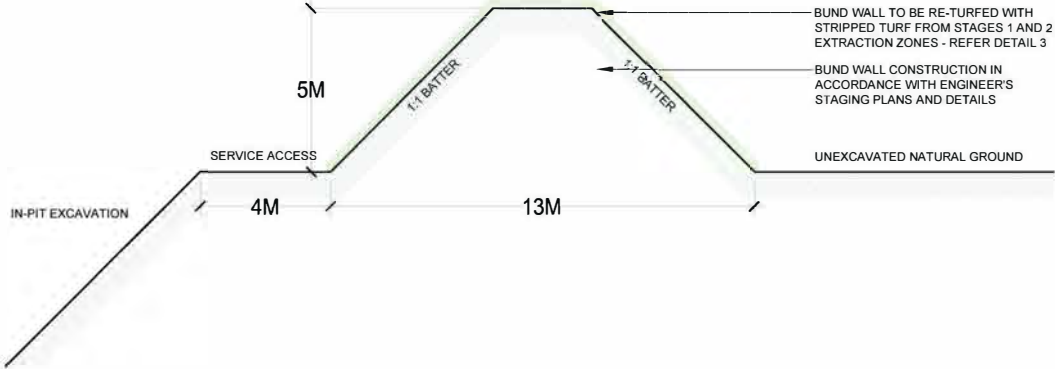
GROUNDCOVER: HARDENBERGIA

Figure Five. Bundwall Detail

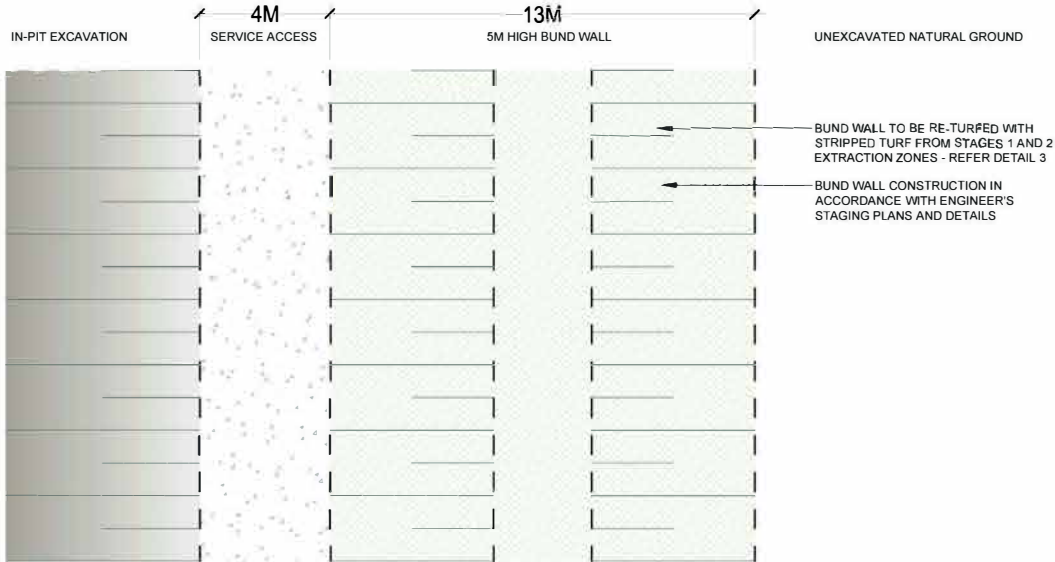
Plan of:	Environmental Management Plan/Landscape & Rehabilitation Plan 2023 for the Sand Quarry, Roberts Road, Maroota - Bund Rehabilitation Plan (EA Plan LPDA 15-94/3)	Location:	Maroota Quarry, Roberts Road, Maroota, NSW	Source:	Concept Landscape Architects/Nexus Environmental Planning Pty Ltd Proposed Rehabilitation of Existing Sand Mine/Final Rehabilitation Details/Section 75W Modification 2 Dwg No:LPDA 15-94/3 Rev D 7/09/2015	Plan By:	TO/JD
Figure:	FIVE	Council:	Hills Shire Council	Survey:	Not Applicable	Project Manager:	LT
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Our Ref:	12521_HMA_EMP2023_LRP_Q006_V0_F6	Client:	Hodgson Quarries & Plant Pty Ltd	Contour Interval:	Not Applicable		



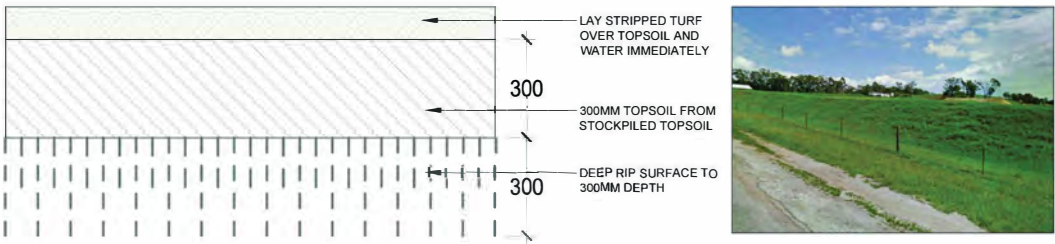
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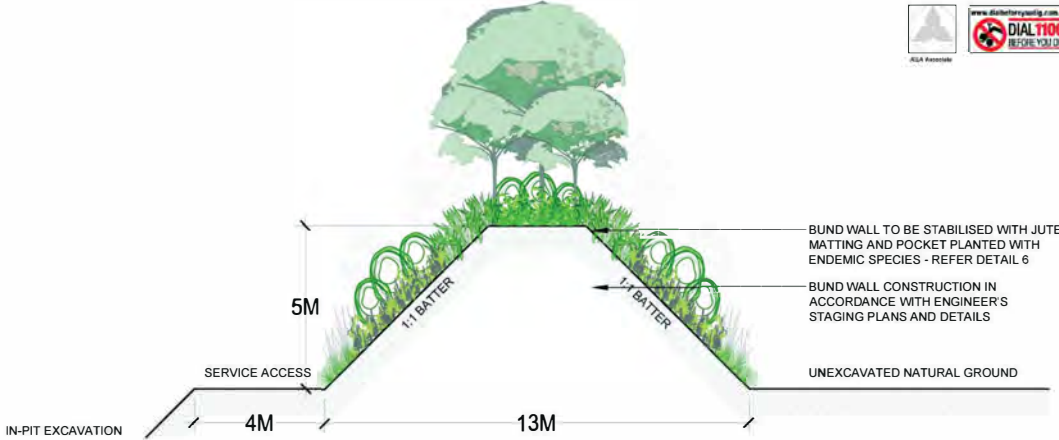
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SCALE 1:100



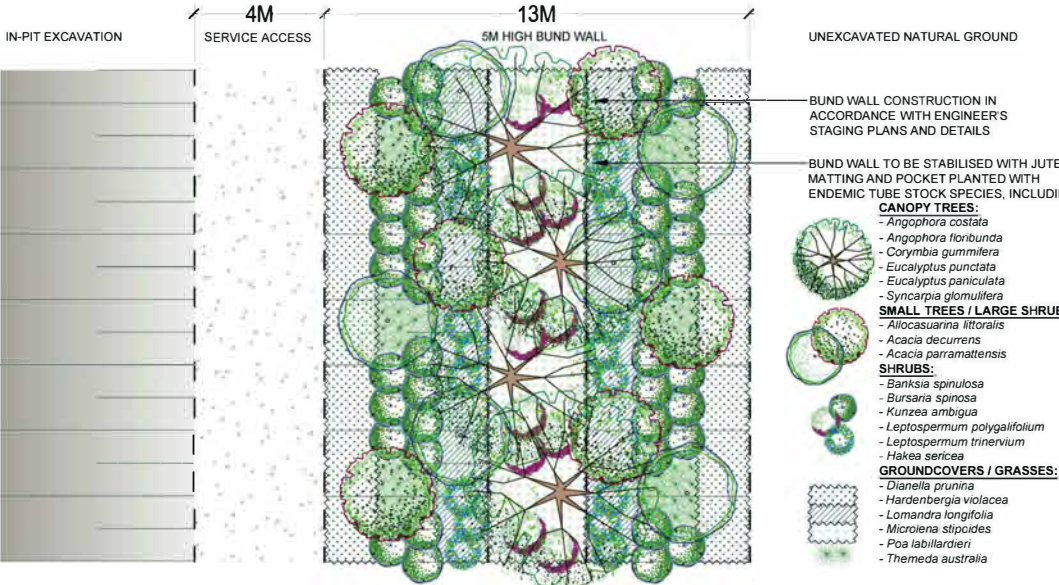
DETAIL 02: TEMPORARY BUND WALL PLAN
SCALE 1:100



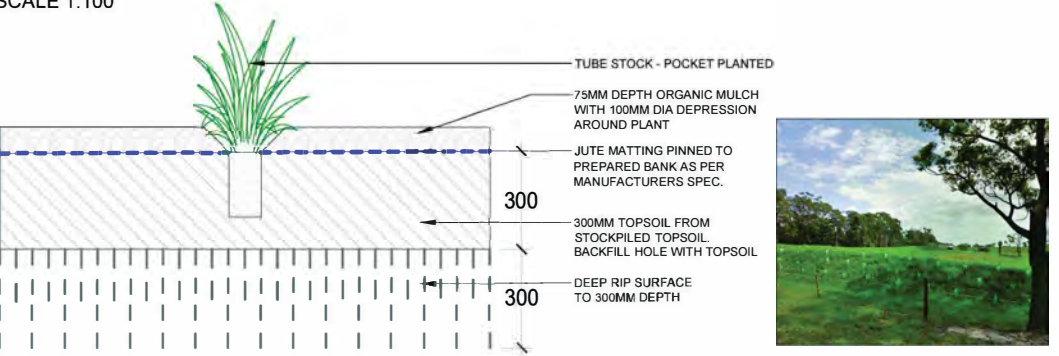
DETAIL 03: TEMPORARY BUND WALL TURFING
SCALE 1:10



DETAIL 04: PERMANENT BUND WALL SECTION
SCALE 1:100



DETAIL 05: PERMANENT BUND WALL PLAN
SCALE 1:100



DETAIL 06: PERMANENT BUND WALL TUBE STOCK PLANTING
SCALE 1:10

MAINTENANCE SCHEDULE

GENERAL
AFTER THE COMPLETION OF THE SPECIFIED REHABILITATION WORKS, VEGETATED AREAS SHALL BE SUBJECT TO A MINIMUM LANDSCAPE WORKS PERIOD OF 12 MONTHS. DURING THIS TIME THE LANDSCAPE CONTRACTOR SHALL MAKE GOOD ALL DEFECTS WHICH MAY OCCUR FOR WHATEVER REASON.

CONSOLIDATION AND MAINTENANCE SHALL MEAN THE CARE AND MAINTENANCE OF ALL AREAS UNDERGOING REHABILITATION IN ACCORDANCE WITH THIS REPORT AND ASSOCIATED PLANS, ENSURING THAT A SATISFACTORY RESULT OCCURS FOR THESE AREAS WITH REGARDS TO GERMINATION AND ESTABLISHMENT.

THE MAINTENANCE SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING ITEMS WHERE AND AS REQUIRED:

- WATERING ALL LANDSCAPED AREAS
- MONITORING GERMINATION, REPLACEMENT PLANTING AND RE-HYDROMULCHING
- WEED CONTROL
- MAKE GOOD AREAS OF SOIL SUBSIDENCE OR EROSION
- TOPPING UP OF MULCHED AREAS
- SPRAY / TREATMENT FOR INSECT AND DISEASE CONTROL
- MONITORING AND CONTROLLING RABBITS

WATERING
ALL AREAS WHICH HAVE BEEN HYDROMULCHED OR POCKET PLANTED SHALL BE WATERED IN THOROUGHLY FOLLOWING INITIAL WORKS, & SHALL BE WATERED A MINIMUM 3 TIMES PER WEEK DURING WINTER, AND 4 TIMES PER WEEK DURING SUMMER. WATERING SHALL BE DONE BY HAND, UTILIZING DAM WATER ON SITE. FREQUENCY OF WATERING MAY BE ADJUSTED BASED ON WHETHER CONDITIONS, WITH THE OBJECTIVE TO ENSURE THE MAXIMUM PERCENTAGE OF SUCCESSFUL ESTABLISHED PLANT STOCK.

MONITORING GERMINATION, REPLACEMENT PLANTING AND RE-HYDROMULCHING
AREAS UNDERGOING REHABILITATION SHALL BE CONTINUALLY MONITORED UNTIL WELL ESTABLISHED, WITH FAILURES BEING REPLACED IN LINE WITH THE REPORT AND LANDSCAPE SPECIFICATION, AND FAILED HYDROMULCHING RE-SPRAYED.

ALL REPLACEMENTS SHALL BE TO SPECIFICATION, AND OF A SIZE EQUIVALENT TO SIMILAR HEALTHY SPECIES SURROUNDING THE REJECTED PLANT, OR, AS IN THE CASE OF MATURE TREES, TO THE ORIGINAL SIZE AND QUALITY, AS A MINIMUM.

WEED CONTROL
WEED REMOVAL SHALL BE CONDUCTED REGULARLY, WITH HAND REMOVE ALL TOP GROWTH ROOTS, RHIZOMES AND STOLONS OF UNWANTED VEGETATION. THE REGULAR CONTROL OF ALL WEEDS IS ESSENTIAL. THE APPLICATIONS OF PRE-EMERGENT SPRAYS ARE ACCEPTABLE WITH APPROVED CHEMICALS APPLIED IN STRICT ACCORDANCE WITH MANUFACTURER DIRECTIONS. ANY SPRAYING SHALL BE DONE DURING CALM DAYS, TO AVOID WINDS BLOWING HERBICIDES ONTO NATIVE PLANTING.

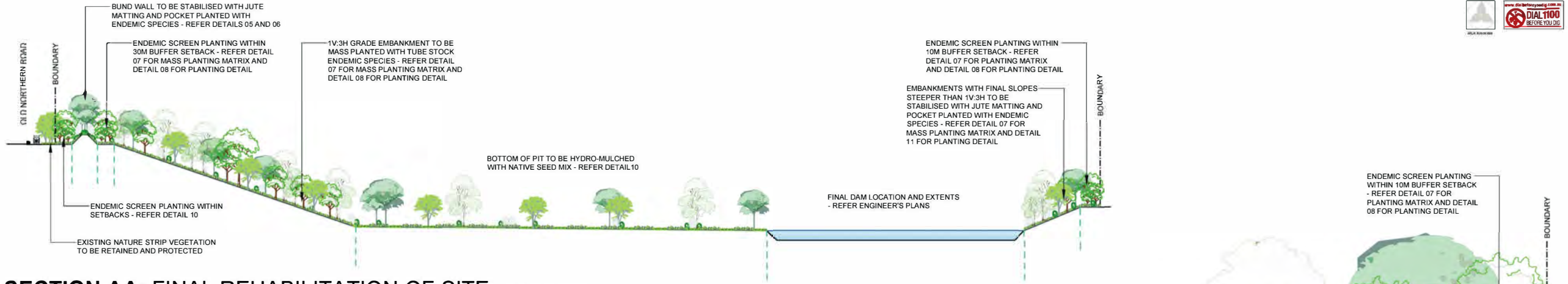
INSECT, DISEASE CONTROL AND RABBIT CONTROL
THE LANDSCAPE CONTRACTOR SHALL BECOME FAMILIAR WITH THE HEALTHY APPEARANCE OF THE PLANT MATERIAL AND CONSTANTLY MONITOR IT FOR DAMAGE OR PEST INFESTATIONS. WHEN EITHER OF THESE BECOME EVIDENT THE CONTRACTOR SHALL IMMEDIATELY APPLY THE NECESSARY CONTROL MEASURES.

IF NEWLY PLANTED AREAS ARE BECOMING SUBJECT TO RABBIT ATTACK, IT MAY BE NECESSARY TO INSTALL APPROVED RABBIT-PROOF FENCING TO THE AREA OF REHABILITATION, TO ENSURE MINIMAL DAMAGE IS DONE.

Figure Six. Planting Detail

Plan of:	Environmental Management Plan/Landscape & Rehabilitation Plan 2023 for the Sand Quarry, Roberts Road, Maroota - Final Rehabilitation Details (EA Plan LPDA 15-94/5)	Location:	Maroota Quarry, Roberts Road, Maroota, NSW	Source:	Concept Landscape Architects/Nexus Environmental Planning Pty Ltd Proposed Rehabilitation of Existing Sand Mine/Final Rehabilitation Details/Section 75W Modification 2 Dwg No:LPDA 15-94/5 Rev D 7/09/2015	Plan By:	TO/JD
Figure:	SIX	Council:	Hills Shire Council	Survey:	Not Applicable	Project Manager:	LT
Version/Date:	V0 26/06/2023	Tenure:	Not Applicable	Projection:	GDA2020/MGA Zone 56 EPSG:7856		
Our Ref:	12521_HMA_EMP2023_LRP_Q007_V0_F7	Client:	Hodgson Quarries & Plant Pty Ltd	Contour Interval:	Not Applicable		

This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.

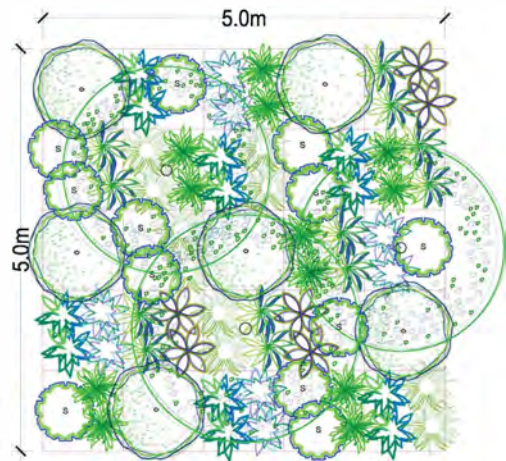


SECTION AA: FINAL REHABILITATION OF SITE SCALE 1:1000

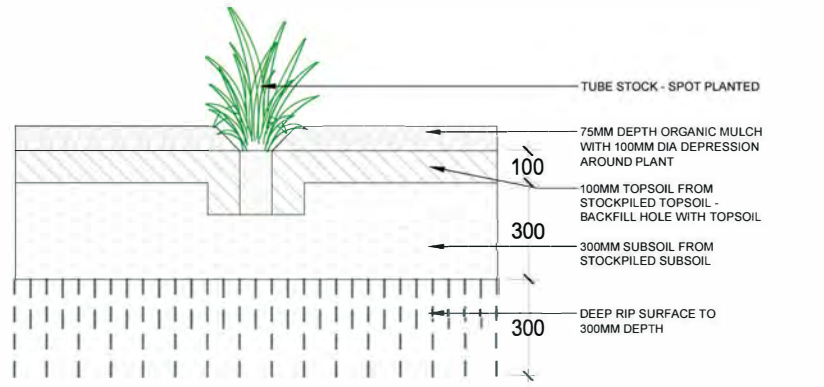
LEGEND & SCHEDULE

Planting shall be modified to suit embankment, existing trees and natural elements and where planting areas are smaller than the 5m grid. Refer to the Final Rehabilitation Plan for required planting areas.

