DONALDSON COAL

FINAL

Donaldson Open Cut and Abel Underground Coal Mines

Landscape Management Plan

March 2008

DON3-07-01 Landscape Management Plan

GSS ENVIRONMENTAL
Environmental, Land and Project Management Consultants

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1.0 INTRODUCTION

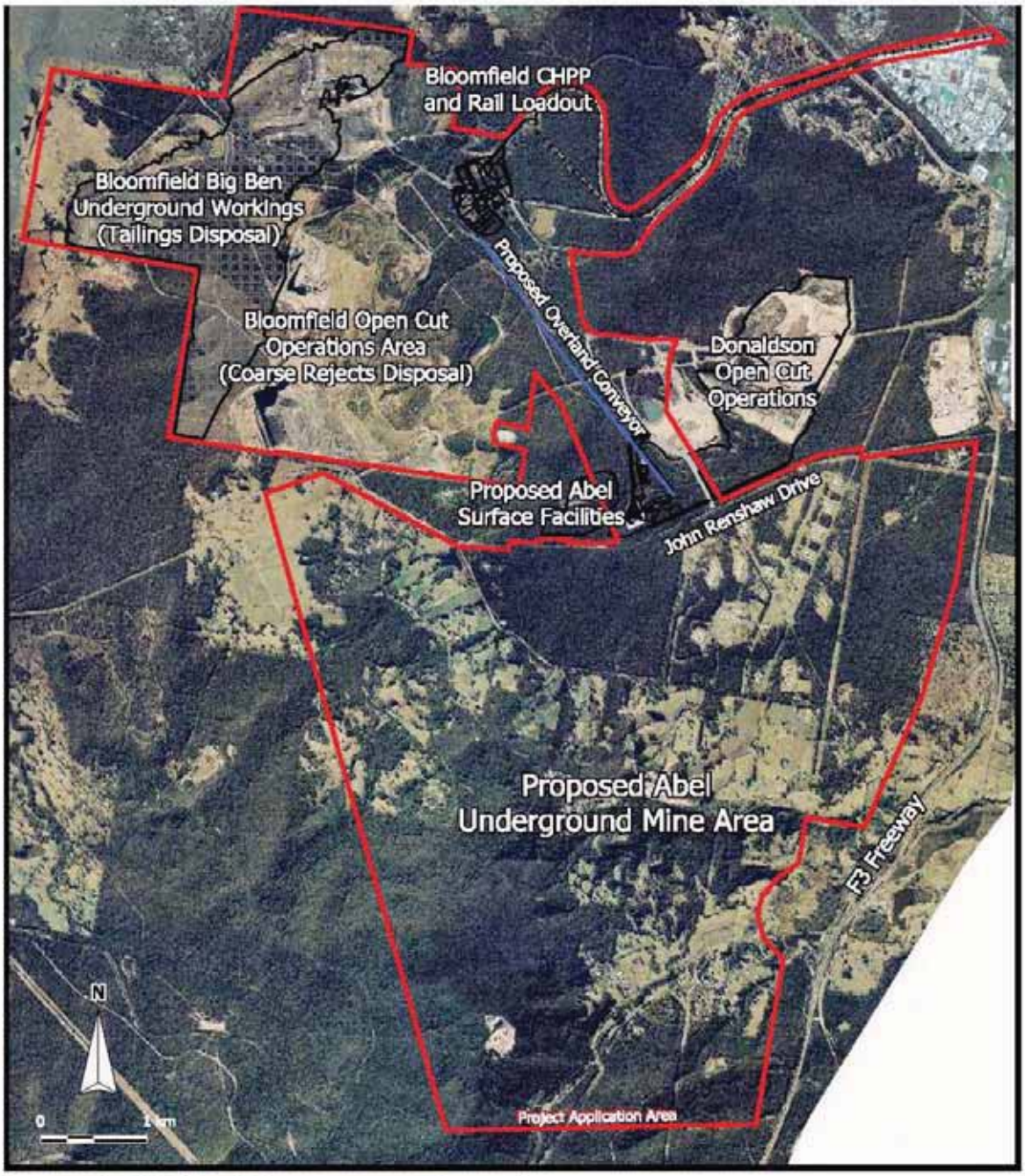
The Abel Underground Coal Mine ('Abel') is owned and operated by Donaldson Coal Pty Ltd ('Donaldson') which is located approximately 23 kilometres north-west of Newcastle, south of John Renshaw Drive. The Abel underground mine area is within the eastern section of Exploration Lease 5497 (EL5497) and has a surface area of approximately 2750 hectares. Donaldson also owns and operates the adjacent Donaldson Open Cut Mine which has been operation since 2001. The Abel site lies across both the Maitland and Cessnock Local Government Areas and the operation is approved to mine up to 4.5 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal over the next 21 years.

The operation will utilise a high productivity continuous miner based bord and pillar system, using pillar extraction techniques. Mine access and associated surface infrastructure will be located within the existing Donaldson Coal Mine open cut void, with the transfer of coal to the existing Bloomfield Coal Handling and Preparation Plant immediately to the north for coal washing and rail transport to the Port of Newcastle. **Figure 1** shows the location of the site.

The Project Approval (05_0136) was issued on the 7 June 2007 for the development of the Abel underground mine. ***Condition 19*** of the approval requires the preparation of a **Landscape Management Plan (LMP)** of which there are three (3) key components. These components include the following management plans:

- **Rehabilitation Management Plan (RMP)**
- **Final Void Management Plan (FVMP);** and
- **Mine Closure Plan (MCP)**.

The Abel and Bloomfield mines are operated independently, however the two operations interact significantly especially with regard to coal processing and handling. Not withstanding this, the management plans mentioned above relate to the Abel operation only as described in the Abel Part 3A (2006). Further details with regard to the preparation of these management plans are contained as ***Conditions 20, 21*** & ***22*** of the Project Approval. This document has been prepared to fulfil these Management Plan requirements of Project Approval.



DONALDSON COAL

Abel Underground Mine Project
Aerial Site Plan

Figure 1 28/07/06

LEGEND					**FIGURE 1** Abel Underground Mine Project Aerial Site Plan	Project: Abel Landscape Management Plan
						Client: Donaldson Coal
Version	Date	Author	Checked	Approved	GSS ENVIRONMENTAL Environmental, Land and Project Management Consultants	File: DON3-07-01
1	20/08/07	RC	SS	AH		Projection:

2.0 BACKGROUND AND OVERVIEW

The existing Donaldson Open Cut Mine has been given approval to operate until 2012 at which point the economic coal reserves will be exhausted. In September 2006, Donaldson Coal submitted an Environmental Assessment to the NSW Department of Planning for the Abel Underground Mine and in June 2007 the project was given approval to develop the new underground area that will access coal reserves south of the Donaldson Open Cut Mine. A major benefit of this development is that the surface facilities area can be placed within existing areas of disturbance in the Donaldson Open Cut mine. Coal brought to the surface will be transported by truck and conveyor through the previously disturbed Donaldson mine lease area to the existing Bloomfield Coal Handling and Preparation Plant (CHPP) and Rail Loading Facility (RLF) for coal processing and loading. Bloomfield is currently approved to process 3.5 million tonnes per annum of product coal. As the Abel Underground Mine starts producing coal it is expected there will be an increased in production through the Bloomfield CHPP of 30%. The development consent for Abel approves modifications to the CHPP infrastructure to facilitate this increase in production capacity. This enables the mine to access new coal resources while minimising the need for new facilities and land disturbance. The Bloomfield CHPP generally complies with the relevant management requirements of this LMP.

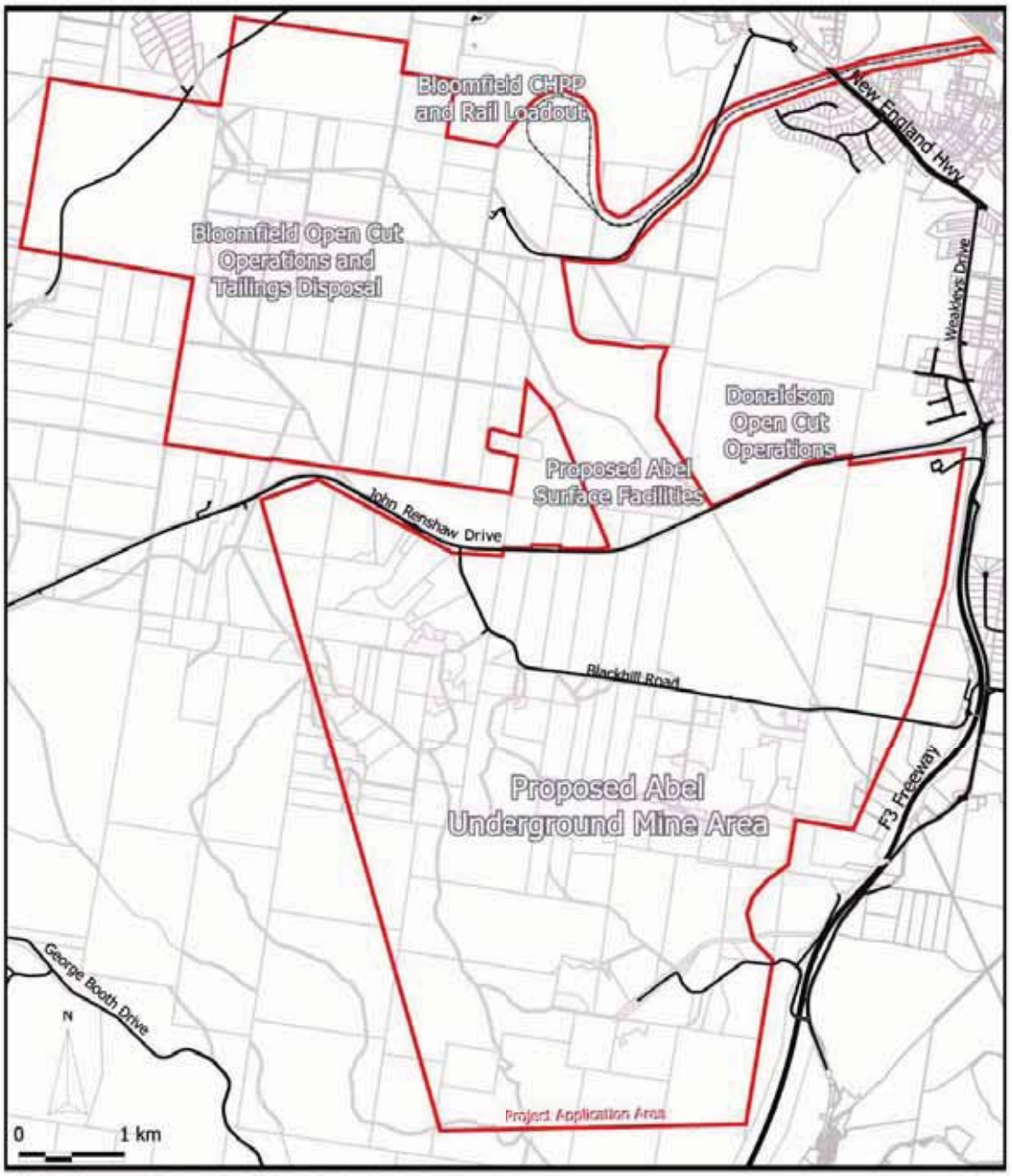
Figure 2 shows the total project area including the Abel Underground Mine area, parts of the existing Donaldson Open Cut mine that will be used for Abel surface infrastructure, and parts of the existing Bloomfield Colliery that will be used for the Abel Project, including the coal handling and preparation plant, rail loading facility and some access roads and water management structures. Underground workings and open cut areas within Bloomfield colliery are also shown in **Figure 2** as some of these areas will be used for tailings disposal.

The underground mine area, within which coal will be extracted, extends southwards from John Renshaw Drive towards George Booth Drive. It is bounded on the eastern side by the F3 Freeway and on the western side by a geological feature in the vicinity of Buttai Creek.

Abel Underground Mine will extract coal from the Upper Donaldson and Lower Donaldson coal seams. These seams dip downwards at approximately 5 degrees towards the south of the underground mine area, so that mining will become deeper as it progresses southwards. The depth of cover to mining ranges from 30 metres in the northern area immediately adjacent to John Renshaw Drive, to 450 metres at the southern boundary.

Access to the underground reserves will be from the Donaldson high wall north of John Renshaw Drive. A number of roadways will be driven under John Renshaw Drive with underground mining commencing on the southern side of John Renshaw Drive and progressing southwards. ROM coal will be transported via conveyor through the high wall to a stockpile located within the existing Donaldson area of disturbance. From the stockpile, coal will be transported to the existing Bloomfield CHPP, initially by truck but later by conveyor, where it will be processed and loaded onto rail.

Project Approval (05_0136) has been issued under Part 3A of the *Environmental Planning and Assessment Act 1979*. **Table 1** below summarises the relevant parts of ***Condition 21*** of Project Approval (05-0136) and the section(s) in this document where they are addressed in this LMP.



NOTE: The properties contained within the Project Application Area are listed in Appendix B.

DONALDSON COAL

Proposed Abel Underground Mine
Project Application Area

Figure 1.1 28/07/06

LEGEND					**FIGURE 2** Abel Underground Mine Project Total Project Area (Including Bloomfield)	Project: Abel Landscape Management Plan
						Client: Donaldson Coal
Version	Date	Author	Checked	Approved	GSS ENVIRONMENTAL Environmental, Land and Project Management Consultants	File: DON3-07-01
1	20/08/07	RC	SS	AH		Projection:

Table 1 – Checklist of Conditions of Project Approval (05_0136) relevant to this LMP

Condition No.	Condition Requirement	Relevant Section(s)
19	The Proponent shall prepare and implement a detailed Landscape Management Plan for the site to the satisfaction of the Director-General and DPI. This plan must:	**Entire Document**
(a)	*Be submitted to the Director-General for approval with in 6 months of this approval;*	**Entire Document**
(b)	*be prepared by suitably qualified expert/s whose appointment/s have been endorsed by the Director-General;*	**Appendix 1**
(c)	*be prepared in consultation with DWE, DECC and affected Councils; and*	**Appendix 2**
(d)	*include a:* • *Rehabilitation Management Plan;* • *Final Void Management Plan; and* • *Mine Closure Plan.*	**Appendix 3, 4 & 5**

In accordance with the requirements of Condition 19(b) of the Project Approval, Donaldson Coal sought approval from the Department of Planning (DoP) for the appointment of GSSE as suitably qualified expert with the experience to prepare the Landscape Management Plan. A copy of the approval letter from DoP is attached as **Appendix 1**.

In addition to this, the Management Plan has been prepared in consultation with several key government departments and agencies. These include the Department of Water and Energy (DWE), the Department of Environment and Climate Change (DECC) and the Maitland and Cessnock Councils. Consultation with these stakeholders was undertaken to satisfy the requirements of ***Condition 19(c)*** of the Project Approval. A copy of the correspondence from these agencies relating to this condition is attached as **Appendix 2**.

3.0 PURPOSE AND OBJECTIVES

The purpose of the **Landscape Management Plan** is to:

- Address the relevant conditions of the Project Approval;
- Address the relevant commitments made within the Environmental Assessment;
- Address legislative requirements and guidelines relevant to the LMP and related management plans; and
- Provide Donaldson Coal Pty Ltd with a clear and concise description of their responsibilities in relation to Landscape Management (including Rehabilitation, Final Void Management & Mine Closure) during the operation and subsequent closure of the Abel underground coal mine and address the closure requirements of the Bloomfield CHPP which is approved under the Abel consent.

4.0 STRUCTURE OF THE LANDSCAPE MANGEMENT PLAN

In accordance with the requirements of **condition 19(b)** of the Project Approval the Landscape Management Plan is made up of three separate management plans as described above.

Figure 3 shows the relationship between the various management plans and the Donaldson Coal Environmental Management Strategy (EMS). The Donaldson Coal EMS is currently being reviewed to address the operation from and enterprise wide perspective. The review of the EMS will encompass the Bloomfield infrastructure approved by the Abel consent.

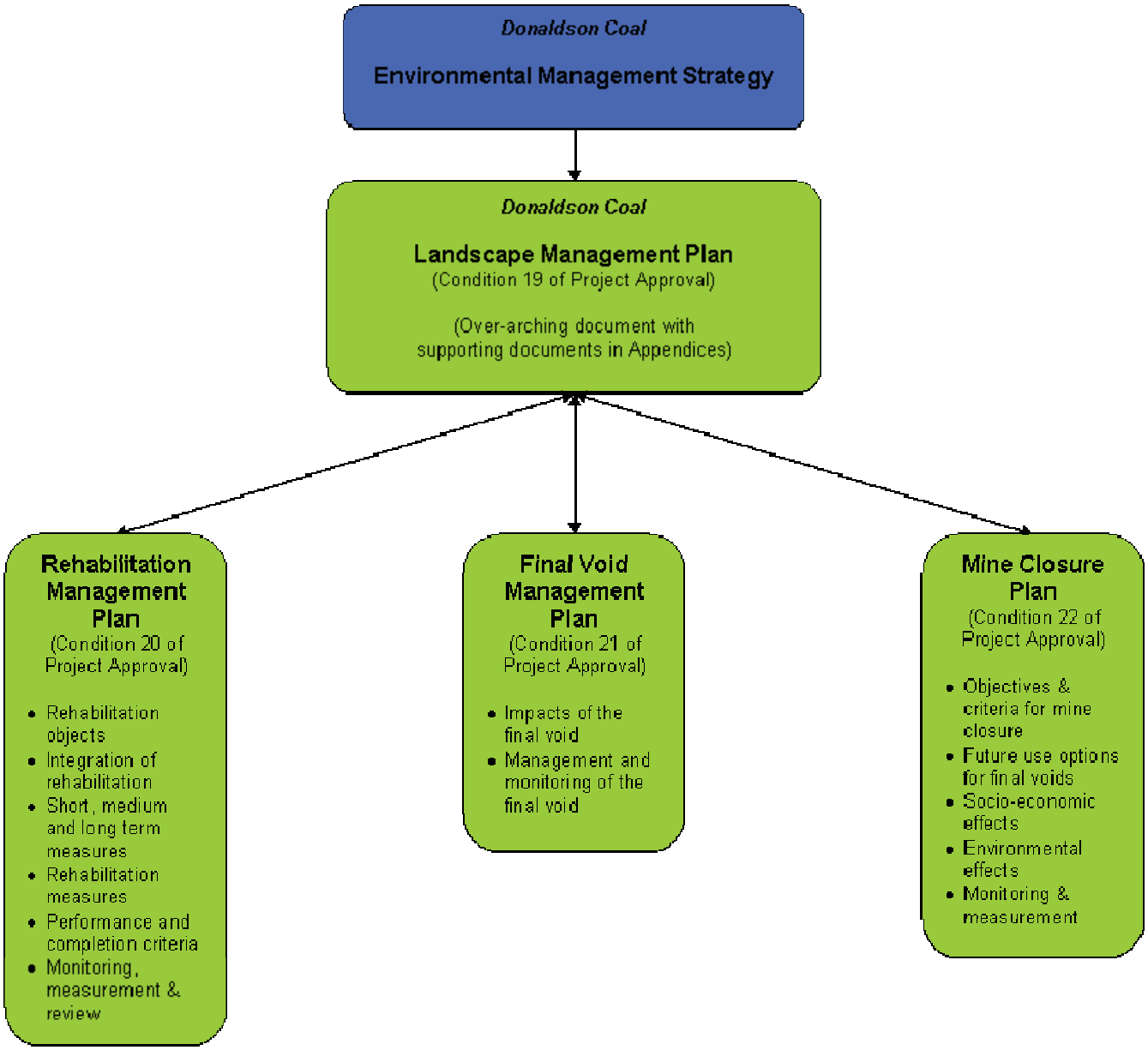


Figure 3 – Landscape Management Plan Structure

The following summarises the key aspects addressed in each of the management plans. For more detail on the individual plans listed below refer to **Appendix 3**, **4** and **5**.

Rehabilitation Management Plan

- Define how rehabilitation of the site will be integrated with surrounding buffer lands;
- Provide short, medium and long term measures for the rehabilitation of the site;
- Design measures to be implemented over the next three (3) years to rehabilitate the site;
- Provide detailed performance and completion criteria for rehabilitation;
- Provide a monitoring programme to assess performance and completion criteria; and
- Outline responsibilities with regard to monitoring, reviewing and implementation of the RMP.

Void Management Plan

- Provide a summary of the potential impacts to groundwater from the Donaldson and Abel operations;
- Propose mitigation measures to minimise potential impacts associated with the modified final void of the Donaldson Mine on the Abel site; and
- Propose measures for management and monitoring of potential impacts associated with the void over time.

Mine Closure Plan

- Provide detail on the mine closure strategy for the Donaldson Open Cut and Abel Underground Mines;
- Provide objectives and criteria for mine closure;
- Provide options for site use after closure, including Donaldson final void use;
- Propose measures to manage the environmental impacts of mine closure; and
- Outline performance criteria for long term management of the site.

5.0 REPORTING AND REVIEWING

5.1 Reporting

All internal and external reporting will be done in accordance with the Donaldson Coal EMS, which includes reporting within the Annual Environmental Monitoring Report (AEMR). The AEMR will be prepared in accordance with Condition 4, Schedule 5 of the Project Approval.

For further information on the individual reporting requirements specifically related to each of the management plans each plan should be reviewed.

5.2 Review

The Abel Underground Coal Mine has an operational life of 21 years, during which time its mine plan may be changed or altered depending on operational circumstances. Therefore the LMP and its individual components will be regularly updated, where needed, to capture these mine plan changes. Three (3) years prior to mine closure the LMP will be reviewed addressing the final mine plan and any changes that may have occurred since the previous LMP.

6.0 ROLES AND RESPONSIBILITIES

The Environmental Manager is responsible for overseeing the implementation of this LMP. The General Manager (or his delegate) is responsible for:

- Delegating tasks associated with this LMP when the Environmental Manager is absent;
- Providing adequate resources to implement this LMP; and
- Providing adequate training to employees and contractors regarding their requirements under this LMP.

GSSE Approval letter from Director General

APPENDIX 1

NSW GOVERNMENT
Department of Planning

Contact: Colin Phillips
Phone: (02) 9228 6483
Fax: (02) 9228 6466
Email: colin.phillips@planning.nsw.gov.au

Our ref:

Mr Mark McPherson
Director
Donaldson Coal Pty Limited
PO Box 37
MAITLAND NSW 2320

Dear Mr McPherson

Abel Coal Mine (05_0136)
Approval of Consultants

I refer to your letter, dated 15 June 2007, seeking approval of certain nominated consultants to prepare the Water and Landscape Management Plans required by conditions 11 and 19, respectively, of schedule 4 of the Minister's approval for the Abel Coal Mine (05_0136). The Department has reviewed the information provided on the consultants' expertise and experience and believes that all nominated consultants are suitable to prepare the respective management plans. Accordingly, the Director-General has approved:

- Dr Steve Perrens of Evans and Peck; and Mr Peter Dundon of Peter Dundon and Associates Pty Ltd, as suitably qualified experts to prepare the Water Management Plan required by condition 11 of schedule 4; and
- Mr Colin Driscoll of HUNTER ECO; Mr Rod Masters of GSS Environmental; and Mr Mark Burns of Global Soil Services, as suitably qualified experts to prepare the Landscape Management Plan required by condition 19 of schedule 4.

If you have any enquiries in relation to this matter, please phone Colin Phillips on 9228 6483.

Yours sincerely,

Howard Reed 20.6.07
Howard Reed
A/Manager
Mining and Extractive Industries
as Delegate for the Director-General

Correspondence & Consultation

APPENDIX 2

Our reference : DOC07/46502 273338A1
Contact : Mitchell Bennett, 4908 6806

Mr Phillip Brown
Environmental Manager
Donaldson Coal Pty Ltd
PO Box 37
MAITLAND NSW 2320

27 NOV 2007

Dear Mr Brown

Landscape Management Plan

I refer to your letter dated 13 November 2007 and the attached *Abel Coal - Landscape Management Plan.*

The Department of Environment and Climate Change (DECC) encourages the preparation of strategies, programs and plans as useful tools for industry to ensure that it meets the environmental objectives specified in conditions of the Environment Protection Licences. As a regulatory authority the DECC does not review or comment on these plans.

Please contact Mitchell Bennett on 4908 6806 if you wish to discuss this matter.

Yours sincerely

MITCHELL BENNETT
Head Regional Operations Unit – Hunter Region
Climate Change & Environment Protection Group

PO Box 488G, Newcastle NSW 2300
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Received 28.11.07

Rehabilitation Management Plan

APPENDIX 3

DONALDSON COAL

FINAL

Donaldson Open Cut and Abel Underground Coal Mines

Rehabilitation Management Plan

March 2008

DON3-07-01 Abel Rehabilitation Management Plan

GSS ENVIRONMENTAL
Environmental, Land and Project Management Consultants

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The operation will utilise a high productivity continuous miner based bord and pillar system, using pillar extraction techniques. Mine access and associated surface infrastructure will be located within the existing Donaldson Mine open cut void, with transfer of coal to the existing Bloomfield Coal Handling and Preparation Plant immediately to the north for coal washing and rail transport to the Port of Newcastle.

Project Approval (05_0136) was issued on 7 June 2007 for the development of the Abel Underground Mine. ***Condition 19*** of the approval requires the preparation of a Landscape Management Plan of which one component is a **Rehabilitation Management Plan** (RMP). Further details with regard to the preparation of the RMP are outlined in ***Condition 20*** of the approval. This document has been prepared to fulfil the RMP requirements of the development approval.

2.0 REGULATORY REQUIREMENTS

2.1 Project Approval

Project Approval (05_0136) has been issued under Part 3A of the *Environmental Planning and Assessment Act 1979*. **Table 1** summarises the relevant parts of ***Condition 20*** of Project Approval (05-0136) and the section(s) in this document where they are addressed.

Table 1 – Project Approval (05_0136) Condition 20 & Relevant Sections of the RMP

Condition Number	Condition Requirement	Section
20	The Rehabilitation Management Plan must include:	
(a)	*The rehabilitation objectives for the site;*	**4.0**
(b)	*A strategic description of how the rehabilitation of the site would be integrated with the 4,400 hectares of land owned by the Proponent surrounding the site, with a view to improving or enhancing the regional landscape and flora and fauna habitat values;*	**6.0**
(c)	*A general description of the short, medium and long term measures that would be implemented to rehabilitate the site;*	**5.0**
(d)	*A detailed description of the measures that would be implemented over the next three years to rehabilitate the site, including the measures to be implemented for:* • *progressively rehabilitating areas disturbed by mining operations on the site;* • *managing the remnant revegetation and habitat on site;* • *revegetating, monitoring and maintaining the offset area;* • *undertaking additional pre-subsidence fauna surveys;* • *minimising impacts on threatened fauna;* • *minimising visual impacts;* • *conserving and reusing topsoil;* • *collecting and propagating seeds for rehabilitation works;* • *salvaging and reusing material from the site for habitat enhancement;* • *controlling weeds, feral pests and access;* • *managing bushfires; and* • *managing any potential conflicts between the rehabilitation works and Aboriginal cultural heritage.*	**5.0** **6.0** **8.0**

Condition Number	Condition Requirement	Section
(e)	*Detailed performance and completion criteria for the rehabilitation of the site;*	**7.0**
(f)	*A detailed description of how the performance of the rehabilitation works would be monitored over time to achieve the stated objectives and against the relevant performance and completion criteria; and*	**8.0**
(g)	*Details of who is responsible for monitoring, reviewing and implementing the plan*	**9.0**

2.2 Guidelines

Key guidelines referred to in the preparation of the RMP include:

- G.J Summerhayes (1999) *The Rehabilitation of Coal Mines & Opportunities for Integrated Post Mining Land Uses*, Part 2, Invited Papers included in the Synoptic Plan for Integrated Landscapes, prepared by Andrews Neil for the NSW Department of Minerals Resources.
- The Department of Environment & Heritage (2002) – Best Practice Environmental Management in Mining Booklet for Mine Closure.
- Department of Environment (1998) Landform Design for Rehabilitation, Best Practice Environmental Management in Mining.

3.0 REHABILITATION OBJECTIVES

The primary objective for mine rehabilitation of the Abel Project will be to create stable final landforms with acceptable post-mining land use and capability. Revegetation and regeneration of the Abel final void and surface infrastructure areas will be conducted progressively over the life of the project as an integral component of mining operations. All rehabilitation works will be scheduled to commence as soon as practicable after disturbance associated with mining and mine related infrastructure construction. This approach minimises the disturbed area at any given point in time and hence reduces the ecological impact of the Project.

