

**Mineral Resources Tasmania**

**Merrywood Coal Mine**

**Rehabilitation Project Stage 1**

**2001-2002**



**Version 2**  
**Dated 9/1/2002**  
**Nigel Bedford CPEng**  
**Civil Engineering Consultancy**

## Conditions of Tendering

### Tender Closing

Tenders shall be returned to the following address by 12.00 noon on the .....

Nigel Bedford  
PO Box 230 Deloraine,  
Tas. 7304

Tenders faxed to 0363624117 before the closing time will be considered provided all requested information is attached to the Tender to allow full assessment.

### Project Duration

It is envisaged that the earthworks and drainage component of the Project will be commenced in January 2002 and be substantially complete by 22<sup>nd</sup> March, 2002. This timing is to facilitate optimal access to and through site. The Tenderer is to advise start and completion dates, working days per week and working hours per day.

Start Date .....

Completion Date .....

Duration 6 Calendar Weeks

Work Days per Week .....

Working Hours per Day .....

### Statutory Requirements

At all stages of the contract, works will comply with the obligations of all Statutory Authorities and all Acts and Regulations relating to, but not limited to:

- Occupational Health and Safety (specifically the Tasmanian Workplace Health and Safety Act, 1995 and subsequent Regulations)
- Environmental Protection

### Project Prerequisites

A Workplace Safety Plan for the Project is to be submitted with the Tender for Tender Assessment purposes. The plan will describe, in detail, procedures to minimise risks associated with the proposed Scope of Works. Details to be included in the Plan are:

- Introduction
- Aim
- Scope
- Responsibility
- Method (including but not limited to - Risk Assessment, Control of Risk, Training, Induction, Emergency Response Plan with "emergency evacuation", "working in isolation", and First Aid Provision components, and Hazardous Substances)
- Record Keeping (including initial risk assessment and procedure proformas for risk assessment during the Project)

Please note that mobile phone coverage of the site is unreliable.



**Option A**

Item	Description of Works	Lump Sum Price incl. GST
1	Establishment and Disestablishment	\$
2	Drainage Improvements	\$
3	Earthworks	\$
	<b>Total</b>	<b>\$</b>

**Option B**

Item	Description of Works	Lump Sum Price incl. GST
1	Establishment and Disestablishment	\$
2	Drainage Improvements	\$
3	Earthworks	\$
	<b>Total</b>	<b>\$</b>

Signed .....

Position .....

Dated .....

Company Seal

## General

The Merrywood Coal Mine is located some 30 km from Avoca, and accessed via the Royal George Road and Merrywood Road. The coalmine site is located in State Forest and is within the boundaries of the Northern Midlands Municipality. A small portion of the treatment area is on private land adjacent to the State Forest boundary.

The Merrywood Coal Mine has not operated since 1996, with the operator going into receivership. Garland Mining purchased the main plant at auction with plans to relocate it for a coal recovery project in southern Queensland and have subsequently offered the Tasmanian Government a viable proposal for reprocessing coal waste on site prior to the main plant being relocated. Approvals have been sought from DPIWE, MRT, NMC and DIER to proceed, but at the time of this plan no final decision has been made. As there is approximately 70,000 BCM of fine washery waste stockpiled within the northern treatment areas and approx. 20,000 BCM of fine waste and 30,000 BCM of coarse coal in the plant area, this plan allows for all eventualities and will be modified as required as relevant information becomes available.

The rehabilitation site includes approximately 60 HCT of treatment area with treatments prescribed dependent on the extent of degradation. Land Management and Rehabilitation Services Pty. Ltd. have prepared and will deliver the Revegetation Plan attached in Appendix B, as budgets and practicality dictate. The siltstone overburden used for rehabilitation in the past, and covering the majority of the most degraded land, is extremely low in nutrient value and requires substantial treatment to ensure the likelihood of successful rehabilitation. Dolerite clay was recovered from the toe of the adjacent forested area in the past to act as the final growth medium for regeneration, but this has caused a multitude of substantial landslips to occur. As there is no other source of reasonable soil type available within the strategic area it is considered more prudent to treat the siltstone with fertiliser to increase nutrient levels than to continue to remove dolerite clay from unstable sources.