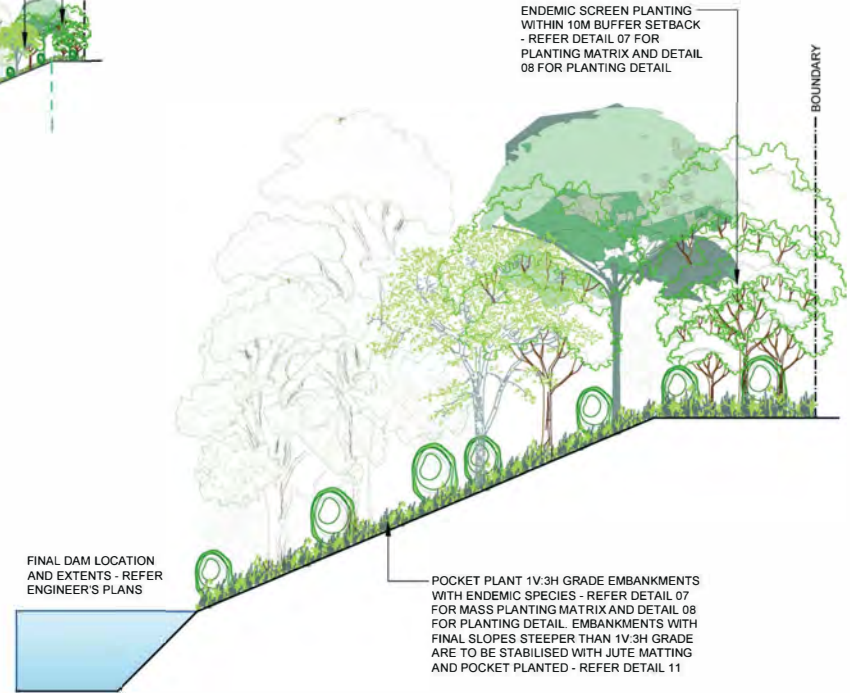
- TREES**
Angophora costata, *Angophora floribunda*, *Corymbia gumifera*, *Eucalyptus punctata*, *Eucalyptus paniculata*, *Syncarpia glomulifera*
 Pot size: tube stock
 Planting Density: 3 per 5m grid (alternate species each 5m grid)
- SHRUBS**
Banksia spinulosa, *Bursaria spinosa*, *Kunzea ambigua*, *Leptospermum polygalifolium*, *Leptospermum trinervium* & *Hakea sericea*
 Pot size: tube stock
 Planting Density: 12 per 5m grid (2 of each species per 5m grid)
- SMALL TREES / LARGE SHRUBS**
Allocasuarina littoralis, *Acacia decurrens* & *Acacia parramattensis*
 Pot size: tube stock
 Planting Density: 6 per 5m grid (2 of each species per 5m grid)
- GRASSES & GROUNDCOVERS**
Dianella pruriens, *Hardenbergia violacea*, *Lomandra longifolia*, *Microseris stipoides*, *Poa labillardieri* & *Themeda australis*
 Pot size: tube stock
 Planting Density: 60 per 5m grid (10 of each species per 5m grid)



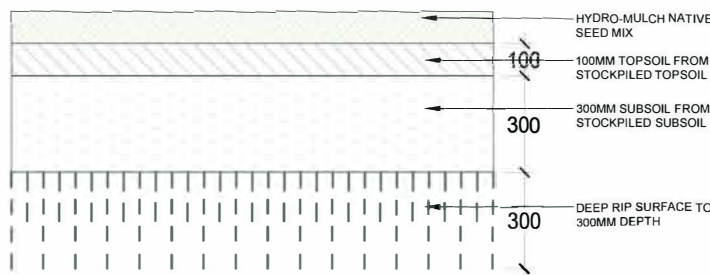
DETAIL 07: TUBE STOCK MASS PLANTING SCALE 1:40



DETAIL 08: PLANTING FOR BUFFER SETBACKS AND EMBANKMENTS WITH 1V:3H GRADE SCALE 1:10



DETAIL 09: TYPICAL BUFFER SCREEN PLANTING AND EMBANKMENT TREATMENT SCALE 1:200



DETAIL 10: HYDRO-MULCH TREATMENT SCALE 1:10

HYDRO-MULCHING SPECIFICATION:

Site Preparation

Areas to be seeded shall be ripped (up to 300mm deep) using a suitable machine or a chain designed for this purpose. The area should be free of weed growth, large stones or other debris prior to applying subsoil and topsoil as detailed.

Hydromulching

The application of Hydromulching Native seed shall commence immediately after topsoil has been placed on the surface prepared.

Application Rates

The required areas shall be treated by the Contractor will the following:
 a. Native Seed 15 kgs per Hectare
 b. Cover Crop Seed 35 kgs per Hectare
 c. Fertiliser 200kg - 500 kg per hectare. Selection will depend on soil analysis results and client requirements.
 d. Wood Fibre Mulch (Dyed green) 2 tonnes - 2.5 tonnes per hectare.
 e. Binder Emulstick at 40- 60kg per hectare or Polymer binder maximum 250 litres per hectare. Note: The seed and fertiliser rates are a representative sample only of the quantities that should be applied per hectare.

Grass Seed Mix

A qualified ecologist shall be engaged to collect native seed from the area to be used as part of the hydromulch mix. Where appropriate quantities of seed

are unable to be collected onsite, the required native seed shall be purchased from an endemic seed collector and shall include the following species, typical of the 'Sandstone - Shale Transition Forest':
Trees:
Allocasuarina littoralis, *Angophora costata*, *Angophora floribunda*, *Eucalyptus acmenoides*, *Eucalyptus notabilis* and *Syncarpia glomulifera*
Shrubs:
Acacia longifolia, *Acacia parramattensis*, *Banksia spinulosa*, *Bursaria spinosa*, *Kunzea ambigua*, *Leptospermum polygalifolium*, *Leptospermum trinervium* and *Hakea sericea*
Grasses and Groundcovers:
Dianella pruriens, *Hardenbergia violacea*, *Lomandra longifolia*, *Microseris stipoides*, *Poa labillardieri* and *Themeda australis*

The grass seed component of the hydromulch mix shall, depending on the season, be made up of the following grasses:

Autumn / Winter Mix:	
- Oats	15Kg/ha
- Rye Grass	10Kg/ha
- White Clover	5Kg/ha
- Red Clover	5Kg/ha
Summer / Spring Mix:	
- Japanese Millet	20Kg/ha
- Dobson Ryegrass	9Kg/ha
- White Clover	3Kg/ha
- Red Clover	3Kg/ha

Grass seed mixes for areas where a permanent grass

cover is required shall also contain:
 - Rhodes Grass 5Kg/ha
 - Hulled Couch 5Kg/ha

Operation

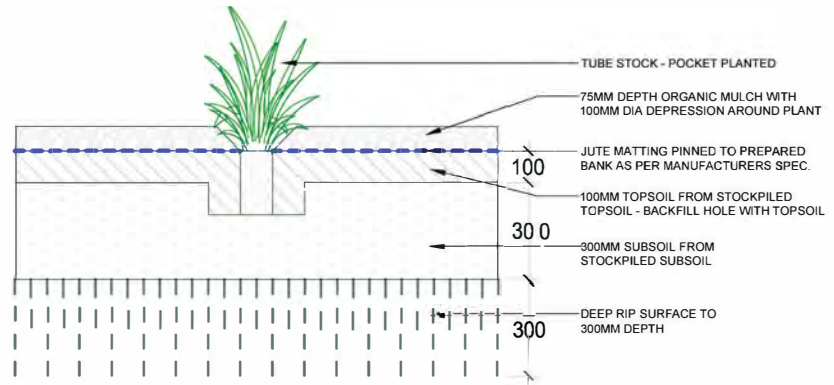
Seed, fertiliser, wood fibre mulch, water and binder shall be thoroughly mixed together with water to provide a slurry and then applied under pressure onto the area to be treated by means of hydromulching equipment specifically designed for this purpose and by operators trained in the use of this equipment.

After Care Maintenance

Watering of the seeded area shall be carried out immediately and the wood-fibre should be kept moist until a satisfactory germination occurs. After this, sufficient watering must be kept up until the native plants have reached a stage where they can survive in their own right.

Note:

- The seeds of many Australian Native Species have a hard outer covering that must be removed or softened before germination can take place. Nature relies on bush fires to assist germination of some species by splitting the outer coating with heat. The hard seeds (eg Acacia) shall be immersed in boiled water and left to soak for up to 24 hours before planting.
- In this operation the germination of Australia Native Species is not reliable and therefore can take up to 3 to 12 months before a result is achieved.
- Surfaces that fail to germinate shall be reseeded.



DETAIL 11: PLANTING FOR EMBANKMENTS STEEPER THAN 1V:3H GRADE SCALE 1:10

6.3 TEMPORARY BUNDING

The construction of the temporary bundwalls shall be constructed as follows:

- Turf is to be stripped using a turf cutter and stored in an appropriate location.
- 300mm depth of topsoil will be excavated and stockpiled (outside of extraction areas)
- Subsoil is to be excavated and stockpiled (outside of extraction areas).
- Stockpiles will be clearly labelled and identifiable to ensure correct future use.
- Appropriate sediment and erosion controls shall be undertaken to ensure no mixing, leaching, run-off or contamination of stockpiles.
- Temporary bundwalls are to be constructed in accordance with the engineer's staging plans and directions as listed i.e. 5 metres high with 1H:1V walls.
- Temporary bundwalls will be re-turfed with stripped turf from stages 1 and 2 extraction zones.

6.4 PERMANENT BUNDING AND SCREEN PLANTING

Permanent bundwalls are to be constructed within a 30m setback to Old Northern Road and Roberts Road. A service access area of 4m will be retained between the pit excavation and the toe of the bundwalls. The bundwall will extend a further 13m (toe to toe) towards the boundary as shown in Detail 4 & 5 of the EA ([Nexus 2015](#)) plans shown in *Figure Five*. These walls are to be mass planted with native tube stock, according to the Rehabilitation Plan in the EA ([Nexus 2015](#)).

Boundary plantings under powerlines are to be in accordance with energy provider requirements, i.e., grasses and groundcovers only. Existing perimeter vegetation is to remain as undisturbed as possible. Access is only to be permitted for rehabilitation and monitoring activities as required by the consent.

There is expected to be minimal adverse stray light impacts due to the presence of the bunds as well as the screen planting. The site does not operate overnight, and lighting of the processing area is not required.

The construction will proceed as shown in the EIS Landscaping Plan ([Nexus 2015](#)) as outlined below.

- 300mm depth of topsoil will be excavated and stockpiled (outside of extraction areas)
- Subsoil is to be excavated and stockpiled (outside of extraction areas).
- Stockpiles will be clearly labelled and identifiable to ensure correct future use.
- Appropriate sediment and erosion controls shall be undertaken to ensure no mixing, leaching, run-off, or contamination of stockpiles.
- Permanent bundwalls are to be constructed in accordance with the engineer's staging plans and directions as listed i.e., 5 metres high with 1H:1V walls.
- The surface of the bunds will be deep ripped to 300mm and topsoil to a depth of 300mm be keyed in.
- The bundwalls will be stabilised with Jute Matting and 75mm of organic mulch laid on top with pocket planting of endemic tube stock species.
- Species to be planted under the power lines will have a mature height that will not interfere with the overhead infrastructure i.e., Shrub and grass species.
- Planting density will be as shown in *Figure Six*.

In areas where the permanent perimeter bund walls will not be constructed, buffer visual screening will be achieved through planting in a manner as close as practicable to that described in the EA. Endemic species will be planted within the 10m setback from the boundary as described in *Section 6.6.2* below for Pocket Planting. In summary tubestock will mass planted with density as described in *Table 13*. Slopes greater than 3H:1V will be stabilised with jute matting.

Soil preparation will proceed as follows:

- The surface of the buffer areas will be deep ripped to 300mm and topsoil to a depth of 300mm be keyed in.
- The buffer areas will be stabilised with Jute Matting if slopes are greater than 3H:1V and 75mm of organic mulch laid on top with pocket planting of endemic tube stock species. Jute matting is not required for slopes less than 3H:1V.
- Planting density will be as shown in *Figure Six*.

6.5 VENM AND ENM IMPORTATION PROTOCOL

The importation of Virgin Excavated Natural Material (VENM) and Excavated Natural Material (ENM) will be undertaken to backfill the extraction area and create a final landform which better integrates with the surrounding landforms. From the Consent:

LIMITS ON APPROVAL

9A. *The applicant must not:*

(b) receive more than 320,000 tonnes of VENM and ENM (in total) at the site in any calendar year;

(c) import more than 3 million tonnes of VENM and ENM to the site; and

(d) import VENM and ENM beyond 31 May 2030.

IMPORTATION OF VENM AND ENM

26. *The applicant must:*

a) ensure only verified VENM and ENM is received at the site

b) collect data on the VENM and ENM received including detail of the origin, date and quantity received; and

c) include a copy this data in the Annual Review.

WASTE

27. *No other materials classified as waste under the EPA's Waste Classification Guidelines 2009 (or its latest version) may be received or processed on the site, except as expressly permitted in an applicable EPL, specific resource recovery order or exemption under the Protection of the Environment Operations (Waste) Regulation 2014.*

6.5.1 Classification

Only material that has been verified as ENM or VENM in accordance with the definition below will be accepted on the site:

'The material to be used for filling will consist of material classified as VENM or ENM. The Protection of the Environment Operations Act 1997 (POEO Act) defines VENM as:

'virgin excavated natural material means natural material (such as clay, gravel, sand, soil or rock fines):

(a) that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities, and

(b) that does not contain any sulfidic ores or soils or any other waste,

and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice.'

The Excavated Natural Material Exemption 2014 (ENM Exemption) under Part 9, Clause 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 (POEO (Waste) Reg.) defines ENM as:

'Excavated natural material is naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

- a) been excavated from the ground, and
- b) contains at least 98% (by weight) natural material, and
- c) does not meet the definition of Virgin Excavated Natural Material in the Act.

Excavated natural material does not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores.'

No other materials classified as waste under the EPA's Waste Classification Guidelines 2009 (or its latest version) will be received or processed on the site, except as expressly permitted in the EPL, specific resource recovery order or exemption under the current *Protection of the Environment Operations (Waste) Regulation*.

6.5.2 Amount

The site will not receive more than 320,000 tonnes of VENM and ENM in total in any calendar year. The site will not import more than 3,000,000 tonnes of VENM and ENM to the site in total. These amounts will be recorded daily and reported to the Quarry Manager monthly to ensure the limit is not exceeded.

6.5.3 Source Assessment and Validation

Each potential source of fill material is required to have an assessment report prepared prior to importation, to confirm that the potential fill material is suitable for use within the Quarry. The assessment report will, as a minimum, include:

- a description of the source material;
- the anticipated amount of the material to be imported from the site;
- the fill source location;
- NATA accredited laboratory analysis certificates (where required for ENM), including Quality Assurance/Quality Control Data; and
- an assessment of whether the material is VENM or ENM in accordance with the requirements of the POEO Act and POEO (Waste) Regulation.

Where the material imported is ENM, the assessment report must include a validation certificate that complies with the requirements of the ENM Exemption. The validation certificate must demonstrate that the fill material is free from contaminants, that it is suitable for its intended purpose and land use, and that it will not pose an unacceptable risk to human health or the environment.

6.5.4 On-Site Validation and Tracking

All vehicles entering the site must do so through **the main gate which will be attended during operations**. A material tracking register is to be maintained to ensure that only VENM or ENM is imported to the site and to track the individual and cumulative volumes of VENM/ENM imported. **A Quarry staff member will be assigned during importation campaigns to inspect and verify every load.** The details recorded will be stored and summarised in the Annual Review, and will include:

- Verification of waste classification, ie ENM or VENM;
- Date received;
- Name and contact details of contractor delivering the material;
- Address and detail of origin of the material;
- Quantity received from each origin, including docket number/s; and
- Each load is visually inspected to verify the contents and that volumes delivered match the verification certificates.

Vehicles will then be directed to the active filling face. **Site access will be locked after hours to prevent unauthorised dumping of material.**

The operator will ensure the effective control of traffic within the Site and at the active tipping face of the emplacement area by ensuring that all contractors have the relevant inductions. They will also ensure that the equipment engaged in the movement, spreading, compaction and dust suppression in the vicinity of the active tipping face are not operated in such a way as to constitute a risk to persons disposing of VENM/ENM or the delivering of the VENM/ENM. The operator will keep a daily logbook for recording activities and incidences that occur during the rehabilitation operations.

6.5.5 Refusal and Excluded Material

All vehicles suspected of containing Excluded Waste will be refused permission to deposit waste until the waste is verified as being acceptable. The Operator will require and collect appropriate evidence from the driver of the vehicle (as detailed in section 6.5.3) to substantiate that the waste is not an Excluded Waste. If Excluded Waste is identified in an incoming vehicle, the vehicle shall be refused entry and details of the incident recorded as described above. The Operator will advise the driver of the vehicle to contact the EPA for advice on the proper disposal of the Excluded Waste.

If Excluded Waste is identified during deposition by a vehicle, the Operator will immediately segregate and contain the waste away from the active tipping face. The details of the waste such as type, the source, and the vehicle and driver identification, will be recorded by the Operator. The Operator will advise the driver of the vehicle that the waste is not acceptable and will load the waste back onto the vehicle where safe and practicable to do so. The vehicle shall then be escorted from the site. The Operator will advise the driver of the vehicle to contact the EPA for advice on the proper disposal of the Excluded Waste.

If Excluded Waste is identified during the spreading and compaction of deposited waste the Operator will segregate and contain the waste away from the active emplacement area. The Operator shall make all practical efforts to identify the source of the waste, including;

- Inspecting the waste for possible identification labels on containers; and/or
- Identifying the type of waste and consequently the possible sources.

The Operator will contact the EPA to determine the proper acceptable disposal options and will dispose of the Excluded Waste in accordance with the EPA's requirements.

6.5.6 Placement of Fill Material

On exhaustion of the sand resource from sections of the approved extraction area, the Applicant would excise these from extraction operations and create an access road and tipping point for trucks delivering the VENM and ENM. The Quarry machinery would be used to load, push and profile the VENM and ENM material to:

- create a flat surface for tipping; and
- profile the tipped VENM and ENM into the preferred landform.

6.5.7 Erosion Management of Filled Materials

Where a filled area has not reached the final landform level, but due to staging of filling will remain inactive for greater than three months, the area will be stabilised. This will be achieved by grading and seeding with a suitable grassing/fertiliser mix as soon as practicable. All other erosion management activities will be undertaken as outlined in the Water and Erosion Management Plan, and section 9.6.

6.5.8 VENM and ENM Processing Operations

A portion of the imported VENM or ENM, which is of high sand content, may be used to blend with on-site sand to produce additional material for sale. The likely source of such material would be friable sandstone from tunnelling or construction projects where the material is able to make up at least 30% of the final product.

This material would be identified prior to delivery to the Quarry and placed in stockpiles either adjoining the raw feed sand stockpiles or within the extraction area away from active extraction or backfill activities.

From stockpiles, the material would be screened to either remove large rocks and organic material or produce a specific size fraction. Screened material unsuitable for this purpose would be managed as backfill material (refer to Section 6.5.6).

The screened sandstone/sand will be stockpiled along with the extracted in situ sand for sale or further blending with the extracted in situ sand resources. Blending may be undertaken by manual combination using available mobile equipment, e.g., front-end loader or excavator, or as a supplementary feedstock to the processing circuit.

6.6 REHABILITATION TREATMENT

As described in the EA (Nexus 2015), there are three (3) types of landscape rehabilitation treatments proposed; hydromulching, pocket planting in natural material & pocket planting in jute matting (for steeper grades). Direct seed application to achieve revegetation is described in the Mod 4 SoEE and included below.