The majority of the proposed disturbance area, including the re-graded void area and underground mining areas impacted by subsidence, will be progressively revegetated and regenerated to self-sustaining pasture swards (void area) indigenous vegetation communities (underground mining area). The proposed final land use aims to emulate the pre-mining environment and will enhance local and regional ecological linkages across the Project Area.

Revegetation of subsidence areas will be implemented using local provenance species wherever possible. A native seed collection program will be initiated in the project area to ensure propagation of local provenance species.

A key rehabilitation objective will be to ensure that protection of the natural and man-made pre-mining environment will be achieved by implementing ‘safe and serviceable’ subsidence tolerance limits.

4.0 REHABILITATION MANAGEMENT STRATEGY

The key elements of the rehabilitation strategy proposed in this plan include:

- Setting long-term rehabilitation objectives;
- Developing specific Rehabilitation Criteria for assessment of "success";
- Specifying and implementing current best practice rehabilitation procedures; and
- Monitoring, continuous improvement feed back and eventual signoff.

This progress is shown diagrammatically in **Figure 1**.

Rehabilitation of the Abel Project will involve stabilization of the following areas:

- Boxcut & Abel Pit final void
- Underground areas
- Surface infrastructure areas
  - temporary / permanent surface facilities
  - coal haulage roads/conveyor route
  - vent shaft sites
  - Bloomfield CHPP

4.1 Boxcut and Abel Pit Final Void

The following strategies will be implemented to stabilise the void low wall area:

- The low wall will be battered back from the angle of repose to enhance the long term geotechnical stability of the face. Determination of geotechnical stability will be based on an assessment of the spoil material, the likely degree of settlement, and the degree of weathering expected in the long term. Where required the eastern, western and southern sides of the final void will be battered back to 18 degrees and the northern side to 10 degrees;

- Drainage on and over the low wall will be minimised through the construction of drainage control structures;

- Erosion of the low wall will be controlled by limiting the length of slope, minimising the degree of slope and by the establishment of suitable vegetation;

Surface water is a possible cause of slope deterioration and ultimate failure. Drainage will be directed away from the highwall face through the construction of interceptor channel drains around the perimeter of the highwall and spoon drains will be utilised on the upslope side of all benches. Drainage over the low wall will be minimised through constructing surface water diversions. The majority of the catchments, formerly reporting to the final void, will be diverted away from the low wall areas to minimise the amount of clean water runoff accumulating in the voids. These catchment areas will be either rehabilitated or in an advanced stage of rehabilitation. Runoff from these areas will be diverted to appropriate sediment control measures prior to leaving the site through stable water disposal areas.

Existing low wall and internal benches will be shaped to achieve a final landform with a slope gradient that is geotechnically stable and has the ability to support vegetation. Where required the eastern, western and southern sides of the final void will be battered back to 18 degrees and the northern side to 10 degrees. During the low wall dozer reshaping, water management structures such as contour banks,

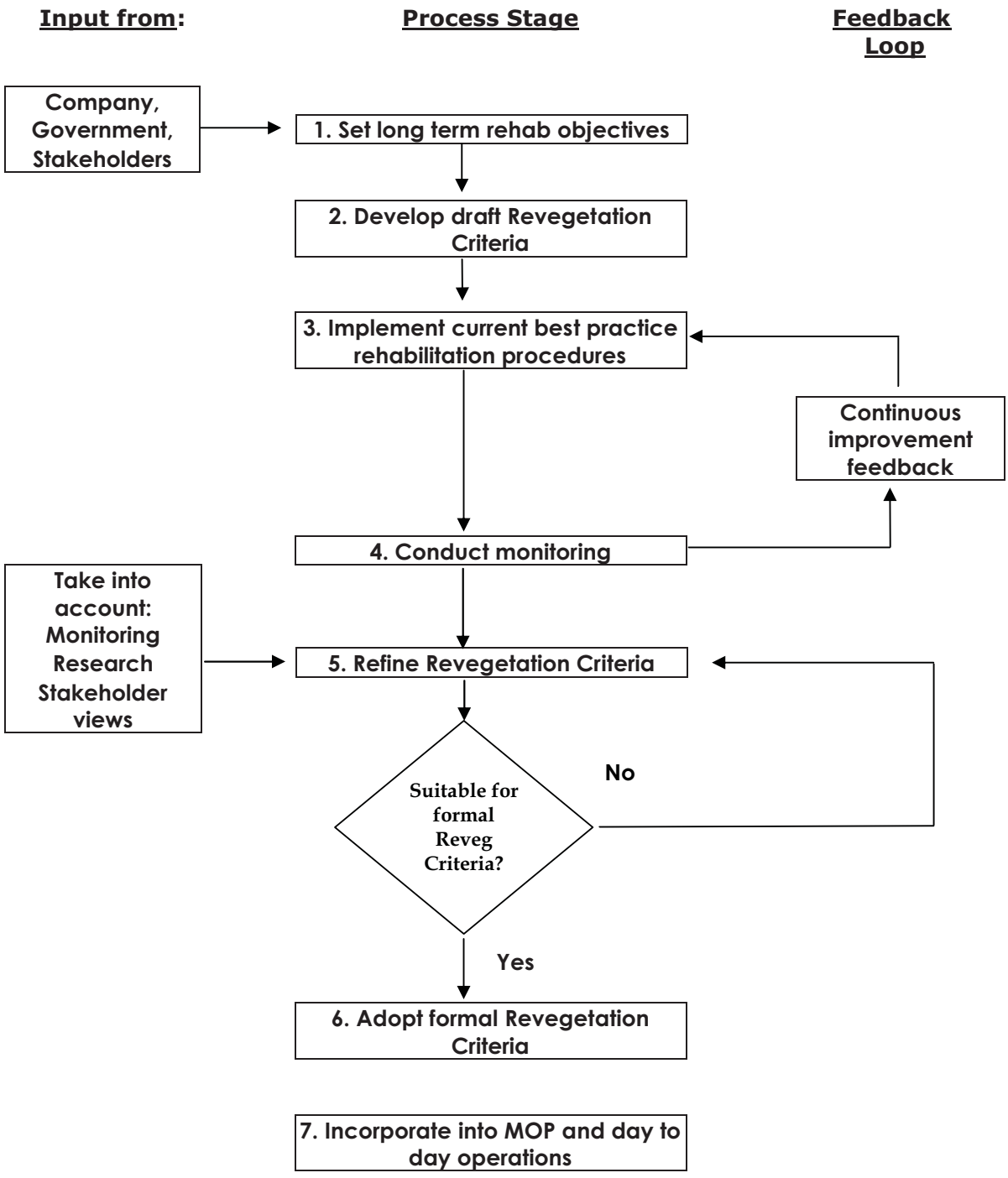

Figure 1 – The continuous improvement process proposed for Abel Coal Mine

drains and drop structures will be established to divert as much of the surrounding catchment as possible away from the final void so as to limit the amount of water that accumulates in the void.

The site will be trimmed, rock raked and deep ripped with gypsum prior to the placement of topsoil to 150mm thick. Topsoil will be sourced from existing topsoil stockpiles. The spoil will be ameliorated and sown to exotic pasture species commonly used in Hunter Valley mine site rehabilitation programs. Prior to initiation of revegetation works, the re-spread topsoil on low wall slopes will be sampled and subsequently tested for pH, conductivity, exchangeable Na% and nutrient requirements.

Low wall slopes with gradients of 10 degrees or less will be sown conventionally via ground broadcasting. Low wall slopes approaching 18 degrees, and where structural soil conservation earthworks cannot be used, will be hydromulched or straw mulched to enhance the surface stability of the slopes by hastening vegetative germination and establishment.

4.2 Abel Underground Mining Area

Rehabilitation of areas required due to subsidence will be undertaken in accordance with the Trigger Action Response Plans (TARPs) outlined in the Abel Underground Mine Environmental Assessment (EA) commitments and the Subsidence Management Plan (SMP) to be prepared for the proposed underground mining area.

Rehabilitation methods for natural features may include such actions as grouting surface cracks in water courses, dam walls, roads or general areas such as grazing paddocks. This will require topsoil to be stripped, the surface re-graded, filling of cracks with a self cementing material such as sand, cement or bentonite grout, prior to the surface being re-graded, compacted and topsoil replaced.

The rehabilitation of potentially affected dams is described in Abel Environmental Assessment and includes such actions as draining the dam storage area and repairing the dam with an impermeable clay liner to seal any cracks, prior to re-instatement of water.

Section 6.2.7 and **Table 4** of the Statement of Commitments in **Section 7** of the Abel Underground Mine Environmental Assessment Report provides detailed procedures for the monitoring and repair of structures, including Principals Residences, in accordance with the Mine Subsidence Board requirements. Additional detail is provided in the Project Subsidence Management Plan (SMP) and Individual Property SMPs to be prepared. Rehabilitation strategies for the following features will be addressed in the SMPs:

- Watercourses – Schedule 1 Creeks
- Cliff lines & ridges
- Sensitive ecosystems (ie Cool temperate rainforests)
- Residential buildings
- Black Hill public school & church
- Disused chicken sheds & Catholic diocese owned land
- Land used for agriculture
- Earth embankment dams

- Transgrid 330kV towers
- Energy Australia powerlines
- Hunter Water pipelines
- Buried fibre optic cable easements & communication lines
- Roads & drainage
- Black Hill & Stockrington quarries
- Agility natural gas pipelines
- Aboriginal heritage sites
- European heritage sites
- State survey marks

4.3 Surface Infrastructure Areas

4.3.1 General

The primary objective of the surface infrastructure area revegetation will be to stabilise all re-topsoiled batters, road verges, drains, banks, etc. All revegetation works will be scheduled to commence as soon as practicable after civil works are completed.

Limited disturbance of native vegetation will be undertaken during construction of the key infrastructure areas eg Bloomfield CHPP expansion area. Clearing will constrained to the footprint area of the development.

The principal revegetation techniques used will be hydroseeding and straw mulching of exotic pasture species. In order to achieve a stable final landform, consisting of a self-sustaining exotic pasture community, a specific species list has been developed (refer **Section 4.3.3**).

All revegetation operations are best undertaken immediately after ripping of topsoiled areas is complete so that the ripped surface has minimal time to crust prior to seed application. The most effective way of controlling erosion will be to establish and/or maintain a healthy vegetation cover. Vegetation will provide effective surface protection against raindrop impact, bind the underlying soil to resist detachment by surface flows, and improve and maintain the soil's infiltration capacity thereby decreasing the velocity and volume of runoff. Vegetation will also improve the aesthetic appearance of each area and the operational efficiency of structural sediment and erosion control measures employed.

4.3.2 Hydroseeding & Straw Mulching

Techniques proposed for vegetative stabilisation of the infrastructure area batters include the use of hydroseeding and straw/bitumen (straw mulching). All reshaped areas will be sown with exotic pasture species and inorganic fertiliser at luxurious rates.

After surface soil tillage is completed for any given area, revegetation will commence as soon as practicable. The proposed method of sowing will be via hydroseeding. Straw mulching will be undertaken as a post-sowing treatment for enhancement of pasture germination.

Hydroseeding is a technique which involves the mixing, in a large tanker, of slurry containing selected seed varieties, fertiliser and wood pulp (cellulose fibre), adding water as an adhesive. The slurry is then pumped through a high pressure spray, over the area to be treated. The seed generally adheres to the pulp, which improves the micro-climate for germination and establishment.

Pasture species and rates will generally be three (3) times that normally broadcast or drilled in pasture improvement programs throughout the district. The soils in the Lower Hunter area typically respond well to high rates of nitrogen and phosphorus fertilisers. The use of luxurious fertiliser rates will be a key feature of the revegetation program.

All areas will be straw mulched upon completion of hydroseeding. Straw mulching involves providing cover for the soil to improve pasture growth, modifying the soil surface to control erosion, or a combination of both. Securely pressed against the surface of the soil, straw mulch provides a high degree of erosion control and improves moisture availability to establishing pasture. The mulch also has the effect of protecting the soil surface against raindrop impact, improving the micro-environment for seed germination and establishment by reducing evaporation losses, and assisting in the control of surface erosion caused by raindrop impact and overland water flow.

Straw will be applied at a rate of 5 t/ha to achieve approximately 80% ground cover at a nominal thickness of 1 to 2 cm. The mulch will be fixed to the soil surface to avoid loss by wind or water. This will be achieved by applying a slow-breaking anionic bitumen emulsion with water in a 1:1 mixture at a rate of 2 litres/m^2.

The use of hydroseeding and straw mulching techniques negate the need for irrigation to promote germination and establishment of the pasture sward.

4.3.3 Species Selection

A mixture of exotic pasture grass and legume species have been selected for revegetation of surface infrastructure areas within the Abel Project. The proposed mix is provided in **Table 2**.

Table 2 – Pasture Specification

Species	Rate (kg/ha)
Pioneer Rhodes Grass	8
Hulled Couch	6
Wimmera Ryegrass	10
Consul Lovegrass	2
Oats (autumn / winter) or Jap Millet (spring / summer)	20
Sub Clover	4
Haifa White Clover	5
Lucerne	5

All legumes (clovers & lucerne) will be inoculated with Rhizobia and lime pelleted prior to sowing to promote nodulation thus facilitating subsequent nitrogen fixation.

4.3.4 Nutrition and Fertiliser

Fertiliser will be applied during the hydroseeding operation. Granulock 15 (or similar) will be applied at a rate of 250 kg/ha in a slurry containing seed, wood fibre pulp and water.

4.3.5 Timing

Exotic pasture seed is best sown when soils are warm and at Abel preferably between September and March (inclusive). Sowing will always be undertaken immediately after site preparation and before rain and surface crusting can occur.

5.0 INTEGRATION OF REHABILITATED LANDS WITH SURROUNDING LANDS

Rehabilitation of the boxcut / Abel Pit final void, underground mining areas and surface infrastructure will be strategically integrated into surrounding land owned by the proponent with the major objective being improvement of the regional landscape and ecological values. Introduction of fencing and the management of weeds, feral animals and bushfire will be key components of this strategy.

5.1 Fencing

Areas of retained vegetation within the surrounding land owned by the proponent will be appropriately protected from human-induced impacts such as damage to vegetation from vehicles or trampling, increased rubbish dumping and alteration to normal fauna behavior patterns. As appropriate, fencing will be used to protect existing vegetation from accidental disturbance and will clearly identify areas of vegetation to be retained. The type of fencing used will consider the need for facilitation of fauna movement.

Fencing will also be used as part of the revegetation strategy to control impacts such as grazing and to allow vegetation to regenerate naturally. This option will be used where active disturbance to the soil for replanting is not considered appropriate, such as in areas of archaeological significance or in other places where significant tree cover remains. In such cases, sensitive areas will be fenced to exclude stock and to allow native vegetation to occur.

5.2 Weed Control

A weed management strategy will also be incorporated into the program to remove unwanted species. The presence of weed species has the potential to be a major hindrance to revegetation and regeneration activities. In addition to this, the presence of weed species within the surrounding land has the potential to significantly decrease the value of the native vegetation. Weed management will be a critical component of mine rehabilitation and landscaping.

Control measures will include:

- Hosing down equipment in an approved wash down area before entry to site.
- Scalping weeds off topsoil stockpiles prior to re-spreading topsoil.
- Identifying and spraying existing weed populations on-site together with ongoing weed spraying over the life of the mine.

The spread of weeds will be eliminated from rehabilitation areas by using weed free soil from the open cut area and monitoring & controlling weed populations should they occur.

Weed control, if required, will be undertaken in a manner that will minimize soil disturbance. Any use of herbicides will be carried out in accordance with Department of Primary Industries and Department of Environment & Climate Change requirements though it is anticipated that regular monitoring of weeds, combined with extremely low base weed populations, will enable simple physical weed control to be effective. If herbicides are required, selective application will be used in preference to broad area application.

5.3 Feral Animal Control

Introduced fauna species such as foxes, rabbits and feral cats will be controlled on an "as required" basis. An increase in feral species within the site has the potential to cause considerable impacts on existing native species. Feral animal control programs will be initiated in consultation with the Rural Lands Protection Board.

5.4 Bushfire Management

The exclusion of bushfire from revegetated batters will be necessary to allow re-sown pasture to successfully establish. Inappropriate bushfire regimes have the potential to, not only destroy essential mining infrastructure, but significantly alter vegetative status of the area or even completely destroy all vegetation rendering the batters vulnerable to erosion.

5.5 Adaptive Management

A strong positive feedback loop between monitoring and adaptive management will be established. This process has been highlighted in **Figure 1** (refer **Section 4.0**). The management of the ecological components of the Project will be responsive to any new ecological data that may arise through the monitoring of the site, or any other studies completed as part of the Project. This will enable a flexible approach to the management requirements of the Project, allowing ongoing feedback and refinement of the rehabilitation management strategy.

6.0 COMPLETION CRITERIA

6.1 Abel Pit Final Void Area

Rehabilitation completion criteria are outlined in detail in the Donaldson Open Cut and Abel Underground Mine Integrated Mine Closure Plan which is an integral part of the Landscape Management Plan. Some variation of these criteria is required for the final void area given that the slopes will be vegetated with exotic pastures species compared to native vegetation across the majority of the rehabilitated open cut area.

Completion criteria are proposed for both vegetation and soils for re-graded slopes within the final void area. However, experience has shown that there is no single 'quick fix' indicator which unequivocally demonstrates that a rehabilitated ecosystem will be sustainable. The following criteria are recommended:

Vegetation

Achieve and maintain vegetation cover of at least 70%. Vegetation cover forms the single most important control on erosion and slope surface stability.

Natural regeneration. Evidence of natural regeneration occurring of at least four (4) pasture species after five (5) years.

Soil Quality

Physical and chemical soil data will be compared with data from samples from unmined analogue monitoring plots surrounding the mine. The progression of soil parameters towards those typical of undisturbed soils in surrounding areas can then be monitored. This will necessitate a one off assessment of physical and chemical soil parameters in surrounding un-mined land against which soil results from monitoring plots will be compared over time.

Soil quality success criteria include:

- Soil pH to be in the range 6.0 to 8.0 after 5 years;
- Conductivity of replaced topsoil to be below 900uS/cm after 5 years;
- The surface layer to be free of any hazardous material to a depth of at least 1 metre;
- Runoff water quality less than 1000uS/cm after 5 years;
- Soil N and P levels to be within 20% of levels in adjacent analogue site after 5 years.

For more detail on completion criteria see the *Abel Underground Mine Integrated Mine Closure Plan* attached as **Appendix 5**.

7.0 REHABILITATION MONITORING

7.1 Final Void Area

7.1.1 Regular Walkthrough Assessment

An annual walk-through of the rehabilitating void area will be undertaken to assess the need for remedial action. This assessment will examine:

- Adequacy of vegetation cover/need for re-sowing of bare areas, modification of seed mix;
- Presence of weeds;
- Presence of unacceptable erosion;
- Need for fertiliser addition and/or other maintenance;
- Need for additional topsoiling, timber debris re-spreading and site preparation.

7.1.2 Rapid Assessment Prior to Signoff

When, on the basis of site inspections, monitoring and research data mine staff conclude that the mine rehabilitation is ready for signoff, the following procedures will be undertaken:

- Collation of all relevant records, monitoring and research data, including any 'Initial Post-establishment Monitoring Checklists completed to determine whether all completion criteria standards and milestones have been met;
- Regardless of whether an 'Initial Post-establishment Monitoring Checklist has been completed or not, a general inspection will be required to confirm that rehabilitation operations have been carried out as required;
- During long-term monitoring or rapid assessment, a site worksheet will be prepared, which summarises key rehabilitation operations, describes the rehabilitation in general terms, and notes any remedial actions that may be required to meet particular standards and milestone e.g. repair of drainage areas. An indicative walk through monitoring sheet format will include:
  - Site No.
  - Photo No.
  - Co-ordinates.
  - Task/Problem.
  - Action Recommended.
  - Action Priority (1 to 5).
  - Due Date.
  - Completion Status.
  - Comments;
- When all records have been collated and any required remedial work completed, a Lease Relinquishment Report (LRR) will be prepared, as described in DPIs EDG174: Reporting Requirements for Mine Closure and Lease Relinquishment; and
- Submission of the LRR will be followed by a site inspection with DPI staff (and other nominated stakeholders as required) to confirm their agreement that requirements have been fulfilled, or if not, determine any additional work is needed.

7.2 Underground Mining Area

Prior to mining occurring that will impact on any Schedule 1 Streams the Abel Underground Mine SMP will be developed so as to address the following in relation to Schedule 1 Streams:

- detailed identification of risk factors on a case-by-case basis;
- setting up of permanent monitoring locations along watercourses as well as regular inspection regimes;
- continuation of baseline data collection on water flow conditions and health indicators (such as macro-invertebrates);
- establishment of trigger levels that will be used to assess whether any changes observed through monitoring warrant responsive action;
- details of responsive and remedial action to be undertaken if required;
- require the identification of any existing degradation in the streams prior to mining to allow differentiation of that degradation induced by the mining; provide for a post-mining assessment of any streams within the area of mine subsidence within six (6) months of the initial subsidence;
- provide for a subsequent assessment within eighteen (18) months of the initial subsidence to confirm that post-mining degradation resulting from the mining is successfully remediated;
- require any remediation works to be implemented to a standard approved by DWE, where the assessment has indicated degradation of the streams in the area of mining induced subsidence, and thereafter on an annual basis until any mining induced stream instability is addressed to the standard approved; and
- require a photographic record of stream stability for areas where either fracturing is detected (at maximum strain points), or at maximum tilts within the subsidence envelope.

Where it is proposed not to leave a barrier around a Schedule 2 streams a detailed assessment will be undertaken for the stream and provided to the Department of Water and Energy addressing the proposed impacts on it. It will include as a minimum:

- assessment of the geomorphic and vegetation condition and aquatic habitat for the stream;
- selective measurements of channel boundary sediment size;
- predications of subsidence and cracks/fractures throughout the stream;
- a detailed photographic record of the existing stream condition;
- a map of the spatial distribution of alluvium and colluvial aprons throughout the stream;
- collection of background data for the main areas of alluvium for the shallow alluvial aquifer by the installation and regular monitoring of a network of piezometers and/or wells in the main areas of alluvium for the shallow alluvial aquifer;
- assessment of the location and activity of springs, pipes/tunnels and/or salt seepages;
- measurement of current bed slope and any pool-riffle sequences on each channel and periodic assessments of changes over time;
- an assessment of likely erosion points, fracturing or seepage zones from the mining area to the stream, along the stream channel occurring as a result of mining activities;
- an assessment of any required remedial works on the affected stream, including:
    - options considered for the remediation program

- anticipated lifetime of the remedial works
- details of the engineering design or process for engineering
- design of the remediation works
- long term remediation requirements, including revegetation.

- details of the proposed monitoring regime. It will provide for:
  - post-mining assessment, to a standard approved by DWE, within six (6) months of the initial subsidence.
  - provide for a subsequent assessment within eighteen (18) months of the initial subsidence to confirm that post-mining degradation resulting from the mining is successfully remediated.

Following consultation with DWE on the above assessment for each Schedule 2 Stream the SMP for the Abel Underground Mine will be developed to implement the findings of the above assessment.

In conjunction with the monitoring described above, monitoring under the SMP will include:

- Collection of extensive baseline data prior to mining, including the ability to collect at least 15 years of baseline data for Blue Gum Creek and Pambalong Nature Reserve;
- Monthly monitoring during any substantial subsidence period for each monitoring site, and annual monitoring for all sites;
- Water quality sampling will be undertaken throughout the site with analytes measured in the laboratory including pH, Electrical Conductivity, Total Dissolved Solids, Total Suspended Solids, Chloride, Sulfates, Alkalinity (Bicarbonate), Alkalinity (Carbonate), Calcium, Magnesium, Sodium and Potassium;
- Detailed assessment of geomorphic characteristics for specific watercourses reaches and more general assessment of larger watercourse lengths, with monitoring locations selected from those areas at greatest risk of subsidence impact (including predicted ponding locations and large sandstone outcrops);
- Flow gauging stations established on Blue Gum Creek to monitor water flow and level; and
- Macro-invertebrate monitoring within Blue Gum Creek and Pambalong Nature Reserve, including the use of AUSRIVAS (Australian River Assessment System) to assess biological health.

The precise nature of the monitoring to be undertaken will be determined in consultation with the relevant stakeholders as part of the preparation of the SMP.

8.0 ROLES AND RESPONSIBILITIES

The Environmental Manager is responsible for overseeing the implementation of this RMP. The General Manager (or his delegate) is responsible for

- Delegating tasks associated with this RMP when the Environmental Manager is absent;
- Providing adequate resources to implement this RMP;
- Providing adequate training to employees and contractors regarding their requirements under this RMP;
- Reviewing and updating the plan;
- Coordinating all activities and investigations under the plan;
- Coordinating all consultation with relevant stakeholders; and
- Being the first point of contact at Abel in relation to rehabilitation issues.

Final Void Management Plan

APPENDIX 4

DONALDSON COAL

FINAL

Donaldson Open Cut and Abel Underground Coal Mines

Void Management Plan

March 2008

DON3-07-01 Void Management Plan

GSS ENVIRONMENTAL
Environmental, Land and Project Management Consultants

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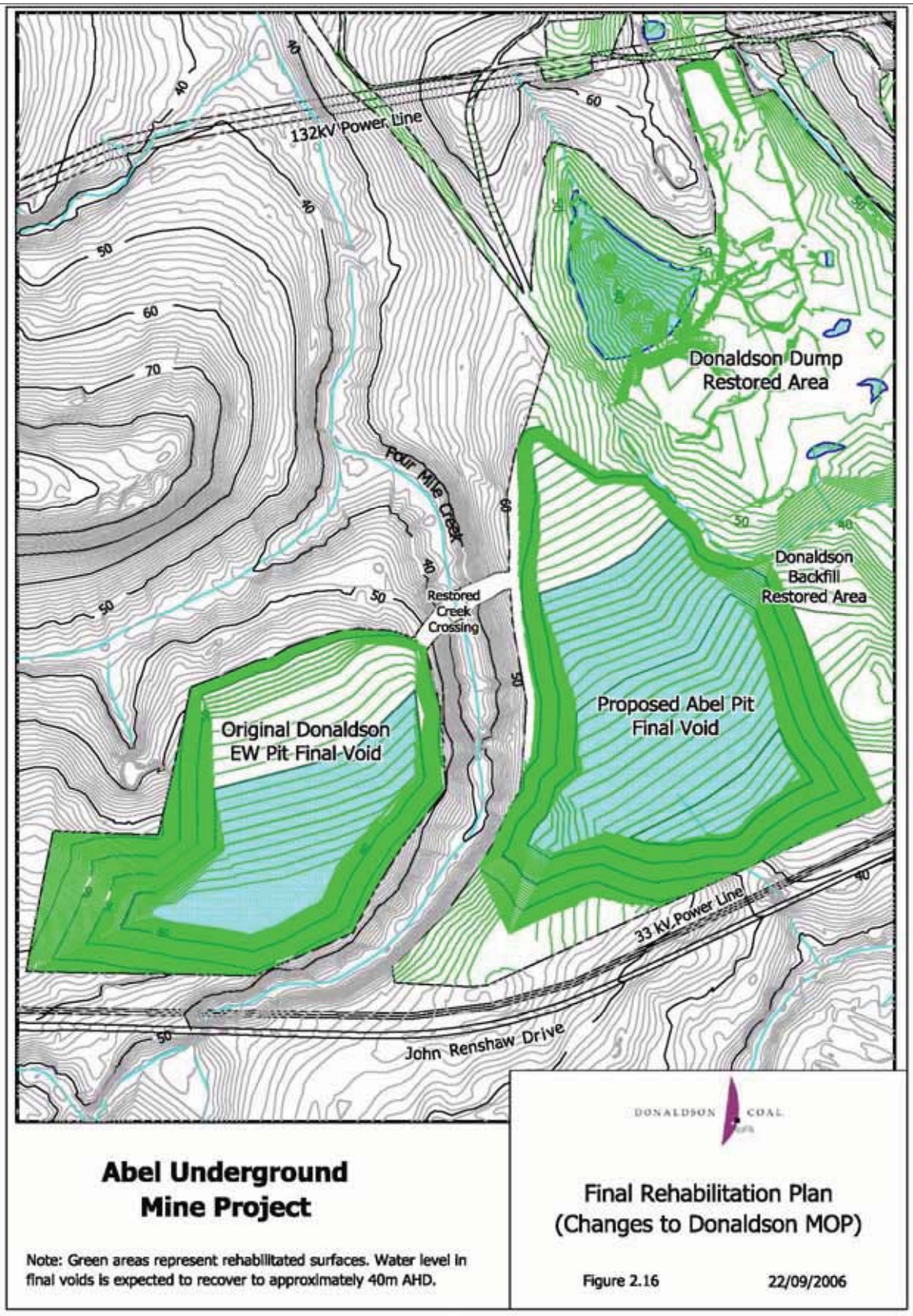
1.0 INTRODUCTION

The Abel Underground Coal Mine ('Abel') is owned and operated by Donaldson Coal Pty Ltd ('Donaldson') which is located approximately 23 kilometers north-west of Newcastle, south of John Renshaw Drive. The Abel underground mine area is within the eastern section of Exploration Lease 5497 (EL5497) and has a surface area of approximately 2750 hectares. Donaldson also owns and operates the adjacent Donaldson Open Cut Mine which has been operation since 2001. The Abel site lies across both the Maitland and Cessnock Local Government Areas and the operation is approved to mine up to 4.5 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal over the next 21 years.