The major cause of poor regeneration on previously untreated areas, apart from the poor nutrient values, is rainfall run off management. To this end, this plan will detail typical drainage structures, drain cross-section, maximum open drain slope, energy dissipaters and other earthworks to retard the velocity of runoff so that revegetation is given the best chance to succeed. The secondary cause is the direction of the ripping. Previously the operator rehabilitated by ripping across the contours rather than with the contour. The main areas for treatment will be ripped on the contour to slow runoff, decompact soils, allow trapping of nutrients in areas they are required (applied), and present the optimal texture growth medium for seed germination.

The major slip is to be treated by unloading the crest of the slip of washery fine waste and removing it to at least 10m from its current position. The uncovered area will be sloped to drain away from the influence of the slip. Further earthworks in this area are considered impractical in cost benefit terms. Hand revegetation techniques are described in Appendix B.

The minor slips at the forest fringe will be treated by drainage improvements that will direct and manage runoff. Further earthworks in this area are considered impractical in cost benefit terms. Revegetation techniques for this area are described in Appendix B.

## Scope of Works

- Site establishment and disestablishment.
- Drainage improvements to manage rainfall run off, minimise erosion and promote soil surface stability to allow optimal chance of revegetation success.
- Earthworks to reshape the existing contours to promote drainage improvements. Surface contours, where practical, are to be regraded to improve long term stability, including removal of the fine coal waste crest load from the major slip. Recovery of dolerite clay where available (uncovered during process) and spreading over the siltstone material is included in this activity. Recovery of rock to line steeper drains if practical is included in this activity.
- Growth medium (surface) preparation by ripping along the contours for the areas designated.
- **Provision of documented evidence that the Project Prerequisites have been addressed.**

## Civil Works

### Drainage Improvements

- 1) All drains are to be reshaped to create a parabolic shaped drain cross-section. Placed fill is to be adequately compacted by sufficient track rolling to resist erosion. See design drain profile Drawing MCM1. Open drains are to be established as required to suit the new landform.
- 2) Allow for 16 hours drainage improvements in Area 2 at the Superintendent's direction.
- 3) All drains to have maximum slope of 1.5%.
- 4) Silt traps to be re-established with parabolic shaped bund walls and outflow protection structures (mattress protection one off per exit 4m x 2m x 0.25m shaped to water exit profile) constructed where run off leaves the trap. Placed fill is to be adequately compacted by sufficient track rolling to resist erosion. These silt trap structures will create a wetlands environment for revegetation.
- 5) A drop structure is to be constructed in the drain on the main central access road through the northern area. Location of the structure will be determined once Earthworks and Garland Mining reprocessing outcomes are known. See Drawing MCC3 for structure details.
- 6) Three (3) in-drain energy dissipator structures are to be installed at locations to be designated by the Superintendent. Location of the structure will be determined once Earthworks and Garland Mining reprocessing outcomes are known. See Drawing MCC2 for structure details.

## Earthworks

### Option A      Garland Mining Reprocess Project is Completed

- 1) Shape and contour to a stable landform as per requirements Areas 3, 6, and 7.
- 2) Contour rip Areas 3, 5, 6, and 7 in preparation for revegetation. Final surfaces are to be ripped to a depth of 200 mm with rip lines less than 500 mm apart over the full area (ref. Tim Duckett L.M.R.S.). On all readily accessible level portions within Area 4 carry out the same treatment.
- 3) Recover rock for erosion protection uses wherever practical.
- 4) Protect Areas 1, 2, and revegetated portions of Areas 4 and 7 from degradation due to works.

### Option B      Garland Mining Reprocess Project is Not Undertaken

- 1) Shape and contour to a stable landform as per requirements Areas 3, 6, and 7.
  - a) The coal washery fine waste mound is to be reshaped around its perimeter to lesser slopes. The perimeter reshaping will be as per Drawing MCC1. Recover dolerite clays exposed by the mound perimeter reshaping and spread to a uniform thickness over the perimeter wall, treating the external mound perimeter as the priority. The top of the mound is to be treated by re-establishment of the existing silt traps construction as per the requirements for Drainage Improvements 4 to create a wetlands environ for revegetation.
  - b) The wash-down facility area, Area 7, is to be reshaped and contoured to shed rainfall runoff to existing drains. The coarse coal stockpile is to be reshaped by reducing the perimeter batter

height by 2.5 m. Immediately to the south of this stockpile the floor is to be reshaped to shed runoff to the highest drain inlet. An access track is to be left to the coarse coal stockpiles to recover this material to be processed off site by others. Retain the existing ponds and erosion protection drainage through this area. Recover dolerite clays exposed by reshaping and spread to a uniform thickness over poorer quality materials.