- Direct seed application to the topsoil layer of the gently sloping landform. An application of water and fertilizer may be applied (depending on seasonal conditions), however, irrigation of the landform will be discouraged to avoid habituation of the vegetation to higher moisture levels.
- Hydromulching: This treatment is proposed for the open, general flat areas of the site, located centrally. The process is detailed in Detail 10 of LPDA 15-94 / 5 – Final Rehabilitation Details (shown in *Figure Six*), which includes preparation and specification for the proposed hydromulching works.
- Pocket planting in natural finishes: This treatment is proposed for the finished embankments located around the perimeter of the site. This treatment is proposed for embankments up to a maximum grade of 1 in 3. The process is detailed in Detail 7 & 8 of LPDA 15-94 / 5 – Final Rehabilitation Details (shown in *Figure Six*), which includes preparation and plant schedules for this process.
- Pocket planting in Jute Matting: This treatment is proposed for the finished embankments located around the perimeter of the site *Figure Six*. This treatment is proposed for embankments which exceed a grade of 1 in 3.

The process is detailed in Detail 7 & 11 of LPDA 15-94 / 5 – Final Rehabilitation Details (shown in *Figure Six*), which includes preparation and plant schedules for this process.

6.6.1 Hydromulch Areas

As described in the EA (Nexus 2015), the areas will be treated as follows.

6.6.1.1 Site Preparation

Once final contours have been developed, areas to be seeded shall be ripped (up to 300mm deep) and 300mm of previously stockpiled subsoil will be emplaced. Approximately 100mm of topsoil will then be spread over the surface in preparation for hydromulching. The application of hydromulching native seed shall commence immediately after topsoil has been placed or the surface prepared.

6.6.1.2 Application Rates

The required areas shall be treated by the contractor with the following:

- Native seed at 15kg per Hectare.
- Cover crop seed at 35kg per Hectare.
- Fertiliser at 200kg to 500kg per hectares. Selection will depend on soil analysis results and client requirements.
- Wood fibre mulch (dyed green) 2 tonnes to 2.5 tonnes per Hectare.
- Binder Environtack at 40kg to 60kg per Hectare or Polymer binder maximum 250L per Hectare. Note, the seed and fertiliser rates are a representative sample only of the quantities that should be applied per hectare.

Seed, fertiliser, wood fibre mulch, water and binder shall be thoroughly mixed together with water to provide a slurry and then applied under pressure onto the area to be treated by means of hydromulching equipment specifically designed for this purpose and by operators trained in the use of this equipment.

6.6.1.3 Grass Seed Mix

The species to be used on the site shall include those typical of the 'Sandstone-Shale Transition Forest' as listed below. It will also comprise of pasture species to ensure rapid groundcover whilst native species germinate.

Table 11. Native Species to be applied in hydromulch areas

Species
Trees Allocasuarina littoralis Angophora costata Angophora floribunda Eucalyptus acmenoides Eucalyptus notabilis Syncarpia glomulifera
Shrubs Acacia longifolia Acacia parramattensis Banksia spinulosa Bursaria spinose Kunzea ambigua Leptospermum polygalifolium Leptospermum trinervium Hakea sericea
Grasses and Groundcover Dianella prunina Herdenbergia violacea Lomandra longifolia Microlena stipoides Poa labillarderi Themeda australis

Table 12. Grass species to be applied in hydromulch areas

Grass Species	Application rate
Autumn/Winter Mix	
Oats	15kg/Ha
Rye grass	10kg/Ha
White clover	5kg/Ha
Red clover	5kg/Ha
Summer/Spring Mix	
Japanese Millet	20kg/Ha
Dobson Ryegrass	9kg/Ha
White clover	3kg/Ha
Red clover	3kg/Ha
Grass seed mix for permanent grass cover areas	
Rhodes Grass	5kg/Ha
Hulled Couch	5kg/Ha

6.6.2 Pocket Planting Areas

These areas encompass the perimeter slopes of the site inside the permanent bundwalls where batters are generally 3H:1V, with some areas slightly steeper that will require additional attention to reduce potential erosion impacts. As described in the EA, they will be treated as follows.

6.6.2.1 Site Preparation

Once final contours have been developed, areas to be seeded shall be ripped (up to 300mm deep) and 300mm of previously stockpiled subsoil will be emplaced. Approximately 100mm of topsoil will then be spread over the surface in preparation for planting followed by a further layer approximately 75mm in depth of organic mulch. The application of mulch shall commence immediately after topsoil has been placed or the surface prepared.

For areas where slopes are steeper than 3H:1V, jute matting will be installed between the topsoil and the mulch layer.

6.6.2.2 Tubestock Mass Planting

The planting density of the mass planting within the pocket planting areas is based on the average numbers within a 5m by 5m grid. Planting shall be modified to suit embankment, existing trees and natural elements and where planting areas are small than the 5m grid. Planting holes will be back filled with topsoil and a 100mm depression formed around the plant.

Species and planting density are indicated in the following table.

Table 13. Pocket Planting Tubestock Species List

Species	Planting Density per 5m grid
Trees Angophora costata Angophora floribunda Corymbia gummifera Eucalyptus punctata Eucalyptus paniculata Syncarpia glomulifera	3 with alternate species each 5m grid
Shrubs Banksia spinulosa Bursaria spinose Kunzea ambigua Leptospermum ploygalifolium Leptospermum trinervium Hakea sericea	12 with 2 of each species per 5m grid
Small Trees/Large Shrubs Allocasaurina littoralis Acacia parramattensis	6 with 2 of each species per 5m grid
Grasses and Groundcovers Dianella prunina Herdenbergia violacea Lomandra longifolia Microlena stipoides Poa labillarderi Themeda australis	60 with 10 of each species per 5m grid

6.7 PROGRESSIVE REHABILITATION

Rehabilitation is to be undertaken progressively where possible. Extraction works will occur across the face of several active cells and as soon as these areas are fully extracted to the site perimeter, they will be rehabilitated in accordance with the EA (Nexus Environmental Planning Pty Ltd, September 2015). No fill material sourced from outside the site [except for VENM and ENM \(as described in Section 6.5\)](#) is to be used in site rehabilitation to avoid contamination.

Interim stabilisation measures will be implemented to control dust emissions in disturbed areas which are not active, and which are not ready for final rehabilitation.

Native vegetation rehabilitation areas are to be hydromulched [or direct seeded](#) onto the prepared surface with a native and an annual cereal crop seed mixture.

Unimproved pasture areas and temporary bunds or rehabilitation areas are to be treated with lime or gypsum (if required) and hydromulched with a grass seed mix or laid with pre-stripped turf.

6.8 DECOMMISSIONING AND DEMOLITION ACTIVITIES

As the extraction progresses, the holding and drying areas will be decommissioned as required. This will involve removing any water by pumping to the final water body and incorporating and silt material into the final landform.

Decommissioning of the processing plant area will be undertaken during the final stages of the extraction operations. All plant and temporary offices will be removed from the site. Services such as power and water will be disconnected, and remaining infrastructure removed. Any concrete pads or footings will also be removed from the site and disposed of at a licenced waste facility. Remaining stockpile material will either be removed from the site or incorporated into the final batters.

The workshop and concrete hardstand located at the site entrance will remain for use by the landowner. The weighbridge will be removed, and the all-weather access road restored.

SUMMARY OF REHABILITATION STATUS

The following summarises the rehabilitation status of the site as described by domains as described in [Section 5.2](#) and shown in [Figure Three](#).

Domain 1 to Domain A Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Infrastructure(1)	Infrastructure(A)	1A	Active	0.40	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	Nil	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	0.40
			Total	0.40	0.40

Domain 1 to Domain C Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Infrastructure(1)	Grassland (C)	1C	Active	1.09	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	Nil	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	1.09
			Total	1.09	1.09

Domain 3 to Domain B Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Water Management Area (3)	Water Management Area (B)	3B	Active	2.17	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	Nil	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	2.60
			Total	2.17	2.60

Domain 3 to Domain C Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Water Management Area (3)	Grassland (C)	3C	Active	3.24	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	Nil	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	3.24
			Total	3.24	3.24

Domain 4 to Domain C Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Overburden Emplacement Area (4)	Rehabilitation Area- Grassland (C)	4C	Active	0.77	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	Nil	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	0.77
			Total	0.77	0.77

Domain 4 to Domain E Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Overburden Emplacement Area (4)	Rehabilitation Area- Woodland (E)	4E	Active	0.13	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	Nil	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	0.13
			Total	0.13	0.13

Domain 6 to Domain C Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Void (open Cut Void) (6)	Rehabilitation Area- Grassland (C)	6C	Active	3.38	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	Nil	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	8.55
			Total	3.38	8.55

Domain 6 to Domain E Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Void (open Cut Void) (6)	Rehabilitation Area-Woodland (E)	6E	Active	4.79	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	Nil	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	12.1
			Total	4.79	12.1

Domain 9 to Domain J Progress

Primary Domain	Secondary Domain	Code (with map legend)	Rehabilitation Phase	Area at Report Date (ha)	Area at end of Rehabilitation (ha)
Conservation Area (9)	Conservation Area (J)	9J	Active	Nil	Nil
			Decommissioning	Nil	Nil
			Landform Establishment	Nil	Nil
			Growth Medium Establishment	Nil	Nil
			Ecosystem Establishment	0.99	Nil
			Ecosystem development	Nil	Nil
			Relinquished Lands	Nil	0.99
			Total	0.99	0.99

7 Environmental Issues Management

7.1 REHABILITATION RISK ASSESSMENT

A risk assessment of Environmental and Rehabilitation issues has been undertaken in accordance with standard risk assessment practices outlined in ISO 31000 *Risk Management – Principles and Guidelines*. The Consequence/Likelihood Matrix has been used with the following scale definitions:

Table 14. Consequence/Likelihood Matrix

			Consequence				
			1	2	3	4	5
			Insignificant	Minor	Moderate	Major	Severe
Likelihood	E	Almost Certain	IV	III	II	I	I
	D	Likely	IV	III	III	II	I
	C	Possible	V	IV	III	II	II
	B	Unlikely	V	IV	III	III	II
	A	Rare	V	V	IV	III	II

Likelihood Scale

E	Almost Certain	Expected to occur within weeks
D	Likely	Will probably occur, has happened within recent months
C	Possible	Might occur at sometime within next 2-3 months
B	Unlikely	Could occur within 6-12 months although unlikely
A	Rare	Might occur at some time in exceptional circumstances

Consequence

5	Severe	Irreversible long term environmental harm.
4	Major	Prolonged environmental impact with significant remedial measures required.
3	Moderate	Moderate environmental impacts with immediate remedial measures effective.
2	Minor	Minimal environmental harm with minor remediation activities
1	Insignificant	Little or no environmental harm. Remediation not required.

Table 15. Site Summary Rehabilitation Risk Assessment

Environmental Risks	Description	Likelihood	Consequence	Risk
Ambient air quality impact	Risk of earth moving associated with rehabilitation activities will impact adversely on ambient air quality	Possible	Moderate	III
Erosion and Sediment Control	Risk of soil loss due to erosion	Possible	Moderate	III
Erosion and Sediment Control	Risk of sediment leaving the site	Rare	Minor	V
Soil and Overburden Types(s) and Suitability	Risk of growth media be unsuitable for growth of vegetation	Unlikely	Moderate	III
Flora	Risk of weeds impacting on growth of vegetation	Possible	Moderate	III
Fauna	Risk of fauna habitat, for foraging, being impacted by the final landform	Rare	Minor	V
Fauna	Risk of feral animals impacting on ecological sustainability	Unlikely	Minor	IV
Slopes and Slope Management	Risk of unstable slopes impacting on final landform	Possible	Moderate	III
Slopes and Slope Management	Insufficient material available for batters in final landform	Possible	Moderate	III
Surface Water Quantity	Risk of insufficient water for revegetation	Unlikely	Major	III
Surface Water Quality	Risk of harm caused by poor quality of water in final water body	Rare	Minor	V
Bushfire	Risk of harm to vegetation, fauna and rehabilitation plantation	Rare	Moderate	IV
Visual Amenity	Risk of impact on local residences	Possible	Insignificant	V
Trespassing	Risk of impact on rehabilitation areas by public	Rare	Minor	V

7.2 REHABILITATION RISK MANAGEMENT

7.2.1 Dust Control Measures

Environmental Risks

Risk of earth moving associated with rehabilitation activities will impact adversely on ambient air quality

Dust control measures have been detailed in the Air Quality Management Plan (AQMP) by VGT. The measures discussed in the AQMP apply equally to the control of dust during operations and the rehabilitation phase of the site operations. The relevant sections are reproduced below.

Visually assess activities during adverse weather conditions and modify activities as required to minimise dust, including:

- Notification will be sent to site management during heightened wind speeds (>6 m/s or >20 km/h). When this alert is triggered, the management controls below will be implemented where practical and relevant;
 - Increase use of the water cart in dry weather;
 - Sprinklers installed over exposed or disturbed areas, ENM/VENM emplacement areas and stockpiles will operate during dry weather and high wind periods;
 - Any offending works shall cease when operations are resulting in visible dust emissions blowing in a direction so as to cross onto public roads or lands not owned by the operation;
 - Delaying non-essential earth-moving activities during periods of high wind; and
 - Reducing truck speeds and limiting non-essential vehicle movements.

Areas of the site which are exposed and active at any one time are minimised to the greatest extent practicable (condition 29 (c)).

- Damping Down
 - Hardstand and manoeuvring areas are to be kept in a sufficient state of dampness so as to minimise dust raised into the air by the passing of vehicles.
 - Water is applied by water cart. Frequency of water application shall be as often as required so as to prevent dust rising into the air under the prevailing conditions.
 - Water should be applied so that the top layer is sufficiently damp. When done correctly, this should form a crust when dry
 - Potential dust generating material is to be processed and stored in a damp condition.

Transportation:

- All vehicles are restricted to a speed limit of 30km/h.
- Trucks are covered when entering and leaving the premises carrying loads of potentially dust generating material.
- All vehicle movements on unsealed areas are to be restricted to internal haul roads and working areas.
- Water cart regime will be implemented on unsealed roads at the beginning of each day prior to vehicle movements on site.
- Watering will be sufficient enough to form a crust on the road and adequately cover all unsealed roads within the site.
- Unsealed roads and ENM/VENM surfaces will be inspected during the initial water cart route and also during wind events of greater than 6m/s or 20km/hr average from the north-west.

- Where these surfaces have been disturbed by site activities or environmental factors, they require spraying to ensure a surface crust is present at all times.

The application of ENM/VENM to disturbed areas on site will reduce potential dust emissions by covering finer, looser dust particles with coarser, larger materials; effectively smothering smaller materials with larger ones. In addition to using the ENM/VENM as a cover, water spraying the ENM/VENM as it is deposited will increase the effectiveness of the materials as a screen, and ensure that finer materials are covered by the application of coarser ENM/VENM materials.

Once ENM/VENM has been deposited, the following practices should be conducted to prevent dust:

- Materials will be sufficiently wet down with water sprays to crust the surface layer;
- Filled areas are to be inspected daily and included in the daily water cart route to ensure adequate observations are made; and
- Where surfaces have been disturbed by further vehicle movements or additional ENM/VENM application, water spraying will be undertaken to ensure a surface crust is present at all times.

7.2.2 Erosion and Sediment Control Measures

Table 16. Summary of Erosion and Sediment Control Risks

Environmental Risks
Risk of soil loss due to erosion
Risk of sediment leaving the site

Soil and erosion control measures have been detailed in the Surface Water Management Plan (SWMP) by VGT. The measures discussed in the SWMP apply equally to the control of sediment and erosion during operations and the rehabilitation phase of the site operations. The relevant sections are reproduced below.

7.2.2.1 General Instructions

The control of erosion and sedimentation at the site focusses on source reduction measures. In general, these measures include:

- Reading the SWMP with the engineering plans and any other plans or written instructions issued in relation to development at the subject site.
- Ensure contractors undertake all soil and water management works as instructed in this specification and constructed following the guidelines stated in Department of Housing (2008) (the "Blue Book").
- Informing all subcontractors of their responsibilities in minimising the potential for soil erosion and pollution to downslope areas.

7.2.2.2 Works Sequence

- ~~All works are to be undertaken following the engineering plans~~
- Topsoil will be stripped and stockpiled in a convenient location which is both out the way of daily activity, however, easily accessed for re-use in the creation of bunds and for preparation of rehabilitation areas as necessary.
- Construct earth banks (Stormwater Collection Drains) to divert as much clean water as possible and capture the dirty water.
- Rehabilitate lands previously used to stockpile topsoil with clay residue materials and previously stockpiled topsoil.

- Install barrier fencing to limit access to rehabilitated areas.
- Ensure management practices are carried out to minimise areas being affected by wind and water erosion.

7.2.2.3 Erosion Control

- The soil erosion hazard on the site will be kept as low as practicable by minimising disturbance. Some ways of doing this are outlined in *Table 17*.
- Extraction will take place within a defined work area and materials will be transported only within the site for processing.
- Entry to land not involved directly in the extraction process will be prohibited and will be managed according to the Landscape and Rehabilitation Plan (LRP). Maintenance activities, as described in the LRP may include but not restricted to weed control, pest control, fencing to prevent access by livestock and vehicles, watering and replacement planting where required.
- Limit vehicular access to the site to that essential for construction work.

Table 17. Limitations to Access

Landuse	Access Limitations	Comments
Extraction	Land disturbances beyond five (preferably two) metres from the edge of the operations are prohibited.	All site workers should clearly recognise these areas and they should be clearly marked — suitable materials include barrier mesh, sediment fencing, etc. The project manager will determine their actual location on site. They can vary in position to conserve existing vegetation best while being considerate of the needs of efficient works activities.
Access Roads	Roads and tracks are limited to a width that are the minimum necessary to allow safe operation of heavy equipment	
Remaining Lands	Land disturbances are prohibited except for essential management works.	

Here, rehabilitation means achieving a C-factor (Revised Universal Soil Loss Equation) of less than 0.1 and set in motion a program that should ensure it will drop permanently, by reducing the risk of erosion by vegetation, paving, armouring, etc. as soon as practicable after extraction activities cease.

NOTE: The cover factor, C, is the ratio of soil loss from land under specified crop or mulch conditions to the corresponding loss from continuously tilled, bare soil. A C-factor of 1.0 corresponds to that of bare soil.

While C-factors are likely to rise to 1.0 during the work's program, they should not exceed those given in *Table 18* within the specified times.

Table 18. Maximum acceptable C-factors at nominated times during works

Lands	Maximum C-Factor	Remarks
Waterways and other areas subjected to concentrated flows, post construction.	0.05	<i>Applies after ten working days from completion of formation and before they are allowed to carry any concentrated flows. Flows are limited to those indicated in "Blue Book". Foot and vehicular traffic are prohibited in these areas.</i>
Stockpiles, post clearance	0.1	<i>Applies after ten working days from completion of formation.</i>
All lands, including waterways and stockpiles during construction	0.15	<i>Applies after 20 working days of inactivity, even though works might continue later.</i>

Note: *working days* does not include public holidays, weekends, or days when work is not possible due to wet weather.

The required C factors can be achieved in the short term (temporary protection for up to six months) with either:

- a suitable soil binder in areas of sheet flow, e.g., topsoil stockpiles
- anionic bitumen emulsion sprayed over hessian cloth (at 0.5 L/m²) in areas of concentrated flow, e.g., diversion banks and waterways
- a temporary vegetative cover i.e., replace stripped turf.

Application of any soil binders employed should follow the manufacturer's instructions.