The operation will utilise a high productivity continuous miner based bord and pillar system, using pillar extraction techniques. Mine access and associated surface infrastructure will be located within the existing Donaldson Coal Mine open cut void, with the transfer of coal to the existing Bloomfield Coal Handling and Preparation Plant immediately to the north for coal washing and rail transport to the Port of Newcastle.

At the completion of mining at Donaldson Open Cut Mine in 2012, it is intended that all infrastructure will be removed and the land rehabilitated in accordance with the requirements of this Mine Closure Plan. The exception to this is the infrastructure required for the Abel Underground Mine which will remain. This is described in the Environmental Assessment (2006). It includes the Donaldson Open Cut Mine final voids (including the Abel Pit Void), the existing sealed access road, the coal haul road to Bloomfield CHPP and some strategic water management structures (e.g. the Big Kahuna Dam). For the final void configuration refer to **Figure 1**.

Project Approval (05_0136) was issued on the 7 June 2007 for the development of the Abel underground mine. ***Condition 19*** of the approval requires the preparation of a **Landscape Management Plan** of which one component is a **Final Void Management Plan** (FVMP). Further details with regard to the preparation of the FVMP are outlined in ***Condition 21*** of the approval. This document has been prepared to fulfil the FVMP requirements of the project approval.



LEGEND					**FIGURE 1** Final Void Configuration	Project: Abel Final Void Management Plan
						Client: Donaldson Coal
Version	Date	Author	Checked	Approved	GSS ENVIRONMENTAL Environmental, Land and Project Management Consultants	File: DON3-07-01
1	20/08/07	RC	SS	AH		Projection:

2.0 REGULATORY REQUIREMENTS

Project Approval (05_0136) has been issued under Part 3A of the *Environmental Planning and Assessment Act 1979*. **Table 1** below summarises the relevant parts of ***Condition 21*** of Project Approval (05-0136) and the section(s) in this document where they are addressed in this FVMP.

Table 1 - Project Approval (05_0136) Condition 21 & Relevant Sections of the FVMP

Condition No	Condition	Section where addressed
21	The Final Void Management Plan must describe what actions and measures would be implemented to:	
(a)	*Minimise any potential adverse impacts associated with the modified final void of the Donaldson mine on the Abel site; and*	4 & 5
(b)	*Manage and monitor the potential impacts of this final void over time.*	8

This document has been prepared in consultation with several key government departments and agencies. These include the Department of Water and Energy (DWE), the Department of Environment and Climate Change and the Maitland and Cessnock Councils. Consultation with these stakeholders was undertaken to satisfy the requirements of ***Condition 19(c)*** of the Project Approval.

3.0 PURPOSE AND OBJECTIVES

The primary purpose of the FVMP is to:

- Address the relevant conditions of the Project Approval;
- Address the relevant commitments made within the Environmental Assessment;
- Address legislative requirements and guidelines relevant to the LMP and related management plans; and
- Provide Donaldson Coal Pty Ltd with a clear and concise description of their responsibilities in relation to Landscape Management (including Rehabilitation, Final Void Management & Mine Closure) during the operation and subsequent closure of the Abel underground coal mine.

The primary objectives of this FVMP are to:

- Ensure that the relevant conditions of project approval are addressed;
- Consult with the relevant stakeholders and government departments with regard to the preparation of this document;
- Propose mitigation measures to minimise potential impacts associated with the modified final void of the Donaldson Mine on the Abel site;
- Propose measures for the management and monitoring the potential impacts of the void over time;
- Provide a summary of the interaction of the Donaldson Open cut and the Abel Underground Voids; and
- Present options for the final landuse of the void following the completion of the Abel Underground.

4.0 POTENTIAL IMPACTS OF THE MODIFIED DONALDSON VOID ON THE ABEL UNDERGROUND OPERATION

4.1 Groundwater

In July 2006, Peter Dundon and Associates Pty Ltd were engaged on behalf of Donaldson Coal to prepare a **Groundwater Assessment** as part of **The Abel Coal Project Environmental Assessment**. Cumulative impacts on the regional groundwater aquifer were assessed, which included the Tasman, Donaldson, Bloomfield and proposed Abel underground mining operations.

Below is a summary of the key predictions from the groundwater assessment as they relate to the Abel and Donaldson Open Cut voids.

- The dewatering operations at the Donaldson Open Cut Mine have caused a noticeable cone of drawdown in groundwater levels, ranging up to more than 30m (ie to around –15 m AHD) along the southern margin of the open cut.

- The Donaldson Open Cut Mine dewatering appears to have had negligible impact on groundwater levels in the alluvium/colluvium, or in the Permian coal measures lithologies that are stratigraphically above the zones that have been directly intersected by the open cut;

- A less pronounced cone of depression has developed around the Bloomfield mining operations, most of which are situated north of the Donaldson Seam subcrop line. Near the southern boundary of the Bloomfield lease, mine dewatering appears to have resulted in drawdown in groundwater levels to around –30 m AHD; and

- Notwithstanding this, it is expected that some water will accumulate to a maximum depth of approximately 24 metres in the deepest part of the final void (below 40 metres RL.) when water is not actively managed on the site.

For more detail on the **Groundwater Assessment** undertaken by Dundon (2006) the Abel Environmental Assessment should be consulted.The following mitigation measures will be implemented during operation and after closure to mange the impact of the final void on groundwater. These include, but are not limited to the following:

- Groundwater extraction will be licenced by the Department of Water and Energy (DWE) to ensure compliance with NSW water extraction legislation (Current Donaldson open cut void is licensed)

- Groundwater bores surrounding the void (as part of a larger integrated monitoring program) will be monitored to establish impacts to water quality and adjoining watertable;

- Water captured from the workings will be collected, stored and utilised onsite and at the CHPP and will not be discharged from the mines; and

- Following mine closure, surrounding water quality and height will be monitored (as part of a larger integrated monitoring program) until such time that the Project Approval is relinquished by the Department of Planning and the lease relinquished to the Department of Primary Industry.

In addition to the above, contingency plans for managing any adverse impacts of the Abel Underground on the surface and groundwater quality are be addressed in more detail the **Surface Water Management Plan** and **Ground Water Management Plan** as stipulated by ***Conditions 14*** & ***15*** of the Project Approval.

4.2 Surface Water

All permanent Abel Underground Mine pit top facilities will be located within the final void created by Donaldson Open Cut Mine operations. All runoff from external catchments will therefore drain away from the void and there will be no requirement for separate facilities for diversion of "clean" runoff away from the facilities.

The base of the open cut void will be graded to enable water to drain in a south-easterly direction. A sump with simple sedimentation and oil separation systems will be established in this vicinity. Water collected in this sump will be pumped to the 'Big Kahuna' Dam, where it will be used for dust suppression on stockpiles, haul roads and general disturbed surface areas. Excess water removed from the Abel Underground Mine will also be pumped into the Big Kahuna Dam where it will be used on the site or transferred to the Bloomfield CHPP where it will be used in coal washing and processing.

4.3 Vegetation

All undisturbed areas outside of the void are already vegetated or will be revegetated at the completion of the Donaldson Open Cut Mine. By placing the Abel infrastructure into the Donaldson Void no additional disturbance should be required. Notwithstanding this, if additional surface disturbance is required, the current Donaldson Coal pre-clearing survey protocols will apply.

5.0 FINAL VOID MANAGEMENT

Following closure of the site, several key environmental issues may need to be considered for the long term management of the void. The areas requiring management are outlined below in **Section 5.1**.

5.1 Void Water Quality

Water should only be permitted to accumulate in the void if it maintains a quality that does not compromise its intended use or the quality of surrounding groundwater reserves. The aim is to provide a usable water storage or biologically viable water resource. Prior ground water and surface water modelling should provide some indication of the expected water quality in the final void. Once this prediction is made actions can be taken during the closure process regarding the control of external sources of water into the void. Maintaining void water quality will be essential to achieving the long term viability of the water resource. The following aspects need to be considered with respect to managing final void water quality:

- Stratification of the water column;
- Concentration of dissolved salts resulting from the mining of the coal seams;
- Control of surface flow into the void;
- Determination of recharge rates to the spoil aquifer and void;
- Understanding the movement of flow through the spoil aquifer;
- Groundwater inflows and outflows; and
- Rainfall and evaporation.

All of the above have the potential to impact on the water quality of the final void and its potential end use. Post closure a water monitoring program will need to remain in place to closely monitor any changes to chemistry within the void. For further detail on **Monitoring and Measurement** refer to **Section 8.0** below.

5.2 Void Slope Stability

5.2.1 Low Walls

For the purposes of this management plan the low wall is assumed to be composed of mixed, disturbed and fragmented material. Stability of the low wall will be achieved through implementing the following:

- The low wall will be battered back from the angle of repose to ensure that long term geotechnical stability of the face. Determination of geotechnical stability should be based on an assessment of the spoil material, the likely degree of settlement, and the degree of weathering expected in the long term. Where required the eastern, western and southern sides of the final void will be battered back to 18 degrees and the northern side to 10 degrees;
- Drainage on and over the low wall will be minimised through the construction of drainage control structures;
- Erosion of the low wall will be controlled by limiting the length of slope, minimising the degree of slope, and by the establishment of suitable vegetation;
- Battering of the low wall against the bottom of the high wall will enhance stability; and

- Benching of the spoil material may need to be considered in some areas in order to achieve geotechnical stability and minimise erosion.

5.2.2 High Walls

For the purposes of this management plan the high wall is assumed to be composed of undisturbed, solid material generally occurring above the economically lower-most limits of the mineable seam in the final void. Depending on the geology of the deposit, the highwall material may comprise any variety of natural occurring soil or rock types in an equal variety of strength or weathering states.

To ensure the safety of the final void, the surrounding final slopes should be left in a condition where the risk of slope failure is minimised. This requires that the highwall is battered back from the vertical to a stable overall slope angle to achieve a minimum final landform of 18 degrees.

The following will need to be considered when assessing the geotechnical stability of highwalls:-

- Long term groundwater levels;
- Long term final void water levels;
- Height and inclination of slope and number and spacing of intermediate benches;
- Shear strength of the highwall soils and rocks;
- Density and orientation of fractures, faults, bedding planes, and any other discontinuities, and the strength along them; and
- The effects of the external factors, such as surface runoff.

Prior to closure, investigations will be undertaken to confirm the criteria above.

5.3 Spontaneous Combustion

While spontaneous combustion is not know to occur at the site, it has been included for reference as it is often an issue associated with final voids.

Spontaneous combustion of mined material results from a build up of heat resulting from an exothermic reaction between the material and oxygen. Once spontaneous combustion has occurred it is usually difficult to control and becomes a safety and environmental risk.

Spontaneous combustion above ground commonly occurs in waste dumps containing reject coal material, in unconsolidated heaps where oxygen can come into contact with the coal and heat can't dissipate. The problem is compounded when rainfall events cause erosion, progressively exposing the coal. Spontaneous combustion may also occur in the coal seam exposed in the remaining highwall of the final void.

The following will be undertaken to reduce the potential for spontaneous combustion to occur:

- Accumulations of coal material, particularly pyritic, will be buried under inert spoil;
- Any remaining coal spalling will be removed from the highwall where possible;
- If any coal on the highwall face is prone to spontaneous combustion, it will be sealed with water, clay or inert soil where possible; and
- Should any outbreaks of spontaneous combustion occur in the final void, details on the materials involved, presence of pyrites, location, date, time and climatic conditions will be recorded. This

will be undertaken as part of the ongoing inspection and monitoring that will occur post closure of the mine.

5.4 Control of Surface Inflow

The control of surface inflow into the final void is essential for the long term management of water quality within the pit and will also aid in the control of erosion to low walls and high walls.

Surface water is a possible cause of slope deterioration and ultimate failure. Drainage will be directed away from the highwall face through the construction of interceptor channel drains around the perimeter of the highwall and spoon drains will be utilised on the upslope side of all benches.

Drainage over the low wall will be minimised through constructing surface water diversions, and drainage on the wall will be limited and controlled to reduce the erosion potential.

The catchment area of the final void will be minimised by the installation of diversion drains. This will ensure that the water storage in the final void will never overflow.

5.5 Dust Management

During and after closure of the site, the management of dust will be undertaken in accordance with the **Donaldson Coal Dust Management Plan** that is part of the sites current operational EMS.

5.6 Safety

At mine closure, one of the main priorities for the void will be to render it safe in terms of access by humans, livestock and wildlife. The following will be considered at the time of closure to ensure that the void is left in a safe manner. These include:

- Instability of the high wall and low wall can induce failures or mass movement. To ensure the stability of the high walls and low walls they will be battered back to a stable slope angle (also see **Section 5.2** above);

- Exposed coal seams will be covered with inert material to prevent ignition either from spontaneous combustion, bush fires or human interference (also see **Section 5.3** above);

- A barrier at a safe distance from the perimeter of the void to prevent human access will be constructed. The highwall areas will be secured by the construction of a trench and a 2 metre safety berm, as well as a 2.1 metre security fence along the entire length of the remaining high wall. This is to provide an engineered barrier between the pit and the surrounding area. The trench and berm is to be constructed in such a way that it will physically stop most vehicles;

- Suitable signs, clearly stating the risk to public safety and prohibiting public access will be erected at 50 metre intervals along the safety fence;

- Surface runoff from land surrounding the void will be diverted from entering the void so as to prevent flooding of the pit and potential development of instability of the void walls (also see **Section 5.4** above); and

- Shrub and/or tree planting along the outside edge of the bund wall will be implemented where practicable to lessen the visual impact of the wall, and will be in accordance with the agreed post-mining rehabilitation criteria and land use (see the **Mine Closure Plan** for detail).

6.0 REHABILITATION METHODOLOGY FOR THE FINAL VOID

Figure 1 shows the proposed final void and landform at the conclusion of the Abel Underground Mine operation. Areas shown in green are disturbed land that will be revegetated. Undisturbed areas outside of the void are already vegetated or will be revegetated at the completion of the Donaldson Open Cut Mine. The void at the portal will be shaped and managed in a manner consistent with the rehabilitation principles for the Donaldson Open Cut Mine.

The rehabilitation methodology for the final voids is described in detail in the Mine Closure Plan. The key elements as they relate to the final void have been summarised below:

- The eastern, western and southern sides of the final void will be blasted and pushed using a dozer to a maximum slope of 18 degrees.

- The northern side will be blasted and regraded to a maximum of 10 degrees, with a permanent vehicle access and egress ramp constructed to allow access to the pit void for ongoing monitoring and management.

- During highwall dozer reshaping, water management structures such as contour banks, drains and drop structures will be established to divert as much of the surrounding catchment as possible away from the final void, to limit the amount of water that accumulates in the pit.

- Material blasted from the high walls will also be used to cover any exposed coal seams and other carbonaceous material that might be left at the end of mining.

- Due to the expected standing water at the bottom of the void, a safety berm and security fence will be provided around the void to prevent unauthorised access. The berm will be designed with a trench to prevent unauthorised vehicle access to the void.

7.0 CATCHMENT MANAGEMENT STRATEGIES

The catchments, formerly reporting to the final void, will be diverted away from the low wall areas to minimise the amount of clean water runoff accumulating in the voids.

These catchment areas will be either rehabilitated or in an advanced stage of rehabilitation. Runoff from these areas will be diverted to appropriate sediment control measures prior to leaving the site through stable water disposal areas.

The remainder of the regraded low wall area entering the void, will be stabilised with structural soil conservation earthworks (banks, drains, drop structures, etc), and revegetation using exotic pasture species that are routinely used throughout the Hunter Valley coalfields during mine site rehabilitation programs. Pasture establishment will provide sufficient ground cover to minimise low wall erosion.

Low wall slopes with gradients of 18 degrees or less will be sown conventionally via ground broadcasting. Low wall slopes exceeding 18 degrees, and where structural soil conservation earthworks cannot be used, will be hydromulched to enhance the surface stability of the slopes by hastening vegetative germination and establishment.

Prior to initiation of revegetation works, the re-spread topsoil on low wall slopes will be sampled and subsequently tested for pH, conductivity, exchangeable Na% and nutrient requirements.

Nutrient requirement testing will be a useful tool to determine site specific fertiliser application rates to optimise nutrient utilisation by establishing pastures thus preventing nutrient overload to the catchment area potentially causing excessive nutrient leaching to the void and the resultant nitrification of water stored in the void.

Post-sowing soil testing will be carried out on a regular basis to ensure that nutrient application has been targeted to match the establishing vegetations needs.

8.0 MONITORING AND MEASUREMENT

Following closure of the mine and the ensuing rehabilitation program, monitoring programs, such as air, noise and water quality monitoring will be continued until decommissioning and rehabilitation procedures have been completed. Rehabilitation will be monitored for a period of five (5) years after completed to ensure completion criteria have been achieved. This monitoring will include visual inspections, tree density and percentage cover and transect studies, flora and fauna surveys and water quality monitoring of runoff waters. Surface and ground water quality monitoring will be undertaken to verify the long-term quality of water in the final void and surrounding aquifers, as well as salinity levels of any runoff and ground water inflows.

Whilst the post closure monitoring and measurement program will be similar to that undertaken during operation of the mine it will be scaled back to focus on those aspects of the site that have the potential to cause pollution or are being used as an indicator to verify the success or failure of the rehabilitation works.

Until the mining lease is relinquished, regular field inspections will be undertaken of all rehabilitated areas, particularly the low walls and high walls of final void, waterways, banks, sediment control dams and diversions. The inspections will assess signs of failure, sedimentation, erosion and any other areas that may require repair.

For a full list of the **Monitoring and Measurement** recommended post closure see **Section 10.0** of the **Integrated Mine Closure Plan** the Donaldson Open Cut Mine and the Abel Underground Mines (GSSE, 2007) which is part of the **Landscape Management Plan.**

9.0 FINAL VOID USE OPTIONS

Open cut mining generally leaves an open pit void (final void) remaining at mine closure. These voids represent a potential danger to people, native wildlife and stock, as well as a possible source of environmental pollution from water accumulation.

It is essential that final voids be left in a safe condition where backfilling is not reasonably practical. Available options for post mining land use are mainly determined by the location and nature of the void. The options presented below may not be feasible or viable at this time, however at the point of mine closure of the Abel underground these options could be considered as alternatives to the current proposed final void use and may be considered at that time.

Options for the treatment of final voids are outlined below.

9.1 Backfilling

During the life of the mine backfilling will occur into the mining areas until such time that mining ceases. Backfilling will seek to minimise the overall size of the remaining void. Even though backfilling the entire void area with overburden is not economical (and there is not the available material) the size of the void can be reduced over time as mining progresses. The long-term void areas may further be reduced by using the site as a disposal area for waste material. This will be addressed further below in **Section 9.4** relating Domestic and Commercial Waste Disposal.

9.2 Water storage area

The location of the void and water chemistry may allow use as a water storage. As coal seams are generally saline, it is anticipated that water quality within the void would not be suitable as a storage area for human consumption. However, water quality may be suitable for recreational purposes or as water storage for future mining. The following are examples of uses for mining voids elsewhere that may be considered.

9.2.1 Recreational

If void water quality is of a suitable water chemistry that is not harmful to human contact, the area could be utilised for recreational water sports. If this option was to be considered then a thorough investigation would need to be undertaken before this option is adopted.

9.2.2 Aquaculture

Due to the final voids remaining open, they will potentially form saline water storages due to the salinity that exists within the coal measures and from evaporation from the void. There are currently research projects undertaken by the Curtain University looking at the use of saline void water for use in some types of aquaculture.

9.2.3 Water Storage for Mine Use

Several mines are located nearby to the Donaldson open cut and Abel underground operations and there may be the potential for other mines to be approved in the future. The final void may be of use to these mines as a water collection or storage area. This water could be utilised on these sites for purposes such as coal washing and dust suppression. Alternatively, they could also utilise the void for the disposal of excess water generated from their operations.

9.3 Development as a wetland or wildlife habitat

The void may have the potential to be developed as a wetland or a wildlife habitat for aquatic dependant animals; however depth is a critical factor in regard to this option. Deep, steep-sided voids are generally not suited to such use unless appropriate safe ingress and egress can be provided.

9.4 Domestic and Commercial Waste Disposal

Waste disposal into final voids is a possible option for future use; however several keys areas need to be considered depending on the type of waste to be disposed of. Waste disposal in a mine void is being successfully undertaken at the Woodlawn Mine south of Sydney. The main factors to consider with the disposal of domestic and commercial waste are the physical and chemical nature of the waste, the volumes of wastes, the distance from the source of the waste and the transport requirements along with other environmental constraints that may be present.

The volume of the final void is such that it would be able to absorb an enormous quantity of domestic and commercial waste and fill material, but the potential leachate effects on the local groundwater systems and the proximity to several sensitive areas, such as Hexham Swamp, would need to be considered and managed.

9.5 Final Void Use

At this point in time, the preferred use for the Donaldson and Abel voids are as water storages as outlined in the Abel Part 3A Environmental Assessment. As outlined above this could include such uses as wildlife habitat, recreational use, aquaculture, and water storage for some other commercial use. It is predicted that the water levels within the voids will recover to a level of approximately 40m AHD.

10.0 DOCUMENT REVIEW

10.1 Reporting

Any reporting will be undertaken in accordance with Project Approval (05_0136) and the reporting requirements of the Donaldson EMS.

10.2 Review

The Abel Underground Coal Mine has an operational life of 21 years, during which time its mine plan may be changed or altered depending on operational circumstances. Therefore the FVMP will be regularly updated, where needed, to capture these mine plan changes. Three (3) years prior to mine closure a more detailed plan will be undertaken addressing the final mine plan and any changes that may have occurred since the previous FVMP.

11.0 ROLES AND RESPONSIBILITIES

The Environmental Manager is responsible for overseeing the implementation of this FVMP. The General Manager (or his delegate) is responsible for:

- Delegating tasks associated with this FVMP when the Environmental Manager is absent;
- Providing adequate resources to implement this FVMP; and
- Providing adequate training to employees and contractors regarding their requirements under this FVMP.

12.0 EMERGENCY RESPONSE PROCEDURE

The following **Emergency Response Procedure** will be implemented in the event of significant unforeseen variances from the predicted inflow rates and/or groundwater level impacts within the void. This will include, but may not be limited to the following:

- Additional sampling and/or water level measurements to confirm the variance from expected behaviour;
- Immediate referral to a competent hydrogeologist for assessment of the significance of the variance from expected behaviour;
- The review hydrogeologist will be requested to recommend an appropriate remedial action plan or amendment to the mining or water management approach; and
- If appropriate, this recommended action plan will be discussed with DWE and other agencies for endorsement.

13.0 REFERENCES

Department of Environment (1998) *Landform Design for Rehabilitation*, Best Practice Environmental Management in Mining.

Department of Environment & Heritage (2002) – *Best practice Environmental Management in Mining*, Booklet for Mine Closure.

Department of Industry and Resources (1997) *Safety Bunds Walls Around Abandoned Open Pit Mines*, Advisory Guideline, December 1997.

Department of Industry, Tourism and Resources (2006) *Mine Rehabilitation*, Leading Practice Sustainable Development Program for the Mining Industry, October 2006.

Development Consent (DA 98/01173 & DA 118/698/22) for '*The Construction and Operation of an Open-Cut Coal Mine, including a Coal Preparation Plant, known as Donaldson Coal Mine'*, issued by the Minister for Urban Affairs & Planning, 1999.

D Jones (1997) *Water Quality and Quantity in Final Voids*, The Australian Coal Review, November 1997.

Environmental Assessment (2006) *Abel Underground Mine*, prepared by Business Environment.

Environmental Impact Statement (1998) *Donaldson Coal Mine*, prepared by PPK Environment & Infrastructure Pty Ltd.

G.J Summerhayes (1997) *Challenges and Opportunities in the Hunter Valley*, The Australian Coal Review, November 1997.

G.J Summerhayes (1999) *The Rehabilitation of Coal mines & opportunities for Integrated Post Mining Land Uses*, Part 2, Invited Papers included in the Synoptic Plan for Integrated Landscapes, prepared by Andrew Neil for the NSW Department of Minerals Resources.

GSSE (2007) *Development of a Conceptual Mine Closure Plan and Rehabilitation Liability Assessment for the Donaldson Coal/Abel Underground Coal Mine,* Hunter Valley, NSW.

Project Approval (05-0136) for '*Abel Coal Project*', issued by the Minister for Planning, June 2007.

Queensland Environment Protection Authority (1995) *Minesite Decommissioning*, Advisory Guideline, January 1995.

Queensland Environment Protection Authority (1995) *Open Pit Rehabilitation*, Advisory Guideline, January 1995.

Integrated Mine Closure Plan

APPENDIX 5

DONALDSON COAL

FINAL

Donaldson Open Cut and Abel Underground Coal Mines

Integrated Mine Closure Plan

March 2008

DON3-07-01 Abel Underground LMP

GSS ENVIRONMENTAL
Environmental, Land and Project Management Consultants

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1.0 INTRODUCTION

1.1 Background

The Donaldson Open Cut Coal Mine is located approximately 23 km from the Port of Newcastle, north of John Renshaw Drive and immediately west of Weakleys Drive. Construction at the mine commenced on the 25th January 2001. Donaldson Coal Pty Ltd ("DCPL") operates the mine in accordance with the Development Consent (File No. N97/00147) granted on the 14th October 1999 and amended on the 26th August, 2005. The existing Donaldson Open Cut Mine has been given approval to operate until 2012 at which point the economic coal reserves will be exhausted. The mining operations are wholly contained within the Mining Lease ML1461.

In September 2006, Donaldson Coal submitted an Environmental Assessment (EA) to the NSW Department of Planning (DoP) for the Abel Underground Mine and in June 2007 approval was given to develop a new underground area that will access coal reserves south of the existing Donaldson Open Cut Mine. A major benefit of this development is that the surface facilities area is intended to be placed within the existing areas of disturbance within the current Donaldson Open Cut mine. Coal brought to the surface will be transported by truck and conveyor through the previously disturbed Donaldson mine lease area to the existing Bloomfield Coal Handling and Preparation Plant (CHPP) and Rail Loading Facility for coal processing and loading. This enables the mine to access new coal resources while minimising the need for the establishment of substantial new facilities and undertaken additional land disturbance.

1.2 Mine Closure Planning

The Project Approval (05_0136) for the Abel underground mine includes a requirement to prepare a Landscape Management Plan of which one component is the preparation of a **Mine Closure Management Plan**.

The purpose of this Mine Closure Plan is to fulfil the Mine Closure Planning requirements for the Donaldson Open Cut Mine, considering that closure is planned for 2012, while also integrating the requirements of the Abel Underground Mine, satisfying the requirements of condition 22 (a) – (e) of the Project Approval. Given the synergies between the operations an integrated approach to mine closure has been adopted.

At the completion of mining at Donaldson Open Cut Mine in 2012, it is intended that all infrastructure will be removed and the land rehabilitated in accordance with the requirements of this Mine Closure Plan. The exception to this is the infrastructure required for the Abel Underground Mine which will remain. This is described in the Environmental Assessment (2006). It includes the Donaldson Open Cut Mine final voids (including the Abel Pit Void), the existing sealed access road, the coal haul road to Bloomfield CHPP and some strategic water management structures (eg. the Big Kahuna Dam). It also includes the structures and operations associated with the Bloomfield operations which were approved by the Abel Underground Mine approval (ie: CHPP, rail loading facility, tailings disposal areas and associated infrastructure).

Table 1 below shows the specific requirements of the Project Approval and where in the document they have been addressed:

Table 1 - The requirements of the Mine Closure Plan in accordance with the Project Approval for the Abel Underground Coal Mine.