- 2) Contour rip Areas 3, 5, 6, and 7 in preparation for revegetation. Final surfaces are to be ripped to a depth of 200 mm with rip lines less than 500 mm apart over the full area. On all readily accessible level portions within Area 4 carry out the same treatment. In the works area on the western side of the access road (southernmost portion of Area 7) rip the surface layer of coal to expose dolerite clays as revegetation medium.
  - 3) Recover rock for erosion protection uses wherever practical.
  - 4) Protect Areas 1, 2, and revegetated portions of Areas 4 and 7 from degradation due to works.
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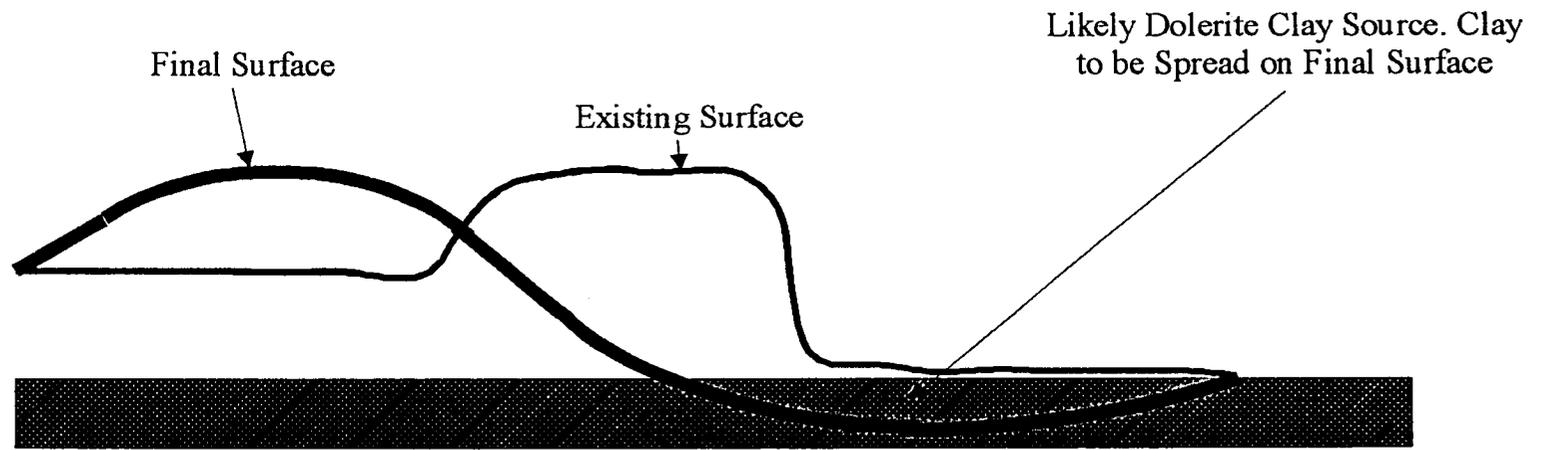
## **Attachments**

### Appendix A

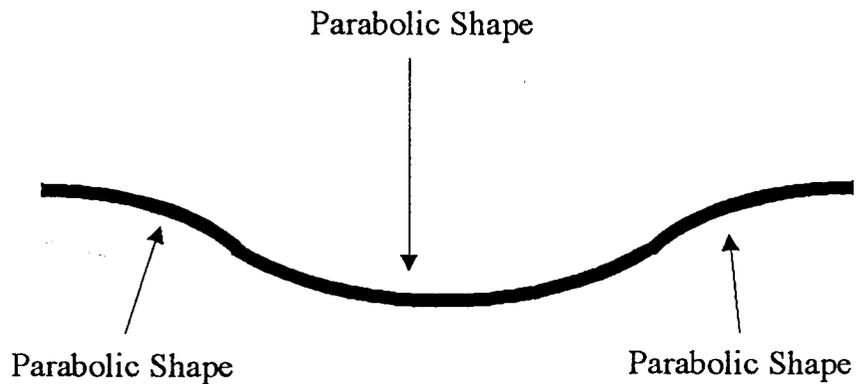
Drawing MCC1	Open Drain Profile and Area 6 Cross-Sections
Drawing MCC2	Energy Dissipator Structure
Drawing MCC3	Gabion Drop Structure
Drawing MCC4	Drainage Improvements