- While ever the C-factor is higher than 0.1, maintain the lands in a condition that resists removal by wind. This can be achieved by:
 - o keeping moist (not wet) by sprinkling with water
 - o where practicable, leaving the surface in a cloddy state.
- Notwithstanding the above, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than:
 - o 10 days on slopes steeper than 30 per cent
 - o 20 days on slopes less steep than 30 per cent.
- Lands planted recently with grass species or re-turfed will be watered regularly until an effective cover has properly established and plants are growing vigorously. Follow-up seed and fertiliser will be applied as necessary in areas of minor soil erosion and/or inadequate vegetative protection.
- Where practicable, keep foot and vehicular traffic away from all recently stabilised areas.
- Stockpiles of topsoil to be located at least five metres from areas of likely concentrated or high velocity flows, especially drainage lines and access roads. If necessary, earth banks or drains will be constructed to divert localised run-on.
- Replace soil materials in the same order they are removed from the ground. It is particularly important that all subsoils are buried, and topsoils remain on the surface at the completion of works.
- Earth batters will be laid back to lower grades before the rehabilitation program starts. Final batter gradients should not exceed 3:1.
- All waterways, drains, spillways, and outlets will be constructed to be stable in accordance with the "Blue Book" for soils with high erodibilities.
- Topsoil stockpiles are not to exceed 3m in height with a minimum crest width of 3m and if not immediately re-turfed, are to be seeded with a temporary vegetation cover if stockpiles are to remain longer than 14 days
- Topsoil is to be stripped in a moist condition to avoid pulverisation and dust.

7.2.2.4 Sediment Control

Clean water is diverted around the site via series of earthen bunds where possible or utilising the natural ridgeline topography and bunds. This reduces the volume of water within the active site available to entrain sediment. All surface water captured over the disturbed areas of the quarry is considered dirty and is collected in on site dams. No water is discharged off site therefore the risk of sediment leaving the site is very low.

By the final rehabilitation stages the total catchment area will be directed to a dam located in the northeast. The final catchment will be approximately 39Ha, including the rural/residential catchment east of Roberts Road. Extraction will have proceeded to final depth and the voids backfilled with VENM and ENM to achieve a free draining landform. and A spillway will be designed to overtop at 192m AHD. Once the vegetation of the site has been completed the risk of entrainment of sediment will be negligible and any water overtopping the final dam will be considered clean.

7.2.3 Soil and Overburden Suitability

Table 19. Summary of Soil and Overburden Suitability Risks

Environmental Risks
Risk of growth media be unsuitable for growth of vegetation

The soil landscape of the Maroota area is described in Soil Landscapes of St Albans 1:100,000 Sheet in which the typical soils of the area are classified under the soil landscape known as Sydney Town (st). In particular the Maroota Sand comprises a sequence of interbedded and poorly sorted sands, gravels, clayey gravels, gravelly sands, pebbly sands, clayey/silty sands and clay which range from compacted to partly consolidated materials. The bulk of these sediments however consists of sand sized material. The general characteristics of the soils have been classified as follows:

- Very low fertility.
- Strongly acidic with low water holding capacities and low to very low nutrient status and cation exchange capabilities.
- Soil depth varies considerably and occasionally rock outcrops limit root penetration.
- Erosion hazard is high to very high.

According to the E-Spade online soil mapping data, the A soil horizon typically consists of a sandy clay loam with a neutral pH. The B Horizon consists of mainly sandy clay with a pH varying from 7.5 to 6.5, generally trending to a lower pH with depth. There is no appreciable salinity noted.

The species selected for rehabilitation of the site are endemic and suitable for the low fertility soils. It is not anticipated that the soil quality will therefore limit the rehabilitation success of the site. However, soil testing will be undertaken prior to planting to determine if soil ameliorants are required.

7.2.4 Native Flora and Fauna

Table 20. Summary of Flora and Fauna Risks

Environmental Risks
Risk of weeds impacting on growth of vegetation
Risk of fauna habitat, for foraging, being impacted by the final landform
Risk of feral animals impacting on ecological sustainability

The management of native flora and fauna will be as described within the Flora and Fauna Management Plan (FFMP) contained within the Environmental Management Plan. The objective of the plan to protect known threatened flora species on the site and ensure correct procedures are applied in the event of other threatened flora or fauna species being located on the site.

A draft FFMP was reviewed by the Baulkham Hills Council and in email correspondence dated the 19th of October 2016, Council required more information regarding Condition 55 of the consent. The FFMP was updated on the 23rd of November 2016 and submitted to the Secretary and is approved. At the time two of the items that Council requested more information on were not updated with the proviso that the information would be forthcoming when the Rehabilitation Plan was updated and submitted to the Secretary by 30th of June 2017. The items are listed below.

1. *Additional information is required to be provided on Part (c), dot point 3, in regard to planting around the conservation area i.e. 'planting around the conservation area to further buffer this area and enhance its long term viability as a bushland ecosystem'.*
2. *Additional information is required to be provided on Part (c), dot point 4, in regard to improving connectivity of existing and future vegetation. In this regard the information provided refers only to separation distances between vegetation and does not adequately address how areas will be linked, actions required to be undertaken such as additional planting, and on-going management i.e. 'connection of existing areas and future areas of revegetation to form a network of wildlife corridors throughout site and to adjoining lands to facilitate species recruitment through natural immigration.'*

The following is intended to provide the additional information.

7.2.4.1 Conservation Areas

Conservation areas are defined as existing vegetation that is to be retained and protected. They are described in *Figure Four Final Landscape and Rehabilitation Plan* and are located on the perimeter of the site along Old Northern Road and Roberts Road. They are characterised by the presence of mature trees typical of a Shale-Sandstone Transitional Forest. Along Old Northern Road the tree stands are thin i.e. no more than 1 to 2 trees in width. The northern portions on Roberts Road are distributed along and adjacent to existing bundwalls and form more substantial stands.

Protection of these areas will largely be achieved by preventing access via fencing or similar. These areas will be blended into the mass plantings that will be undertaken on the existing and proposed perimeter bundwalls and buffer setbacks on Old Northern and Roberts Roads.

It will not be necessary for additional planting within the conservation areas to enhance the vegetation. It is envisaged that once the adjacent mass planted areas within the setbacks and bundwalls are completed and established, the viability of the bushland ecosystem will increase. This will primarily be due to the migration of species across the conservation areas and the new plantings due to propagation and self-seeding as vegetation becomes self-sustaining. The end result is an increasing biodiversity and therefore sustainability.

7.2.4.2 Connectivity

The biodiversity value of corridor networks is well known. Landscapes that retain more connections between patches of otherwise isolated areas of vegetation are more likely to maintain more numerous and more diverse populations of various plant and animal species. If existing remnants are left to persist without sufficient immigration to maintain genetic diversity, continued losses of biodiversity are likely.

Within the site the connectivity of wildlife corridors during the operational phase will be limited to the perimeter of the site where buffer areas will be established as described above. As the rehabilitation of the site progresses within the extraction area connectivity within the site will increase. Felled logs and rocks may be placed strategically within all rehabilitation areas to encourage migration of fauna species into the site. Nesting boxes may also be considered in the existing mature trees to foster breeding in arboreal species.

Regionally the site is located approximately 5km west of the Marramarra National Park. The site currently has potential linkages to the national park to the east of the site where forested areas abut Roberts Road. Forested Crown land to the west of the site, opposite Old Northern Road, leading to the Hawksbury River currently has poor, isolated linkages to the Marramarra NP due to the proliferation of sand mining and other agricultural activities that lie between.

Whilst the current site does not support wildlife corridors, future rehabilitation efforts will eventually provide improved connectivity with the forested Crown lands to the west of Old Northern Road. Additionally, it is presumed that the rehabilitation of the sand mine to the west of the site, a barrier to linkages, will be conducive to enhancing the connectivity between the two ecosystems.

7.2.5 Weed and Pest Management

Table 21. Summary of Weed and Pest Management Risks

Environmental Risks
Risk of weeds impacting on growth of vegetation
Risk of fauna habitat, for foraging, being impacted by the final landform
Risk of feral animals impacting on ecological sustainability

Weed removal shall be conducted regularly, with hand removal of all top growth, rhizomes and stolons of unwanted vegetation. The regular control of all weeds is essential. The applications of pre-emergent sprays are acceptable with approved chemicals applied in strict accordance with manufacturer's directions. Any spraying will be done during calm days to avoid winds blowing herbicides into native planting. [Details are included in the Flora and Fauna Management Plan. A summary of the weed management plan for 2023 is given in Table 22, with updates managed through the Annual Review.](#)

If evidence of feral animal impacts on revegetation is noted, control measures such as rabbit proof fencing will be investigated. A baiting program may also be investigated with the appropriate authorities if required.

Table 22. Weed Management Plan

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
African Lovegrass	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide				Herbicide	Herbicide	Herbicide	Herbicide
Blackberry	Herbicide	Herbicide	Herbicide						Herbicide	Herbicide	Herbicide	Herbicide
Bridal Creeper	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal
Cobblers Peg	Hand Removal	Hand Removal	Hand Removal	Hand Removal					Herbicide	Herbicide	Herbicide	Hand Removal
Crofton Weed	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide				Herbicide	Herbicide	Herbicide	Herbicide
Fireweed	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal
Lantana	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide				Herbicide	Herbicide	Herbicide	Herbicide
Paspalum	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide			Herbicide	Herbicide	Herbicide	Herbicide
Rhodes Grass	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide	Herbicide
Whiskey Grass	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Hand Removal	Herbicide	Herbicide	Herbicide	Hand Removal

Reference: Appendix D: Biodiversity Report 2022

7.2.6 Slopes and Slopes Management

Table 23. Summary of Slopes and Slopes Management Risks

Environmental Risks
Risk of unstable slopes impacting on final landform
Insufficient material available for batters in final landform

The conceptual landform reshaped with 1,200,000 m³ fill material would have slopes ranging from 6° (approximately 9.5 Horizontal: 1 Vertical (9.5H: 1V)) in the eastern sections to 11° (approximately 5H: 1V) in the western sections of the final landform over a flat floor and dam which drains to the north. The landform reshaped with 2,000,000 m³ fill material would produce slopes of approximately 6° to 8° across the whole landform over a final dam which drains to the north. These slopes are considered to be at low risk of erosion and geotechnical instability, that is safe and stable.

~~The conceptual final landform proposed generally consists of a 3H:1V slopes around the perimeter of the site leading to a relatively flat floor draining to a water body in the northeast of the void. Some areas to the north and east of the final water body may be slightly steeper but are still considered safe and stable.~~

Vegetation will be established on the rehabilitation areas as soon as practicable in order to reduce the risk of erosion and to further stabilise the final slopes. Where slopes on the perimeter exceed 3H:1V, the slopes will be stabilised with jute matting and mass pocket planting of vegetation. This will be designed to provide sufficient stability to the batter slopes.

~~At this stage, the actual final landform may not conform to the approved final landform if the wet weather high groundwater level is determined to be higher than expected. Therefore, a mass balance on the overburden material required cannot be undertaken until agreement with DPI Water is reached as to the extraction depth limit.~~

7.2.7 Surface Water

Table 24. Summary of Surface Water Risks

Environmental Risks
Risk of insufficient water for revegetation
Risk of harm caused by poor quality of water in final water body

The SWMP contains details of a site water balance, over a critical 10-year period, which indicates that the site has more than sufficient water on site to maintain the processing operations and still have surplus water to requirements. Thus, there will be sufficient water available for progressive rehabilitation efforts whilst the site is under the extraction phase. For a period between final landform construction and completion of rehabilitation to produce a non-polluting, free-draining landform, the Quarry may be required to discharge water from the remaining water body, during wet periods, to the downstream environment so as to maintain the minimum settling and sediment storage volumes. Therefore, at some time in the future, prior to the establishment of the proposed free draining landform, the operator may need to apply to vary EPL 6535 to include a Licensed Discharge Point to allow surplus water captured in remaining water body to be discharged to the drainage line immediately to the north of the Quarry.

Once rehabilitation has been completed, the final water body will also have sufficient capacity to provide irrigation for the vegetation until it is sufficiently established.

The water quality in the current and final water body is not expected to present any issues with regards to quality for irrigation of any rehabilitated areas. There are no processes undertaken on the site that would contaminate the captured rainfall. Sediment entrained through incident rainfall is captured in the site dams and settles rapidly. Fuels and oils held on site are of relatively low volumes and stored in bunded areas in the workshop. Spill kits are available, and the risk of water contamination is very low.

Surface water monitoring will be undertaken on the site if a potential contaminant is identified, the impacts of irrigation of rehabilitation areas will be investigated. At the completion of the final landform, the final water body quality will be initially assessed to confirm that it will not be detrimental to the planted native vegetation. Further water quality testing is not anticipated to be required.

7.2.8 Bushfire Management

Table 25. Summary of Bushfire Risks

Environmental Risks
Risk of harm to vegetation, fauna and rehabilitation plantation

There is some risk of bushfire due to the grassed land and vegetation in place for dust or visual amenity and nearby native forest areas. The extraction activities will not increase the risk of bushfire. Deliberately lit fires are the most frequent cause of bushfire, and the proponent employs several measures such as fencing, signage and monitoring to dissuade trespassers from entering the site.

Fire extinguishers are held onsite and water pumps held onsite could utilise held dam water to extinguish minor fires. Old Northern Road and Roberts Road perform as a fire break in the south, west and east. To the north, there is minimal forested areas, and the land is predominately agricultural.

Procedures are in place to contact the local fire brigade in the event of a bushfire. Communication with the Rural Fire Service, emergency services and National Parks and Wildlife Service will be undertaken when necessary to assist them.

Native vegetation, as proposed in this plan, is generally resilient to bushfire and in fact often relies upon them to propagate. If rehabilitation areas are impacted by bushfire, the area will be monitored over a period of 12 months to determine if natural regeneration occurs. If regeneration is insufficient or fails, re-planting will be undertaken.

7.2.9 Hazardous Materials Management

Table 26. Summary of Hazardous Materials Risks

Environmental Risks
Risk of harm to vegetation, fauna and rehabilitation due to the presence of hazardous materials

General domestic waste is collected in rubbish bins located at the site office and disposed of via a licensed waste disposal facility. Fuels or oils are stored in bunded areas built in accordance with the relevant Australian Standard in the workshop and refuelling and repairs are undertaken within the workshop hardstand area. Other chemicals will be stored on site, in minimal volumes, in appropriate containers. Empty drums and unused tyres will be picked up by a licenced contractor. Metals are to be sorted into those that are required for spare parts and repairs, and that which can be recycled or otherwise disposed of. A spill kit is also retained within the office.

7.2.10 Visual Impacts

Table 27. Summary of Visual Amenity Risks

Environmental Risks
Risk of impact on local residences

The visual amenity of nearby residents will not be adversely impacted by the extraction or rehabilitation activities. The perimeter bundwalls and buffer tree screening proposed will provide adequate shielding for residents and users of Old Northern Road and Roberts Road. Residents to the north of the site, which are topographically lower, will observe the progression of exposed faces to revegetated lands and thus reduced impacts.

7.2.11 Controlling Access

Table 28. Summary of Trespassing Risks

Environmental Risks
Risk of impact on rehabilitation areas by public

In the interests of public safety, fences are maintained around the perimeter of the mine sites. Prominent signage has also been erected along the length of the fences to discourage trespassers. Fences will assist in deterring trespassers from entering the site and wilfully or otherwise damaging the rehabilitation areas.

Visitors onto the site must report to the site office and sign in. All visitors must be accompanied by site personnel at all times.

Rehabilitation areas will be marked as 'no-go' areas to prevent unauthorised entry by staff or vehicles and accidental damage. This may be accomplished by fencing or taping off the relevant areas and erecting signs displaying no unauthorised access statements.

8 Performance Indicators and Completion Criteria

Table 29. Rehabilitation Objectives and Completion Criteria

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
Phase 1 - Decommissioning						
Domain 1 - Infrastructure						
Surface Infrastructure to be decommission and removed, unless the Secretary agrees otherwise. Minimise the adverse socio-economic effects of quarry closure. ~~All infrastructure and services not suitable for the final landuse will be removed.~~	Services not required for final landuse are disconnected.	Relevant services disconnected by qualified contractors	Report from qualified contractors	Upon decommissioning completion	EIS/This report	Not commenced/ Post extraction completion
	Infrastructure not required for final land use is removed	Relevant infrastructure removed.	Inspection and report	Upon decommissioning completion	EIS/This report	Not commenced/ Post extraction completion
~~All roads and hardstand areas to be retained for the final landuse will be reduced in width/size to that suitable for the final landuse.~~	Roads not required for final landuse are removed.	Roads removed unless specified to be retained	Inspection and report	Upon decommissioning completion	EIS/This report	Not commenced/ Post extraction completion
	Roads required for final landuse are reduced in width (if required)	Roads reduced in width to that suitable for final land use.	Inspection and report	Upon decommissioning completion	EIS/This report	Not commenced/ Post extraction completion
	Hardstand areas reduced to a size required for the final landuse	Hardstand areas reduced in size to that suitable for final landuse.	Inspection and report	Upon decommissioning completion	EIS/This report	Not commenced/ Post extraction completion
~~Domain free from hazardous materials~~	No hazardous material remains	All hazardous material removed	Contamination report prepared by qualified person. Register of Hazardous Material.	Following decommissioning with follow up validation testing as required.	This Report	Not commenced/ Post extraction completion
~~All remaining stockpiles will be removed and/or reused in the establishment of the final landform.~~	No remaining product stockpiles	All remaining product stockpiles are removed.	Inspection and report	Upon decommissioning completion	EIS/This report	Not commenced/ Post extraction completion
Sediment runoff to be contained	Sediment retained in water management structures	~~Sediment Dams will be designed to Best Practice according to the 'Blue Book' Criteria for a 5 day 90th percentile storm event. All drains will be designed for the 1 in 10 year design storm event.~~	~~Existing dams currently meet capacity specifications (see SWMP). Final water body is designed to exceed the required capacity and will be assessed once complete.~~ Inspection for capacity by quarry manager.	~~For the final water body, on construction completion and monthly until completion.~~	DECC—Managing Urban Stormwater, EIS, SWMP and this report	~~Temporary dams are in place. Final Water Body construction not commenced/ Post extraction completion~~

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
Phase 1 – Decommissioning (continued)						
Domain 3 - Water Management						
Site to be safe, stable and non-polluting ~~Sediment dams to be retained in the final landform are converted to clean water dams.~~	No sediment laden water enters the remaining clean water dam system.	Final water body has been desilted, if required to increase capacity and minimise sediment entrainment in discharged water. The catchment areas for the final water body are sufficiently rehabilitated so as to only contain clean water runoff.	Inspection by quarry manager and suitably qualified person.	On construction completion and monthly until completion	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Final Water Body construction not commenced/ Post extraction completion
	Sediment dam discharge due to overtopping does not entrain sediment.	Final water body will be designed to Best Practice according to the 'Blue Book' Criteria for a 5 day 90th percentile storm event. All drains will be designed for the 1 in 10-year design storm event and do not re-entrain sediment. The dam spillway will be designed for the 1 in 100-year design storm event.	Inspection by quarry manager and suitably qualified person.	For the final water body, on construction completion and monthly until completion.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Final Water Body construction not commenced/ Post extraction completion
Domain 4 – Overburden Emplacement Area						
Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land. ~~All overburden will be removed and reused in the establishment of the final landform.~~	No remaining overburden stockpiles	All overburden stockpiles are removed and or incorporated into the final landform.	Inspection and report	Upon decommissioning completion	EIS, and this report	Not commenced/ Post extraction completion
~~Sediment runoff to be contained.~~	Sediment retained in water management structures	Final water body will be designed to Best Practice according to the 'Blue Book' Criteria for a 5 day 90th percentile storm event. All drains will be designed for the 1 in 10-year design storm event and do not re-entrain sediment. The dam spillway will be designed for the 1 in 100-year design storm event.	Existing dams currently meet capacity specifications (see SWMP). Final water body is designed to exceed the required capacity and will be assessed once complete. Inspection by quarry manager and suitably qualified person.	On construction completion and monthly until completion.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Final Water Body construction not commenced/ Post extraction completion
Domain 6 - Open Cut Void						
No activities within this domain are required during this phase						
Domain 9 - Native Vegetation Conservation Area						
No activities within this domain are required during this phase						