Condition	Section where addressed in this report
22. The Mine Closure Plan must: (a) define the objectives and criteria for mine closure	**9.0 & 10.0**
(b) investigate options for the future use of the site, including the final voids	**3.4 & 11.0**
(c) investigate ways to minimise the adverse socio-economic effects associated with mine closure, including reduction in local and regional employment levels	**4.3 & 4.4**
(d) describe the measures that would be implemented to minimise or manage the on-going environmental effects of the project; and	**10.0**
(e) describe how the performance of these measures would be monitored over time.	**9.0 & 10.0**

In addition this mine closure plan has been developed to assist DCPL in making the appropriate financial provisions for the eventual closure, decommissioning and rehabilitation of the Donaldson Open Cut and Abel Underground sites, so that at the completion of mining, the land can be returned to a stable and sustainable post mining land use. To facilitate this process, the approach adopted in this closure plan has been to divide the mine site into a number of like units or "*domains*" that will enable better focus on the treatment of *like* areas. In assigning domains across the site, a combination of the location, type of land disturbance and the environmental issues to be addressed have been considered.

The Mine Closure Plan has been prepared based on three (3) separate scenarios, the first being closure in 2007, which is based on the current status of the mine (and it represents sudden closure of the mine), with the second being closure of the Donaldson Open Cut in 2012 which is based on the original mine plan submitted as part of the Environmental Impact Statement (EIS) (1998) as well as the current Mining Operations Plan (MOP) (2006). The third scenario is closure of the Abel Underground Mine in 2028.

The preparation and continual update of this Mine Closure Plan is a requirement of the Department of Primary Industries - Mineral Resources (DPI-MR) guidelines for Mining, Rehabilitation and Environmental Management (MREM). It is intended that this mine closure plan will be progressively reviewed and updated over the remaining life of the Donaldson Open Cut and Abel Underground Mine.

1.3 Current Mining and Rehabilitation Activities at the Donaldson Open Cut Coal Mine

Coal is extracted from an open cut operation, employing terrace/strip mining methods, at a rate of up to 2.5 million tonnes per year. The coal resource occurs within the Permian Tomago Coal Measures, comprising of six (6) coal seams, of which the upper four (4) are extracted and blended to produce a premium grade steam coal.

All Run of Mine (ROM) coal is transported by 40T truck and processed under contract at the existing Bloomfield Colliery Coal Handling and Preparation Plant (CHPP) prior to rail loading. Washed coal (the export steam coal) is transported by rail 23 km to the port of Newcastle and exported though Port

Waratah Coal Services' loading facilities at Carrington and Kooragang. Coal for domestic consumption in the local Hunter power stations is also delivered by rail.
The facilities and infrastructure at Bloomfield Colliery were originally not considered as part of the mine closure plan (2005), as Donaldson has no responsibility for their closure, however with these facilities, being part of the Abel Underground Approval, have now been included as **Section 8.13**.

Cooks Construction ("Cooks") undertakes the mining under long term contract with DCPL. Whilst Cooks conducts the mining at Donaldson Open Cut Coal Mine, all consents and approvals continue to be vested with DCPL. Environmental management responsibilities are managed by DCPL, with Cooks required to comply with the Environmental Management System (EMS) and approvals under the mining contract.

Cooks have established a maintenance workshop and administration facility on the site. On site re-locatable facilities such as crib rooms and fuel storages have also been established to service the mining activities. Cooks will be responsible for the removal, decommissioning and removal of these sites in accordance with the requirements of the mining contract.

The following major components have been considered as part of this mine closure plan:

- The active mining area (in pit dumps & the void);
- Internal access and haulage roads;
- The Coal Haul road from the Donaldson Coal ROM stockpile to the intersection with Bloomfield's internal coal haulage road just south of their coal stockpile area;
- The out of pit overburden emplacement;
- Administration offices (Cooks & Donaldson), the stores and workshop;
- Bulk Fuel Storage areas (2 x 50,000L tanks);

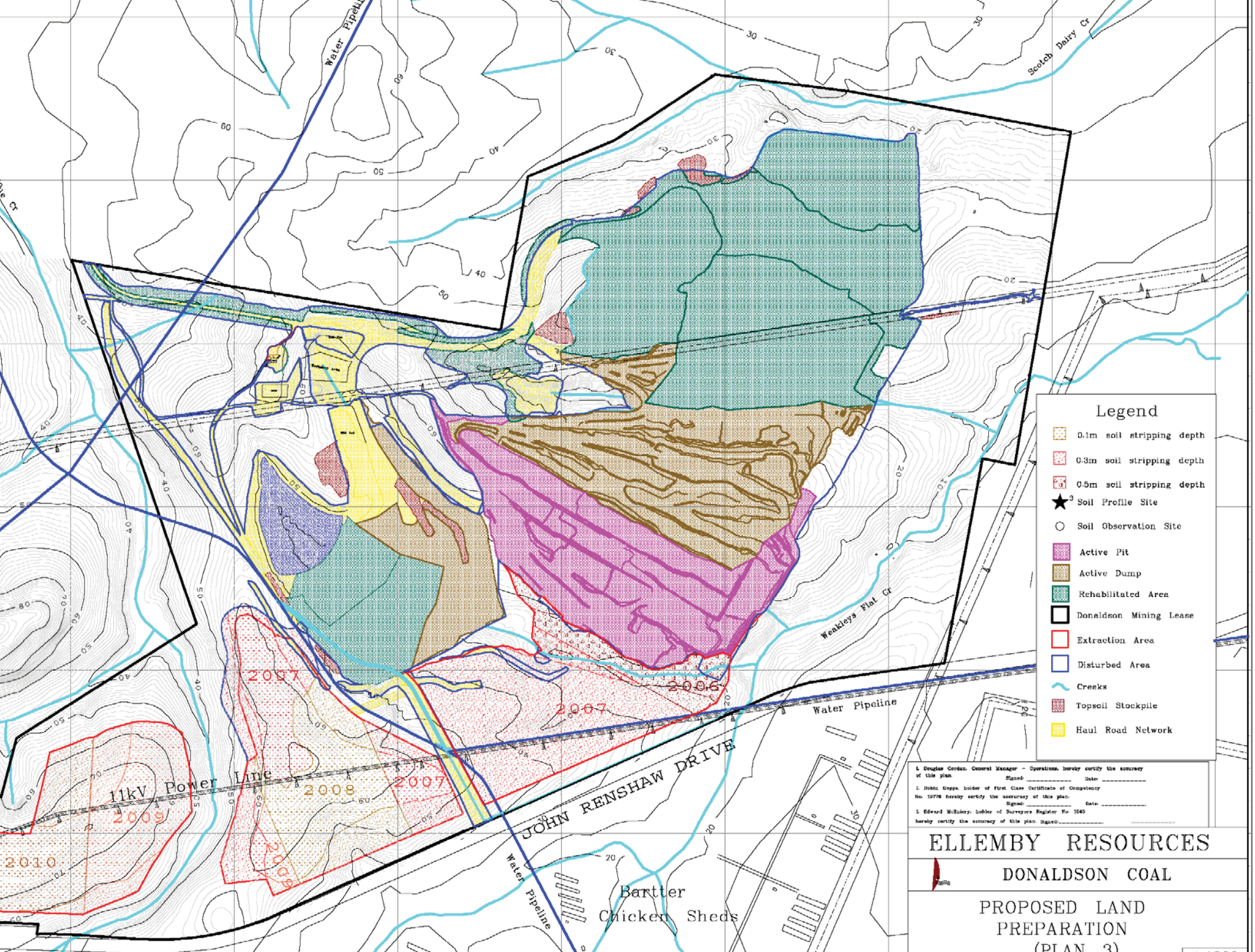
  Product Coal Stockpiles;
- The Big Kahuna Dam;
- Water management structures (dams / clean water diversions); and
- Buffer lands, including the surrounding Bushland Conservation Area (BCA) and the *Tetratheca juncea* Conservation Area.

The existing and approved pit layout for the life of the mine Donaldson Open Cut is shown in **Figure 1** over page.

Rehabilitation is undertaken progressively as soon as practicable after mining is completed. The current approved final landform for closure is as described and detailed in Plan 6 (attached as **Appendix 1**) in the current Mining Operations Plan. The existing consent requires that all areas disturbed within the mine footprint be rehabilitated to a similar woodland community as existed prior to mining.

1.4 Description of the Abel Underground Mine surface facilities

Section 2.6 of the Abel Underground Mine Part 3A Environmental Assessment describes the surface facilities for the Abel Mine which will be located on the northern side of John Renshaw Drive within a section of the Donaldson Open Cut Mine where the coal has been extracted to form a final void, or box-cut. This area is shown on **Figure 2**. The surface infrastructure area will form part of the new coal mine lease and will be transferred to the Abel Underground Mine operation from the existing Donaldson Open Cut Mine. As a result of the interaction with the Abel Underground, the current approved Donaldson



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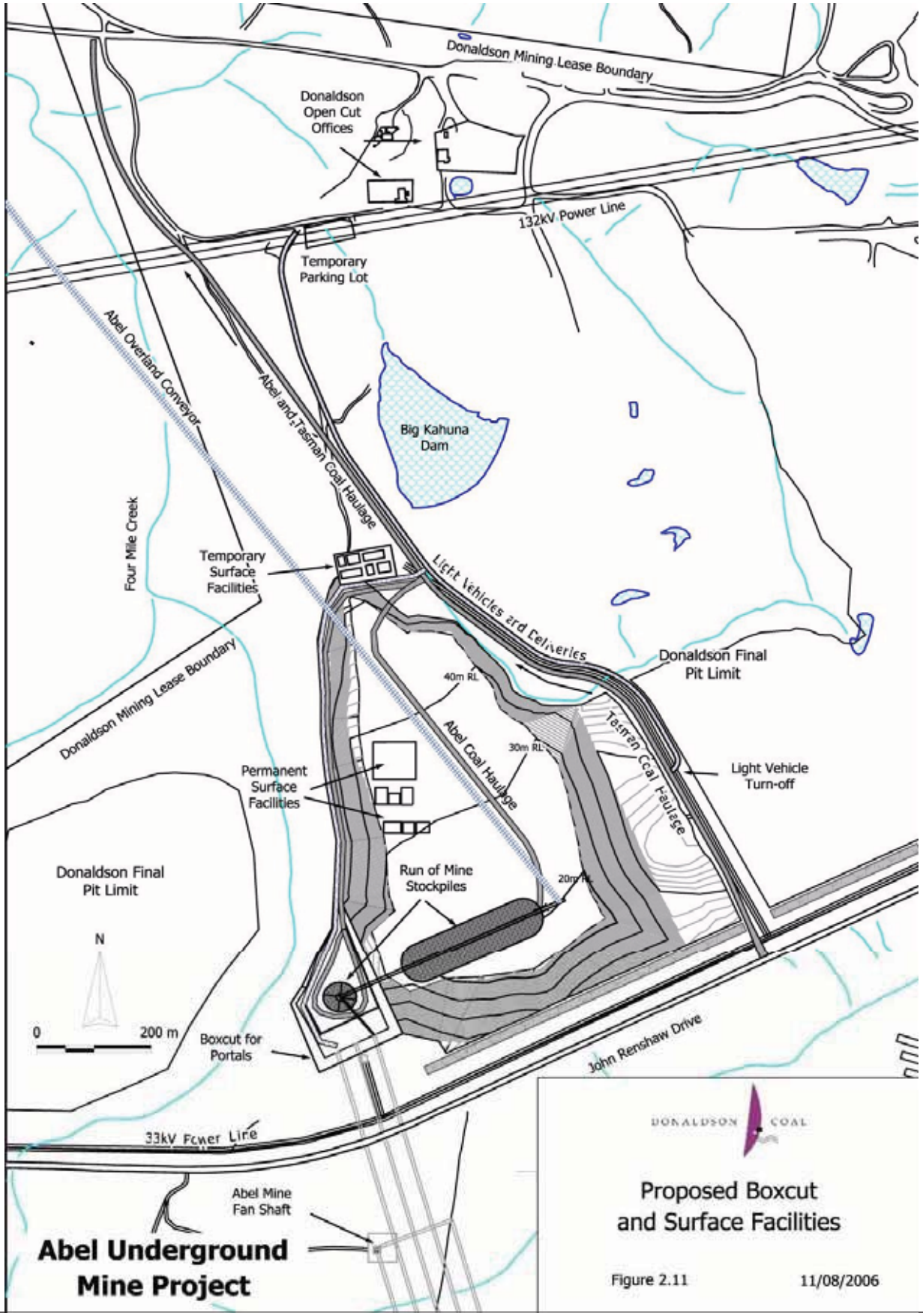

LEGEND					**FIGURE 2** Surface Facilities	Project: Abel Integrated Mine Closure
						Client: Donaldson Coal
Version	Date	Author	Checked	Approved	GSS ENVIRONMENTAL Environmental, Land and Project Management Consultants	File: DON3-07-01 Abel Underground LMP
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Open Cut Landform will be amended to incorporate the Abel Pit Void. This is described in more detail in **Section 1.5**.

Once coal has been brought to the surface through the mine portal under John Renshaw Drive, it will be conveyed to a run-of-mine (ROM) coal surge stockpile. This will initially be located adjacent to the mine portal but will later be re-located to a section of the Donaldson Open Cut final void screened from John Renshaw Drive. Further buffer planting associated with Donaldson Open Cut operations will enhance this screening. This area will also house the required site buildings such as administration, staff facilities, store, etc. Coal will then be transported approximately 4 kilometres from the ROM coal stockpile to Bloomfield Coal Handling and Preparation Plant (CHPP). Coal will be transported by trucks on an internal, sealed haul road until an overland conveyor is constructed. At the Bloomfield CHPP, coal will be stored on another ROM coal stockpile prior to being processed in the washery and then stored in various stockpiles according to processed coal type. A conveyor will then transport coal from the various stockpiles to the rail loading bin, which loads the coal into waiting trains.

Other surface infrastructure will include:

- Mine infrastructure comprising three mine portals (providing access to the underground mine), ventilation fans, compressors and water supply pumps;
- Items within the main surface infrastructure compound, comprising power supply, car parking areas, mine offices, bath-house for mineworkers, contractors, staff and visitors, lamp-room, first aid room, workshop, vehicle.

It is proposed that the construction of Abel will be staged as follows:

i. Stage 1 Construction

This will comprise:

- Construction of the temporary bath-house and car parking area which will be separated from the operating Donaldson Mine open-cut;
- Construction of temporary workshops and offices adjacent to the new Donaldson internal access road;
- Excavation of a box cut for the mine entries that is scheduled to occur as part of the open cut activity;
- a run-of-mine (ROM) stack-out conveyor with a stockpile capacity of approximately 10,000 tonne capacity located within the box cut;
- three roadways under John Renshaw Drive; and
- construction of a ventilation shaft and ventilation fans south of John Renshaw Drive.

ii. Stage 2 Construction

This will occur after the Donaldson Open Cut Mine has ceased shot firing activities (ie: explosives used to break up overburden material so that it can be removed to expose the coal seam). It includes the following construction items:

- permanent offices, bath-houses and car parking area nearer to the portals;
- permanent workshops, storage areas etc nearer to the portals; and
- a higher capacity stack-out conveyor and larger run-of-mine (ROM)stockpile in the open cut void.

iii. Stage 3 Construction

This involves the construction of a ROM coal reclaim system. It is also proposed to construct an overland conveyor from the ROM mine stockpile to the Bloomfield CHPP to replace truck haulage. This will be constructed as financial circumstances permit after the commencement of the Abel Underground Mine.

Under the current mine plan the life of the mine is expected to be 20 years taking the Abel Underground Mine operation through to 2028.

1.5 Summary of the Mine Closure objectives for the Donaldson Open Cut and the Abel Underground Mines

At the completion of mining at Donaldson Open Cut Mine in 2012, all infrastructure required for the Donaldson Mine will be removed and the land rehabilitated in accordance with the Donaldson Mine Closure Plan (see **Section 7.0** for detail). The Mine Closure Plan is part of the Mine Operations Plan for the mine required as a condition of the Mining Lease. Only infrastructure required for the Abel Underground Mine will remain, being items located within the Donaldson Open Cut Mine void, the access road, haul road to Bloomfield CHPP and some water management structures.

1.5.1 Donaldson Open Cut Coal Mine

The current mine plan has post mining rehabilitation restoring the ground topography and soils to substantiality the pre-mining conditions with some variations in topography as a result of the swell of the placed overburden material.

Donaldson's general rehabilitation goal is to return the disturbed area to open woodland and forest. The program generally aims to re-establish the vegetation communities and habitat to that which existed in the pre mine environment. Under these circumstances the post mining land capability class will be substantiality the same as the pre-mining condition. It is therefore anticipated that the majority of the rehabilitated areas will be returned to Class VI land.

A survey was conducted as part of the EIS prepared for the mine in accordance with the DIPNR rural land capability assessment system, which classifies land on the basis of an increasing soil erosion hazard and decreasing versatility of use. It recognises the following three (3) types of land uses:

- land suitable for cultivation;
- land suitable for grazing; and
- land not suitable for rural production.

These capability classifications identify the limitations to the use of the land as a result of the interaction between the physical resources and a specific land use. The principal limitation recognised by these capability classifications is the stability of the soil mantle (Soil Conservation Service, 1986).

The method of land capability assessment takes into account a range of factors including climate, soils, geology, geomorphology, soil erosion, topography and the effects of past land uses. The classification does not necessarily reflect the existing land use; rather it indicates the potential of the land for such uses as crop production, pasture improvement and grazing.

The pre-mining land capability within the Donaldson Coal mine area is best described as being a majority of land classified as Class VI. The area is not suitable for cultivation on a regular basis owing to considerable biophysical limitations such as light textured shallow soils and relatively steep slopes (up to 25%). The recommended soil conservation practices for this land classification includes pasture improvement, low stocking rates, fire prevention and vermin control.

Two distinct ridge zones and two depositional areas adjoining Weakleys Flat Creek and Scotch Dairy Creek have been classified as Class IV land because of low slope gradient and a greater depth of topsoil. These areas have the potential to be more productive as grazing land than the surrounding Class VI land.

All land within and adjacent to Four Mile, Weakleys Flat and Scotch Dairy Creeks has been classified as Class VII land which has been protected by the existing vegetation and has been contained within the Bushland Conservation Area (BCA) surrounding the mine.

All areas disturbed for mining, with the exception of the final void, will be backfilled with overburden, reshaped, covered with topsoil (where available) or an alternative surface ameliorant, and then revegetated. The backfill will be dumped and shaped so that it is consistent with the surrounding natural landforms. Drainage control and erosion protection measures will be incorporated into the final landform design. This will include, but not be limited to, contour and graded banks, drains and sediment retention basins. Slopes will generally be regraded to no greater than 10 degrees.

1.5.2 Abel Underground Mine

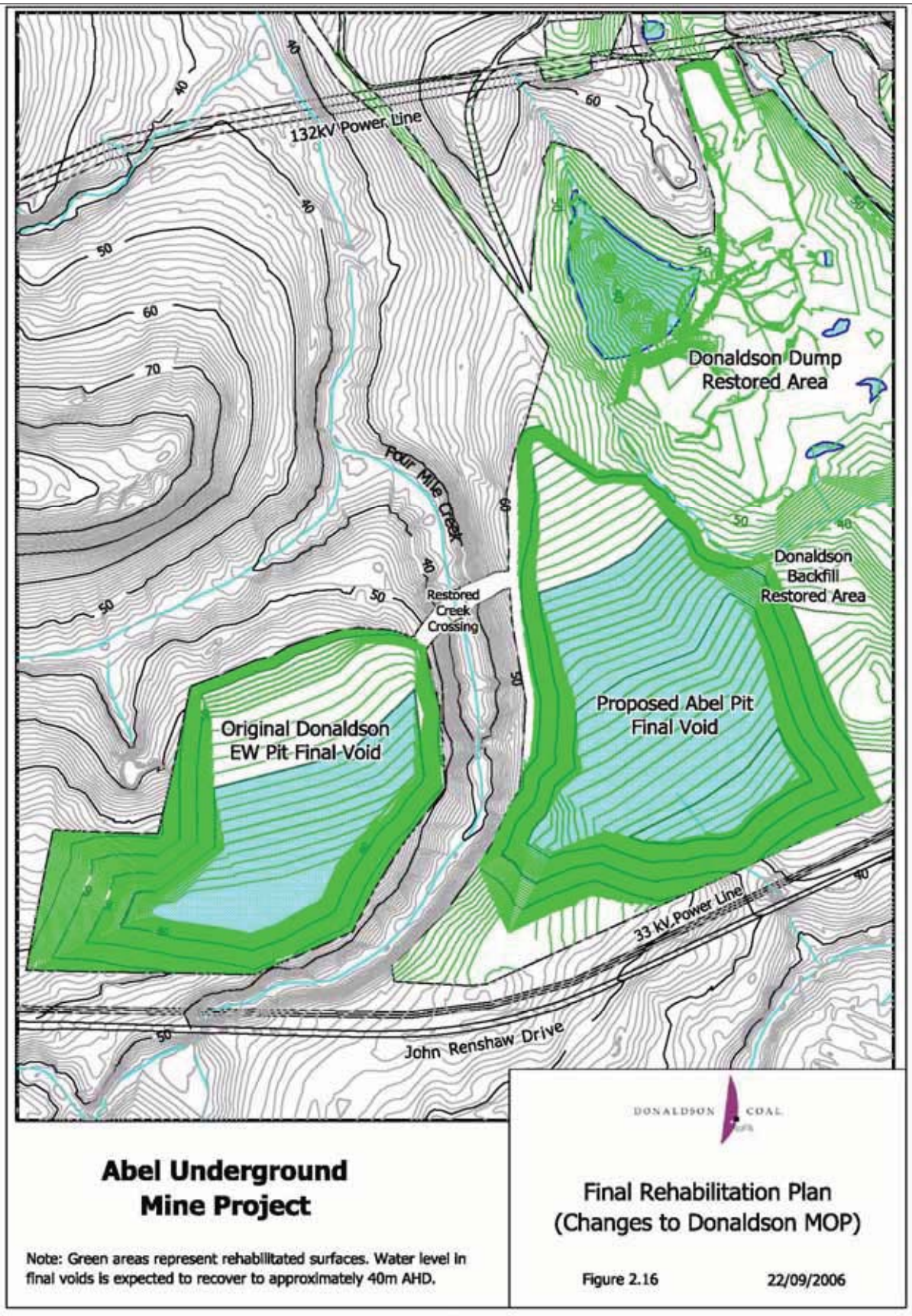
Decommissioning of the Abel Underground Mine at the end of the extraction period (in 2028) will require the sealing of the underground access portals and the removal of surface infrastructure, including offices, bath house, ROM coal stockpile infrastructure, workshop, conveyors and operational water management structures. The ground surface will then be reshaped to form a stable surface with embankments at a maximum of ten degrees. Surface water management structures such as contour banks, drains and settlement ponds required to provide permanent, long-term stable water flow and storage will be constructed and open areas rock raked and ripped, in particular where roads and hardstand areas have compacted the existing ground, ripping will be up to one metre in depth. 150 mm of soil will then be spread over the site and seeded with tree seed including a cover crop to minimise soil erosion. Some roads may remain if required for future land uses, as determined by planning processes developed closer to closure time.

Figure 3 shows the proposed final void and landform at the conclusion of the Abel Underground Mine operation. Areas shown in green are disturbed land that will be revegetated. Undisturbed areas outside of the void are already vegetated or will be revegetated at the completion of the Donaldson Open Cut Mine. The void at the portal will be shaped and managed in a manner consistent with the rehabilitation principles for the Donaldson Open Cut Mine.

The eastern, western and southern sides of the final void will be blasted and pushed using a dozer to a maximum slope of 18 degrees. The northern side will be blasted and regraded to a maximum of 10 degrees, with a permanent vehicle access and egress ramp constructed to allow access to the pit void for ongoing monitoring and management. During highwall dozer reshaping, water management structures such as contour banks, drains and drop structures will be established to divert as much of the surrounding catchment as possible away from the final void, to limit the amount of water that accumulates in the pit. Notwithstanding this, it is expected that some water will accumulate to a maximum depth of approximately 24 metres in the deepest part of the void (below 40 metres RL.)

Material blasted from the high walls will also be used to cover any exposed coal seams and other carbonaceous material that might be left at the end of mining. Given there is no history of spontaneous combustion at the site, this approach to sealing off the exposed seams with inert overburden material is considered appropriate. Once blasting and reshaping has been completed, final rehabilitation of the disturbed void area will commence. Due to the expected standing water at the bottom of the void, a safety berm and security fence will be provided around the void to prevent unauthorised access. The berm will be designed with a trench to prevent unauthorised vehicle access to the void.

The 490 ML water management dam (the Big Kahuna) that is currently used for the Donaldson Open Cut Mine will continue to be used for the Abel Underground Mine. Dewatering and re-engineering of this dam to create a permanent water storage structure, as detailed in the Donaldson MOP, will therefore be delayed until closure of the Abel Underground Mine.



LEGEND					**FIGURE 3** Proposed Final Void and Landform	Project: Abel Integrated Mine Closure Plan
						Client: Donaldson Coal
Version	Date	Author	Checked	Approved	GSS ENVIRONMENTAL Environmental, Land and Project Management Consultants	File: DON3-07-01
1	16/10/07	RC	SS	AH		Projection:

It is proposed to fill former open cut areas within Bloomfield Colliery with tailings from the coal washing process. This will assist in filling and rehabilitating these areas. Rehabilitation will be undertaken in accordance with DPI guidelines which require the Bloomfield Mine Operations Plan, required as a condition of the Bloomfield mining lease, to provide details on proposed outcomes to be achieved through rehabilitation and final landform. Dewatering of these tailings areas will continue to be undertaken in accordance with current methods, which include the pumping of excess water back to the washery for settling and reuse, and the covering of dewatered areas with soil, landform shaping and seeding for tree cover.

Maintenance of rehabilitation areas will consist of two applications of fertiliser to tree cover areas and weed and feral animal management over a five year period after mine closure. Minor remedial earthworks or soil conservation works to address any erosion or sedimentation issues will also be undertaken over this period. Monitoring programs, such as air, noise and water quality monitoring will be continued until decommissioning and rehabilitation procedures have been completed. Rehabilitation will be monitored for a period of five years after completion to ensure completion criteria have been achieved. This monitoring will include visual inspections, tree density and percentage cover and transect studies, flora and fauna surveys and water quality monitoring of runoff waters. Water quality monitoring will be undertaken to verify the long-term quality of water in the final void as well as salinity levels of any runoff waters.

2.0 OBJECTIVES OF THE MINE CLOSURE PLAN

Planning for mine closure includes integrating the closure design for the Donaldson Open Cut mine site with the proposed surface areas to be used by the Abel Underground, identify the timing of the planning process, considering issues which relate to specific rehabilitation methods and economical and community objectives, as well as making sure adequate financial provisions have been set aside.

The principal objectives of mine closure planning incorporated into this mine closure plan include:

- To provide an overall framework for mine closure including rehabilitation and decommissioning strategies. In this regard a mine closure plan should be considered a template on which future activities should be based. It is intended to address the imminent closure of the Donaldson Open Cut Mine as well as the Abel Underground surface infrastructure area that will form part of the new coal mine lease and will be transferred to the Abel Underground Mine operation from the existing Donaldson Open Cut Mine;

- To ensure that adequate financial provision is made available to cover the cost of decommissioning, final rehabilitation and any other post closure costs related the to the closure of the Donaldson Open Cut (e.g. such as monitoring and maintenance as may be required) as well as outline the future possible closure costs associated with the closure of the Abel Underground in 2028;

- To establish clear and agreed criteria with all relevant stakeholders, which can be used to provide the standard to which the final mine rehabilitation and post mining land use can be assessed against;

- To reduce or eliminate adverse environmental effects once the mines cease operation;

- To ensure closure is completed in accordance with good industry practice as well as meeting the statutory requirements that may be applicable; and

- To ensure the closed mine does not pose an unacceptable risk to public health and safety.

The most effective mine closure plans are those that are integrated with the long term operational plans of the mine and are subject to regular review to accommodate regulatory, technological, social and economic change.

3.0 LEGAL & OTHER REQUIREMENTS FOR MINE REHABILITATION & MINE CLOSURE

Government agencies at both the State and Federal level have formulated regulations, policies and guidelines that relate to mine closure and decommissioning. In addition, a number of industry and government councils have also developed frameworks / guidelines for mine closure.

This mine closure plan has generally been developed to be consistent with the objectives of these key policy and guidelines described in this section below.

3.1 Government Regulatory Frameworks

3.1.1 Mining Lease Conditions

The principle regulatory instrument related to mine closure & decommissioning are the conditions attached to the Mining Lease issued by the Minister in accordance with the requirements of the *Mining Act* (1992). It specifies such matters as the demolition and removal and make safe of mine infrastructure and landforms. It requires the progressive rehabilitation of the areas disturbed by mining, utilising a security deposit provision linked to the Mining Operations Plan for the mine.

Furthermore the mining lease is subject to a condition that the holder of the lease will not suspend mining operations within the mining area otherwise than in accordance with the written consent of the Minister. Such consent requires conditionally the documentation of systematic and timely decommissioning, clean up and rehabilitation plan to be incorporated in a final MOP.