### Appendix B

L.M.R.S. Revegetation Plan August 2001



Typical Treatment Area 6 (Fine Coal Washery Waste)



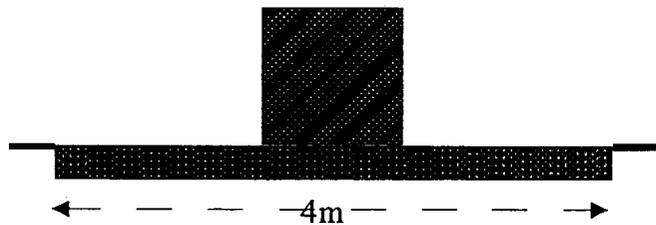
Typical Drain Cross-Section

Merrywood Coal Mine Rehabilitation

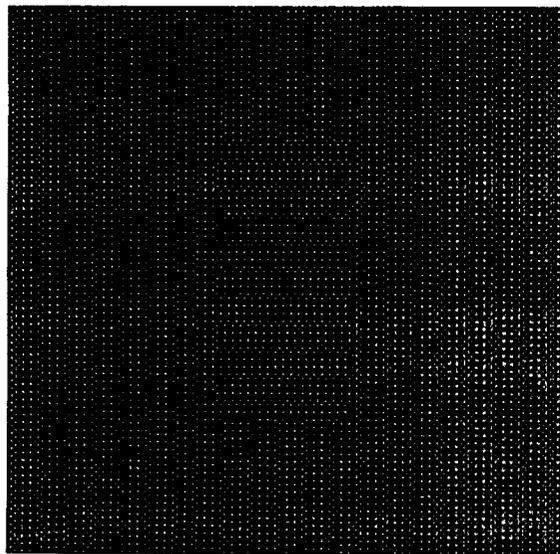
Project 2001-2002

Drain & Area 6 Cross-Sections

Drg.MCM 1 (NTS)