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
Phase 2 - Landform Establishment						
Domain 1 – Infrastructure						
Domain landform is safe, stable and non-polluting, fit for the purpose of the intended final land use. Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land.	Final landform contours similar to proposed final landform contours.	Slope lengths in rehabilitated areas shall not exceed 20m for a 3H: 1V batter i.e., an earth bank shall be installed. Slope lengths in rehabilitated areas shall not exceed 30m for a 4H: 1V batter i.e., an earth bank shall be installed. Slope lengths in rehabilitated areas shall not exceed 40m for batters >4H: 1V i.e., an earth bank shall be installed.	Survey on completion by registered surveyor.	Upon completion of landform establishment phase.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Not commenced/ Post extraction completion
	Suitable sediment and erosion controls in place.	Final water body will be designed to Best Practice according to the 'Blue Book' Criteria for a 5 day 90th percentile storm event. All drains will be designed for the 1 in 10-year design storm event and do not re-entrain sediment. The dam spillway will be designed for the 1 in 100-year design storm event.	Final water body is designed to exceed the required capacity and will be assessed once complete. Inspection by quarry manager and suitably qualified person.	Visual Inspection on construction completion and monthly until completion.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Final Water Body construction not commenced/ Post extraction completion
Domain 3 - Water Management						
Final water body is non-polluting and fit for the purpose of the intended final land use.	Final water body is constructed to the engineer's design specification.	The dam dimensions, location and walls construction will be to the engineer's design specification (yet to be determined). The dam spillway will be designed for the 1 in 100-year design storm event.	Inspection by quarry manager and suitably qualified person.	During construction as determined by the engineer	DECC- Managing Urban Stormwater and engineer's plans	Final Water Body construction not commenced/ Post extraction completion
	Final water body is not a pollution hazard to the downstream environment.	Final water body will be designed to Best Practice according to the 'Blue Book' Criteria for a 5 day 90th percentile storm event. All drains will be designed for the 1 in 10-year design storm event and do not re-entrain sediment. The dam spillway will be designed for the 1 in 100-year design storm event.	Final water body is designed to exceed the required capacity post establishment and will be assessed once complete. Inspection by quarry manager and suitably qualified person.	Visual Inspection on construction completion and monthly until completion.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Final Water Body construction not commenced/ Post extraction completion
Domain 4 - Overburden Emplacement Area						
Ensure overburden emplacement areas has been battered/shaped to the final landform. Domain landform is safe, stable and non-polluting, fit for the purpose of the intended final land use. Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and	Final landform contours similar to proposed final landform contours.	Slope lengths in rehabilitated areas shall not exceed 20m for a 3H: 1V batter i.e., an earth bank shall be installed. Slope lengths in rehabilitated areas shall not exceed 30m for a 4H: 1V batter i.e., an earth bank shall be installed. Slope lengths in rehabilitated areas shall not exceed 40m for batters >4H: 1V i.e., an earth bank shall be installed.	Survey on completion by registered surveyor.	Upon completion of landform establishment phase.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Not commenced/ Post extraction completion

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
minimising visual impacts when viewed from surrounding land.						
Sediment runoff to be contained.	Sediment retained in water management structures	Final water body will be designed to Best Practice according to the 'Blue Book' Criteria for a 5 day 90th percentile storm event. All drains will be designed for the 1 in 10 year design storm event and do not re-entrain sediment. The dam spillway will be designed for the 1 in 100 year design storm event.	Existing dams currently meet capacity specifications (see SWMP). Final water body is designed to exceed the required capacity and will be assessed once complete. Inspection by quarry manager and suitably qualified person.	Visual Inspection on construction completion and monthly until completion.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Final Water Body construction not commenced/ Post extraction completion
Domain 6 - Open Cut Void						
Domain landform is safe, stable and non-polluting, fit for the purpose of the intended final land use. Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land. Minimise the height and slope of batters. Minimise the drainage catchment. Ensure public safety	Final landform contours similar to proposed final landform contours.	Slope lengths in rehabilitated areas shall not exceed 20m for a 3H: 1V batter i.e., an earth bank shall be installed. Slope lengths in rehabilitated areas shall not exceed 30m for a 4H: 1V batter i.e., an earth bank shall be installed. Slope lengths in rehabilitated areas shall not exceed 40m for batters >4H: 1V i.e., an earth bank shall be installed.	Survey on completion by registered surveyor.	Upon completion of landform establishment phase.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Not commenced/ Post extraction completion
Minimise the drainage catchment. Ensure public safety Domain landform is effectively drained and protected from erosion	Landform drains towards water management domain	Final water body will be designed to Best Practice according to the 'Blue Book' Criteria for a 5 day 90th percentile storm event. All drains will be designed for the 1 in 10-year design storm event and do not re-entrain sediment. The dam spillway will be designed for the 1 in 100-year design storm event.	Existing dams currently meet capacity specifications (see SWMP). Final water body is designed to exceed the required capacity and will be assessed once complete. Inspection by quarry manager and suitably qualified person.	Visual Inspection on construction completion and monthly until completion.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Final Water Body construction not commenced/ Post extraction completion
Materials (including topsoils of the disturbed areas) are recovered, appropriately managed and used efficiently as resource in the rehabilitation	Available topsoils are stockpiled appropriately and reused on the site	Available topsoil is spread over final landform	Site contractor to record growth medium management procedures to the quarry manager. Records to include amounts stripped, locations and depths re-spread.	As required during construction.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Not commenced/ Post extraction completion
Ensure public safety Access tracks to be retained	Tracks suitable for private access or pedestrian usage	Slopes of major tracks <10° or have cross drains/banks installed. Where unsuitable soils are present, tracks to be stabilised with crushed bricks, concrete, gravel or similar.	Survey on completion by registered surveyor. Stabilisation methods to be recorded and reported by Site Contractor to the quarry manager.	Upon completion of landform establishment phase.	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Not commenced/ Post extraction completion
Domain 9 - Native Vegetation Conservation Area						
No activities within this domain are required during this phase						

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
Phase 3 - Growth Medium Development						
Domain A - Infrastructure						
No revegetation is to occur in this domain; therefore, no activities are required during this phase						
Domain B - Water Management						
No revegetation is to occur in this domain; therefore, no activities are required during this phase						
Domain C & D - Rehabilitation Area – Grassland/Woodland						
Domain landform is safe, stable and non-polluting. Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land. The quarry pit floor is landscaped and revegetated using improved pasture species, native trees and understorey species.	Compacted surfaces deep ripped to 300mm along contour.	Photographs of ripped areas	Inspection by quarry manager and suitably qualified person.	Following Deep ripping	EIS and this report	Not commenced/ Post landform establishment
	Hydromulch Area- Minimum 300mm of subsoil emplaced over deep ripped surface. Minimum of 100mm of topsoil emplaced over subsoil layer.	Small 'test pits' dug and photographed to show final media depth, report indicates required thicknesses achieved.	Photographs of test pits reported by quarry manager and/or suitably qualified person	Following spreading of soils.	EIS and this report	Not commenced/ Post landform establishment
	Buffer Setbacks and Embankments with 1V:3H Grade- Minimum 300mm of subsoil emplaced over deep ripped surface. Minimum of 100mm of topsoil emplaced over subsoil layer. Minimum of 75mm of organic mulch emplaced over topsoil.	Small 'test pits' dug and photographed to show final media depth, report indicates required thicknesses achieved.	Photographs of test pits reported by quarry manager and/or suitably qualified person	Following spreading of soils.	EIS and this report	Not commenced/ Post landform establishment
	Embankments Steeper than 1V:3H Grade- Minimum 300mm of subsoil emplaced over deep ripped surface. Minimum of 100mm of topsoil emplaced over subsoil layer. Jute matting pinned to topsoiled bank. Minimum of 75mm of organic mulch emplaced over topsoil.	Small 'test pits' dug and photographed to show final media depth and presence of jute matting, report indicates required thicknesses achieved.	Photographs of test pits reported by quarry manager and/or suitably qualified person	Following spreading of soils.	EIS and this report	Not commenced/ Post landform establishment

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
	Permanent Bundwalls- Minimum 300mm of topsoil emplaced over deep ripped surface. Jute matting pinned to topsoiled bank. Minimum of 75mm of organic mulch emplaced over topsoil.	Small 'test pits' dug and photographed to show final media depth and presence of jute matting, report indicates required thicknesses achieved.	Photographs of test pits reported by quarry manager and/or suitably qualified person	Following spreading of soils.	EIS and this report	Not commenced/ Post landform establishment
Domain J - Native Vegetation Conservation Area						
No activities within this domain are required during this phase						

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
Phase 4 - Ecosystem and Land use Establishment						
Domain A - Infrastructure						
No revegetation is to occur in this domain; therefore, no activities are required during this phase						
Domain B - Water Management						
Wetlands water management structure to remain therefore no activities required during this phase						
Domain C & D - Rehabilitation Area – Grassland/Woodland						
Domain landform is safe, stable and non-polluting. Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land. The quarry pit floor is landscaped and revegetated using improved pasture species, native trees and understorey species. ~~Re-establishment of a grassland/woodland community with a similar composition to the pre-disturbance community i.e. Shale-Sandstone Transition Forest.~~	Revegetation species mix applied as suggested in Rehabilitation Management Plan	A target coverage factor of 70% will be subject to further refinement. Low mortality of plants used in progressive revegetation with 75% becoming established 3 years.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EIS and Rehabilitation Management Plan	Not commenced/ Ongoing
	The rehabilitated area does not constitute an erosion hazard.	Total projected foliage cover is greater than or equal to 70%.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	DECC- Managing Urban Stormwater, EIS, SWMP and this report	Not commenced/ Ongoing
	Weeds not preventing revegetation from establishing	Weed cover no more than 25% over a 3-year monitoring period within any given areas where revegetation has occurred. Note that non-native species purposefully planted to control erosion are excluded from this target.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EIS and Rehabilitation Management Plan	Not commenced/ Ongoing
	Grazing by native and domestic fauna not adversely impacting on ecosystem development	Rural fences and gates installed around disturbed area to prevent grazing of domestic stock. Feral animal controls will be implemented if required.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EIS and Rehabilitation Management Plan	Not commenced/ Ongoing
	Branches and logs of any trees cleared on the site are to be spread within the rehabilitation areas to provide habitat for ground fauna	Evidence of logs and other fallen timber spread over re rehabilitated areas. Ground fauna species of similar diversity to adjacent areas of similar habitat.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EIS and Rehabilitation Management Plan	Not commenced/ Ongoing

Domain J - Native Vegetation Conservation Area						
Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land. ~~Ensure that the conservation areas are progressing towards the Shale-Sandstone Transition Forest vegetation community.~~	The rehabilitated area does not constitute an erosion hazard.	Total projected foliage cover is greater than or equal to 70%.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	DECC- Managing Urban Stormwater EIS	Not commenced/ Ongoing
	Weeds not overtaking existing vegetation	Monitoring confirms that after 2 years the non-native/non-target species (weeds) represents less than 20%of projected foliage cover or equivalent to surrounding vegetation not disturbed by mining activities.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EIS and Rehabilitation Management Plan	Not commenced/ Ongoing
	Grazing by native and domestic fauna not adversely impacting on ecosystem development	Rural fences and gates installed around disturbed area to prevent grazing of domestic stock. Feral animal controls will be implemented if required.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EIS and Rehabilitation Management Plan	Not commenced/ Ongoing

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
Phase 5 - Ecosystem and Land use Sustainability						
Domain A - Infrastructure						
No activities are required during this phase						
Domain B - Water Management						
Domain landform is safe, stable and non-polluting. ~~Water contained in the final landform is consistent with the baseline ecological, hydrological and geomorphic conditions of the surrounding environment.~~	Water quality monitoring results show that the final water body is non-polluting should it overtop and is suitable for stock water.	Water Quality meets the objective of Section 120 of the Protection of the Environment Operations Act 1997: and Water Quality meets the objective of the ANZECC Guidelines for 90% protection of freshwater ecosystems.	Water to be monitored for pH, Turbidity, Oil & Grease and TSS on a once off basis. NATA laboratory	Once off basis.	EA and Rehabilitation Management Plan	Not commenced/ Post completion
Domain C & D - Rehabilitation Area – Grassland/Woodland						
Landscaped and revegetated using improved pasture species, native trees and understorey species. ~~Re-establishment of a grassland/woodland community with a similar composition to the pre-disturbance community i.e. Shale-Sandstone Transition Forest.~~	Vegetation self-sustaining.	Monitoring confirms: - Evidence of new growth of endemic species. - Evidence of successive generations of endemic species - No further active weed control required (beyond that considered necessary at analogue sites).	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EA and Rehabilitation Management Plan	Not commenced/ Ongoing
	Rehabilitated areas to be linked to existing and future areas of vegetation where possible to form a network of wildlife corridors	Connectivity between current and future rehabilitated areas is established adjacent to existing and future areas of vegetation where possible. Patches are not to be separated by more than 10 metres where possible.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EA and Rehabilitation Management Plan	Not commenced/ Ongoing
	Rocks of varying sizes are to be spread over rehabilitated areas to provide ground fauna habitat and refuge.	Evidence of varying sized rocks between 20 mm and greater than 200 mm spread over rehabilitated areas. Ground dwelling fauna species of similar diversity to adjacent areas of similar habitat.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EA and Rehabilitation Management Plan	Not commenced/ Ongoing

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
	The provision of nest boxes for a range of arboreal fauna to be installed during the establishment of final rehabilitation areas	On completion of the rehabilitation, a suitably qualified ecologist determines the requirement on whether nest boxes are required. If nest boxes are required to be installed a nest box management plan will be prepared.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	On installation	EA and Rehabilitation Management Plan	Not commenced/ Ongoing
Domain J - Native Vegetation Conservation Area						
Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land. Conservation area is established and self-sustaining	Vegetation self-sustaining.	Monitoring confirms: - Evidence of new growth of endemic species. - Evidence of successive generations of endemic species - No further active weed control required (beyond that considered necessary at analogue sites).	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EA and Rehabilitation Management Plan	Not commenced/ Ongoing
	Conservation area to be linked to existing and future areas of vegetation where possible to form a network of wildlife corridors	Connectivity between conservation areas is established adjacent to existing and future areas of vegetation where possible. Patches are not to be separated by more than 10 metres where possible.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved	EA and Rehabilitation Management Plan	Not commenced/ Ongoing
	The provision of nest boxes for a range of arboreal fauna to be installed during the establishment of final rehabilitation areas	On completion of the rehabilitation, a suitably qualified ecologist determines the requirement on whether nest boxes are required. If nest boxes are required to be installed a nest box management plan will be prepared.	Monitoring including photography to be conducted by suitably qualified person and reported annually.	On installation	EA and Rehabilitation Management Plan	Not commenced/ Ongoing

Objective	Performance Indicator	Completion Criteria	Monitoring Methodology and Responsibility	Monitoring Frequency	Justification /Source	Current Progress and Expected Completion
Phase 6 - Relinquishment						
All Domains						
Relinquishment	Demonstrated compliance with all completion criteria	Outlined above	Completion Report to be prepared by suitably qualified person describing compliance with all criteria.	-	-	Not commenced
Minimise the socio-economic effects of quarry closure	Demonstrated compliance with all completion criteria		Completion Report to be prepared by suitably qualified person describing compliance with all criteria.	-	-	Not commenced

9 Monitoring and Maintenance

9.1 GENERAL

Monitoring of the rehabilitation of the site will be conducted on a monthly basis during the first 6 months establishment. After that time, if progress is satisfactory, inspections may be conducted on a quarterly basis until the completion criteria are met.

After the completion of permanent rehabilitation works, a monitoring and maintenance schedule is to be followed. This program will be prepared as part of the Quarry Closure Plan. Maintenance shall include but not limited to, the following items where and as required:

- Watering all landscaped areas.
- Monitoring germination, replacement planting and hydromulching.
- Weed control.
- Make good areas of soil subsidence or erosion.
- Topping up of mulched areas
- Spray/treatment for insect and disease control
- Monitoring and controlling feral fauna.

9.2 WATERING

All areas which have been hydromulched or pocket planted shall be watered in thoroughly following initial works. In the case of the hydromulch areas the wood-fibre should be kept moist until a satisfactory germination occurs. After this, sufficient watering must be kept up until the native plants have reached a stage where they can survive in their own right. In general, this means the rehabilitated areas shall be watered a minimum of 3 times per week during winter and 4 times per week during summer.

Watering shall preferentially be done by hand utilising dam water on site unless a suitable sprinkler system can be installed. Frequency of watering may be adjusted based on weather conditions, with the objective to ensure the maximum percentage of successful established plant stock.

9.3 MONITORING GERMINATION, REPLACEMENT PLANTING AND RE-HYDROMULCHING

Areas undergoing rehabilitation shall be continually monitored (see completion criteria for frequency) until well established, with unsuccessful planting being replaced in line with this report and the landscape specifications. Failed hydromulched areas will be resprayed. Note that native species in the hydromulch can be unreliable to germinate and it may take up to 3 to 12 months before a result is achieved.

Re-laid turf or grasses are to be visually monitored by the manager to ensure that sufficient cover is present to prevent a breach of air quality performance criteria and erosion impacts are minimised.

All replacements shall be to a specification and of a size equivalent to similar healthy species surrounding the rejected plant, or, as in the case of mature trees, to the original size and quality as a minimum.

9.4 WEED CONTROL

The rehabilitation areas will be inspected monthly after establishment for a period of six months. After that time 6 monthly inspections will be undertaken to determine the impact of weeds. Spot spraying and other control methods described in *Section 7.2.5* will be undertaken as required.

9.5 INSECT, DISEASE CONTROL AND CONTROL OF RABBITS

As described in the EA, the landscape contractor shall become familiar with the healthy appearance of the plant material and constantly monitor it for damage or pest infestations. When either of these become evident the contractors shall immediately apply the necessary control measures.

If newly planted areas are becoming subject to rabbit attack, it may be necessary to install rabbit proof fencing to the area of rehabilitation to ensure minimal damage is done.

9.6 EROSION

The rehabilitation areas will be inspected monthly after establishment for a period of six months. After that time 6 monthly inspections will be undertaken to determine evidence of erosion. Any areas of erosion will be remediated by replacing soil where applicable, applying ameliorants as recommended by a qualified specialist and revegetated as required.

9.7 MONITORING AND MAINTENANCE SCHEDULE

The following table summarises the monitoring schedule for the rehabilitation of the site.