In preparing a MOP a mining company is to make specific reference to mine closure and decommissioning, providing final landform / rehabilitation outcomes. The NSW Department of Primary Industries – Mineral Resources (DPI-MR) requires that all MOP's lodged within 3-5 years of mine closure contain detailed information on mine closure and decommissioning. The completion and sign off of an acceptable mine closure and decommissioning strategy is the principle requirement to obtaining relinquishment of the mining lease following the cessation of mining. It is intended that this mine closure plan be included as an appendix to a revised MOP which will cover the completion of the Donaldson Open Cut and the commencement of the Abel Underground Mine.

The following mining lease has been considered by GSSE in the preparation of the mine closure plan:

- Donaldson Open Cut Mine Mining Lease No. 1461 under the *Mining Act, 1992*, granted by the Minister for Mineral Resources on the 22nd December 1999 for the mining of coal; and
- Abel Open Cut Mine Mining Lease (to be issued under the *Mining Act, 1992*).

It is noted that at the completion of the Donaldson Open Cut, the areas utilised by the Abel Underground will be transferred from the Donaldson Mining Lease to the Abel Mining Lease.

3.1.2 Other Department of Primary Industries – Mineral Resources (DPI-MR) Guidelines

Further to the requirements of the Mining Lease, the DPI-MR also has in place a series of policy guidelines or Environmental Management Guidelines for Industry that are either directly of indirectly relevant to mine closure issues. They include:

- **DPI-MR Policy edg 03:** – Guidelines to the Mining, Rehabilitation & Environmental Management process;

  In 2006, the DPI released a revised version of EDG03, *Guidelines to the Mining, Rehabilitation and Environmental Management Process* which included requirements for Mine Closure to be included in Mining Operations Plans. The main objectives of closure planning under the guideline are:

- to protect the environment and public health and safety by using safe and responsible closure practices;

- to reduce or eliminate environmental effects once the mine ceases operations;

- to establish conditions which are consistent with the pre-determined end land use objectives; and

- to reduce the need for long term monitoring and maintenance by establishing stable landforms.

- **DPI-MR Policy edg 14:** – Reporting Requirements for Mine Closure and Lease relinquishment (***note**: this policy is currently under review*);
- **DPI-MR Policy edp 01:** – Management of Exploration and Mining in NSW;
- **DPI-MR Policy edp 05:** – Rehabilitation and Mine Closure (**note**: This policy has been withdrawn and is currently under review); and
- **DPI-MR Policy edp 07:** – Criteria for Cancellation or Non Renewal of Mining Leases.
- **DPI-MR:** V3 Excel Spreadsheet Tool used to calculate mine security deposits (2005).

GSSE has considered these policies and guidelines in the preparation of this mine closure plan (where appropriate).

3.1.3 Rehabilitation Security Deposit Requirements for Mining & Petroleum Titles (ESB20, June 2006).

This guideline has been prepared by the DPI-MR to assist the NSW mining and Petroleum industries to comply with the DPI Rehabilitation Security Deposits Policy (EDP11). The Policy requires that **security bonds** be provided such that they cover the full rehabilitation costs of activities on exploration, mining and petroleum titles such that should the title holder default on their responsibility to rehabilitate a site, the Government would have sufficient funds to undertake the rehabilitation works.

Section 13.0 of this closure plan provides detail on the current security bond calculations for the Donaldson Open Cut. This estimate has been prepared in accordance with the requirements of EBP11.

3.1.4 Environment Protection Licence (EPL)

The *Protection of the Environment Operations Act 1997* (POEO Act) requires all extractive industries, including coal mines, to hold an Environment Protection Licence (EPL). Licences are issued by the Department of Environment and Conservation (DEC) and are normally reviewed every three (3) years. The EPL contains specific conditions relating the protection of the environment and as such the relevant conditions have been considered in the preparation of this mine closure plan where applicable.

- Donaldson Open Cut Mine Environmental Protection Licence (EPL) No. 11080 under the *Protection of the Environment and Operations Act, 1997*, granted by the Environment Protection Authority (EPA) on 13th September 2000 for the mining of coal.
- Abel Underground Mine Environmental Protection Licence - issued under the *Protection of the Environment and Operations Act, 1997*.
- Bloomfield Colliery Environmental Protection Licence No. 396 under the *Protection of the Environment and Operations Act, 1997*.

3.1.5 Development Consent & Project Approval Conditions

The Development Consent for both the Donaldson Open cut and the Project Approval for the Abel Underground includes conditions that are relevant to mine closure such that they impose restrictions on final rehabilitation and / or landform design. They also include other conditions that contain the requirement to undertake monitoring beyond the cessation of mining. Where appropriate these conditions have been considered in the preparation of this mine closure plan.

A number of the conditions contained within the Development Consent contain some reference to various aspects of mine closure particularly in the area of post closure monitoring and care & maintenance.

GSSE has considered these specific conditions in the preparation of this mine closure plan.

Table 1 in **Section 1.2** above includes the conditions of the Abel Project Approval that are specifically related to mine closure.

3.1.6 Water Licences issued under the Water Act (1912)

Water Licence Approvals contains conditions that are relevant to mine closure, requiring the licensee to construct and maintain any diversion structures or bores in a stable state for the life of the project.

- Water Works Licence No. 20SL060534 under the *Water Act, 1912*, granted by the Department of Land and Water Conservation on the 19th February 2001 for the clean water diversion of five (5) unnamed creeks.

- Bore Licence No. 20BL168123 under the *Water Act, 1912*, granted by the Department of Land and Water Conservation on the 12th November 2001 for the groundwater extraction as a result of the active mining area.

- Bore Licence No. 20BL168124 under the *Water Act, 1912*, granted by the Department of Land and Water Conservation on the 12th November 2002 for the groundwater monitoring bores.

GSSE has considered the relevant conditions in the preparation of this mine closure plan.

3.2 External Guidelines & Polices

3.2.1 Strategic Framework for Mine Closure (ANZMEC & MCA, 2000)

The Strategic Framework for Mine Closure (2000) has evolved as a cooperative development between the Australian and New Zealand Minerals & Energy Council (ANZMEC) and the Australian Minerals Industry represented by the Minerals Council of Australia (MCA). It provides a framework of issues to be considered as part of a mine closure plan.

GSSE has prepared this mine closure plan to be consistent with this strategic document.

3.2.2 Enduring Value – Australian Minerals Industry Framework for Sustainable Development

Enduring Value is a code where signatories commit to the principles of Sustainable Development. It replaces the old Minerals Industry Code of Conduct for Environmental Management.

DCPL is currently not a signatory to the Code, although the general principles have been considered by GSSE in the preparation of this mine closure plan.

Enduring Value builds on the industry's commitment to continuous improvement in performance as outlined in the Australian Minerals Industry Code for Environmental Management (1996 – 2000).

3.2.3 International Council of Mining & Metals (ICMM)– Financial Assurance for Mine Closure & Reclamation (Feb 2005)

This report has been prepared by the ICMM and it considers Environmental financial assurance (EFA) measures. It looks at issues and current policies in the use of financial assurances through the industry; analysing trends that were revealed through a survey of the industry, governments and financial institutions.

3.3 Other State & Federal Agencies Policy & Guidelines

While not specifically relevant in a regulatory context, other State agencies have also developed guidelines and policies that are applicable to mine closure and decommissioning. Where relevant these policies and guidelines have been considered by GSSE in the preparation of this mine closure plan.

The policy and guidelines considered include:

- Australian Minerals & Energy Environment Foundation (AMEEF) – Best Practice Environmental Management in Mining series;
- Northern Territory Department of Mines & Energy (DME) – Mine Close Out Criteria: Life of mine planning objectives;
- Chamber of Mines & Energy of Western Australia – Mine Closure Guidelines for Minerals Operations in Western Australia: and
- Queensland Mining Council – Guidelines for Mine Closure Planning in Queensland.

3.4 Draft Lower Hunter Regional Strategy

The Draft Lower Hunter Regional Strategy (2005) prepared by the Department of Planning is a broad-scale land use planning framework set to accommodate the predicted 25% increase in the Lower Hunter population over the next 25 years. It is relevant to the longer term post-mining land use of the site.

According to the draft strategy, the proposed land use planned in the proximity of the current Donaldson Open Cut Coal Mine is an Inter-model Freight Facility. It has been identified by the Department of Planning as a site that provides an opportunity for the storage, transfer and distribution of containerised freight.

4.0 THE ADOPTED APPROACH TO PREPARING THE MINE CLOSURE PLAN

The information presented in this mine closure plan will be included in the review of the Mining Operations Plan for the Donaldson Open Cut Mine and the Part 3A Environmental Assessment prepared for the Abel Underground Mine.

The basic approach adopted to identify the mine closure issues is illustrated in the **Figure 4** below:

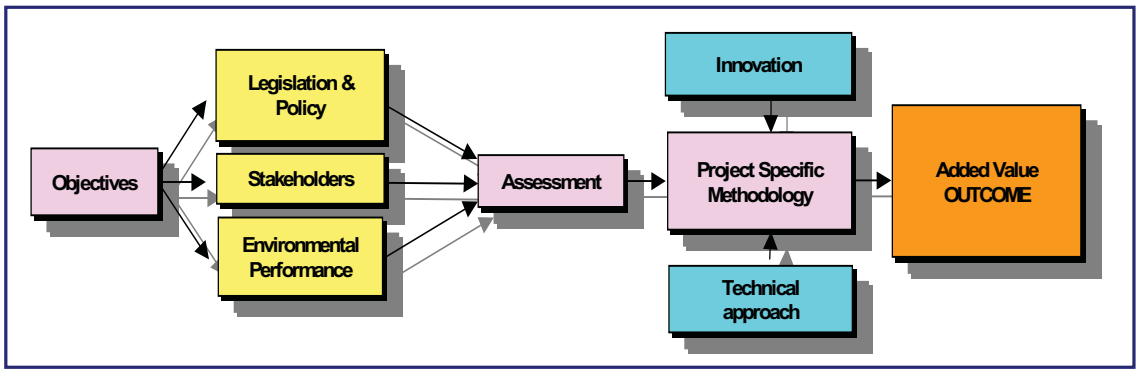


Figure 4 - Basic mine Closure approached adopted by GSSE (2007)

The approach adopted by GSSE for developing this mine closure plan has been firmly built on a *planning* focus to ensure the process of mine closure is able to occur in an orderly, cost effective and timely manner. GSSE has utilised several meetings with DCPL representatives to ensure that the proposed mine closure scenarios are consistent with the current mine plans.

1. **The "close now" scenario** which assumes that mining would cease in 2007 (i.e. Closure brought forward unexpectedly):

2. **Closure and final rehabilitation of the Donaldson Open Cut in 2012** following the cessation of open cut mining in accordance with the current mine plan and development consent. It also includes the transfer of closure liability to the Abel Underground taking into consideration the surface features that are intended to be utilised by the Abel operation.

3. **Planned Closure of the Abel Underground in 2028.**

4.1 Key Steps in the Process of Developing the Mine Closure Plan

The following section includes detail on the key steps taken in the preparation of this mine closure plan.

4.1.1 Site Meetings & Document Review

An initial site meeting was held between GSSE and representatives of Donaldson Coal on the 5th October 2005. It gave GSSE an opportunity to visit the site and get a detailed understanding of the mine layout as well as get an appreciation for operational issues that may impact on the rehabilitation methodologies (i.e. proximity of the mine to "protected" sites, standard of rehab, etc). GSSE revisited the site in July 2007 to determine what additional changes had occurred since 2005 and collect any additional site based information that was relevant to the preparation of this mine closure plan.

The commitments made in the Abel Underground Part 3A Environmental Assessment have been integrated into this Mine Plan.

4.1.2 Site Project Focus Workshop

GSSE presented preliminary mine closure strategies based on the experience and an understanding of the site. This was used to consider the best options for mine closure & rehabilitation within each domain of the mine.

A site project focus workshop was held on the 27th February 2006 to provide site personnel with an opportunity to provide feedback on the concepts developed by GSSE, and to consider site specific constraints and commitments that may eliminate or indeed introduce alternative ways to address some mine closure issues. The site Project Focus Workshop was attended by Phil Brown (Environmental Engineer), Tim Posetti (Ellemby Management), John Furner (Pegasus Group – sub-contractor to GSSE) and Andrew Hutton (GSSE Principal Environmental Consultant).

4.2 Mine Closure Management "Domains"

In order to best address the complexity of different mining activities across the site, GSSE divided the mine site into series of management "*domains*" that enabled better focus on the treatment of like areas.

By addressing each like "*domain*" systemically GSSE was able to focus on and address the specific aspects related to the closure of the mine. This included considering the combination of the location of the site, type of land disturbance and the specific environmental issues to be addressed.

This systematic approach has the added benefit in that it enables DCPL to identify and progressively implement effective mine closure and decommissioning "as they go". This will result in the following key benefits both during and at the end of mining operations.

- Continually reduces liabilities by optimising rehabilitation works;
- Provide for a more accurate assessment of accrual for rehabilitation liability;
- Tests rehabilitation design;
- Reduces double handling;
- Enables a tighter control on "actual" costs to undertake various rehabilitation treatments and enables improvement in budget allocation;
- Identifies areas of high environmental risk (e.g., coal stockpiles, hydrocarbon contaminated areas); and
- Facilitates direct involvement by internal stakeholders (i.e. mining supervisors).

The following includes a summary of the domain areas used in this Mine Closure Plan.

- **Domain 1.** Administration Offices, Maintenance precinct and access / coal haulage roads.
- **Domain 2.** Out of Pit Emplacement and Big Kahuna water storage dam; and
- **Domain 3**. The Active Mining Area.

These have been revised in this Mine Closure Plan to include the boxcut and surface facilities for the Abel Underground (see **Figure 3**). **Domain 4** has been added to include these areas.

The plan attached as **Appendix 2** shows the revised Domains as they apply to this Mine Closure Plan.

4.3 Stakeholder Engagement & Community Consultation

DCPL has recognised the value of identifying and engaging the key stakeholders during the development of a *detailed* mine closure plan. This is important as it enables all stakeholders to have their interests considered as part of the mine closure planning process. Engaging all relevant stakeholders is seen as one of the fundamental principles for effective mine closure, as the closure of the mine can often be responsible for substantial changes in both the community and the environment in which it operates. In addition to this there is the added benefit that the stakeholders are able to provide input into alternative post mining land use options.

Stakeholders in the context of mine closure will generally include individuals, state and local government agencies, community groups, Aboriginal groups, mine employees and local environmental / interest groups.

The guiding principles for stakeholder engagement in mine closure (as defined in ANZMEC/MCA 2000) have been adopted in the preparation of the mine closure plan. These include:

- Identification of stakeholders and interested parties;
- Effective consultation;
- Developing a targeted communication strategy that reflects the needs of the stakeholder groups;
- Providing adequate resources; and
- Working with the communities to manage the potential impacts of mine closure.

4.3.1 List of identified Stakeholder Groups

Through out the mine closure planning process, the following key stakeholders will be included in any future consultation relating the mine closure at DCPL. The level of consultation will vary depending on their involvement in the project.

- Relevant NSW Government Agencies, which should include, but not be limited to, the following;
  - NSW Department of Planning (DoP);
  - NSW Department of Water and Energy (DWE);
  - NSW Department of Environment, Conservation and Climate Change (DECC);
  - Cessnock and Maitland City Councils;
  - Mine Subsidence Board;
  - National Parks and Wildlife Service (part of DECC);
  - Department of Primary Industries - Mineral Resources (DPI-MR);
  - NSW Agriculture;
  - NSW Fisheries;
  - Hunter-Central Rivers Catchment Management Authority; and
  - Roads and Traffic Authority (RTA).

- The local residents living in close proximity to the mine, particularly those living in or within the vicinity of the areas of Blackhill, Weakleys Drive and Avalon Estate.
- The rail authority;
- Bloomfield Colliery; and
- The local Aboriginal Community.

4.4 Socio-economic effects associated with Mine Closure

4.4.1 Donaldson Open Cut Coal Mine.

As discussed previously, closure of the Donaldson Open Cut is planned for 2012. Currently there are 84 employees at the Donaldson Open Cut Mine. Ten (10) work for DCPL in management and technical support roles while the remaining 74 work for the mining contractor. All DCPL employees will be retained and gradually transferred to the Abel Underground Mine as it moves towards development and full production.

The existing Cooks Construction workforce will be retained until the cessation of coal mining. It is then anticipated that a reduced crew will be retained to complete any final decommissioning and rehabilitation works as well as de-mobilise the mining contractor from the site. Given the majority of the workforce are employed by Cooks Construction (mining contractor) they will be responsible for retaining the required skills to enable the closure and decommissioning activities to be completed.

Some other key aspects that will need to be considered in relation to human resource issues moving towards closure include:

- Communication with workforce regarding closure. A communication strategy needs to be developed to ensure that the workforce remains informed;
- Retaining of key technical staff and mine workers required to implement closure of the site;
- Redundancy packages to be offered;
- When redundancy packages will commence being offered. Develop a strategy for scaling back the operation;
- Investigate the possibility of transfer of employment to another mine site (whether that be Abel or another operation where Cooks Construction are operating); and
- Counselling, career advice and training services to be offered to employees.

In addition to these Human Resource commitments, DCPL will be responsible providing funds required to address issues related to the Community. This may include, but not be limited to:

- Community Trust Fund; and
- Other Community Programmes.

A provisional sum for additional community consultation relating to mine closure may be required to be undertaken prior to and throughout closure.

4.4.2 Abel Underground Coal Mine.

While closure of the Abel Underground is not scheduled until 2028, DCPL recognises that the closure of the mine at that time is likely to have some impact on the local community. As part of the Mine Closure Process, DCPL proposes to prepare a Social Impact Assessment (SIA) addressing the following key issues

relating to the imminent closure of the Donaldson Open Cut. This will be prepared five (5) years out from closure. It will include:

- the demands & contributions of the mine on local services to better assess the impacts of closure on those demands and contributions;
- establishing a benchmark for retention of economic activity within the site;
- studies/monitoring of social contributions and sustainability post closure;
- relationships with local suppliers (business planning workshops pre-closure with local businesses to assist them moving on from reliance on the mine);
- stakeholders' ideas of end land use and considering their perceptions as part of the planning for the mine closure plan and incorporating the consultation into developing and finalising the plan;
- the preparation of the stakeholder consultation strategy which needs to give careful consideration to the methodology and consultation with individual stakeholders at each stage;
- the study data as part of planning for closure including data related to employees, suppliers and the wider community;
- understand the nature of the current economic / social contribution in order to consider the future contribution / loss of contribution post closure.

Table 2 below is a summary of the stakeholder strategy that is to be adopted during preparation of the Abel Underground detailed Mine Closure Plan.

Table 2 - Summary of the stakeholder strategy to be used during mine closure

Stakeholder	Proposed Strategy	Issues to be addressed
Employees	Focus groups	Re-training Re-location Business development support Networks Voluntary Redundancies
Local Councils	Presentation with feedback invited	Baseline data Potential Impacts Planning Guidelines Future Use of the site
DPI-MR & DoP	Presentation with feedback invited	Baseline data Potential Impacts Planning Guidelines Future Use of the site
Near Neighbours	On –on –one interviews Information Sessions / invitation to comment (via website)	Future of the site Any concerns re Closure
Mine Subsidence Board	Presentation with feedback invited	Management of subsidence.
Special Interest Groups	Information Sessions / invitation to comment (via website)	Future Use of the site Identified potential impacts Strategy for enhancing benefits to local and regional communities
Broader Community	Media release and invitation to comment (via website)	Future Use of the site Opportunities Social Impact of Closure

5.0 BROAD BRUSH RISK ASSESSMENT – MINE CLOSURE

In 2005, GSSE completed an initial Broad Brush Risk Assessment (BBRA) looking specifically at mine closure issues. The aim was to formally identify issues associated with mine closure to include them in the review of the closure concepts. In addition it enables GSSE to present effective management protocols as well as identify any additional studies that may be required to prepare a detailed Mine Closure Plan. The Risk assessment was undertaken following four (4) fundamental steps:

(a) Establish the context for the risk assessment process;

(b) Identify the mine closure risks;

(c) Analyse the risks; and

(d) Evaluate the risks to determine the significant issues.

GSSE has developed a mine closure Risk Register to document the risk assessment outcome(s) for all risk identified throughout the process. A copy of the Risk Register is attached as **Appendix 2** to this Mine Closure Plan.

Figure 5 below presents the Risk Matrix used to determine the risk rating for each key aspect. It includes reference to the probability tables used

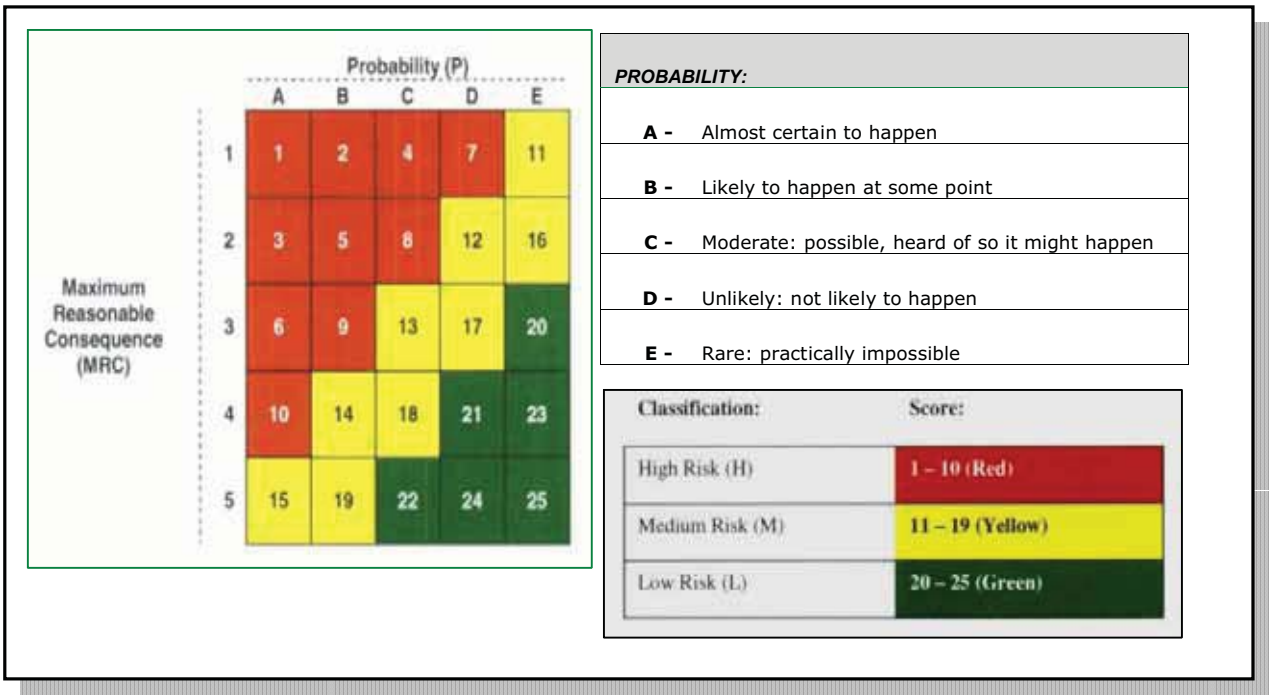


Figure 5 – The Risk Matrix used by GSSE in the preparation of the mine closure risk assessment

The *Consequences* **Figure 6** over page has been prepared specifically for the purpose of mine closure at the Donaldson Open Cut Coal Mine.

1	**Catastrophic**	**A major event which could cause severe or irreversible damage to the natural and/or human environment.** • Major Closure costs (i.e. estimated closure costs > $5M). • Severe or irreversible damage to natural environment could result • Could kill or permanently disable people • Actual or potential loss of credibility with key stakeholders (community / government). • Long term environmental liability / legacy to Xstrata. • Regulatory intervention, prosecution would occur (ie. fines). • Bad publicity/complaints (Global media exposure). • Loss of global reputation for Xstrata. • Pollution event causes major downstream damage that is rectified by a long term remediation program over 12 months (e.g. failure of major tailings dam wall that pollutes waters).
2	**Major**	**An event which could have a substantial and permanent consequence to the natural and / or human environment.** • Major Closure costs (ie. estimated closure costs $1M - $5M). • Substantial and permanent consequences to the natural environment could result. • Could cause serious injury or disease to people. • Potential loss of credibility with key stakeholders (community / government). • Reported incident, regulatory intervention which would result in prosecution. • Adverse publicity and community complaints (National media exposure). • Loss of national reputation for Xstrata. • Pollution event which causes serious downstream damage that is rectified by a medium term remediation program over 1-12 months •
3	**Moderate**	**An event which could create substantial temporary or minor permanent damage to the natural and / or human environment.** • Moderate Closure costs (ie. estimated closure costs $500K - $1M). • Substantial temporary or minor permanent damage to the natural environment. • Could cause typical lost time injury (LTI) to people • Potential loss of credibility with key stakeholders (community / government) • A reportable incident not likely to result in prosecution. • Adverse local publicity and community complaints (Local media exposure). • Event which causes substantial temporary damage that is rectified by medium term remediation program over 3 – 6 months.
4	**Minor**	**An event which could have temporary and minor effects to the natural and / or human environment.** • Minor closure costs (ie. estimated closure costs $100K - $500K) • Temporary minor damage to the natural environment. • Could cause a first aid injury to people • Complaints received from near neighbours. • Could result in government intervention but not likely to result in prosecution • Event which causes temporary minor damage which may require some minor rectification works
5	**Insignificant**	**No detrimental impact on the natural and / or human environment is measured or envisaged.** • Minor closure costs (ie. estimated closure costs <$100K) • No detrimental impact to the natural environment. • Couldn't cause injury or disease to people.

Figure 6 - Consequence and Probability tables used in the mine closure risk assessment

6.0 SCENARIO 1: MINE CLOSURE NOW (2007) (INCLUDES THE DONALDSON OPEN CUT ONLY).

The following section of the mine closure plan outlines the proposed commitments for each domain under the scenario of Mine "Closure in 2007". It is also intended that the satisfactory completion of these proposed commitments would be used as criteria to demonstrate that the decommissioning and rehabilitation of each of the nominated domains has been successfully completed. Further discussion of specific mine closure criteria is included as **Section 9.0** of this Closure Plan.

6.1 Description of the Decommissioning and Rehabilitation Commitments for each Domain

The plan attached as **Appendix 2** show the management domains identified as part of the mine closure plan. There were four (4) domains identified. The following sections provide a more detailed description of each domain, including an overall framework for the mine closure process, assumptions made, and the actions required to meet the nominated closure criteria for the domain.

6.1.1 Domain 1: Administration Area(s), Workshop & Service Bay & Access and Coal Haulage Roads.

Domain 1 covers an area that includes the following key elements.

- The Donaldson Coal Pty Ltd Administration office, car park and associated storage sheds;
- The tar-sealed access road from the Cooks access road to the car park;
- The Cooks Construction maintenance workshop, service bays, vehicle wash down, parts storages pads and storage containers, industrial area dam, administration office and employee car park;
- The gravel "light vehicle" access from the Cooks Facility to the private access road for Bloomfield Colliery;
- The original area office/workshop area used by both Donaldson and Cooks prior to moving to the existing facilities in 2002; and
- The coal haulage road from the Donaldson ROM stockpile area to the Bloomfield CHPP area.

Disconnecting Site Services

All services including power, water and telephone for the entire domain will be disconnected and terminated to make them safe. The inspection pits and junction boxes for underground services will be sealed. Generally all underground services will be made safe and left buried in the ground. The overhead power lines back to the Bloomfield's access road will be removed and the materials (i.e. poles and wire) recovered for potential re-sale or recycling as applicable.

Buildings & Fixed plant (Donaldson Coal Pty Ltd)

All buildings, sheds and fixed plant will be removed from the site. The free standing sheds will be dismantled and removed from the site. Where appropriate the materials recovered in the demolition will be sold for re-use or recycled. All concrete footings and pads will be broken up and removed with the waste material being buried in the final void.

The bio-cycle sewerage plant will be removed from site.

The gravel from the car park area will be scalped off and stockpiled for use off the site. Once the gravel has been removed the area will be deep-ripped to at least 400mm in two directions. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Access Roadways (Donaldson Coal Pty Ltd)

The tar sealed road way from the Donaldson office to the access road into the Cooks facility will have the tar stripped off, be regraded and ripped to a minimum of 400mm. 150 mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP. Mitre drains will be constructed at 50m intervals along the road alignment to minimise erosion along the road prior to the establishment of vegetation.