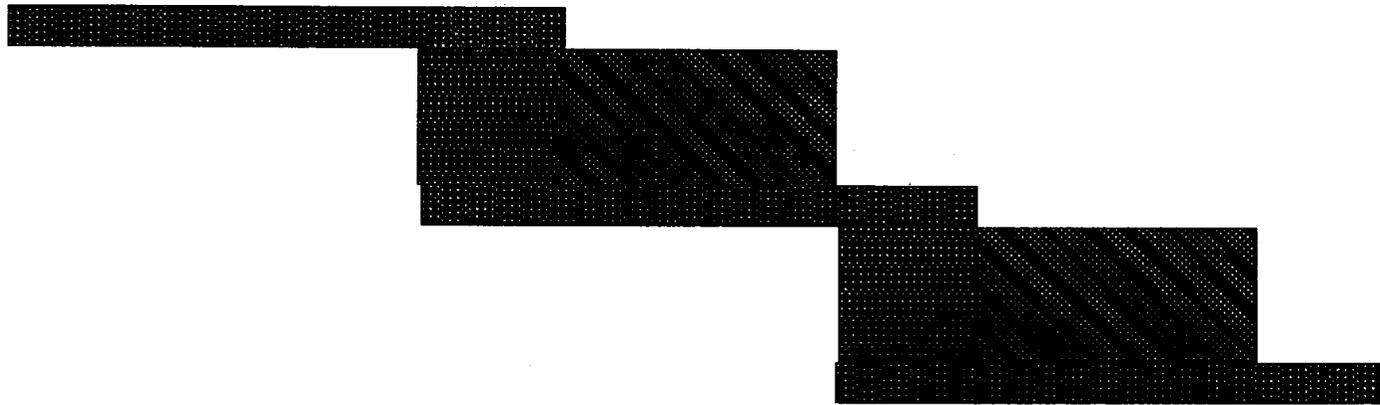
Side Elevation



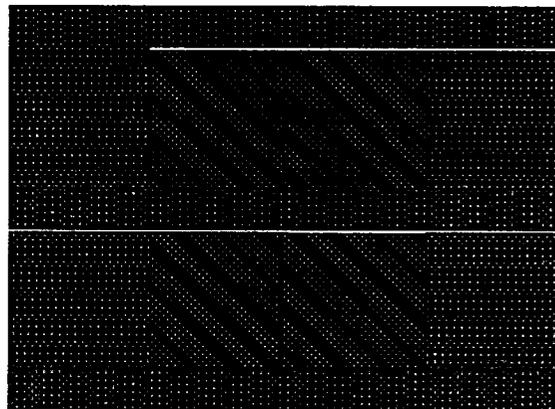
Plan

1. Standard Gabions and mattress dimensions are 2x1x1 and 4x2x0.25 respectively.
2. Gabion fill to either paddock rock to the manufacturers req'ts or erodable fill wrapped in geofabric bags (Bidim A34 or equiv) sewn closed.
3. Mattress to be shaped to suit drain profile and finished flush with invert. Gabion to be attached to mattress with tie wire.
4. All installation to as per manufacturers' requirements.

Merrywood Coal Mine Rehabilitation  
Project 2001-2002  
Energy Dissipator Structure Drg. MCM 2  
 (NTS)



Elevation From Side



Elevation From Downstream

1. Standard Gabions and mattress dimensions are 2x1x1 and 4x2x0.25 respectively.
2. Gabion fill to be either paddock rock to the manufacturers req'ts or erodable fill wrapped in geofabric bags (Bidim A34 or equiv) sewn closed.
3. Drop structure surrounds to be shaped to suit.
4. All installation as per manufacturers' requirements.

Merrywood Coal Mine Rehabilitation  
Project 2001-2002  
Gabion Drop Structure Drg.MCM 3 (NTS)