Table 30. Monitoring and Maintenance Schedule

Item	Details	Monitoring/Maintenance Frequency
General	Monitoring after rehabilitation establishment	Monthly for the first 6 months. Quarterly until completion criteria met.
Erosion	Evidence of erosion over rehabilitation areas.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved
Vegetation	Watering of rehabilitation vegetation	Preferably 3 times per week during winter and 4 times per week during summer.
	Achievement of 70% ground coverage of revegetation after establishment.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved
	Vegetation self-sustaining i.e. • Evidence of new growth of endemic species; • Evidence of successive generations of endemic species; and • No further active weed control required (beyond that considered necessary at analogue sites).	Monthly for the first 6 months, then 6 monthly until completion criteria achieved
Weed Inspection and Spraying	The non-native/non-target species (weeds) represents less than 20% of projected foliage cover.	Monthly for the first 6 months. 6 monthly until completion criteria met.

Item	Details	Monitoring/Maintenance Frequency
Pest Inspection and Control	Grazing by native and domestic fauna not adversely impacting on ecosystem development.	Monthly for the first 6 months, then 6 monthly until completion criteria achieved
Water management structures	Dams to be monitored for effectiveness in sediment containment i.e., have sufficient capacity.	Monthly until completion criteria met.
	Sediment dams are not discharging dirty water	On construction completion and monthly until completion
	Dirty water is not entering the final water body at completion of rehabilitation works.	On construction completion and monthly until completion criteria met.
Topsoil and Subsoil Volumes	Recording of the amounts and locations of stripped topsoil and subsoils during land clearing.	As required during land clearing.

10 Intervention and Adaptive Management

10.1 THREATS TO REHABILITATION

A summary of hazards or threats identified for the rehabilitation objectives is given below, along with a risk assessment. For risks deemed higher than acceptable (namely I to III in *Table 31*), a Trigger Action Response Plan (TARP) has been developed. A TARP identifies proposed contingency strategies in the event of unexpected variations in rehabilitation outcomes. These risks have been determined on the assumption that procedures and mitigation measures outlined in this report and other standard procedures that could be reasonably expected have been undertaken.

Table 31. Analysis of Rehabilitation Threats

Rehabilitation Threat	Potential Adverse Outcome	Likelihood	Consequence	Risk	Tarp No
Failure to remove infrastructure and services not suitable for the final landuse.	Unable to complete rehabilitation or establish the identified final landuse.	Rare	Insignificant	V	-
Failure to remove all roads and hardstand areas to be retained for the final landuse and reduce the width/size to that suitable for the final landuse.	Unable to complete rehabilitation or establish the identified final landuse.	Rare	Insignificant	V	-
Domain is not free from hazardous materials.	Unable to complete rehabilitation or establish the identified final landuse.	Rare	Moderate	IV	-
Water discharged from the site is not consistent with the baseline ecological, hydrological and geomorphic conditions of the surrounding environment.	The final landform is a source of pollution.	Unlikely	Minor	IV	-
Final landform does not conform to approved final landform	Unable to complete rehabilitation or establish the identified final landuse.	Possible	Moderate	III	1

Rehabilitation Threat	Potential Adverse Outcome	Likelihood	Consequence	Risk	Tarp No
Domain landform is not safe, stable and secure, fit for the purpose of the intended final land use.	Geotechnical instability of the final open cut void.	Unlikely	Moderate	III	2
Domain landform is not properly protected from erosion.	The final landform is a source of pollution.	Rare	Moderate	IV	-
	Vegetation is unable to be established due to erosion.	Rare	Major	III	3
Access tracks to be retained are not retained.	Unable to complete rehabilitation or establish the identified final landuse.	Rare	Insignificant	V	-
Incorrect species established on final landform	Vegetation community does not become established on final landform affecting final land use and ecosystem	Unlikely	Moderate	III	4
Failure to establish soil/growing medium suitable for establishment of grassland or woodland vegetation community	Insufficient soil available for rehabilitation.	Possible	Moderate	III	5
	Inadequate soil thickness applied to final landform	Possible	Moderate	III	5
	Soil not capable of sustaining vegetation community	Possible	Moderate	III	5
Weed or pest management fails	Weeds and pests become established and require significant resources to manage	Possible	Minor	IV	-
Vegetation community is not self-sustaining	Final landform requires significantly more management than analogue sites.	Possible	Moderate	III	6
Vegetation community not receiving adequate rainfall to establish/self-sustain	Failure of vegetation community	Possible	Moderate	III	7
Public access to open cut void possible	Damage to rehabilitation areas	Possible	Moderate	III	8

10.2 TRIGGER ACTION RESPONSE PLAN

Table 32. Trigger Action Response Plan

TARP Ref No	Rehabilitation Threat	Potential Adverse Outcome	Trigger level	Actions to be implemented	Evidence / Reference
1	Final landform does not conform to approved final landform.	Stockpiles not removed/used in the establishment of the final landform.	- Inventory indicates stockpiles are not removed/reused. - Slopes required by the final landform are not obtained due to material deficits.	Stockpile material is to be removed from the site or incorporated into the rehabilitation of the final landform.	Survey plan
		Overburden not used in the establishment of the final landform	- Inventory indicates stockpiles are not removed/reused. - Slopes required by the final landform are not obtained due to material deficits.	Overburden material is to be removed from the site or incorporated into the rehabilitation of the final landform.	Survey plan
		Slopes too steep to be rehabilitated as planned	Field slope measurements taken during land forming activities indicate slopes do not meet the completion criteria.	Slopes to be reduced until all slopes meet approved final landform unless final landform considered stable by geotechnical review and vegetation establishment success meets completion criteria- subject to approval by DPE	Survey plan prepared by surveyor indicates that final slopes meet approved final landform.

TARP Ref No	Rehabilitation Threat	Potential Adverse Outcome	Trigger level	Actions to be implemented	Evidence / Reference
2	Domain landform is not safe, stable and fit for the purpose of the intended final land use.	Geotechnical instability of the final open cut void.	Monitoring or final closure geotechnical assessment identifies instability/unacceptable movement (actual or potential) in final face of open cut void.	- Suitably qualified geotechnical engineer engaged to assess the instability and provide a range of recommendations to remediate the instability - Recommendation to be implemented in consultation with the DPE.	Geotechnical Report
3	Domain landform is not properly protected from erosion.	Vegetation is unable to be established due to erosion.	Projected total foliage cover is less than 70%	- Mine personnel identify site of erosion and remediate through additional earthworks, soil works including addition of ameliorants, supplementary revegetation or other stabilisation method. - If the above is unsuccessful, a suitably qualified professional in sediment and erosion control will be engaged to prepare and assessment report and recommendations to be implemented.	Managing Urban Stormwater 'Blue Book' 2004 CPESC Report

TARP Ref No	Rehabilitation Threat	Potential Adverse Outcome	Trigger level	Actions to be implemented	Evidence / Reference
		Final landform is a source of pollution.	Surface water monitoring records indicate that water quality levels are outside the completion criteria. Visual inspection indicates that the final landform is the source of unacceptable levels of sedimentation or is actively eroding.	- Mine personnel identify site of erosion and remediate through additional earthworks, soil works including addition of ameliorants, supplementary revegetation or other stabilisation method. - If the above is unsuccessful, a suitably qualified professional in sediment and erosion control will be engaged to prepare and assessment report and recommendations to be implemented.	Managing Urban Stormwater 'Blue Book' 2004 CPESC Report

TARP Ref No	Rehabilitation Threat	Potential Adverse Outcome	Trigger level	Actions to be implemented	Evidence / Reference
4	Incorrect species established on final landform	Vegetation community does not become established on final landform affecting final land use and ecosystem.	Monitoring indicates that endemic species represent less than 70% of the total species number and projected foliage cover after 2 years from planting and less than 80% after 5 years from planting.	Suitably qualified ecologist or revegetation expert engaged to assess reasons for divergence of failure of endemic species establishment and recommend actions to ensure that the final vegetation community corresponds as closely as possible to the approved community. Additional actions may include: • Sowing of additional seed mix for targeted species or additional species endemic to the pre-disturbance community; • Use of Tubestock, seed and mulch mix or other application techniques; • Soil amelioration works such as addition of fertiliser; and • Additional weed control activities (mechanical and/or chemical).	Ecologist Report

TARP Ref No	Rehabilitation Threat	Potential Adverse Outcome	Trigger level	Actions to be implemented	Evidence / Reference
5	Failure to establish soil/growing medium suitable for establishment of grassland or woodland vegetation community.	Insufficient soil available for rehabilitation.	Soil inventory prior to rehabilitation (particularly stockpile volumes) indicates a deficit of soil material.	- Suitable sources of additional soil material to be identified, including the need for importation of soils from off-site. - Investigation into measures that may be implemented to ameliorate other materials to make them suitable for use as a growth medium.	Annual reporting and scheduled audits/ This report
		Inadequate soil thickness applied to final landform	Test pits following placement of soil material identifies placed soil thickness not consistent with final approved soil thickness.	Additional soil material spread on the final landform.	Annual reporting and scheduled audits/ This report
		Soil not capable of sustaining vegetation community	Topsoil parameters not within the identified criteria (criteria to be determined).	Suitably qualified agronomist or soil scientist engaged to prepare a report including a range of recommendations to ensure that the identified criteria are achieved/soil is suitable for sustaining the vegetation community.	Soil analysis reports and interpretation by qualified specialist.

TARP Ref No	Rehabilitation Threat	Potential Adverse Outcome	Trigger level	Actions to be implemented	Evidence / Reference
6	Vegetation community is not self-sustaining	Final landform requires significantly more management than analogue sites (analogue sites yet to be established).	Monitoring indicates that: - Established vegetation is not replacing itself through successive generations; or - Weed growth is increasing above a projected foliage cover of 20%.	Suitably qualified ecologist or revegetation expert engaged to assess reasons for additional management requirements and recommend actions to align management required with that of the analogue sites. Additional actions (to be undertaken in targeted areas) may include: - Sowing of additional seed mix for targeted species or additional species endemic to the pre-disturbance community; - Use of Tubestock, seed and mulch mix or other application techniques; - Soil amelioration works such as addition of fertiliser; and - Additional weed control activities (mechanical and/or chemical) and/or pest management as required (especially of rabbits).	Ecologist Report
7	Vegetation community not receiving adequate rainfall to establish/self-sustain	Failure of vegetation community	Rainfall below the lowest 10% of records for greater than 3 months	Water cart to be utilised over revegetated areas.	BOM website

TARP Ref No	Rehabilitation Threat	Potential Adverse Outcome	Trigger level	Actions to be implemented	Evidence / Reference
8	Public access to open cut void possible	Damage to rehabilitation areas	Monitoring indicates evidence of trespassing and/or damage to rehabilitation areas.	Appropriate fencing, signage and bunding is to be repaired and maintained.	Annual reporting and scheduled audits/ This report

11 Conservation and Rehabilitation Bond

Consent condition 61 states:

'By 31 December 2017, the Applicant shall lodge a Conservation and Rehabilitation Bond with the Department to ensure that the management of biodiversity and the rehabilitation of the site are implemented in accordance with the performance and completion criteria set out in the Flora and Fauna Management Plan and Landscape and Rehabilitation Plan. The sum of the bond shall be determined by:

(a) calculating the cost of rehabilitating the site taking into account the likely surface disturbance over the following 3 years of quarrying operations; and

(b) employing a suitably qualified quantity surveyor or other expert to verify the calculated costs, to the satisfaction of the Secretary.

Note: If the rehabilitation of the site is completed to the satisfaction of the Secretary, then the Secretary will release the bond. If the rehabilitation of the site is not completed to the satisfaction of the Secretary, then the Secretary will call in all or part of the bond and arrange for the completion of the relevant works.'

The Bond will be calculated in accordance with the Resource Regulators current calculation tool by Lisa Thomson or Greg Thomson of VGT, as approved by the DPE on 2/11/2021. The most recent version of the Bond calculation is included in *Appendix B*, along with the approval of the experts. The Bond will be reviewed every 3 years and the amount amended with the DPE as required.

12 Reporting

Copies of this plan, along with the complete Environmental Management Plan, will be available to Council, EPA, DPE Water and on a publicly available website within 14 days of approval by the Secretary.

12.1 ANNUAL REVIEW AND CONDITIONS COMPLIANCE REPORT

Items regarding *rehabilitation activities* to be reported in the Annual Review (Condition 66) and the Conditions Compliance Report (Condition 6) are listed below:

- Areas temporarily and progressively rehabilitated;
- Procedures used and the progress towards completion criteria;
- Monitoring activities undertaken and a report on their effectiveness;
- Summaries of imported materials and examples of reports received; and
- Calendar year and cumulative total for imported ENM/VENM materials.

12.2 INCIDENTS AND NON-COMPLIANCES

Any incidents, complaints, non-compliances or exceedances will be managed and reported according to the procedures outlined in the OEMP and the Pollution Incident Response Management Plan (PIRMP) required by the EPA and includes the following:

- **Incident Notification-** The DPE will be immediately notified and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing via the Major Projects Website and identify the DA and name and set out the location and nature of the incident.
- **Non- Compliance Notification-** Within 7 days of becoming aware of a non-compliance, the DPE will be notified. The notification must be in writing via the Major Projects Website and identify the DA and name and set out the consent that the site is not compliant with, the way on which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

12.3 COMPLAINTS

All complaints will be recorded in a logbook and managed in accordance with the EMP Complaints Management and Incident Response section.

13 Review

A Landscape and Rehabilitation Management Plan (this report) has been prepared to satisfy condition 60, including a program to monitor and report on the effectiveness of measures developed to ensure compliance with the rehabilitation objectives, and progress towards the completion criteria. This Plan will also identify potential risks to the success of the rehabilitation and contingency measures that will be undertaken to mitigate these risks.

The plan will be updated each 3-year period following the 3 years covered by the initial approval of the plan (initial approval of plan dated 22nd August 2018).

A review of the Plan will be undertaken as required by Condition ~~6 and~~ 67:

Revision of Strategies, Plans and Programs

67. Within 3 months of the submission of:

(a) an annual review under Condition 66 above;

(b) an incident report under Condition 68 below;

(c) an audit report under Condition 70 below; or

(d) any modification to the conditions of this Consent (unless the conditions require otherwise),

The Applicant shall review, and if necessary, revise, the strategies, plans, and programs required under this Consent to the satisfaction of the Secretary.

Where this review leads to revisions in any such document, then within 4 weeks of the review, unless the Secretary agrees otherwise, the revised document must be submitted to the Secretary for approval.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.

14 Responsibility

The Plant Manager is responsible for ensuring rehabilitation activities, both temporary and permanent are implemented according to this Plan and the EA, and that these areas are appropriately monitored and maintained. The Plant Manager may engage a specialist to perform some of these tasks.

The Environmental Manager is responsible for ensuring this plan is reviewed and updated every three years or as required by the consent conditions.

All staff and visitors are responsible for being aware of the location of rehabilitation areas and ensuring these areas are preserved. Any observed failure or disturbance is to be reported to the Plant Manager.

15 **References**

- Ref 1 Nexus Environmental Planning Pty Ltd. (May 2015). Environmental Assessment Section 75W Mod 3.
- Ref 2 Nexus Environmental Planning Pty Ltd. (November 1999). Environmental Impact Statement.
- Ref 3 Nexus Environmental Planning Pty Ltd. (September 2015). Environmental Assessment Section 75W Mod 2.
- Ref 4 NSW Department of Planning and Environment. (March 2016). DA 267-11-99.
- Ref 5 NSW EPA. Environment Protection Licence 6535.
- Ref 6 VGT Environmental Compliance Solutions Pty Ltd Operations Environmental Management Plan.
- Ref 7 Umwelt Pty Ltd (December 2019). Statement of Environmental Effects, Modification 4.

Appendix A

Consultation with DPE

Ms Lisa Thomson
Principal Environmental Consultant
VGT – Environmental Compliance Solutions
PO Box 2335
Greenhills NSW 2323

Email: Lisa@vgt.com.au

Dear Ms Thomson

**Roberts Road Quarry – Modification 2 (DA 267-11-99 MOD 2)
Environmental Management Plans**

I refer to your email dated 15 November 2017 submitting revised management plans for the Roberts Road Quarry (DA 267-11-99) including the:

- Groundwater Study, dated October 2017 (condition 39 of Schedule 2);
- Water Management Plan, dated November 2017 (condition 42, Schedule 2); and
- Groundwater Monitoring Program, dated November 2017 (condition 43, Schedule 2).

I also refer to your email dated 29 June 2017 submitting the Landscape and Rehabilitation Management Plan, dated June 2017 (condition 60, Schedule 2).

The Department considers that these documents have not adequately addressed the relevant conditions of consent. The Department's comments on these documents are enclosed in **Attachment A**.

The Department notes that the Department of Industry – Water has also provided comments in relation to the water management plans. Please ensure these comments are satisfactorily addressed prior to resubmitting these plans.

The Department requests that these documents are revised and re-submitted no later than **23 March 2018**.

Should you have any enquiries in relation to this matter, please contact Jack Murphy at the details above.

Yours sincerely,



Howard Reed
Director
Resource Assessments
As nominee of the Secretary

8.2.18

Landscape and Rehabilitation Management Plan – condition 60, Schedule 2	Satisfactory (Yes/No)	Comment	Action Required
The Applicant shall prepare a Landscape and Rehabilitation Management Plan for the development to the satisfaction of the Secretary. This plan must:			
a) be submitted to the Secretary for approval by 30 June 2017, unless otherwise agreed by the Secretary;	Yes	-	Nil actions required, other than those set out in the Comments and General Comments below.
b) provide details of the conceptual final landform and associated land uses for the site;	No	The conceptual final landform is reliant on the agree wet weather high groundwater level. This has not yet been approved.	
c) describe the short, medium and long-term measures that would be implemented to ensure compliance with the rehabilitation objectives and progressive rehabilitation obligations in this consent;	Yes	Sections 4.4 and 4.5.	
d) a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3 year period following the 3 years covered by the initial approval of the plan) including the procedures to be implemented for:			
maximising the salvage of environmental resources within the approved disturbance area for beneficial reuse;	Yes		Nil actions required, other than those set out in the Comments and General Comments below.
protecting vegetation and fauna habitat outside the approved disturbance area on-site;	Yes		
minimising the impacts on native fauna;	Yes		
landscaping the site to minimise visual and lighting impacts;	Partial	What is the timeframe for screening to be fully established?	
reviewing improved pasture species and application rates;	Yes	Section 5.5	
controlling weeds and feral pests;	Partial	Section 6.2.4 notes that 'regular' weed removal shall be conducted. Please specify the frequency of weed and pest inspections to determine if action is required.	
controlling erosion;	Yes		
controlling access; and	Yes		
bushfire management;	Yes		
e) include a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;	Yes		
f) include a mass balance calculation to ensure that appropriate volumes of material are available to implement the final landform as described in this plan;	Yes		
g) provide for the construction and maintenance of the process water dam in accordance with the approved design and construction criteria (see Condition 42(b));	No	Construction methodology of the process dam not provided.	
h) identify the potential risks to the successful rehabilitation of the site, and include a description of the contingency	Yes	Section 6.2	

measures that would be implemented to mitigate these risks; and			
i) include details of who would be responsible for monitoring, reviewing, and implementing the plan.	Yes	Section 11	
Other Comments			



Ms Lisa Thomson
Principal Environmental Consultant
VGT – Environmental Compliance Solutions
PO Box 2335
Greenhills NSW 2323

Email: Lisa@vgt.com.au

Dear Ms Thomson

**Roberts Road Quarry – Modification 2 (DA 267-11-99 MOD 2)
Environmental Management Plans**

The Department has reviewed the following revised management plans for the Roberts Road Quarry (DA 267-11-99) including the:

- Groundwater Study, dated April 2018 (condition 39 of Schedule 2);
- Water Management Plan, dated July 2018 (condition 42, Schedule 2);
- Groundwater Monitoring Program, dated July 2018 (condition 43, Schedule 2); and
- Landscape and Rehabilitation Management Plan, dated May 2018 (condition 60, Schedule 2).