Buildings & Fixed plant (Cooks Construction)

All buildings (demountable or otherwise), sheds, shipping containers and fixed plant will be removed from the site. Under the existing contract with Donaldson, Cooks are required to remove all buildings and fixed plant as part of their demobilisation from the site.

The free standing workshop will be dismantled and removed from the site. Where appropriate the materials recovered in the demolition will be sold for re-use or recycled. All concrete footings and pads will be broken up and removed with the inert waste material being buried in the final void. Should hydrocarbon contamination be identified under the concrete pads the material is not to be buried until it is validated as not presenting a risk to the environment.

The fuel / lube bay infrastructure is to be removed from the site. All concrete footings and bund will be broken up and removed with the inert waste material being buried in the final void. A phase 2 assessment of contamination in the area should undertaken by a suitably qualified consultant. Where the levels of contamination are considered to high for disposal in the pit the material will be placed in the land farm on the out of pit dump. A phase 1 assessment should be undertaken prior to the closure of the mine to ascertain the likelihood that contamination is going to occur. All contaminates will be remediated in accordance with the recommendations of this assessment.

The vehicle washdown pad is to be removed from the site. All concrete footings and pad will be broken up and removed with the inert waste material being buried in the final void. A phase 2 assessment of contamination in the area should undertaken by a suitably qualified consultant. Where the levels of contamination are considered to high for disposal in the pit the material will be placed in the land farm on the out of pit dump.

The oil water separator is to be removed. A phase 2 assessment of contamination in the area should undertaken by a suitably qualified consultant. Where the levels of contamination are considered to high for disposal in the pit, the material will be placed in the land farm on the out of pit dump.

The bio-cycle sewerage plant will be removed from site.

The gravel from the car park area will be scalped off and stockpiled for use off the site. The batters on the western and southern side of the car park will be regraded to a maximum of 10 degrees. The entire area is then to be deep-ripped to at least 400mm in two directions. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Industrial Area Dam

The Industrial area is to remain as a trap for sediment and contamination during the demolition phase. Once this is completed the dam is to be drained to the Big Kahuna Dam. A sample of the sediments is to be taken and assessed for contamination. Where the levels of contamination are found to be outside acceptable levels, the contaminated material is to be taken to the onsite land farm area for bio-remediation.

Reshaping and Rehabilitation

The entire workshop /administration area will then be regraded and trimmed to make a landform that is consistent with the surrounding topography. All embankments will be battered down to 10 degrees or less. Specific attention will be needed to regrade the ROM batter and the cutting that is currently between the Cooks administration office and the workshop. The regrading will be such that it will enable the free drainage of surface runoff from the site. Any surface water management structures (contour banks, drains and settlement ponds) will also be constructed to ensure the water leaving the site does not result in erosion. The entire workshop / administration area will then to be rock raked to remove all surface rock to a size less than 400mm and ripped to a depth of at least 1m in at least 2 directions. The area has been used by heavy equipment so compaction of the area is expected to be a problem that will need to be addressed to enable the establishment of vegetation in the area. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Mine Access Road from Bloomfield private road to Cooks Facility.

The gravel road way from the current Cooks facilities to Bloomfield's private access road will be re-shaped and ripped to a minimum of 400mm. The crushed sandstone running surface is to be stripped off and stockpiled for use off site (approx. 10,400m^3 of saleable product). All culverts and pipes in the roadway will be removed and the original drainage lines re-instated. Additional stabilisation works (rock, hydro-seeding) may be required to provide temporary stabilisation in these drainage lines until the established vegetation provides adequate protection from erosion. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP. Mitre drains will be constructed at 50m intervals along the road alignment to minimise erosion along the road prior to the establishment of vegetation.

Coal Haulage Road.

The gravel coal haulage road from the Donaldson ROM stockpile to the intersection with the Tasman Coal Haulage Road will be re-shaped and ripped to a minimum of 400mm. Before commencing the reshaping works all carbonaceous material occurring in the road as a result of spillage will be stripped off and hauled to the final void for disposal.

All culverts and pipes in the roadway will be removed and the original drainage lines re-instated. Additional stabilisation works (rock, hydro-seeding) may be required to provide temporary stabilisation in these drainage lines until the established vegetation provides adequate protection from erosion.

One hundred-fifty (150) mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP. Mitre drains will be constructed at 50m intervals along the road alignment to minimise erosion along the road prior to the establishment of vegetation.

Mine Access & Tasman Haulage Road.

This road will be retained at the end of Donaldson open cut mining to enable coal mined at the Tasman Mine to be taken to the Bloomfield CHPP for processing.

Maintenance of existing rehabilitation

There is approximately 6.5ha of established rehabilitation along side the access and coal haulage roads. Management of this area will require ongoing maintenance. In the context of this mine closure plan, maintenance constitutes two (2) applications of fertilizer and weed management requirements over a five (5) year period. However this will vary depending on the extent of weed infestation. The cost of any minor remedial earthworks or soil conservation works that may be required are included as part of the contingency.

6.1.2 Domain 2: Mining Areas

Domain 2 covers an area that includes the following key elements.

- The ROM coal stockpile area;
- The Bulk Fuel Storage Tanks and associated infrastructure;
- The in-pit Coal Haul Roads;
- The areas of established / successful rehabilitation;
- Area of in-pit dump that require minor re-shaping before top-soiling and seeding;
- The low wall areas that require major reshaping;
- That Active pit are and Highball;
- Water Management structures such as sediment dams and clean water diversions (excluding the Big Kahuna Dam – see Domain 3);
- The Environmental (noise) bund; and
- The area ahead of mining that has had the topsoil stripped.

ROM Coal Stockpile Area

All remaining coal stockpiles are to be removed to the Bloomfield's CHPP for processing. The remaining carbonaceous material (contaminated floor of stockpiles) is to be scalped off and taken to the final void for burial.

The Northern batter of the ROM pad area is to be regraded using an excavator. The batter will need to be pulled back as it is hard against the northern limit of the mining lease area which limits the use of a bulldozer. The batter should be reduced to a maximum of 10 degrees.

The entire ROM area will then be regarded and trimmed to make a landform that is consistent with surround topography. All embankments will be required to be battered to 10 degrees or less. The regrading will be such that it will enable the free drainage of surface runoff from the site. Any surface water management structures (contour banks, drains and settlement ponds) will also be constructed to ensure the water leaving the site does not result in erosion.

The entire ROM area will then to be rock raked to remove all surface rock to a size less than 400mm and ripped to a depth of at least 1m in at least 2 directions. The area has been used by heavy equipment so compaction of the area is expected to be a problem that will need to be addressed to enable the establishment of vegetation in the area. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Bulk Fuel Storage Facility(2 x 50,000L diesel tanks)

The bulk fuel storage area needs to be decommissioned. Cooks are responsible for the removal of the tanks (2 x 50,000L) and the associated infrastructure. There is evidence of substantial hydrocarbon contamination as a result of spillage and poor management of the facility. A phase 2 assessment of contamination in the area should undertaken by a suitably qualified consultant. Where the levels of contamination are considered to high for disposal in the pit, the material will be placed in the land farm on the out of pit dump.

Internal Coal Haul Road

Currently there is approximately 10ha of internal haul road within the mine. It was originally used as access to the pit, but became redundant as the active mining area moved to the south. Contaminated, carbonaceous or unsuitable (gravel, etc) material will be removed from the haul road and hardstand surfaces and disposed of in the void. The haul road needs to be re-shaped to be consistent with the surrounding landform and ripped and seeded using the forest revegetation mix as detailed in the MOP.

Notwithstanding haul road rehabilitation described, a light vehicle access road is to be maintained to enable inspections (monitoring) of the site following closure of the mine.

Sediment Dams

Sediment dams A, B and C are to remain in place until the rehabilitation of the sites has been completed and it can be demonstrated that erosion from the rehabilitated areas is minimal. Once this point has been reached the dams should be pushed in and reshaped to be consistent with the surrounding landform. They will however need to be maintained during the period where the rehabilitation is becoming established. Where the original capacity of the structure is reduced by 30% or more the sediment should be removed using an excavator and truck and the sediment material dump in the void.

Rumbles Sediment Dam.

The Rumbles sediment dam is to remain as a trap for sediment during the demolition phase. Once this is completed the dam is to be de-watered. A sample of the sediments is to be taken and assessed for contamination (predominantly salts and pH as it has been a dirty water storage dam at one point during the mine life). Where the levels of contamination are found to be outside acceptable levels, the contaminated material is too be scalped out and buried in the final void. Once the sediments have been removed (only if required) the dam wall and spillway is to be pushed out and the original drainage line re-instated so it links in with the surrounding landform.

Ted's Hole Sediment Dam.

The sediment dam is to remain as a trap for sediment during the demolition phase. Once this is completed the dam is to be de-watered. A sample of the sediments is to be taken and assessed for contamination (predominantly salts and pH as it has been a dirty water storage dam). Where the levels of contamination are found to be outside acceptable levels, the contaminated material is too be scalped out and buried in the final void. Once the sediments have been removed (only if required) the dam wall and spillway is to be pushed out and the original drainage line re-instated so it links in with the surrounding landform.

Maintenance of Successful Rehabilitation

There are several areas of established rehabilitation within the mining area. Management of this area will require ongoing maintenance. In the context of this mine closure plan, maintenance constitutes two (2) applications of fertilizer and weed management requirements over a five (5) year period. However this will vary depending on the extent of weed infestation. The cost of any minor remedial earthworks or soil conservation works that may be required are included as part of the contingency.

Unshaped Overburden Dumps – Minor Re-shaping

There are some unshaped areas requiring minor dozer work to meet the final landform criteria (slope gradients of 10 degrees) prior to final rehabilitation works. Once completed the areas will be topsoiled and rehabilitated in accordance with the criteria detailed in the MOP.

Unshaped Overburden Dumps – Major Re-shaping

The area includes the high wall (where benched) (NB: it does not include the end wall.) low wall and low wall ramps. These areas will require bulk dozer pushing to attain a final landform with slope of 10 degrees or less.

Noise Mitigation / Environmental Bund Wall

The noise mitigation bund wall will need to be pushed off the end wall into the final void using a dozer. This is to provide a flat surface to allow access, enable drilling and the preparation of the blast that will be required prior to regrading to a minimum of 18 degrees.

The timber wall constructed on the highwall alongside John Renshaw Drive will be dismantled and reused on the site or sold for another use.

High walls / End walls

The area includes the high walls and end walls and the higher internal benches that are not able to be treated by dozer pushing alone. The proposed treatment is to use standard blast techniques and then use a dozer to push the slopes to a minimum of 18 degrees. During highwall dozer reshaping, water management structures such as contour banks, drains and drop structures will be established to divert as much of the surrounding catchment as possible away from the final void to limit the amount of water that accumulates in the pit.

The material blasted from the high wall will also be used to cover any exposed coal seams and other carbonaceous material that might be left at the end of mining. Given there is not a history of spontaneous combustion at the site, this approach to sealing off the exposed coal seams with inert overburden material is considered appropriate and additional engineering design or compaction or selection of clay material will not be required.

Cross-sections and overburden volume calculations indicate that sufficient material will be available to cover the exposed coal seams as a result of the blasting and extra material will not be required. Once blasting and reshaping is complete, final rehabilitation of the precinct area will commence.

Safety berm and fence around the final void.

Typically a safety berm and security fence are only required where there are no options other than to leave the highwall. Given the location of the mine and the historical use of the area by recreational motorbikes and 4WD vehicles, it is considered necessary to construct the safety berm and fence around the southern and eastern edges of the void to provide additional protection against someone accessing the pit area.

A trench and safety berm would need to be constructed along the entire length of the remaining high wall (approximately 2000m). This is to provide an engineered barrier between the pit and the surrounding area. The trench and berm is to be constructed in such a way that it would physically stop most vehicles.

The configuration of the safety berm and fence will include the following:

- A two (2) metre earthen berm set back at least 5m from the edge of the highwall / end wall;
- A one (1) metre trench on the outside of the berm; and
- A four (4) wire stock fence on the outside of the trench. The fence should also have warning signs placed at 50m intervals along the fence so that they can be read by anyone who may be approaching the old void area.

Figure 7 below shows the general arrangement of the safety berm and fence:

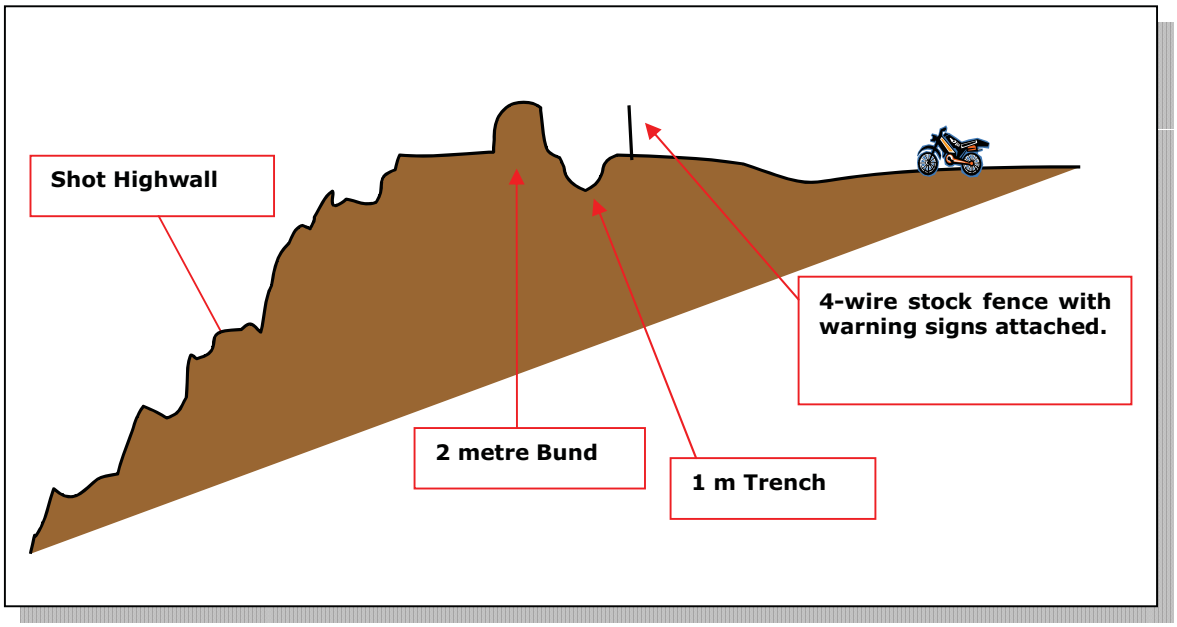


Figure 7 - General arrangement for High wall / End wall safety berm and trench

Final rehabilitation works and surface water management

Once bulk or minor reshaping has been completed the all areas not rehabilitated will require final rehabilitation in accordance with the requirements of the MOP.

The areas will be trimmed to facilitate appropriate surface water management and deep ripped to a minimum depth of 1m. Any free rock on the slopes can be pushed into small mounds around the area to provide local habitat. Structural soil conservation works (graded banks, etc) will be established to ensure that water is directed into the site water management system. Such works may include the construction of waterways, drains, graded banks and check dams. Fertiliser and any required soil ameliorants (e.g. lime) will be applied, and the area ripped and seeded with native tree species, in accordance with the requirements of the MOP.

6.1.3 Domain 3: Out of Pit Dump and Big Kahuna Water Storage Dam

Domain 3 covers an area that includes the following key elements.

- The out of pit overburden emplacement dump;
- The areas of established / successful rehabilitation;
- The 490ML bulk water storage dam (the Big Kahuna Dam);
- An area of the dump that requires minor re-shaping before topsoiling and seeding;
- An area of active dump face that require major reshaping; and
- Water Management structures such as sediment dams and clean water diversions.

Maintenance of Successful Rehabilitation

There is an area of established rehabilitation on the out of pit dump area. This will be increased as further rehabilitation is completed. Management of this area will require ongoing maintenance. In the context of this mine closure plan, maintenance constitutes two (2) applications of fertilizer and weed management requirements over a five (5) year period. However this will vary depending on the extent of weed infestation. The cost of any minor remedial earthworks or soil conservation works that may be required are included as part of the contingency.

"Dump ROM" Stockpile Area

All remaining recoverable coal is to be removed to the Bloomfield's CHPP for processing. The remaining carbonaceous material (contaminated floor of stockpiles) is to be scalped off and taken to the final void for burial.

"Big Kahuna Dam - 490ML water management structure

The 490ML dam has been constructed to store all mine water generated during mining. The design was such that all water generated from the mine could be retained on site to ensure that the commitment of nil discharge of mine water from the site was maintained. Water from the dam is used as part if the site water management strategy including make up water for dust suppression and vehicle washing, etc.

Following completion of mining at the Donaldson Open Cut, the dam will be retained for use by the Abel Underground.

Unshaped Overburden Dumps – Minor Re-shaping

There are unshaped areas requiring minor dozer work to meet the final landform criteria (slope gradients of 10 degrees) prior to final rehabilitation works. Once completed the areas will be topsoiled and rehabilitated in accordance with the criteria detailed in the MOP.

Unshaped Overburden Dumps – Major Re-shaping

The area includes the active dump face on the south east portion of the out of pit dump. These areas will require bulk dozer pushing to attain a final landform with a slope of 10 degrees or less.

Final rehabilitation works and surface water management

Once bulk or minor reshaping has been completed all areas not rehabilitated will require final rehabilitation. The areas will be trimmed to facilitate surface water management and deep ripped to a minimum depth of 1m. Any free rock on the slopes can be pushed into small mounds around the area to provide local habitat. Structural soil conservation works will be established to ensure that water is directed into the site water management system. Such works may include the construction of waterways, drains, graded banks and check dams. Fertiliser and required soil ameliorants will be applied, and the ripped area seeded with native tree species, in accordance with the requirements of the MOP.

6.1.4 Domain 4: Abel Boxcut

Domain 4 covers an area that includes the following key elements.

- The Abel Boxcut Pit; and
- The area ahead of mining that has had the topsoil stripped.

Abel Box Cut pit

As part of the ongoing Donaldson Open Cut Operations a small boxcut is being established to eventually be used for the access to the Abel Underground Mine. If the Donaldson Open Cut were to cease immediately it is anticipated that this would not require any rehabilitation as it the responsibility would be transferred to the Abel Underground Operation

7.0 SCENARIO 2: MINE CLOSURE IN 2012 (INCLUDES THE INTEGRATATION OF THE DONALDSON AND ABEL MINES)

The following section of the mine closure plan outlines the proposed commitments for each domain under the scenario of Mine Closure at the Donaldson Open Cut in 2012. Plan 6 of the Donaldson Coal MOP (May 200x) and key aspects of the Abel Underground Part 3A Environmental Assessment were used to provide the final footprint of the mine and, as such, is the basis of the mine closure plan and associated costing estimates. A detailed description of the integration of the key surface features has been included as **Section 1.5**. Where necessary some assumptions about the amount of rehabilitation completed had to be made.

It is also intended that the satisfactory completion of these proposed commitments be used as criteria to demonstrate successful decommissioning and rehabilitation of each domain, and as such be the basis for relinquishment of the mining lease.

There are some areas of the mine where the difference between the decommissioning and rehabilitation requirements for the "Close in 2005" and "Close 2012" are similar. In this regard some of the description below will be similar.

7.1 Description of the Decommissioning and Rehabilitation Commitments for each Domain

The plan attached as **Appendix 2** show the management domains identified as part of the mine closure plan. There were four (4) domains identified. The following sections provide a more detailed description of each domain, including an overall framework for the mine closure process, assumptions made, and the actions required to meet the nominated closure criteria for the domain.

7.1.1 Domain 1: Administration Area(s), Workshop & Service Bay & Access and Coal Haulage Roads.

Domain 1 covers an area that includes the following key elements.

- The Donaldson Coal Pty Ltd Administration office, car park and associated storage sheds;
- The tar-sealed access road from the Cooks access road to the car park;
- The Cooks Construction maintenance workshop, service bays, vehicle wash down, parts storages pads and storage containers, industrial area dam, administration office and employee car park;
- The "light vehicle" access from the Cooks Facility to the private access road for Bloomfield Colliery;
- The original area office/workshop area used by both Donaldson and Cooks prior to moving to the existing facilities in 2002; and
- The coal haulage road from the Donaldson ROM stockpile area to the Bloomfield CHPP area.

Disconnecting Site Services

All services including power, water and telephone for the entire domain will be disconnected and terminated to make them safe. The inspection pits and junction boxes for underground services will be sealed. Generally all underground services will be made safe and left buried in the ground. The overhead power lines back to the Bloomfield's access road will be removed and the materials (i.e. poles and wire) recovered for potential re-sale or recycling as applicable.

Buildings & Fixed plant (Donaldson Coal Pty Ltd)

All buildings, sheds and fixed plant will be removed from the site. . The free standing sheds will be dismantled and removed from the site. Where appropriate the materials recovered in the demolition will be sold for re-use or recycled. All concrete footings and pads will be broken up and removed with the waste material being buried in the final void.

The bio-cycle sewerage plant will be removed from site.

The gravel from the car park area will be scalped off and stockpiled for use off the site. Once the gravel has been removed the area will be deep-ripped to at least 400mm in two directions. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Access ***Roadways (Donaldson Coal Pty Ltd)***

The tar-sealed road way from the Donaldson office to the access road into the Cooks facility will be have the tar ripped up and be regraded and ripped to a minimum of 400mm. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP. Mitre drains will be constructed at 50m intervals along the road alignment to minimise erosion along the road prior to the establishment of vegetation.

Buildings & Fixed plant (Cooks Construction)

All buildings (demountable or otherwise), sheds, shipping containers and fixed plant will be removed from the site. Under the existing contract with Donaldson, Cooks are required to remove all buildings and fixed plant as part of their demobilisation from the site.

The free standing workshop will be dismantled and removed from the site. Where appropriate the materials recovered in the demolition will be sold for re-use or recycled. All concrete footings and pads will be broken up and removed with the inert waste material being buried in the final void. Should hydrocarbon contamination be identified under the concrete pads the material is not to be buried until it is validated as not presenting a risk to the environment.

The fuel / lube bay infrastructure is to be removed from the site. All concrete footings and bund will be broken up and removed with the inert waste material being buried in the final void. A phase 2 assessment of contamination in the area should undertaken by a suitably qualified consultant. Where the levels of contamination are considered to high for disposal in the pit the material will be placed in the land farm on the out of pit dump. A phase 1 assessment should be undertaken prior to the closure of the mine to ascertain the likelihood that contamination is going to occur. All contaminates will be remediated in accordance with the recommendations of this assessment.

The vehicle wash-down pad is to be removed from the site. All concrete footings and pad will be broken up and removed with the inert waste material being buried in the final void. A phase 2 assessment of contamination in the area should undertaken by a suitably qualified consultant. Where the levels of contamination are considered to high for disposal in the pit the material will be placed in the land farm on the out of pit dump.

The oil water separator is to be removed. A phase 2 assessment of contamination in the area should undertaken by a suitably qualified consultant. Where the levels of contamination are considered to high for disposal in the pit, the material will be placed in the land farm on the out of pit dump.

The bio-cycle sewerage plant will be removed from site.

The gravel from the car park area will be scalped off and stockpiled for use off the site. The batters on the western and southern side of the car park will be regraded to a maximum of 10 degrees. The entire

area is then to be deep-ripped to at least 400mm in two directions. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Industrial Area Dam

The Industrial area is to remain as a trap for sediment and contamination during the demolition phase. Once this is completed the dam is to be drained to the Big Kahuna Dam. A sample of the sediments is to be taken and assessed for contamination. Where the levels of contamination are found to be outside acceptable levels, the contaminated material is to be taken to the onsite land farm area for bio-remediation.

Reshaping and Rehabilitation

The entire workshop /administration area will then be regraded and trimmed to make a landform that is consistent with the surrounding topography. All embankments will be battered down to 10 degrees or less. Specific attention will be needed to regrade the ROM batter and the cutting that is currently between the Cooks administration office and the workshop. The regrading will be such that it will enable the free drainage of surface runoff from the site. Any surface water management structures (contour banks, drains and settlement ponds) will also be constructed to ensure the water leaving the site does not result in erosion. The entire workshop / administration area will then to be rock raked to remove all surface rock to a size less than 400mm and ripped to a depth of at least 1m in at least 2 directions. The area has been used by heavy equipment so compaction of the area is expected to be a problem that will need to be addressed to enable the establishment of vegetation in the area. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Mine Access Road from Bloomfield private road to Cooks Facility.

The road way from the current Cooks facilities to Bloomfield's private access road will have the tar ripped up and be re-shaped and ripped to a minimum of 400mm. The crushed sandstone running surface is to be stripped off and stockpiled for use off site. All culverts and pipes in the roadway will be removed and the original drainage lines re-instated. Additional stabilisation works (rock, hydro-seeding) may be required to provide temporary stabilisation in these drainage lines until the established vegetation provides adequate protection from erosion. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP. Mitre drains will be constructed at 50m intervals along the road alignment to minimise erosion along the road prior to the establishment of vegetation.

Coal Haulage Road.

The gravel coal haulage road from the Donaldson ROM stockpile to the intersection with the Tasman Coal Haulage Road will be re-shaped and ripped to a minimum of 400mm. Before commencing the reshaping works all carbonaceous material occurring in the road as a result of spillage will be stripped off and hauled to the final void for disposal.

All culverts and pipes in the roadway will be removed and the original drainage lines re-instated. Additional stabilisation works (rock, hydro-seeding) may be required to provide temporary stabilisation in these drainage lines until the established vegetation provides adequate protection from erosion.

One hundred-fifty (150) mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP. Mitre drains will be constructed at 50m intervals along the road alignment to minimise erosion along the road prior to the establishment of vegetation.

Mine Access & Tasman Haulage Road.

This road will be retained to enable coal mined at the Tasman Mine to be taken to the Bloomfield CHPP for processing.

Maintenance of existing rehabilitation

There is approximately 6.5ha of established rehabilitation along side the access and coal haulage roads. Management of this area will require ongoing maintenance. In the context of this mine closure plan, maintenance constitutes two (2) applications of fertilizer and weed management requirements over a five (5) year period. However this will vary depending on the extent of weed infestation. The cost of any minor remedial earthworks or soil conservation works that may be required are included as part of the contingency.

7.1.2 Domain 2: Mining Areas

Domain 2 covers an area that includes the following key elements.

- The ROM coal stockpile area;
- The Bulk Fuel Storage Tanks and associated infrastructure;
- The areas of established / successful rehabilitation;
- Area of in-pit dump that require minor re-shaping before top-soiling and seeding;
- The low wall areas that require major reshaping;
- That Active pit are and Highwall;
- Water Management structures such as sediment dams and clean water diversions;
- The area ahead of mining that has had the topsoil stripped.

ROM Coal Stockpile Area

All remaining coal stockpiles are to be removed to the Bloomfield's CHPP for processing. The remaining carbonaceous material (contaminated floor of stockpiles) is to be scalped off and taken to the final void for burial.

The Northern batter of the ROM pad area is to be regraded using an excavator. The batter will need to be pulled back as it is hard against the northern limit of the mining lease area which limits the use of a bulldozer. The batter should be reduced to a maximum of 10 degrees.

The entire ROM area will then be regarded and trimmed to make a landform that is consistent with surround topography. All embankments will be required to be battered to 10 degrees or less. The regrading will be such that it will enable the free drainage of surface runoff from the site. Any surface water management structures (contour banks, drains and settlement ponds) will also be constructed to ensure the water leaving the site does not result in erosion.

The entire ROM area will then to be rock raked to remove all surface rock to a size less than 400mm and ripped to a depth of at least 1m in at least 2 directions. The area has been used by heavy equipment so compaction of the area is expected to be a problem that will need to be addressed to enable the establishment of vegetation in the area. 150mm of topsoil will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Bulk Fuel Storage Facility(2 x 50,000L diesel tanks)

The bulk fuel storage area needs to be decommissioned. Cooks are responsible for the removal of the tanks (2 x 50,000L) and the associated infrastructure. There is evidence of substantial hydrocarbon contamination as a result of spillage and poor management of the facility. A phase 2 assessment of

contamination in the area should undertaken by a suitably qualified consultant. Where the levels of contamination are considered to high for disposal in the pit, the material will be placed in the land farm on the out of pit dump. A phase 1 assessment can be undertaken prior to the closure of the mine to ascertain the likelihood that contamination is going to occur.

Maintenance of Successful Rehabilitation

There are several areas of established rehabilitation within the mining area. Management of this area will require ongoing maintenance. In the context of this mine closure plan, maintenance constitutes two (2) applications of fertilizer and weed management requirements over a five (5) year period. However this will vary depending on the extent of weed infestation. The cost of any minor remedial earthworks or soil conservation works that may be required are included as part of the contingency.