**Legend**

Existing Drains Requiring Treatment

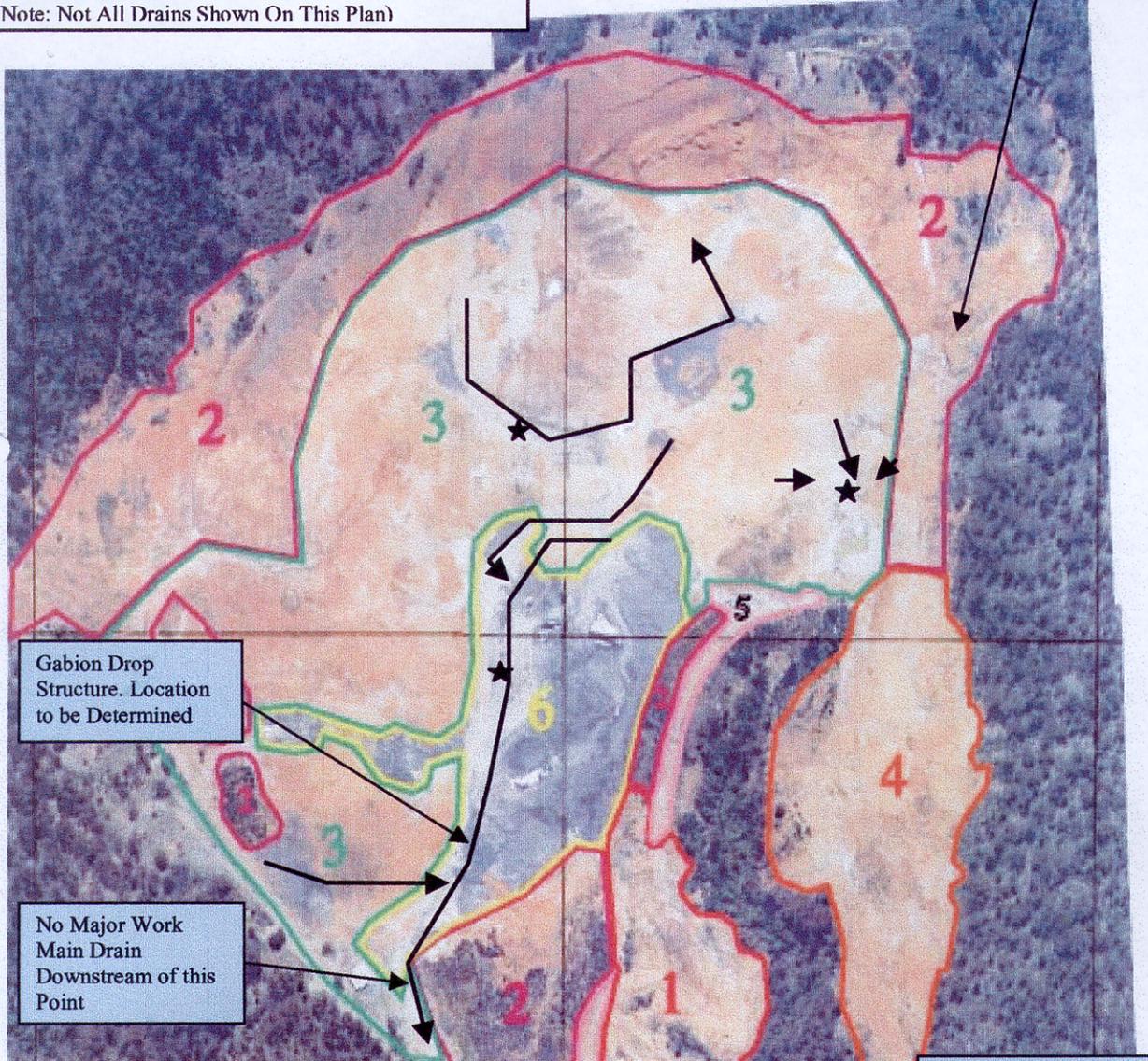
Probable Energy Dissipator Location

Flow Direction

(Note: Not All Drains Shown On This Plan)



Drainage improvement at Sup't Direction . Allow 16 hrs Exc. Hire In This Area



- 1 Landslip
- 2 Revegetated Areas
- 3 Main Central Section
- 4 Eastern Section Across Creek
- 5 Compacted Roads
- 6 Coal Wash Fines
- 7 Wash Down Facility

Maintain Existing Sub Surface and Open Drainage Thru Plant Area

Redirect Runoff to Access Road Side Drain



**LAND MANAGEMENT  
AND  
REHABILITATION SERVICES**

**MERRYWOOD COAL MINE  
REVEGETATION PLAN**

ACN 056 572 779

**AUGUST 2001**

## Introduction

The abandoned Merrywood Coal Mine Site has been divided into 7 areas based on their revegetation requirements. These areas are identified in Figure 1 and are as follows:

- Area 1 : Landslip
- Area 2 : Revegetated Areas
- Area 3 : Main Central Section
- Area 4 : Eastern Section across Creek
- Area 5 : Compacted Roads
- Area 6 : Coal Wash Fines
- Area 7 : Wash-down Facility

Earthworks and drainage specifications are being prepared by Nigel Bedford, a Civil Engineering Consultant. The following revegetation specifications assume and are based on Areas 2,3,4 and 5 being prepared to a loose friable condition suitable for the establishment of vegetation and the sites being stable from the effects of surface run-off and erosion.

Site 1 is inaccessible and sites 6 and 7 may be utilised during a coal recovery process altering the revegetation requirements.

## Revegetation Components

### Nutrient Application

Based on soil analysis results provided by Serve Ag, all sites are nutrient deficient. Nutrients will be applied aurally due to on-ground access difficulties over the majority of the mine site. It is also the most cost effective method to apply fertiliser over the whole area.

The most cost effective fertiliser to apply aurally will be a granular N:P:K mix of 14:16:11 at 300 kg/ha. The use of this fertiliser has been based on a number of trials on the revegetation of dolerite clays.

### Direct Seeding

Local provenance native seed should be collected and applied on Areas 3, 4, 5, and parts of 6 and 7.

The following seed mix is recommended for use :

	%
<i>Acacia dealbata</i>	20
<i>Acacia melanoxylon</i>	05
<i>Eucalyptus amygdalina</i>	10
<i>E. delegatensis</i>	10

<i>E. ovata</i>	05
<i>E. rubida</i>	05
<i>E. viminalis</i>	10
<i>Cassinea aculeata</i>	10
<i>Leptospermum scoparium</i>	15
<i>Goodia latifolia</i>	10

### Spot Seeding

Colonisation of Area 4 has occurred naturally, however, there are gaps within the establishing vegetation cover. These “gaps” should be revegetated by spot application of the specified seed mix.