The Secretary has approved the above-mentioned plans. Please ensure these plans are made available on the company's website.

Should you have any enquiries in relation to this matter, please contact Jack Murphy at the details above.

Yours sincerely,

Howard Reed
Director
Resource Assessments
As nominee of the Secretary

22.8.18

Appendix B

Rehabilitation Bond

Lisa Thomson
VGT Environmental Compliance Solutions Pty Ltd.
PO Box 2335
Greenhills, New South Wales, 2323

02/11/2021

Dear Lisa

Roberts Road Quarry (DA267-11-99)
Approval of Qualified Experts

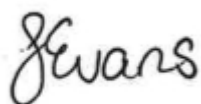
I refer to your letter dated 5 October 2021 requesting approval of suitably qualified persons to prepare the Conservation and Rehabilitation Bond as required by condition 61 of Schedule 2 for the Roberts Road Quarry.

I have reviewed the nominations and information you have provided and consider that the nominees are suitably qualified and experienced. Consequently, I can advise that I approve the appointment of Lisa Thomson and Greg Thomson to prepare the Conservation and Rehabilitation Bond.

Regarding your question about the Rehabilitation Cost Estimation (RCE) Tool, I refer you to condition 61(b) of Schedule 2 which states the sum of the bond shall be determined by suitably qualified expert.

If you have any further questions, please contact Lincoln de Haas on Lincoln.deHaas@dpie.nsw.gov.au

Yours sincerely

A handwritten signature in black ink that reads 'Jessie Evans'.

Jessie Evans
Director
Resource Assessments

As nominee of the Secretary

Site Registration

Date

July

2023

Complete the following fields prior to calculating the Security Deposit.

Mine Name:	Roberts Road Sand Quarry, Maroota		
Lease(s):	None		
Title Holder:	None		
Mine Operator:	Hodgsons Quarries and Plant Pty Ltd		
Term of RCE:	3 years		
Current Security:		Date of last Security Deposit review	
Mine Contact:	Martin Hodgson		
Position:	Quarry Manager		
Address:	PO Box 355		
	Glenorie NSW 2157		
Phone:	0408 251 393	Email:	hodgsonquarries@gmail.com

Site Description

The following site specific information is requested to provide background information in the context of calculating the Security Deposit.

Summary of Mine Activities

Total annual production (tonnes):	480,000
Mine lease area (ha):	N/A
Area of extraction (ha):	18.9
Area of disturbance (ha):	18.9
Rehabilitation in progress (ha):	0
Rehabilitation complete (ha):	0
Achieved ecosystem sustainability	
Forward Program/MOP Utilised:	LRMP July 2023
Reference no. version and date	
Forward Program/MOP Plan Utilised:	1
Reference Plan no. version and date	
	2
	3

☐ Plan(s) attached

NOTE:
Ensure rehabilitation cost estimation reflects all environmental issues affecting the lease. Contingencies should be allocated where costs have not been incorporated elsewhere in the estimation.

Environmental Sensitivities

Surrounding land use (tick all that apply):

- ☒ Cropping
- ☒ Pasture
- ☐ Forest
- ☐ Undisturbed habitat
- ☒ Urban

Environmental Issues affecting site (tick all that apply)

- ☐ Threatened flora
- ☐ Threatened fauna
- ☐ Cultural heritage items
- ☐ Natural heritage features
- ☐ Mine subsidence
- ☐ Surface water pollution
- ☐ Ground water pollution
- ☐ Hydrocarbon contamination
- ☐ Methane drainage/venting
- ☐ Spontaneous combustion
- ☐ Acid Mine Drainage
- ☐ Within drinking water catchment
- ☐ Other (describe below)



Open Cut Summary Rehabilitation Cost Estimation

Note: Sections of this page are automatically filled in from the registration page

Mine Name:	Roberts Road Sand Quarry, Maroota		
Lease(s):	None		
Authorisation Owner:	None		
Mine Operator:	Hodgsons Quarries and Plant Pty Ltd		
Term of RCE:	3 years		
Current Security:		Date of Last Security Deposit Review:	
Mine Contact:	Martin Hodgson		
Position:	Quarry Manager		
Address:	PO Box 355 Glenorie NSW 2157		
Phone:	0408 251 393	Email:	hodgsonquarries@gmail.com

Domain		Security Deposit
Domain 1: Infrastructure		\$100,110
Domain 2: Tailings & Rejects		
Domain 3: Overburden & Waste		
Domain 4: Active Mine & Voids		\$158,998
Domain 5: Management Activities		\$26,000
Subtotal (Domains and Sundry Items)		\$285,108
Contingency	5%	\$14,255
Post Closure Environmental Monitoring	3%	\$7,128
Project Management and Surveying	3%	\$7,128
Total Security Deposit for the Mining Project (excl. of GST)		\$313,619

Note: GST is not included in the above calculation or as part of rehabilitation security deposits required by the Department.

- ☐ Alterations have been made to unit prices within this spreadsheet. (Attach a separate sheet providing details of changes).
- ☐ The proposed rehabilitation design is generally consistent with the development consent for the project.

This Registration Form, Summary Report and calculation pages are to be printed and attached as an appendix the AEMR or MOP.

This mine security calculation has been estimated using the best available information at the time.
It is a true and accurate reflection of the total rehabilitation liability held by this mine.

Martin Hodgson
Company Representative's Name

31/07/2023
Date

Quarry Manager
Company Representative's Role / Responsibility

Signature

Open Cut Operations

Domain 1a: Infrastructure

Total Cost for Infrastructure Domain

\$100,110

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Termination of Services and Demolition Works	Disconnect and terminate services at remote areas (i.e. pump stations, remote workshops, sewage treatment plant etc.)	Y	1	allow	\$5,850		\$5,850	Electricity supply to plant area to be disconnected	Used for infrastructure remote from primary connection. Can also be used for small mines / quarries that do not have dedicated supplies from supply authorities such as steel lattice power lines.
	Demolish and remove demountable structures on concrete stumps. Assumes not being re-used	Y	160	m2	\$40.00		\$6,400	Includes small demountable structures in the plant area.	Crib huts, temporary offices and other 'non permanent' structures. Does not include transport to regional disposal facility or equivalent.
	Remove pump and pontoon from small lake or dam including pipes and electrical supply or diesel tank/s	Y	1	allow	\$20,000.00		\$20,000	Remove process dam pontoons, pipes and remove bore	Includes equipment for retrieval - boats, etc. and labour. Does not include transport to regional disposal facility or equivalent.
	Remove concrete pads & footings (<300 mm thickness) and disposal on-site/locally	Y	800	m2	\$36.00		\$28,800	Concrete pad in processing area	Breaking up slab and disposal or for conversion to aggregate. Generally haulage rates will be \$0.60 - \$1.20 / km, depending on truck fleet, loaders etc. For off-site disposal use alternate rate option and add \$0.90 / km for transport.
	Waste disposal to Council landfill (general waste) - haulage >10 km but <15 km	Y	100	tonne	\$7.00		\$700	General waste	Rate accounts for round trip haulage to Council landfill but excludes landfill fees. Input quantity against Waste disposal to Council landfill - fees for relevant waste type.
	Waste disposal to Council landfill (industrial demolition / concrete / scrap metal) - haulage >10 km but <15 km	Y	100	tonne	\$32.00		\$3,200	Scrap metal and pipes	Rate accounts for round trip haulage to Council landfill but excludes landfill fees. Input quantity against Waste disposal to Council landfill - fees for relevant waste type.
	Waste disposal to Council landfill - fees (general waste)	Y	100	tonne	\$193.00		\$19,300	Fees for above waste	Fee for waste disposal of general waste to local Council landfill; transport rates separate. Please note that this is not applicable to operations with approval for building and demolition waste disposal on site.
Termination of Services and Demolition Works Subtotal							\$84,250		
Rail Infrastructure Subtotal							\$0		
Contaminated Materials Subtotal							\$0		
Vents, Shafts and Boreholes Subtotal							\$0		
Roads and Tracks Subtotal							\$0		
Earthworks / Structural Works (Landform Establishment)	Minor reshaping and pushing	Y	2	ha	\$3,900	\$1,600	\$3,200	D10 and grader too large for project. D6 and excavator suitable	D10 Dozer @ \$400 per hour and 16 H grader @ \$230 per hour (50% utilisation).
	Trim, rock rake & deep rip (includes levelling / landscaping and rip in 1 direction)	Y	2	ha	\$1,130.00	\$565.00	\$1,130	D10 and grader too large for project. D6 and excavator	Undertaken using D10 dozer and 16M grader.
Earthworks / Structural Works (Landform Establishment) Subtotal							\$4,330		
Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment)	Source, cart and spread growth media - haul distance <1 km	Y	2000	m3	\$3.26	\$1.63	\$3,260	<=1km 623 scraper and 14M grader too large for project. D6 dozer would suffice	Undertaken with 623 scraper and 14 M grader.
	Direct seeding / fertiliser (tree or native grass species)	Y	2	ha	\$4,135		\$8,270		Includes treating, weighing, mixing with fertiliser + spreading by tractor or helicopter (aerial seeding).
Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal							\$11,530		
Water Management Subtotal							\$0		
Maintenance of Rehabilitated Areas Subtotal							\$0		
Additional Items Subtotal							\$0		
Total Cost for Infrastructure Domain							\$100,110		

Open Cut Operations**Domain 2a: Tailings & Rejects****Total Cost for Tailings & Rejects Domain****\$0**

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
	Contaminated Materials Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Mine Waste Subtotal						\$0		
	Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal						\$0		
	Water Management Subtotal						\$0		
	Maintenance of Rehabilitated Areas Subtotal						\$0		
	Additional Items Subtotal						\$0		
Total Cost for Tailings & Rejects Domain							\$0		

Open Cut Operations**Domain 3a: Overburden & Waste****Total Cost for Overburden & Waste Domain****\$0**

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
	Contaminated Materials Subtotal						\$0		
	Roads and Tracks Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Mine Waste Subtotal						\$0		
	Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal						\$0		
	Water Management Subtotal						\$0		
	Maintenance of Rehabilitated Areas Subtotal						\$0		
	Additional Items Subtotal						\$0		
	Total Cost for Overburden & Waste Domain						\$0		

Open Cut Operations

Domain 4a: Active Mine & Voids

Total Cost for Active Mine & Voids Domain

\$158,998

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Open Cut Subtotal							\$0		
Earthworks / Structural Works (Landform Establishment)	Minor reshaping and pushing	Y	18.9	ha	\$3,900	\$1,950	\$36,855	D10 and grader too large for project. D6 and excavator	D10 Dozer @ \$400 per hour and 16 H grader @ \$230 per hour (50%)
	Trim, rock rake & deep rip (includes levelling / landscaping and rip in 1 direction)	Y	18.9	ha	\$1,130.00	\$565.00	\$10,679	D10 and grader too large for project. D6 and excavator suitable	Undertaken using D10 dozer and 16M grader.
Earthworks / Structural Works (Landform Establishment) Subtotal							\$47,534		
Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment)	Source, cart and spread growth media - haul distance <1 km	Y	18900	m3	\$3.26	\$1.63	\$30,807	< =1km 623 scraper and 14M grader too large for project. D6 dozer would suffice	Undertaken with 623 scraper and 14 M grader.
	Direct seeding / fertiliser (tree or native grass species)	Y	18.9	ha	\$4,135		\$78,152		Includes treating, weighing, mixing with fertiliser + spreading by tractor or helicopter (aerial seeding).
	Supply from external sources a combination of virgin excavated natural material (VENM) and spoil from large excavation for filling voids and/or capping etc.	Y	640000	m3	\$72.50	\$0.00	\$6	Approx 960,000 tonnes of VENM imported over 3 years. Reduced cost to zero as already underway. Push up cost elsewhere	D10 push into void at \$270/hr. Excavator (\$220/hr) load Artic Trucks (90c/km) from imported stockpile - allow nominal rate of \$60/m3 for imported fill material.
Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal							\$108,965		
Water Management	Clean water dams to be retained after decommissioning – make safe and minor earthworks	Y	1	allow	\$2,500		\$2,500	Process dam to be converted to clean water in final landform	Provisional sum for earthworks and revegetation required to rehabilitate dam batters etc suitable for re-use by an alternate land-user - D6 Dozer (or similar) @ ~\$200 per hour and pasture
Water Management Subtotal							\$2,500		
Maintenance of Rehabilitated Areas Subtotal							\$0		
Additional Items Subtotal							\$0		
Total Cost for Active Mine & Voids Domain							\$158,998		

Open Cut Operations

Domain 5a: Management Activities

Total Cost for Management Activities

\$26,000

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Water Management	On-site treatment of contaminated water due to high salt (includes removal of metals etc, brine disposal and cost of mobile water treatment unit)	N		ML	\$3,600				Rate can fluctuate depending on treatment type however this is a suitable standard rate for current programs at mining operations.
	On-site treatment of contaminated water due to low pH (includes removal of metals etc, neutralisation treatments and cost of mobile water treatment unit)	N		ML	\$1,500				Rate can fluctuate depending on treatment type however this is a suitable standard rate for current programs at mining operations.
Water Management Subtotal							\$0		
Creek Diversions	Repairs and/or stabilisation of new or compromised water course diversion	N		m	\$2,500				Assumes material is suitable for revegetating and has a reasonable chance of stabilising.
	Long term maintenance of water course diversion – Channel constructed through backfilled material	N		m	\$1,500				Assumes maintenance has been kept up and significant works are not required.
	Long term maintenance of water course diversion – Channel constructed through competent material	N		m	\$750.00				Assumes maintenance has been kept up and significant works are not required.
	Installation of rock armouring	N		m2	\$6.00				Assumes competent material is locally available - multiply costs by 2 for sourcing and transporting from offsite
Creek Diversions Subtotal							\$0		
Maintenance of Rehabilitated Areas	Pest management on buffer lands, non-disturbed, and rehabilitated areas	N		ha	\$150.00				Feral animal baiting programs if required and waste materials required to be removed.
	Land management of undisturbed areas (rehabilitation, weeds, ferals, erosion and sediment control works)	N		ha	\$400.00				Undisturbed areas within the lease boundary that require land management activities.
Maintenance of Rehabilitated Areas Subtotal							\$0		
Heritage Items	The restoration and care and maintenance of items that have heritage significance	N		allow	Use alternate rate cell				Item for the redistribution of Aboriginal artefacts, preservation of European heritage items or a combination of activities.
Heritage Items Subtotal							\$0		
Sundry Items	Development of an 'Unplanned' Project Closure Plan - State Significant Development with closure planning well progressed i.e. preferred cover design, closure environment modelled e.g. groundwater /subsidence / pit lakes, preliminary seal designs, etc. and only finalisation of detailed engineering designs required	Y	1	allow	\$100,000	\$20,000	\$20,000	Cost reduced due to small scale of project and works underway	Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Assumes outcomes of studies readily available including modelling, landform design, geochemistry, demolition, etc. Costs to finalise options by domain and finalise designs for construction. Assume a simple site e.g. single open cut, no legacy operations historic in the area, little social dependence, etc. Depending on site size, complexity, final land use requirements and knowledge base investigations can range from ~\$75k to >\$1 M. Sites with more than 1 pit to add
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with at least ≥2 of the following aspects requiring closure planning, but no significant issues realised at this time: previous subsidence, medium or higher geochemistry risk and/or spontaneous combustion propensity, known/ likely contamination, tailings / rejects, final void	N		allow	\$90,000				Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Estimated cost for developing closure plan including studies - basic to satisfy risks and decisions - includes risk assessment, options analysis, Closure Plan. Sites with more than 1 pit to add \$50,000 to rate
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with no EPL and/or only one of the following relevant aspects: previous subsidence, low to medium geochemistry risk and/or spontaneous combustion propensity, known limited contamination, small approved final void	N		allow	\$15,000				Assumes sediment control is the key concern for rehabilitation e.g. small mines, exploration operations. Includes risk assessment, sampling and analyses on <5 samples, one study and Closure Plan.
	Development of an 'Unplanned' Project Closure Plan - State Significant Development with only preliminary to conceptual closure planning in place	N		allow	\$300,000				Includes costs for key investigations and studies including designs e.g. geochemistry, Contamination Remediation Action Plan, subsidence risk, cover/capping and final landform, site wide surface water, etc. Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Assume at least 15 types of studies required ranging from geotechnical to ecology and social, development of a closure plan including address of obligations. Assume a simple site e.g. single open cut, no legacy operations historic in the area, little social dependence, etc. Depending on site size, complexity, final land use requirements and knowledge base investigations can range to >\$3 M. Sites with more than 1 pit to add
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with at least ≥2 of the following aspects resulting in significant issues requiring remediation: previous subsidence, medium or higher geochemistry risk and/or spontaneous combustion propensity, known/ likely contamination, tailings / rejects, final void	N		allow	\$125,000				Includes costs for key investigations and studies including economic treatments and designs e.g. geochemistry, Contamination Remediation Action Plan, subsidence risk, cover/capping and final landform, site wide surface water, etc. Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities.
	Develop a Review of Environmental Factors (REF) to facilitate rehabilitation including contamination works.	N		allow	\$27,950				Based on experience for a REF after completion of a detailed closure study (e.g. contamination investigation) costs could range from \$10,000 to \$100,000 ex GST. Note this does not apply to a Statement of Environmental Effects or Environmental Impact Statement

	Site security during closure	N		yr.	\$75,000				Provisional sum for site security measures required during closure. This includes nightly patrols and first response in the event of an out of hours
	Choose type of HAZMAT Clean-up required - cleaning and decontaminating plant and equipment, chemical storage locations, oil and grease traps, tanks, vessels, and pipe work etc	N		allow	\$0			Select type of HAZMAT Clean-up Required	Type of HAZMAT Clean-up required - cleaning and decontaminating plant and equipment, chemical storage locations, oil and grease traps, tanks, vessels, and pipe work etc
	Removal and disposal of radiation devices	N		each	\$31,630				Provisional sum for removal and disposal of monitoring devices on conveyors using a radiation source (i.e., Americium - 241, Plutonium - 238, Caesium - 137 etc). Source isotope type, quantity, strength, weight, source holder type, source holder weight, pick-up location /among
	Additional fees for accessing State, Crown or other public lands for rehabilitation/remediation activities	N		allow	Use alternate rate cell				Provisional sum.
Sundry Items Subtotal						\$20,000			
Mobilisation and Demobilisation	Mobilisation & Demobilisation for small mine or quarry - small fleet	Y	1	Item	\$12,000	\$6,000	\$6,000	No specialist equipment. Smaller plant than default	May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation for small mine or quarry - medium to large fleet	N		Item	\$35,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site <150 km)	N		item	\$100,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >150 km but <500 km)	N		item	\$150,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >500 km but <1000 km)	N		item	\$300,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >1000 km)	N		item	\$500,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
Mobilisation and Demobilisation Subtotal						\$6,000			
Additional Items	Other 1 <insert>	N			This is				This item includes <<to be added by the operator>>
	Other 2 <insert>	N			deliberately				This item includes <<to be added by the operator>>
	Other 3 <insert>	N			left blank				This item includes <<to be added by the operator>>
Additional Items Subtotal						\$0			
Total Cost for Management Activities							\$26,000		

Open Cut Operations**Domain 1b: Infrastructure****Total Cost for Infrastructure Domain****\$0**