Unshaped Overburden Dumps – Minor Re-shaping

There are some unshaped areas requiring minor dozer work to meet the final landform criteria (slope gradients of 10 degrees) prior to final rehabilitation works. Once completed the areas will be topsoiled and rehabilitated in accordance with the criteria detailed in the MOP.

Unshaped Overburden Dumps – Major Re-shaping

The area includes the high wall (where benched) (NB: it does not include the end wall.) low wall and low wall ramps. These areas will require bulk dozer pushing to attain a final landform with slope of 10 degrees or less.

Final rehabilitation works and surface water management

Once bulk or minor reshaping has been completed the all areas not rehabilitated will require final rehabilitation in accordance with the requirements of the MOP.

The areas will be trimmed to facilitate appropriate surface water management and deep ripped to a minimum depth of 1m. Any free rock (> 500mm) on the slopes can be pushed into small mounds around the area to provide local habitat. Structural soil conservation works (graded banks, etc) will be established to ensure that water is directed into the site water management system. Such works may include the construction of waterways, drains, graded banks and check dams.

Topsoil will be spread over the entire area at a depth of 150mm. Fertiliser and any required soil ameliorants (e.g. lime) will be applied, and the area ripped and seeded with native tree species, in accordance with the requirements of the MOP.

Final Void

The Abel Underground Part 3A Environmental Assessment shows that there will be two (2) final voids remaining at the completion of the Donaldson Open Cut. **Section 1.5.2** describes the configuration of the voids. The void on the eastern side of Four Mile Creek (Abel Pit Final Void) will be retained for use by the Abel Underground until 2028. The responsibility for the closure of the void will be transferred from the Donaldson Open Cut to the Abel Underground at the cessation of mining in the open cut. The closure requirements of this void are summarised in Sections 1.5.2 and 8.0 of this plan.

The Donaldson Open Cut will be responsible for the void on the western side of Four Mile Creek. A creek crossing will be installed over Four Mile Creek to allow overburden and coal to be hauled back to the mine and Bloomfields CHPP.

Under the current mine plan (MOP 200x) a final void will be left at the completion of mining. Through careful mine planning in the last year of operation the void area will be keep to as small as possible.

Three sides of the final void (east, south and west) will be blasted and pushed using a dozer to a maximum of 18 degrees. During highwall dozer reshaping, water management structures such as contour

banks, drains and drop structures will be established to divert as much of the surrounding catchment as possible away from the final void to limit the amount of water that accumulates in the pit. Notwithstanding this it is expected that some water will accumulate in the bottom of the void. Current estimates included in the Abel Environmental Assessment indicate that the water level will return to at least 40RL.

The material blasted from the high walls will also be used to cover any exposed coal seams and other carbonaceous material that might be left at the end of mining. Given there is not a history of spontaneous combustion (and it is not expected) at the site, this approach to sealing off the exposed coal seams with inert overburden material is considered appropriate and additional engineering design or compaction or selection of clay material will not be required.

Cross-sections and overburden volume calculations indicate that sufficient material will be available to cover the exposed coal seams as a result of the blasting and extra material will not be required to be brought. Once blasting and reshaping is complete, final rehabilitation of the precinct area will commence.

The northern batter of the void will be regraded to a maximum of 10 degrees, with a permanent vehicle access and egress ramp being constructed to allow access to the pit void for ongoing monitoring and management.

Safety berm and fence around the final void.

Typically a safety berm and security fence are only required where there are no options other than to leave the existing highwall. Given the location of the mine and the historical use of the area by recreational motorbikes and 4WD vehicles, it is considered necessary to construct the safety berm and fence around the entire perimeter of the void to provide additional protection against someone accessing the void.

A trench and safety berm would need to be constructed around the entire length of the final void (approximately 2500m). This is to provide an engineered barrier between the pit and the surrounding area. The trench and berm is to be constructed in such a way that it would physically stop most vehicles.

The configuration of the safety berm and fence has been described in detail above in **Section 6.1.2.**

7.1.3 Domain 3: Out of Pit Dump and Big Kahuna water Storage Dam

Domain 3 covers an area that includes the following key elements.

- The areas of established / successful rehabilitation on the out of pit dump;
- The Big Kahuna Dam (490ML bulk water storage dam); and
- Water Management structures such as sediment dams and clean water diversions.

Maintenance of Successful Rehabilitation

It is anticipated that the entire out of pit dump will be rehabilitated by 2012 with about 32.6ha of established rehabilitation requiring ongoing maintenance. In the context of this mine closure plan, maintenance constitutes two (2) applications of fertilizer and weed & feral animal management requirements over a five (5) year period. However this will vary depending on the extent of weed infestation. The cost of any minor remedial earthworks or soil conservation works that may be required are included as part of the contingency.

"Big Kahuna Dam - 490ML water management structure

The 490ML dam has been constructed to store all mine water generated during mining. The design was such that all water generated from the mine could be retained on site to ensure that the commitment of nil discharge of mine water from the site was maintained. Water from the dam is used as part if the site water management strategy including make up water for dust suppression and vehicle washing, etc.

Following completion of mining at the Donaldson Open Cut, the dam will be retained for use by the Abel Underground

The base of the Abel Pit Void will be graded to enable water to drain in a south-easterly direction. A sump with simple sedimentation and oil separation systems will be established in this vicinity. Water collected in this sump will be pumped to the 'Big Kahuna' Dam, where it will be used for dust suppression on stockpiles, haul roads and general disturbed surface areas. Excess water will be removed from the Abel Underground Mine will also be pumped into the Big Kahuna Dam. An existing pipeline between Big Kahuna Dam and the Bloomfield CHPP will be upgraded to enable water to be manually transferred between the Big Kahuna Dam and the Bloomfield CHPP. This pipeline will primarily be used to transfer water from the Big Kahuna Dam to the Bloomfield CHPP at a rate sufficient to ensure that no overflow occurs from this dam. If necessary, this pipeline could also be used to transfer water from the Bloomfield CHPP to the Big Kahuna Dam.

8.0 SCENARIO 3: MINE CLOSURE IN 2028 (ABEL UNDERGROUND MINE ONLY).

The following section of the mine closure plan outlines the proposed commitments for each domain under the scenario of Mine Closure at the Abel Underground Mine in 2028. Given the time until closure this section should be seen as conceptual mine closure planning and as such may be revised throughout the duration of the project

The Abel Underground Part 3A Environmental Assessment was used to provide the final footprint of the mine and, as such, is the basis of the mine closure plan and associated costing estimates.

It is also intended that the satisfactory completion of these proposed commitments be used as criteria to demonstrate successful decommissioning and rehabilitation of each domain, and as such be the basis for relinquishment of the mining lease.

8.1 Description of the Decommissioning and Rehabilitation Commitments for each Domain

The plan attached as **Appendix 2** show the management domains identified as part of the mine closure plan. There are three (3) domains identified. The following sections provide a more detailed description of each domain, including an overall framework for the mine closure process, assumptions made, and the actions required to meet the nominated closure criteria for the domain.

8.1.1 Domain 1: Abel Pit Final Void and Surface Facilities

Domain 1 covers an area that includes the following key elements.

- Abel Pit Final Void
- The surface infrastructure, stockpiles and portals;
- Overland conveyor; and
- Tasman Coal Haulage and workforce entrance road.

Disconnecting Site Services

All services including power, water and telephone for the entire domain will be disconnected and terminated to make them safe. The inspection pits and junction boxes for underground services will be sealed. Generally all underground services will be made safe and left buried in the ground. The overhead power lines back to the Bloomfield's access road will be removed and the materials (i.e. poles and wire) recovered for potential re-sale or recycling as applicable.

Buildings & Fixed plant

All buildings, sheds and fixed plant will be removed from the site. The free standing sheds will be dismantled and removed from the site. Where appropriate the materials recovered in the demolition will be sold for re-use or recycled. All concrete footings and pads will be broken up and removed with the waste material being buried in the final void.

The bio-cycle sewerage plant will be removed from site.

The gravel from the car park area will be scalped off and stockpiled for use off the site. Once the gravel has been removed the area will be deep-ripped to at least 400mm in two directions. 150mm of topsoil

will be spread over the entire area, ripped and seeded using the forest revegetation mix detailed in the MOP.

Overland Conveyor

All conveyors will be demolished and removed from the site. Where appropriate the materials recovered in the demolition will be sold for re-use or recycled. All concrete footings and pads will be broken up and removed with the waste material being buried in the final void. The conveyor corridor will be rehabilitated with the disturbed areas being reshaped / trimmed to facilitate appropriate surface water management and deep ripped to a minimum depth of 1m. Any free rock (> 500mm) on the slopes can be pushed into small mounds around the area to provide local habitat. Structural soil conservation works (graded banks, etc) will be established to ensure that water is directed into the site water management system. Such works may include the construction of waterways, drains, graded banks and check dams.

Topsoil will be spread over the entire area at a depth of 150mm. Fertiliser and any required soil ameliorants will be applied, and the area ripped and seeded with native tree species, in accordance with the requirements of the MOP.

Coal Stockpile Areas

All remaining coal stockpiles are to be removed to the Bloomfield's CHPP for processing. The remaining carbonaceous material (contaminated floor of stockpiles) will be left in situ as they are contained within the final void. If required a layer of inert capping material will be placed over the stockpile to minimise the likelihood of spontaneous combustion.

Tasman Coal Haulage / Access Road

The Tasman haul roads will be retained as a permanent all weather access into the property. It is likely that it will service the area post mining.

If the road is not retained then the bitumen will be stripped off and disposed of in the pit. The gravel road base will be deep ripped, and minor dozer reshaping work will be undertaken to ensure surface level consistency with the surrounding rehabilitated areas.

Topsoil will be spread at 150mm over the disturbed areas. Structural soil conservation works will be established to ensure that all water is directed into the site water management system. Such works may include the construction of waterways, drains, graded banks and check dams.

Final Void

The eastern, western and southern sides of the final void will be blasted and pushed using a dozer to a maximum slope of 18 degrees. The northern side will be blasted and regraded to a maximum of 10 degrees, with a permanent vehicle access and egress ramp constructed to allow access to the pit void for ongoing monitoring and management. During highwall dozer reshaping, water management structures such as contour banks, drains and drop structures will be established to divert as much of the surrounding catchment as possible away from the final void, to limit the amount of water that accumulates in the pit. Notwithstanding this, it is expected that some water will accumulate to a maximum depth of approximately 24 metres in the deepest part of the void (below 40 metres RL.)

Material blasted from the high walls will also be used to cover any exposed coal seams and other carbonaceous material that might be left at the end of mining. Given there is no history of spontaneous combustion at the site, this approach to sealing off the exposed seams with inert overburden material is considered appropriate. Once blasting and reshaping has been completed, final rehabilitation of the disturbed void area will commence. Due to the expected standing water at the bottom of the void, a safety berm and security fence will be provided around the void to prevent unauthorised access. The berm will be designed with a trench to prevent unauthorised vehicle access to the void.

The 490 ML water management dam (the Big Kahuna) that is currently used for the Donaldson Open Cut Mine will continue to be used for the Abel Underground Mine. Dewatering and re-engineering of this dam to create a permanent water storage structure, as detailed in the Donaldson MOP, will therefore be delayed until closure of the Abel Underground Mine.

"Big Kahuna Dam - 490ML water management structure

The water in the Big Kahuna Dam will be pumped to Bloomfields Colliery underground workings. Following de-watering it is likely that there will be a layer of sediment that will contain salts at a level above what is considered acceptable. The level of contamination will be determined using laboratory analysis of the sediments. Testing will also include hydrocarbons as the Big Kahuna dam also currently receives overflow water from the Industrial Area Dam (Donaldson Open Cut) that can receive water containing free and emulsified hydrocarbons. The water collected in the sump in the Abel Pit void may also contain some hydrocarbons as result of maintenance and other related activities.

Where the sediment is found to contain unacceptable salt levels / or hydrocarbons it would be excavated and placed in the final void and buried. Assuming that 0.5m of material is likely to be contaminated it is anticipated that 10,500m3 of material will need to be placed in the final Abel Pit void.

Once the sediments have been removed the current spillway will be upgraded to an engineering design appropriate for that size dam given and it will remain as a permanent water storage structure after the life of the mine.

8.1.2 Domain 2: Mine Subsidence Areas

Domain 2 covers the area t includes all areas that have been undermined through the life of the mine. As ongoing rehabilitation of any subsidence areas will be undertaken during the operation of the mine the area affected by subsidence at the closure of the mine is expected to be minimal.

All rehabilitation works will be undertaken in accordance with the requirements of the Rehabilitation Management Plan and the Subsidence Management Plan.

8.1.3 Domain 3: Bloomfield Colliery (aspects included in the Abel EA Only)

Domain 3 includes the tailings disposal areas included as part of the Abel Underground Part 3A Environmental Assessment. In summary the strategy is to utilise the open cut areas within Bloomfield Colliery which will be filled with tailings from the coal washing process. This will assist in filling and rehabilitating these areas.

Rehabilitation will be undertaken in accordance with DPI-MR guidelines which require the Bloomfield Mine Operations Plan, required as a condition of the Bloomfield mining lease, to provide details on proposed outcomes to be achieved through rehabilitation and final landform. Dewatering of these tailings areas will continue to be undertaken in accordance with current methods, which include the pumping of excess water back to the washery for settling and reuse, and the covering of dewatered areas with soil, landform shaping and seeding for tree cover.

While certain aspects of the Bloomfield Colliery are being utilised by Abel (ie. tailings disposal, CHPP, rail loadout, etc) the responsibility for mine closure and meeting the lease relinquishment requirements of the DPI-MR will be retained by Bloomfield.

9.0 OBJECTIVES AND CRITERIA FOR MINE CLOSURE

In general terms, the DPI-MR has established the following generic rehabilitation / closure criteria, and as such all mine sites must be rehabilitated according to the following criteria:

- Rehabilitation and rehabilitation outcomes consistent with the Environmental Impact Statement which formed the basis of approval;
- Based on mine closure criteria and rehabilitation outcomes developed through stakeholder consultation;
- Integrates rehabilitated native vegetation with undisturbed native vegetation to provide consolidated areas and wildlife corridors where possible;
- Suitable for an agreed subsequent land use as far as possible compatible with the surrounding land fabric and land use requirements;
- Addresses limitations of land capability as a consequence of mining and rehabilitation;
- Sustainable in terms of that land use;
- Stable and permanent landforms, with soils, hydrology, and ecosystems with maintenance needs no greater than those of surrounding land. (may include waste emplacements, voids, pits and water-bodies providing that they are part of the accepted final outcome);
- Securely and safely contain waste substances that have the potential to affect land use or result in pollution;
- Not present a hazard to persons, stock or native fauna;
- Addresses identified threatened species issues;
- Clean and tidy, and free of equipment/structures, except for heritage and other agreed features; and
- Freedom from unacceptable air and water pollution, and other environmental effect outside the disturbed area.

In 2006, DCPL engaged Global Soil Systems to prepare closure criteria for the Donaldson Open Cut area. While it has been designed to specifically address the open cut the principles it establishes will also be applied to any rehabilitation undertaken at the Abel Underground Mine.

The GSS report identifies that the standard of rehabilitation at the Donaldson Open Cut is recognised as industry “Best Practice” with the older revegetated areas at Donaldson Open Cut Mine clearly showing a clear progression towards a sustainable outcome. The elements of this sustainability listed by GSS include the following:

- Generally stable landforms that are appropriately drained with minimum erosion and soil movement in most areas.
- The re-establishment of a dense and diverse mixture of local native understorey and over-storey vegetation species.
- The resilience of new ecosystems to frequent drought episodes. (No areas have experienced wildfire to date).

- Wise management and use of the topsoil resource as characterized by its weed free nature and the presence of inherent timber debris and native seed.

- The apparent reinvasion of birds and other wildlife species back into rehabilitated areas.

This report has been adopted by DCPL as the standard that outlines the post mining rehabilitation monitoring strategy for the site as well as detailing suitable success criteria. A copy of this report has been included as **Appendix 3**.

10.0 POST CLOSURE MONITORING & MEASUREMENT

The following section outlines the current Monitoring & Measurement programs as well as providing direction on what future programs may be required both during the mine decommissioning period (i.e. between the cessation of mining and the closure of the mine) and the Post Closure period. Statutory compliance, monitoring, verification of environmental quality and the protection of water resources rank as the highest expectations to be meet across the spectrum of community interests.

10.1 Current Monitoring & Measurement Programs

DCPL, in association with Bloomfield Collieries, intends to establish an Integrated Monitoring Network that will monitor, review and report environmental data across four sites located in close proximity to each other. These sites are:

- Tasman Underground Mine, owned by Donaldson Coal;
- The proposed Abel Underground Mine, owned by Donaldson Coal;
- Donaldson Open Cut Mine, owned by Donaldson Coal; and
- Bloomfield Coal Handling and Preparation Plant, Rail Loading Facility, and tailings management areas, owned by Bloomfield Collieries.

The Integrated Monitoring Network will assist the development of a sub-regional model of environmental data collection from coal mining activities. It will reduce duplication of monitoring on individual sites and identify sensitive areas that may be between mine sites that require monitoring to enable more effective sub regional data sets. Data will be shared across the sites and reported in one Integrated Monitoring Network document. Individual site reporting will still be provided as required by the Environmental Protection Licenses.

This Integrated Monitoring Network is a key aspect of the Abel Underground Mine as it enables a more detailed 'picture' of the sub regional environment to be gained and a report to be produced that addresses issues across the whole sub-region from Mount Sugarloaf to Ashtonfield, rather than focusing on individual mine site issues. This Integrated Monitoring Network will in particular be able to more effectively monitor cumulative impacts from the four sites.

10.2 Decommissioning Monitoring & Measurement Programs

Following closure of the Donaldson Mine, this Integrated Monitoring Network will be maintained until all decommissioning and rehabilitation works at the site have been completed. At this point those elements of the network that related specifically to the Donaldson Open Cut will be reviewed and rationalise in consultation with the appropriate authorities and in accordance with the Project Approval.

Notwithstanding this, there may be the need to establish some additional monitoring sites depending on the nature of the decommissioning works, and in response to finding possible sources of pollutants to the environment that currently may not be know (i.e. hydrocarbon contamination). The type and location of this monitoring will be determined during the decommissioning phase of the mine site.

10.3 Post Closure Monitoring & Measurement Programs

10.3.1 General Environmental Monitoring

After the decommissioning works have been undertaken, whether progressive or final, the main focus of the closure plan will be monitoring and maintenance of the completed works. Therefore the monitoring program should be designed to demonstrate that the completion criteria have been met.

This period should also be used to plan for remedial action where monitoring demonstrates completion criteria are unlikely to be met. If progressive rehabilitation has been successful, with stabilisation and revegetation meeting completion criteria this last phase of closure may be shortened. It is, however, unlikely to be less than five (5) years in duration (ANZMEC/MCA 2000).

The post closure monitoring and measurement program will be similar to that undertaken during operation of the mine only scaled back to focus on those aspects of the site that have the potential to cause pollution or is being used as an indicator to verify the success or failure of the rehabilitation works (e.g. blast & noise monitoring will not be required once all decommissioning and rehabilitation activities at the mine have ceased).

10.3.2 Rehabilitation Monitoring

The report prepared by GSS (2006) outlining rehabilitation monitoring and the establishment of suitable success criteria outlines the monitoring that is being undertaken for closure of the site. A copy of the report is attached as **Appendix 3.**

Until the mining lease has been relinquished, regular field inspections should be undertaken of all rehabilitated area, particularly waterways, banks, sediment control dams and diversions. The inspections should assess signs of failure, sedimentation, erosion and any other areas that may require repair. The inspection should also include the presence of noxious weeds with a weed spraying program to be implemented as required. The frequency of the field inspections could be reduced once it can demonstrate that the vegetation is established and landform is stable

10.4 Specific Post Mining Monitoring & Measurement Programs required by the Development Consent (Donaldson Open Cut Only).

Further to the general monitoring requirements described above the developed consent for the Donaldson Open Cut requires post mining monitoring in the following key areas:

- Monitoring to verify that saline seepage from the rehabilitated landform towards Four Mile Creek (*Condition 61 (viii)*).
- Monitoring to verify the long term quality of water in the final void (*Condition 61 (x)*);
- The current detailed water monitoring program approved by the Director General must continue for at least five years after the completion of mining, or other such period as determined (*Condition 63*);
- Retain management and ownership of the Bushland Conservation Area (BCA) for a minimum of 36 years from the commencement of construction (*Condition 72 & 73*);
- The approved Flora and Fauna monitoring program should extend for the life of the mine and a period there after as approved by the Director General (*Condition 77(vi)*);
- Management and Monitoring of the rehabilitated mine site until such times as the Director General agrees that restoration has been successful (*Condition 78*); and
- The removal of any fences associated with the mine to permit faunal movement within six (6) months of the completion of mining.

11.0 FUTURE FINAL LAND USE OPTIONS

11.1 Rehabilitated Lands

The Draft Lower Hunter Regional Strategy (2005) prepared by the Department of Planning is a broad-scale land use planning framework set to accommodate the predicted 25% increase in the Lower Hunter population over the next 25 years. According to the draft strategy, the proposed land use planned in the proximity of the current Donaldson Open Cut Coal Mine is an Inter-model Freight Facility. It has been identified by the Department of Planning as a site that provides an opportunity for the storage, transfer and distribution of containerised freight.

The exiting intersection with John Renshaw Drive and internal road network (currently a mine access and haul road) provide good access to the site.

Notwithstanding this, for this to occur the areas that have been rehabilitated will need to be cleared and redeveloped. In addition the mining backfill areas have been free dumped with minimal additional engineering compaction (other than wheel rolled with trucks). It is unlikely that any substantial buildings could be constructed on this backfilled material with some additional engineering. The cost of this is considered to be prohibitive at this stage, although further investigation is warranted.

11.2 Surrounding Lands

The lands surrounding the Donaldson Open Cut are currently required to be retained and managed as a Bushland Conservation Area (BCA) for a minimum of 36 years from the commencement of construction (*Condition 72 & 73*). This current commitment will prohibit any other land use until at least 2037.

11.3 Final Voids

The long term management of the Final Voids is outlined in the Void Management Plan (Section 5). It is essential that final voids be left in a safe condition where backfilling is not reasonably practical. Any available options for post mining land uses are generally determined by the location and nature of the pit. At this stage it is proposed that both the Donaldson Final Void and the Abel Pit Final Void will be reshaped and left as permanent water holes.

The Abel Pit Void will be retained and used by the Abel Underground until 2028. The final land use of this void will be reassessed at this time. There are a number of land uses for final voids throughout the mining industry. While the options presented below may not be feasible or viable at this time, however at the point of mine closure of the Abel underground these options could be considered as alternatives to the current proposed final void use and may be considered at that time.

Final Land use options for final voids could include:

- Water Storage (currently preferred option). This could include uses such as wildlife habitat, recreational use, aquaculture, and water storage for some other commercial use;
- Domestic / Commercial Waste Disposal; and
- Other Mining Uses (e.g. tailings disposal) - (likely to be limited given the location).

12.0 RELINQUISHMENT OF THE MINING LEASE

Prior to the cancellation of a mining lease (i.e. following successful mine closure) the Department if Primary Industries – Mineral Resources (DPI-MR) must be assured that the site has been rehabilitated and that it complies with the conditions of the mining lease. It is anticipated that this will include the preparation of reports on the rehabilitation/environmental performance of the site based on the interpretation of monitoring data and comparison to targets and completion criteria that are established for the site.

The title holder will be required to complete a rehabilitation and closure report that must document rehabilitation implementation and outcomes and demonstrate that the requirements have been meet. The DPI-MR Environmental Management Guideline for Industry *edg14 Lease Closure Reporting* describes the Departments expectation in relation to a rehabilitation and closure report.

Upon receipt of the report and comments from the relevant stakeholders, an officer of the Department will undertake an inspection of the mine. The inspection may also include some of the stakeholders.

Subject to accepting that the mine rehabilitation and closure works are satisfactory to the Department, the lease will be cancelled and the outstanding security deposit bond returned. On some occasions a small proportion of the bond may be retained to cover any ongoing or foreseeable maintenance requirements.

The DPI-MR recently released new guidelines for Rehabilitation Security Deposit Requirements (ESB20, June 2006). These guidelines indicate that the Securities will be released when DPI is satisfied that the titleholder has demonstrated that rehabilitation and closure criteria have been met. The DPI-MR encourages progressive rehabilitation and titleholders may request a security review to reflect a decrease in rehabilitation liabilities.

In addition the guidelines indicate that a new DPI-MR guideline on rehabilitation and closure criteria is currently being developed to provide further clarification on the requirements for mine closure and the release of security deposits. This mine closure plan will need to be reviewed and updated when this information is released by the DPI-MR

13.0 REVIEW OF THE MINE CLOSURE PLAN

This mine closure plan should be reviewed annually to re-calculate the mine closure and rehabilitation liability. This will include reviewing the rates used in the calculation as well as the areas of disturbance / volumes of material. This information is generally required by the DPI-MR for any MOP amendment or as part of the requirements of the AEMR.

The review should also aim to consider the mine plan to incorporate any major changes to the mining operation that may have occurred during the year (i.e. new pit area, increased disturbance footprint, etc). Consideration should also be given to changes in technology, state and federal legislation as well as industry mine closure policy and/or guidelines.

14.0 REFERENCES

Abel Underground Mine Part 3A – Environmental Assessment (2006).

Department of Environment & Heritage (2002) – Best practice Environmental Management in Mining Booklet for *Mine Closure*.

Donaldson Coal (2003) *Application by Donaldson Coal Operations: Amendments to Mining Operations Plan for Donaldson Open Cut*.

Donaldson Coal Operations Pty Ltd (2002) *Application by Donaldson Coal Operations: Mining Operations Plan for Donaldson Open Cut*.

Donaldson Coal Development Consent (1999) and Amendments (2005);

DPI-MR Policy edg 03: – Guidelines to the Mining, Rehabilitation & Environmental Management process; www.minerals.nsw.gov.au

DPI-MR Policy edg 14: – Reporting Requirements for Mine Closure and Lease relinquishment (***note**: this policy is currently under review*) www.minerals.nsw.gov.au;

DPI-MR Policy edp 01: – Management of Exploration and Mining in NSW www.minerals.nsw.gov.au;

DPI-MR Policy edp 05: – Rehabilitation and Mine Closure (**note**: This policy has been withdrawn and is currently under review) www.minerals.nsw.gov.au; and,

DPI-MR Policy edp 07: – Criteria for Cancellation or Non Renewal of Mining Leases www.minerals.nsw.gov.au.

Environmental Impact Statement (EIS) dated February 1998 prepared by PPK Environment.

Environmental Protection Licence (EPL) No. 11080 under the *Protection of the Environment and Operations Act, 1997*, granted by the Environment Protection Authority on 13th September 2000 for the mining of coal.

G.J Summerhayes (1999) *The Rehabilitation of Coal mines & opportunities for Integrated Post Mining Land Uses*, Part 2, Invited Papers included in the Synoptic Plan for Integrated Landscapes, prepared by Andrew Neil for the NSW Department of Minerals Resources.