### Seedlings

Seedlings of Poa, Lomandra and Juncus (wetlands) should be propagated as a component of the revegetation program. They should be propagated as 18cm<sup>3</sup> cells, virocells or equivalent.

Separate fertiliser application for seedlings will not be required as sufficient nutrients will be applied during aerial broadcasting

### Fenced Plots

Browsing is a major issue over the whole site, limiting plant growth particularly seed development of native grasses. Fenced revegetation plots measuring 30 m x 30m should be established as on-going seed sources for colonisation in the longer-term .

## Recommended Revegetation Guidelines and Quantities

### Area 1. : Landslip

Area = 3.1 ha

Area 1 is a historic land-slip site and is difficult to access by machinery. Revegetation will involve aerial fertiliser application (in order to encourage growth of established plant species) and the planting of Poa and Lomandra seedlings as 18 cm<sup>3</sup> plugs by hand. As the surface can not be prepared for direct sowing of native seed, it will not be applied.

The fertiliser mix 14:16:11 will be applied at 300 kg/ha

### Material Summary

Fertiliser 14:16:11 @ 300 kg/ha = 0.93 t

Poa Seedlings =	2500
Lomandra seedlings =	500

### Area 2 :Revegetated Areas

Area = 17.6 ha

Area 2 is composed of a number of separate sites that have either been revegetated during mine operations or are being colonised naturally from the surrounding forest. In these instances the sites will be fertilised only in order to encourage increased growth rates.

The fertiliser mix 14:16:11 will be applied at 300 kg/ha

#### Material Summary

Fertiliser 14:16:11 @ 300 kg/ha = 5.3 tonnes

### Area 3 : Main Central Section

Area = 22.8 ha

The main central section has been aerially seeded with little effect, mainly due to inadequate surface preparation. Revegetation will involve direct seed application of the above mix at 4 kg/ha and the planting of local provenance Poa, Lomandra and Juncus as plugs. Juncus will be planted in the developed wetland areas. Sediment traps / wetlands have been identified by Nigel Bedford in the earthworks plan.

Three 30 x 30 browsing animal proof fenced plots will be established in order to protect and assist in the development of an on-going long-term seed source. Browsing severely limits seed production and the rate of colonisation and growth of plant species.

A stabilising ryecorn cover crop will be applied to this open central section at 30 kg/ha

The fertiliser mix 14:16:11 will be applied at 300 kg/ha over the whole site.

The site will be prepared to a loose friable condition (via ripping) suitable for plant establishment. Ripping and drainage provisions will be made during the earthworks component of the rehabilitation program.

#### Material Summary

Fertiliser 14:16:11 @ 300 kg/ha =	6.8 t
Seed for direct broadcast =	91.2 kg

Ryecorn seed =	700 kg
Fenced Plots 3 x 120m =	360 m
Poa Seedlings in fenced plots =	2500
Poa seedlings for planting outside plots =	20,000
Lomandra seedlings in fenced plots =	500
Lomandra seedlings for planting outside plots =	2500
Juncus species for wetland sections =	1000

#### Area 4 : Eastern Section Across Creek

Area = 5.8 ha

Natural colonisation has occurred in patches over this site. Revegetation will involve spot seeding the above mix on the bare sections at 1 kg/ha. Spot seeding will be implemented following scarification of the surface with a rake and the seed will be applied by a puffer pack similar to a “Saxa” salt container.

A fenced plot will be established as for Area 3.

Fertiliser will be applied aerially at 300 kg/ha of N:P:K fertiliser mix 14:16:11.

#### Material Summary

Fertiliser 14:16:11 @ 300 kg/ha =	1.75 t
Seed for spot seeding =	5 kg
Fenced Plots 1 x 120m =	120 m
Poa Seedlings in fenced plots =	800
Lomandra seedlings in fenced plots =	200

#### Area 5 : Compacted Roads

Area = 1.6 ha

The old mine access roads are compacted and require ripping prior to revegetation. Revegetation will involve fertiliser application at 300 kg of N:P:K 14:16:11 and direct seed application at 4 kg/ha.

#### Material Summary

Fertiliser 14:16:11 @ 300 kg/ha =	0.5 t
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Seed for direct broadcast = 6.4 kg

### Area 6 : Coal Wash Fines

Area = 6.5 ha

Two revegetation options have been provided based firstly on the removal of the coal wash fines and secondly, on them remaining and being partially covered by insitu clay (generally at the perimeter of the fines).