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
	Termination of Services and Demolition Works Subtotal						\$0		
	Rail Infrastructure Subtotal						\$0		
	Contaminated Materials Subtotal						\$0		
	Vents, Shafts and Boreholes Subtotal						\$0		
	Roads and Tracks Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal						\$0		
	Water Management Subtotal						\$0		
	Maintenance of Rehabilitated Areas Subtotal						\$0		
	Additional Items Subtotal						\$0		
	Total Cost for Infrastructure Domain							\$0	

Open Cut Operations**Domain 2b: Tailings & Rejects****Total Cost for Tailings & Rejects Domain****\$0**

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
	Contaminated Materials Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Mine Waste Subtotal						\$0		
	Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal						\$0		
	Water Management Subtotal						\$0		
	Maintenance of Rehabilitated Areas Subtotal						\$0		
	Additional Items Subtotal						\$0		
	Total Cost for Tailings & Rejects Domain						\$0		

Open Cut Operations**Domain 3b: Overburden & Waste****Total Cost for Overburden & Waste Domain****\$0**

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
	Contaminated Materials Subtotal						\$0		
	Roads and Tracks Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Mine Waste Subtotal						\$0		
	Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal						\$0		
	Water Management Subtotal						\$0		
	Maintenance of Rehabilitated Areas Subtotal						\$0		
	Additional Items Subtotal						\$0		
	Total Cost for Overburden & Waste Domain						\$0		

Domain 4b: Active Mine & Voids

Total Cost for Active Mine & Voids Domain

\$0

Additional Assumptions: Record any relevant assumptions to this domain below:

Additional Form 100-1000: Please enter any relevant establishment data below:		Key Rehabilitation Area Data for Domain	Enter data below manually
		Total Landform Establishment:	
		Total Growth Media Development:	
		Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
						Open Cut Subtotal	\$0		
						Earthworks / Structural Works (Landform Establishment) Subtotal	\$0		
						Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal	\$0		
						Water Management Subtotal	\$0		
						Maintenance of Rehabilitated Areas Subtotal	\$0		
						Additional Items Subtotal	\$0		
						Total Cost for Active Mine & Voids Domain		\$0	

Open Cut Operations

Domain 5b: Management Activities

Total Cost for Management Activities

\$0

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Water Management	On-site treatment of contaminated water due to high salt (includes removal of metals etc, brine disposal and cost of mobile water treatment unit)	n		ML	\$3,600				Rate can fluctuate depending on treatment type however this is a suitable standard rate for current programs at mining operations.
	On-site treatment of contaminated water due to low pH (includes removal of metals etc, neutralisation treatments and cost of mobile water treatment unit)	n		ML	\$1,500				Rate can fluctuate depending on treatment type however this is a suitable standard rate for current programs at mining operations.
Water Management Subtotal							\$0		
Creek Diversions	Repairs and/or stabilisation of new or compromised water course diversion	n		m	\$2,500				Assumes material is suitable for revegetating and has a reasonable chance of stabilising.
	Long term maintenance of water course diversion – Channel constructed through backfilled material	n		m	\$1,500				Assumes maintenance has been kept up and significant works are not required.
	Long term maintenance of water course diversion – Channel constructed through competent material	n		m	\$750.00				Assumes maintenance has been kept up and significant works are not required.
	Installation of rock armouring	n		m2	\$6.00				Assumes competent material is locally available - multiply costs by 2 for sourcing and transporting from offsite
Creek Diversions Subtotal							\$0		
Maintenance of Rehabilitated Areas	Pest management on buffer lands, non-disturbed, and rehabilitated areas	n		ha	\$150.00				Feral animal baiting programs if required and waste materials required to be removed.
	Land management of undisturbed areas (rehabilitation, weeds, ferals, erosion and sediment control works)	n		ha	\$400.00				Undisturbed areas within the lease boundary that require land management activities.
Maintenance of Rehabilitated Areas Subtotal							\$0		
Heritage Items	The restoration and care and maintenance of items that have heritage significance	n		allow	Use alternate rate cell				Item for the redistribution of Aboriginal artefacts, preservation of European heritage items or a combination of activities.
Heritage Items Subtotal							\$0		
Sundry Items	Development of an 'Unplanned' Project Closure Plan - State Significant Development with closure planning well progressed i.e. preferred cover design, closure environment modelled e.g. groundwater /subsidence / pit lakes, preliminary seal designs, etc. and only finalisation of detailed engineering designs required	n		allow	\$100,000				Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Assumes outcomes of studies readily available including modelling, landform design, geochemistry, demolition, etc. Costs to finalise options by domain and finalise designs for construction. Assume a simple site e.g. single open cut, no legacy operations historic in the area, little social dependence, etc. Depending on site size, complexity, final land use requirements and knowledge base investigations can range from ~\$75k to >\$1 M. Sites with more than 1 pit to add
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with at least ≥2 of the following aspects requiring closure planning, but no significant issues realised at this time: previous subsidence, medium or higher geochemistry risk and/or spontaneous combustion propensity, known/ likely contamination, tailings / rejects, final void	n		allow	\$90,000				Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Estimated cost for developing closure plan including studies - basic to satisfy risks and decisions - includes risk assessment, options analysis, Closure Plan. Sites with more than 1 pit to add \$50,000 to rate
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with no EPL and/or only one of the following relevant aspects: previous subsidence, low to medium geochemistry risk and/or spontaneous combustion propensity, known limited contamination, small approved final void	n		allow	\$15,000				Assumes sediment control is the key concern for rehabilitation e.g. small mines, exploration operations. Includes risk assessment, sampling and analyses on <5 samples, one study and Closure Plan.
	Development of an 'Unplanned' Project Closure Plan - State Significant Development with only preliminary to conceptual closure planning in place	n		allow	\$300,000				Includes costs for key investigations and studies including designs e.g. geochemistry, Contamination Remediation Action Plan, subsidence risk, cover/capping and final landform, site wide surface water, etc. Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Assume at least 15 types of studies required ranging from geotechnical to ecology and social, development of a closure plan including address of obligations. Assume a simple site e.g. single open cut, no legacy operations historic in the area, little social dependence, etc. Depending on site size, complexity, final land use requirements and knowledge base investigations can range to >\$3 M. Sites with more than 1 pit to add
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with at least ≥2 of the following aspects resulting in significant issues requiring remediation: previous subsidence, medium or higher geochemistry risk and/or spontaneous combustion propensity, known/ likely contamination, tailings / rejects, final void	n		allow	\$125,000				Includes costs for key investigations and studies including economic treatments and designs e.g. geochemistry, Contamination Remediation Action Plan, subsidence risk, cover/capping and final landform, site wide surface water, etc. Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities.
	Develop a Review of Environmental Factors (REF) to facilitate rehabilitation including contamination works.	n		allow	\$27,950				Based on experience for a REF after completion of a detailed closure study (e.g. contamination investigation) costs could range from \$10,000 to \$100,000 ex GST. Note this does not apply to a Statement of Environmental Effects or Environmental Impact Statement

	Site security during closure	n		yr.	\$75,000				Provisional sum for site security measures required during closure. This includes nightly patrols and first response in the event of an out of hours
	Choose type of HAZMAT Clean-up required - cleaning and decontaminating plant and equipment, chemical storage locations, oil and grease traps, tanks, vessels, and pipe work etc	n		allow	\$0			Select type of HAZMAT Clean-up Required	Type of HAZMAT Clean-up required - cleaning and decontaminating plant and equipment, chemical storage locations, oil and grease traps, tanks, vessels, and pipe work etc
	Removal and disposal of radiation devices	n		each	\$31,630				Provisional sum for removal and disposal of monitoring devices on conveyors using a radiation source (i.e., Americium - 241, Plutonium - 238, Caesium - 137 etc). Source Isotope type, quantity, strength, weight, source holder type, source holder weight, pick-up location (among
	Additional fees for accessing State, Crown or other public lands for rehabilitation/remediation activities	n		allow	Use alternate rate cell				Provisional sum.
Sundry Items Subtotal						\$0			
Mobilisation and Demobilisation	Mobilisation & Demobilisation for small mine or quarry - small fleet	n		Item	\$12,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation for small mine or quarry - medium to large fleet	n		Item	\$35,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site <150 km)	n		item	\$100,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >150 km but <500 km)	n		item	\$150,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >500 km but <1000 km)	n		item	\$300,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >1000 km)	n		item	\$500,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
Mobilisation and Demobilisation Subtotal						\$0			
Additional Items	Other 1 <insert>	n			This is				This item includes <<to be added by the operator>>
	Other 2 <insert>	N			deliberately				This item includes <<to be added by the operator>>
	Other 3 <insert>	N			left blank				This item includes <<to be added by the operator>>
Additional Items Subtotal						\$0			
Total Cost for Management Activities						\$0			

Open Cut Operations

Domain 1c: Infrastructure

Total Cost for Infrastructure Domain

\$0

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
	Termination of Services and Demolition Works Subtotal						\$0		
	Rail Infrastructure Subtotal						\$0		
	Contaminated Materials Subtotal						\$0		
	Vents, Shafts and Boreholes Subtotal						\$0		
Roads and Tracks	Unsealed roads / vehicle park-up areas – minor works including deep rip and trim	Y		ha	\$1,040.00		\$0		Assumes ~6 m road width - 16H Grader.
	Roads and Tracks Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal						\$0		
	Water Management Subtotal						\$0		
	Maintenance of Rehabilitated Areas Subtotal						\$0		
	Additional Items Subtotal						\$0		
Total Cost for Infrastructure Domain							\$0		

Open Cut Operations**Domain 2c: Tailings & Rejects****Total Cost for Tailings & Rejects Domain****\$0**

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
	Contaminated Materials Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Mine Waste Subtotal						\$0		
	Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal						\$0		
	Water Management Subtotal						\$0		
	Maintenance of Rehabilitated Areas Subtotal						\$0		
	Additional Items Subtotal						\$0		
	Total Cost for Tailings & Rejects Domain						\$0		

Open Cut Operations**Domain 3c: Overburden & Waste****Total Cost for Overburden & Waste Domain****\$0**

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
	Contaminated Materials Subtotal						\$0		
	Roads and Tracks Subtotal						\$0		
	Earthworks / Structural Works (Landform Establishment) Subtotal						\$0		
	Mine Waste Subtotal						\$0		
	Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal						\$0		
	Water Management Subtotal						\$0		
	Maintenance of Rehabilitated Areas Subtotal						\$0		
	Additional Items Subtotal						\$0		
	Total Cost for Overburden & Waste Domain						\$0		

Domain 4c: Active Mine & Voids

Total Cost for Active Mine & Voids Domain

\$0

Additional Assumptions: Record any relevant assumptions to this domain below:

Additional Assumptions: Record any relevant assumptions to this domain below:		Key Rehabilitation Area Data for Domain		Enter data below manually
		Total Landform Establishment:		
		Total Growth Media Development:		
		Total Ecosystem Establishment:		

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
						Open Cut Subtotal	\$0		
						Earthworks / Structural Works (Landform Establishment) Subtotal	\$0		
						Land Preparation and Revegetation (Growth Media Development and Ecosystem Establishment) Subtotal	\$0		
						Water Management Subtotal	\$0		
						Maintenance of Rehabilitated Areas Subtotal	\$0		
						Additional Items Subtotal	\$0		
						Total Cost for Active Mine & Voids Domain		\$0	

Open Cut Operations

Domain 5c: Management Activities

Total Cost for Management Activities

\$0

Additional Assumptions: Record any relevant assumptions to this domain below:

	Key Rehabilitation Area Data for Domain	Enter data below manually
	Total Landform Establishment:	
	Total Growth Media Development:	
	Total Ecosystem Establishment:	

Management Precinct	Activity / Description	Applicable (Y or N)	Quantity	Unit	Default Unit Rate	Alternative Unit Rate	Total Cost	Basis for Costs Estimation and Additional Relevant Information	Description / Notes:
Water Management	On-site treatment of contaminated water due to high salt (includes removal of metals etc, brine disposal and cost of mobile water treatment unit)	n		ML	\$3,600				Rate can fluctuate depending on treatment type however this is a suitable standard rate for current programs at mining operations.
	On-site treatment of contaminated water due to low pH (includes removal of metals etc, neutralisation treatments and cost of mobile water treatment unit)	n		ML	\$1,500				Rate can fluctuate depending on treatment type however this is a suitable standard rate for current programs at mining operations.
Water Management Subtotal							\$0		
Creek Diversions	Repairs and/or stabilisation of new or compromised water course diversion	n		m	\$2,500				Assumes material is suitable for revegetating and has a reasonable chance of stabilising.
	Long term maintenance of water course diversion – Channel constructed through backfilled material	n		m	\$1,500				Assumes maintenance has been kept up and significant works are not required.
	Long term maintenance of water course diversion – Channel constructed through competent material	n		m	\$750.00				Assumes maintenance has been kept up and significant works are not required.
	Installation of rock armouring	n		m2	\$6.00				Assumes competent material is locally available - multiply costs by 2 for sourcing and transporting from offsite
Creek Diversions Subtotal							\$0		
Maintenance of Rehabilitated Areas	Pest management on buffer lands, non-disturbed, and rehabilitated areas	n		ha	\$150.00				Feral animal baiting programs if required and waste materials required to be removed.
	Land management of undisturbed areas (rehabilitation, weeds, ferals, erosion and sediment control works)	n		ha	\$400.00				Undisturbed areas within the lease boundary that require land management activities.
Maintenance of Rehabilitated Areas Subtotal							\$0		
Heritage Items	The restoration and care and maintenance of items that have heritage significance	n		allow	Use alternate rate cell				Item for the redistribution of Aboriginal artefacts, preservation of European heritage items or a combination of activities.
Heritage Items Subtotal							\$0		
Sundry Items	Development of an 'Unplanned' Project Closure Plan - State Significant Development with closure planning well progressed i.e. preferred cover design, closure environment modelled e.g. groundwater /subsidence / pit lakes, preliminary seal designs, etc. and only finalisation of detailed engineering designs required	n		allow	\$100,000				Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Assumes outcomes of studies readily available including modelling, landform design, geochemistry, demolition, etc. Costs to finalise options by domain and finalise designs for construction. Assume a simple site e.g. single open cut, no legacy operations historic in the area, little social dependence, etc. Depending on site size, complexity, final land use requirements and knowledge base investigations can range from ~\$75k to >\$1 M. Sites with more than 1 pit to add \$50,000 to rate.
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with at least ≥2 of the following aspects requiring closure planning, but no significant issues realised at this time: previous subsidence, medium or higher geochemistry risk and/or spontaneous combustion propensity, known/ likely contamination, tailings / rejects, final void	n		allow	\$90,000				Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Estimated cost for developing closure plan including studies - basic to satisfy risks and decisions - includes risk assessment, options analysis, Closure Plan. Sites with more than 1 pit to add \$50,000 to rate.
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with no EPL and/or only one of the following relevant aspects: previous subsidence, low to medium geochemistry risk and/or spontaneous combustion propensity, known limited contamination, small approved final void	n		allow	\$15,000				Assumes sediment control is the key concern for rehabilitation e.g. small mines, exploration operations. Includes risk assessment, sampling and analyses on <5 samples, one study and Closure Plan.
	Development of an 'Unplanned' Project Closure Plan - State Significant Development with only preliminary to conceptual closure planning in place	n		allow	\$300,000				Includes costs for key investigations and studies including designs e.g. geochemistry, Contamination Remediation Action Plan, subsidence risk, cover/capping and final landform, site wide surface water, etc. Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities. Assume at least 15 types of studies required ranging from geotechnical to ecology and social, development of a closure plan including address of obligations. Assume a simple site e.g. single open cut, no legacy operations historic in the area, little social dependence, etc. Depending on site size, complexity, final land use requirements and knowledge base investigations can range to >\$3 M. Sites with more than 1 pit to add \$100,000 to rate.
	Development of an 'Unplanned' Project Closure Plan - Non State Significant Development with at least ≥2 of the following aspects resulting in significant issues requiring remediation: previous subsidence, medium or higher geochemistry risk and/or spontaneous combustion propensity, known/ likely contamination, tailings / rejects, final void	n		allow	\$125,000				Includes costs for key investigations and studies including economic treatments and designs e.g. geochemistry, Contamination Remediation Action Plan, subsidence risk, cover/capping and final landform, site wide surface water, etc. Provisional sum to be used to refine the conceptual closure plan into a detailed closure plan with execution strategies for rehabilitation activities.
	Develop a Review of Environmental Factors (REF) to facilitate rehabilitation including contamination works.	n		allow	\$27,950				Based on experience for a REF after completion of a detailed closure study (e.g. contamination investigation) costs could range from \$10,000 to \$100,000 ex GST. Note this does not apply to a Statement of Environmental Effects or Environmental Impact Statement

	Site security during closure	n		yr.	\$75,000				Provisional sum for site security measures required during closure. This includes nightly patrols and first response in the event of an out of hours
	Choose type of HAZMAT Clean-up required - cleaning and decontaminating plant and equipment, chemical storage locations, oil and grease traps, tanks, vessels, and pipe work etc	n		allow	\$0			Select type of HAZMAT Clean-up Required	Type of HAZMAT Clean-up required - cleaning and decontaminating plant and equipment, chemical storage locations, oil and grease traps, tanks, vessels, and pipe work etc
	Removal and disposal of radiation devices	n		each	\$31,630				Provisional sum for removal and disposal of monitoring devices on conveyors using a radiation source (i.e., Americium – 241, Plutonium – 238, Caesium - 137 etc). Source Isotope type, quantity, strength, weight, source holder type, source holder weight, pick-up location (among
	Additional fees for accessing State, Crown or other public lands for rehabilitation/remediation activities	n		allow	Use alternate rate cell				Provisional sum.
Sundry Items Subtotal						\$0			
Mobilisation and Demobilisation	Mobilisation & Demobilisation for small mine or quarry - small fleet	n		Item	\$12,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation for small mine or quarry - medium to large fleet	n		Item	\$35,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site <150 km)	n		item	\$100,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >150 km but <500 km)	n		item	\$150,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >500 km but <1000 km)	n		item	\$300,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
	Mobilisation & Demobilisation (Distance to site >1000 km)	n		item	\$500,000				May include specialist demolition equipment and/or suitable plant to execute bulk earthworks as required.
Mobilisation and Demobilisation Subtotal						\$0			
Additional Items	Other 1 <insert>	n			This is				This item includes <<to be added by the operator>>
	Other 2 <insert>	n			deliberately				This item includes <<to be added by the operator>>
	Other 3 <insert>	N			left blank				This item includes <<to be added by the operator>>
Additional Items Subtotal						\$0			
Total Cost for Management Activities						\$0			

Assumptions and rehabilitation requirements

List or record any assumptions made when completing this tool:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is a vertical margin line on the left side, creating a narrow left margin. The paper appears to be a standard notebook or ledger page.

Justification for Change of Rates in the Rehabilitation Cost Estimation Tool

Domain	Activity	DRG unit/rate	Adopted Rates	Justification
All	Earthmoving plant defaulting to very large equipment.	D10 = \$400, Grader = \$230, etc	D6 = \$200, excavator = \$200	Project is small and sandy. Large plant not suitable for site access.

In completing the Rehabilitation Cost Estimation, we are seeking an adjustment to the rates currently utilised in the Rehabilitation Cost Estimation Tool. A justification for the rate change by a third party has been included and I confirm that only the rates identified in the above table have been altered in the Rehabilitation Cost Estimation Tool.

Martin Hodgson

 Authorisation Representatives Name

31/07/2023

 Date

Quarry Manager

 Authorisation Representatives Role / Responsibility

.....
 Signature



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