#### Option 1 : Removal of coal fines, exposing clays

Area for Revegetation = 6.5 ha

The first option of coal fines removal and treatment of the clays underneath will involve nutrient application of N:P:K 14:16:11 at 300 kg/ha/, direct seeding of the above mix at 4 kg/ha and the planting of Poa, Lomandra and Juncus seedling plugs. A fenced plot similar to Area 3 will also be established. Sediment traps / wetlands locations have been identified by Nigel Bedford.

An assumption has been made that the clays under the coal fines will be extremely nutrient deficient and a maintenance application may be required in the future. This requirement should be based on a monitoring nutrient analysis 12-18 months in the future.

#### Material Summary

Fertiliser 14:16:11 @ 300 kg/ha =	1.95 t
Seed for direct seeding =	26 kg
Fenced Plots 1 x 120m =	120 m
Poa Seedlings in fenced plots =	800
Poa seedlings outside fenced plot =	6000
Lomandra seedlings in fenced plots =	200
Lomandra seedlings outside fenced plot =	1500
Juncus for wetlands (sediment ponds)=	500
Maintenance fertiliser 14:16:11 @ 300 kg/ha =	1.95 t

#### Option 2 : Coals Fines Remain

Area for Revegetation = 1.6 ha

The above area for revegetation assumes that 25% of the coal fines area can be covered with clay from the perimeter of the coal fines. The remaining 75% will be left to colonise naturally. Sediment traps / wetlands locations have been identified by Nigel Bedford.

Fertiliser will be applied at 3000 kg/ha of N:P:K 14:16:11 to be followed in 12-18 months by maintenance fertiliser application based on monitoring analysis.

#### Material Summary

Fertiliser 14:16:11 @ 300 kg/ha over 1.6 ha only =	0.48 t
Seed for spot seeding =	6.4 kg
Fenced Plots 1 x 120m =	120 m
Poa Seedlings in fenced plots =	800
Poa seedlings outside fenced plot =	1600
Lomandra seedlings in fenced plots =	200
Lomandra seedlings outside fenced plot =	200
Juncus for wetlands (sediment ponds)=	500
Maintenance fertiliser 14:16:11 @ 300 kg/ha =	0.48 t

#### Area 7 : Wash-down Facility

**Area = 3.3 ha**

Only one revegetation option is recommended regardless of the removal of the majority of coal fines or if the fines are to remain and are profiled. Regardless of the future of the coal fines, the site will still be covered by coal based material. Revegetation will be based on nutrient application as set out below, direct seeding at 4 kg/ha of the above mix and planting of Poa, Lomandra and Juncus seedlings.

#### Material Summary

Fertiliser 14:16:11 @ 300 kg/ha over 3.3 ha only =	1.00 t
Seed for direct seeding =	13.2 kg
Poa Seedlings =	3000
Lomandra seedlings =	300
Juncus for wetlands (sediment ponds)=	500

Maintenance fertiliser 14:16:11 @ 300 kg/ha = 1.35 t

### Cost Estimate

A cost estimate for the completion of revegetation works is attached in Table 1.

### Material Summary

Fertiliser 14:16:11 = 18.23 tonnes (including Area 6 Option 1)  
= 16.76 tonnes (including Area 6 Option 2)

Seed = 140 kg (including Area 6 Option 1)  
= 122 kg (including Area 6 Option 2)

	Including Area 6 Option 1	Including Area 6 Option 2
<i>Acacia dealbata</i>	28	24.5
<i>Acacia melanoxylon</i>	7	6.0
<i>Eucalyptus amygdalina</i>	14	12.0
<i>E. delegatensis</i>	14	12.5
<i>E. ovata</i>	7	6.0
<i>E. rubida</i>	7	6.0
<i>E. viminalis</i>	14	12.0
<i>Cassinea aculeata</i>	14	12.5
<i>Leptospermum scoparium</i>	21	18.5
<i>Goodia latifolia</i>	14	12.0

Ryecorn Seed = 700 kg

Poa seedlings = 35600 (including Area 6 Option 1)  
= 31200 (including Area 6 Option 2)

Lomandra seedlings = 5700 (including Area 6 Option 1)  
= 4400 (including Area 6 Option 2)

Juncus seedlings = 2500

Fencing (in metres)= 600 m