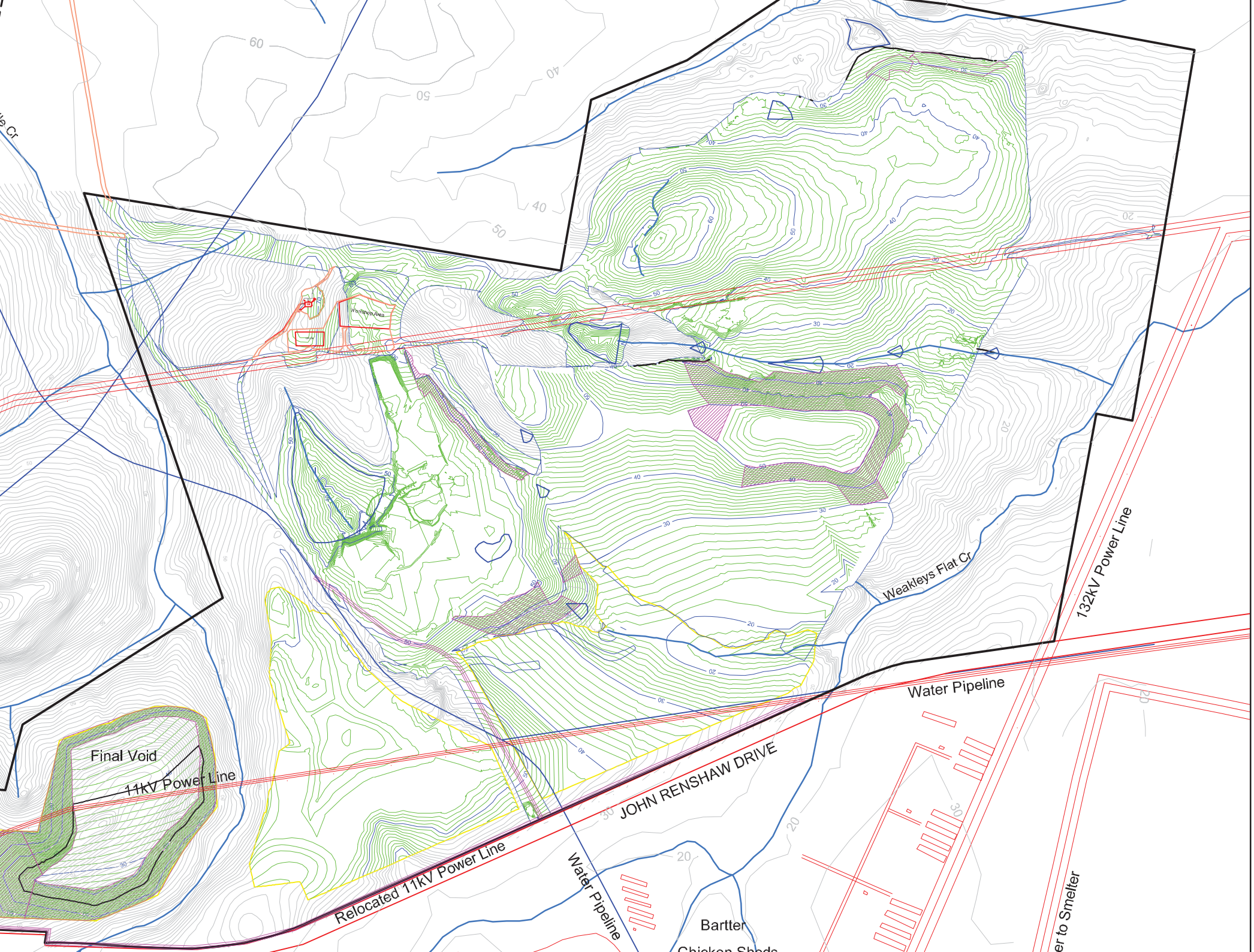
GSSE (2005) Statement of Environmental Effects (SEE) – Minor Extension of the approved mining strips (No. 16 – 23) at the Donaldson Open Cut Coal Mine, Beresfield.

Minerals Council of Australia (2005) Enduring Value – The Australia Minerals Industry Framework for Sustainable Development.

Mining Lease No. 1461 under the *Mining Act, 1992*, granted by the Minister for Mineral Resources on the 22nd December 1999 for the mining of coal.

Approved Landform (Plan 6)

APPENDIX 1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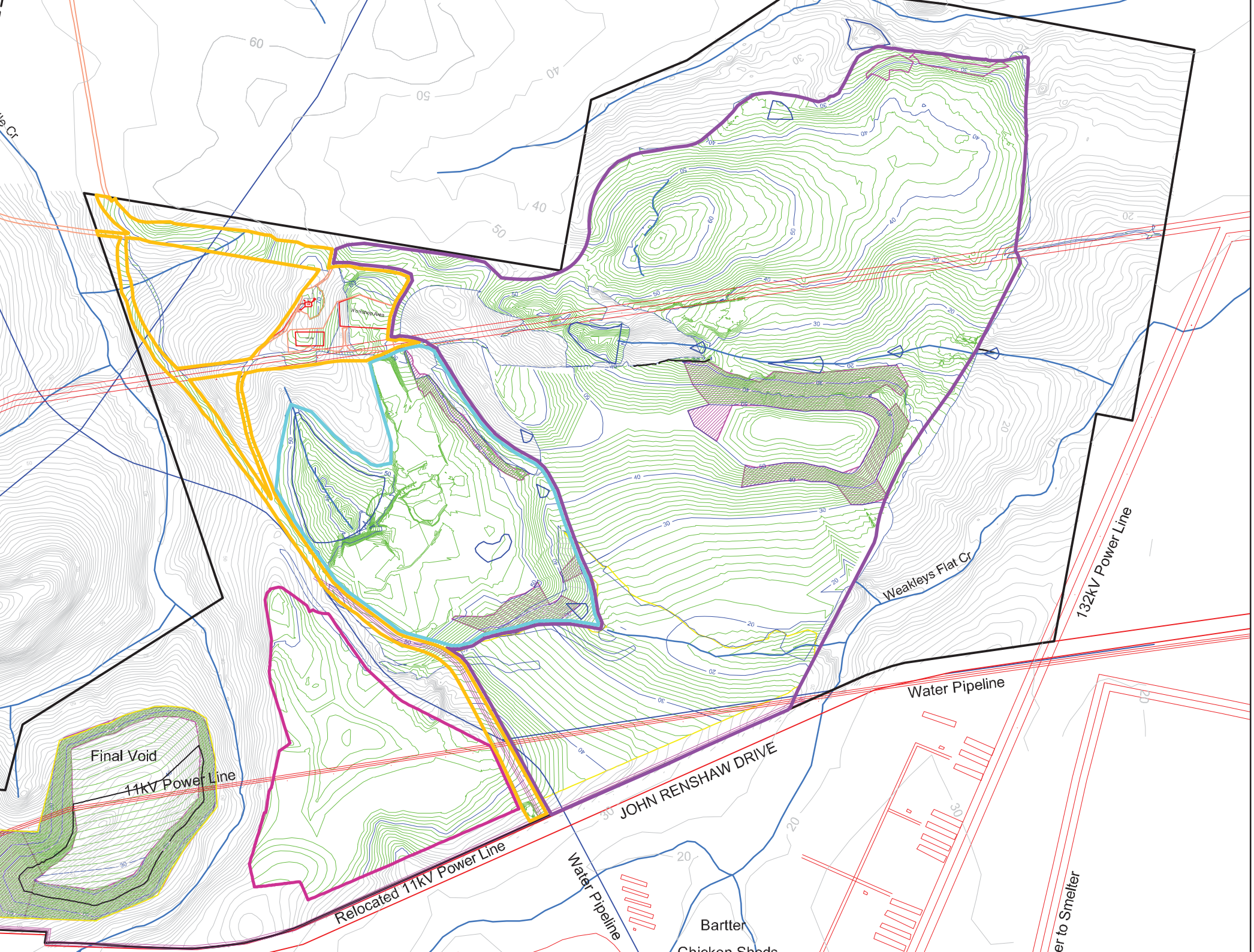
Domain Plan

APPENDIX 2


Final Void
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Global Soils Closure Criteria Report

APPENDIX 3

REHABILITATION SUCCESS CRITERIA AND COMPLETION STRATEGY FOR DONALDSON MINE

Prepared by:

Global Soil Systems & GSS Environmental

July 2007

REHABILITATION SUCCESS CRITERA AND COMPLETION STRATEGY FOR DONALDSON MINE

Prepared for:

Donaldson Coal Pty Ltd

Prepared By:

M. Burns
Principal
Global Soil Systems

R. Masters
Principal
GSS Environmental

C O N T E N T S

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1.0 AGREED OUTCOME

Donaldson Mine is largely located in remnant native bushland. Relevant Development Consent Conditions (Department of Urban Affairs and Planning (DUAP) 14th October 1999) describe mandatory rehabilitation requirements regarding the return of this ecosystem to disturbed areas. These requirements initially included the preparation of a Flora and Fauna Management Plan which also includes a Rehabilitation Plan.

Consent Condition 78 describes the general requirement as follows:

Condition 78. The Flora and Fauna Management Plan shall also include a Rehabilitation Plan that details the measures to be undertaken to progressively rehabilitate disturbed areas of the mine ***to replicate the original vegetation cover that existed before mining occurred****. The applicant shall be responsible for the management and monitoring of the rehabilitated mine site until such time as the Director General agrees that restoration has been successful.*

While the above objective is commendable the condition is very general and does not indicate in any detail with respect to target completion criteria nor how the process of getting there will be achieved or verified. In order to develop more confidence in the ability to achieve rapid and clearly defined sign-off a more comprehensive rehabilitation strategy is needed.

2.0 THE CHANGING PARADIGM

Recent legislation, changes in expectations and improving environmental practice has clearly demonstrated that, for native ecosystem establishment, it is no longer reasonable (nor safe) to expect regulators or other stakeholders to sign off on rehabilitation without sound monitoring data that demonstrates that standards, milestones and overall objectives have been met.

3.0 THE REHABILITATION PLAN

Consent Condition 78 (above) highlights the expected general rehabilitation outcome. In addition, rehabilitation procedural methods are described in the Rehabilitation Plan contained in the Flora and Fauna Management Plan (Gunninah Environmental Consultants, December 2000). However, the later does not contain any direction on rehabilitation objectives, environmental monitoring, nor specific completion criteria that could be reasonably applied to rehabilitated ecosystems. Consequently, and at this point in time, the mine has no regulatory requirement to set completion criteria, nor specific rehabilitation goals to work

towards. However, Donaldson Mine has decided that this shortfall is inappropriate and that setting specific rehabilitation goals and developing a continuous improvement process is a wise and appropriate course of action and will assist in lease relinquishment at a later date.

This report suggests a recommended course of action to rectify this shortfall while recognizing that this is only a starting point and that further refinement of completion criteria will naturally occur as more knowledge is gained.

4.0 REHABILITATION STRATEGY

The key elements of an effective Rehabilitation Strategy include:

1. Setting overall Rehabilitation Objectives.
2. Developing a simple but effective Rehabilitation Monitoring Program.
3. Developing appropriate Completion Criteria including:
    - Selection of revegetation and soil indicators.
    - Assessment of long-term sustainability.
    - Addressing post closure and post relinquishment monitoring and maintenance requirements.

The above process is one of continuous improvement wherein establishment details are noted, rehabilitated areas monitored, and results assessed against agreed criteria. Recommendations to improve rehabilitation practices can than be fed back into the loop. This continuous improvement process is schematically shown in ***Figure 1.***

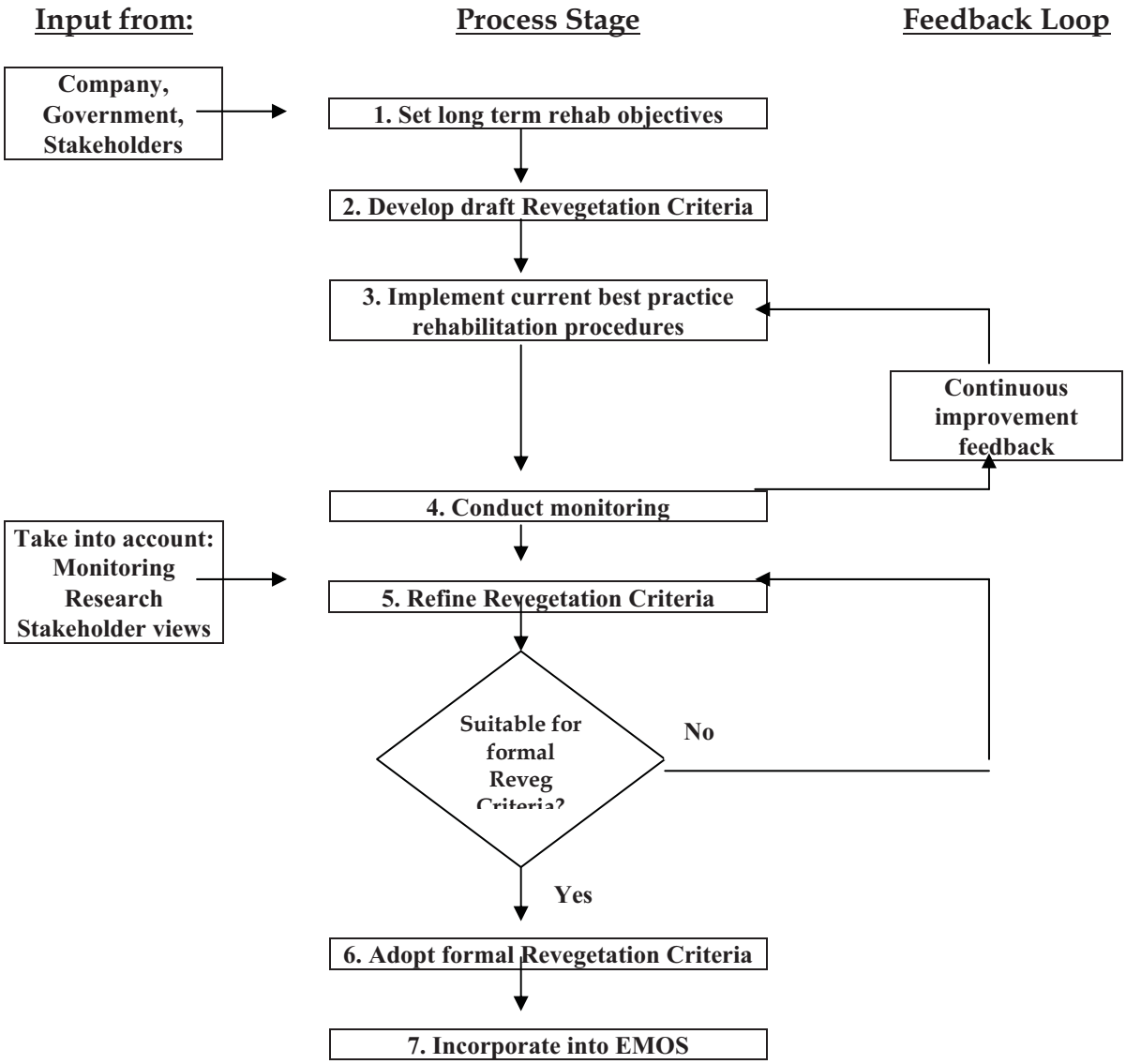

Figure 1: The continuous improvement process proposed for Donaldson Mine.

4.1 Overall Rehabilitation Objectives

Donaldson mine is fortunate in that it has a significant history of rehabilitation with over 80 ha of native bushland established on various sites over a 6 year period.

Rehabilitation results at Donaldson have been generally acknowledged to be satisfactory with several commentators describing the results as representative of industry 'best practice'.

Older revegetated areas at Donaldson Mine clearly show a clear progression towards a sustainable outcome. Apparent elements of this sustainability include:

- Generally stable landforms that are appropriately drained with minimum erosion and soil movement in most areas.
- The re-establishment of a dense and diverse mixture of local native understorey and overstorey vegetation species.
- The resilience of new ecosystems to frequent drought episodes. (No areas have experienced wildfire to date).
- Wise management and use of the topsoil resource as characterized by its weed free nature and the presence of inherent timber debris and native seed.
- The apparent reinvasion of birds and other wildlife species back into rehabilitated areas.

Despite the apparent success of rehabilitation at Donaldson Mine there has been no systematic monitoring and sign off of the rehabilitation process, no systematic and quantitative monitoring of revegetation success, no measurement of soil development processes, no systematic assessment of fauna migration back into revegetated areas, and no strategy for long-term management of rehabilitation areas.

4.2 A Recommended Rehabilitation Monitoring Program

4.2.1 Documenting Establishment Practices

It is important to ensure that rehabilitation practices and relevant site details are documented during the rehabilitation process so that the results of rehabilitation monitoring data can be correctly interpreted. This is best achieved through completion of a checklist following the establishment of each discrete area of rehabilitation. **Table 1** (from Nichols 2004) provides a recommended check list which has been adapted to Donaldson Mine. This checklist is only a starting point and can be adapted once more experience is gained with the process.

Table 1 - Donaldson Initial Post-establishment Monitoring Checklist

Mining Area:		Approx Area (ha):	
Pit/Location:		Checklist complied by:	
Year Rehabilitated:		Date:	

Checklist Point No.	Detail	Response (Yes/No/NA and reasons)
1	**Earthworks:**	
1.1	- Outer slopes have been constructed to a slope angle of 10° or as per EA conditions	
1.2	- Rehabilitated ramp slopes have been constructed at 14° slope angle	
1.3	- Internal slops have been constructed to 10° or flatter	
1.4	- Final void low wall slopes have been constructed at 14° or less	
2	**Drainage:**	
2.1	- Graded banks have been established at approximately the vertical spacings specified in the MOP	
2.2	- Graded banks have longitudinal grade of 1% (on average) and are trapezoidal in cross-section	
2.3	- Where possible, graded banks discharge onto natural surface or onto level areas within the rehabilitated landform	
2.4	- If 2.3 is not possible, graded banks have been fed into one or more rock lined waterways	
2.5	- Rock lined waterway(s) has (have) been constructed in accordance with MOP specifications	
3	**Topsoil**	
3.1	- The appropriate depth of topsoil to be removed has been clearly communicated to operators	
3.2	- All areas have been fully topsoiled	
3.3	- Topsoil has been placed to a minimum depth of 150 mm (confirmed by a number of hand excavations over the area)	
3.4	- If topsoil was directly returned, its source has been recorded	
3.5	- If topsoil was obtained from one or more topsoil stockpiles, note where and approx. age of stockpile(s)	
4	**Ripping:**	
4.1	- Ripping to an approximate depth of 0.5m at 1m spacings on the contour has been undertaken	
5	**Vegetation Establishment:**	
5.1	- Direct seeding was undertaken in conjunction with contour deep ripping. The month of both has been recorded	
5.2	- Tree and pasture seed mixes have been applied to relevant areas.	
5.3	- Seed has been spread evenly over all seeded areas	
5.4	- Seed mixes applied and seeding rates have been recorded (i.e. species lists and rates/ha/species)	
5.5	- Quantity and type of fertilizer/bulking agent noted	
5.6	- Method of spreading identified	

4.2.2 Monitoring Procedure

In developing the rehabilitation monitoring program, the following aspects were taken into consideration.

- Replicated monitoring sites are needed in representative rehabilitation of different ages. One monitoring site per 10 ha is recommended for each major age class.
- Sites should be monitored within the first 12 months after establishment then every 2 years.
- A standard monitoring plot design is shown in ***Figure 2***. The design includes:
  - Five 2m x 2m quadrates will provide some estimate of statistical variance, so that if required, statistical analyses can be undertaken to objectively compare different rehabilitation treatments, changes over time, and others.
  - One 20m x 10m plot overlying the 2m quadrates and located 5m either side of the centerline, for ease of monitoring.
- A 50m erosion monitoring transect on contour, running through the centre of the plot.
- Recommended monitoring procedures are outlined in ***Table 2.***

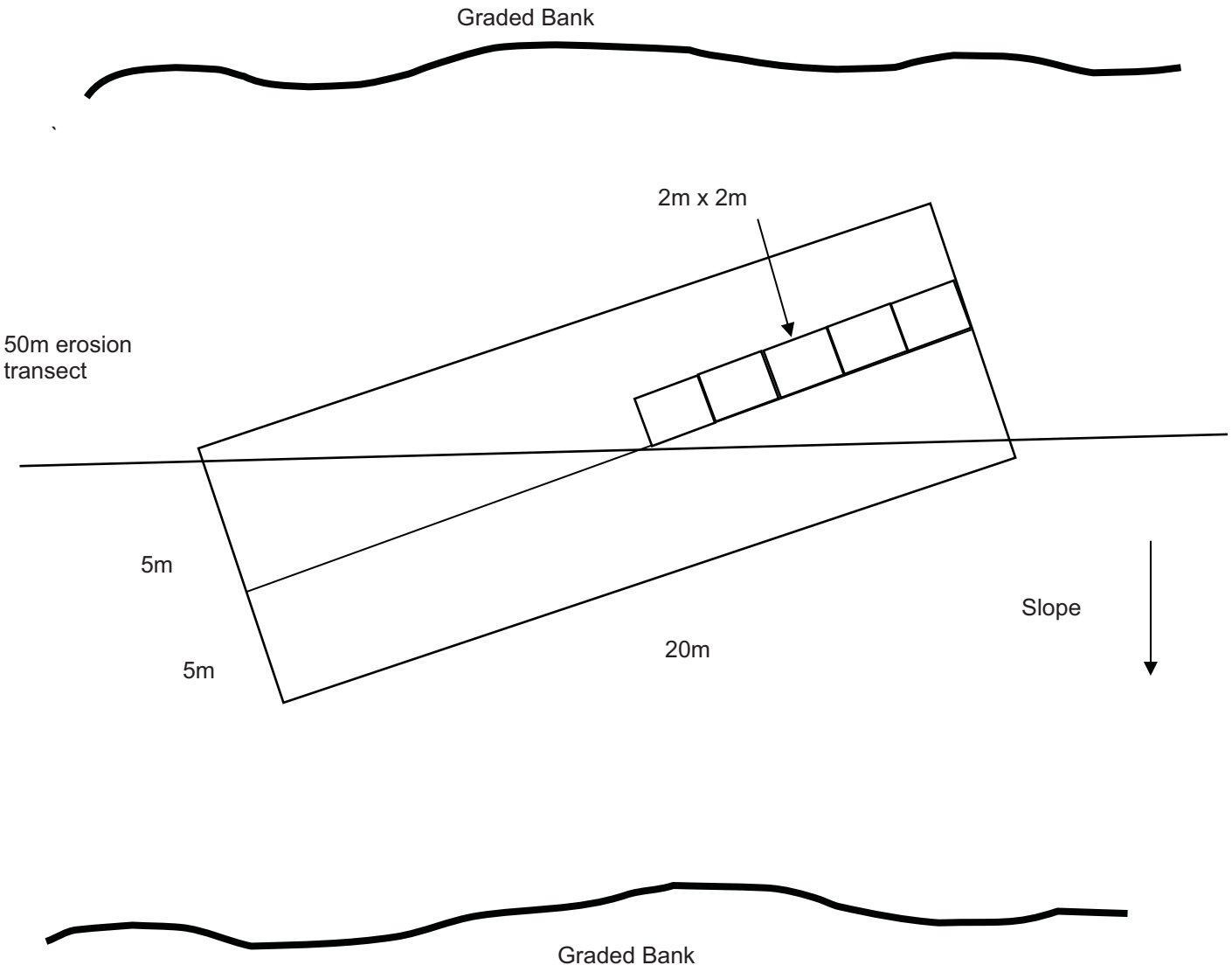

Figure 2: Recommended monitoring plot design for use at Donaldson.

Table 2: Recommended procedures for monitoring representative native rehabilitated ecosystems.

Plot Size	**Measurement**
General description	• Describe the vegetation in general terms, e.g. mixed eucalypt woodland with grass understorey and scattered shrubs, dense Acacia scrub, etc.
2m x 2m quadrats	• record the number of plants of all species, excluding grass • Measure live vegetation cover for understorey and grasses (separately) using a line intercept method • Record details of ground cover (litter, logs, rocks etc.)
20m x 10m plots	• Record, by species, all trees >1.6m tall (estimate this using sub-sampling if there are very large numbers). • Tag and measure DBH of trees >1.6m tall, to a maximum of 10 for any one species. • Record canopy cover over the whole 20m centreline when trees are tall enough • Subjectively describe tree health, by species if relevant, noting signs of drought stress, nutrient deficiencies, disease and severe insect attack. Where health problems are noted, record the percentage of healthy trees. • Record any new plant species not present in the smaller plots, including any problem and declared noxious weeds • Take five surface soil samples (e.g. at approx. 5m intervals along the centreline) and bulk these for analyses of: pH, EC, chloride and sulfate; exchangeable Ca/Mg/K/Na; cation exchange capacity; particle size analysis and R1 dispersion index; 15 bar and field capacity moisture content; organic carbon; total and nitrate nitrogen; total and extractable phosphorus; Cu, Mn and Zn.
50m transect	• Along the 50m erosion monitoring transect, record the location, number and dimension of all gullies >30cm wide and/or 30cm deep.
Profile meters	• Soil loss profile meters should be established in rehabilitation areas to record soil loss.
Rehabilitation in general	• When traversing between monitoring plots, note the presence of species of interest not previously recorded (e.g. key functional or structural species, protected species, noxious weeds), as well as obvious problems including any extensive bare areas (e.g. those greater than 0.1ha). • Observations such as this can provide useful, broad scale information on rehabilitation success and problems.
Photographic record	• For each 20m x 10m plot, a photograph should be taken at each end of the plot, along the centre line looking in.

4.2.3 Selection Criteria

Selection criteria are proposed for both vegetation and soils for 1 to 5 year time frames. However, experience has shown that there is no single 'quick fix' indicator which unequivocally demonstrates that a rehabilitated ecosystem will be sustainable.

Vegetation

The minimum revegetation criteria include the following:

- Species Diversity. The presence of at least four overstorey and four understorey species in each 10m x 20m plot at all ages.
- Stem Densities. Minimum total tree/shrub densities are:
  Year 1 - 10,000 stems/ha
  Year 5 - 3,000 stems/ha
  Year 15 - 1,000 stems/ha.
- Natural Regeneration. Evidence of natural regeneration at Year 5 for at least four species.

To be researched and agreed on within 5 years:

- Minimum canopy cover in native ecosystem areas.
- Minimum tree height and girth standards for indicator species *Corymbia maculata* to be researched and benchmarked for 5 years.
- Fauna monitoring to be undertaken in revegetated areas and key indicator species established and compared. The monitoring program to be integrated with current fauna monitoring.

The above points highlight the fact that it is not possible to define all completion criteria at this time and that further investigation is needed.

Soil Quality

Relevant soil parameters to be measured are described in **Table 2**. Physical and chemical soil data should be compared with data from samples from unmined analogue monitoring plots surrounding the mine. The progression of soil parameters towards those typical of undisturbed soils in surrounding areas can then be monitored. This will necessitate a one off assessment of physical and chemical soil parameters in surrounding unmined forest against which soil results from monitoring plots will be compared. Recommended soil parameters are listed in **Table 2**.

Suggested rehabilitation success criteria include:

- Soil pH to be in the range 6.0 to 8.0 after 5 years
- Conductivity of replaced topsoil to be below 900uS/cm after 5 years
- The surface layer to be free of any hazardous material to a depth of at least 1 metre.

- Runoff water quality less than 1000us/cm after 5 years.
- Soil N and P levels to be within 20% of levels in adjacent analogue site after 5 years.

To be researched and agreed upon within 5 years:

- Salt and ph profile changes to 1m depth to be monitored and compared with analogue sites in unmined bushland.

Table 2 provides a list of soil analytes to be recorded from the proposed monitoring plots (and analogue sites). Objective levels of the most significant soil analytes (in terms of rehabilitation success), pH, conductivity, N & P, have been nominated as determinates for rehabilitation success. The remaining soil parameters listed in **Table 2** will be used as indicative determinates of success. Trends over time (say 5 years) will be evaluated.

Soil Loss

A significant aspect of successful mine rehabilitation is the control of soil erosion. However, before erosion can be comparatively assessed, reliable erosion monitoring programs must be implemented.

A review of contemporary erosion research has highlighted that there is no universally accepted procedure, and that monitoring programs generally incorporate a combination of techniques. Successful erosion monitoring is most commonly associated with a clear definition of objectives and simplicity of design. In general, a small amount of reliable information is preferable to a large amount of unreliable information.

Theoretical soil loss rates can be calculated to identify limitations or deficiencies in landform design and/or rehabilitation management practices. Numerous erosion prediction models are currently being used in earth science related studies. The Revised Universal Soil Loss Equation (RUSLE) appears to be the most suitable model for erosion prediction on mine sites.

Application of the RUSLE is site specific and aims to allow for variables peculiar to an individual site. The model is used to predict rill and inter-rill erosion and has great practical value. By incorporating site specific data from Donaldson into the model, an adequate guide to relative erosion rates of topsoil can be predicted. However, it is necessary to highlight its limitations. The RUSLE's major limitation is that it is an empirical model i.e. based on experimental conditions, and there is no strong justification for expecting the same relationships to hold beyond the measured range. Therefore, soil loss monitoring is required in conjunction with baseline modeling, to adequately assess expected soil loss.

Soil erosion is measured by estimating either the amount of soil lost from the eroding site, or the amount accumulated at another site. The collection of eroded material into suitable holding containers is the most precise method. However, it may not be the most accurate due to the complex nature of the erosion process.

The accuracy of soil loss measurements will depend upon the design of the monitoring program and the sources of error.

After assessing advantages and disadvantages of each method available, the use of profile meters to monitor soil loss at Donaldson is recommended. The profile meter is a horizontal bar with rods or pins, which are lowered down to the soil surface to measure the height of the surface relative to an established datum (see **Figure 3**). Repeated profile measurements after several erosive rainfall events will allow changes in the soil level (if any) to be identified.

The datum is normally established by setting the profile meter upon a set of level pins pushed into the soil. As the technique relies upon the re-establishment of an identical datum at each successive sampling period, it is essential that these pins are not subject to movements of the substrate or other disturbance.

It is proposed to establish the meters in the following areas:

- adjoining un-mined land with 10º slope gradient (analogue site);
- existing revegetated 10º post mine land; and
- topsoiled (either recently sown or unvegetated) 10º post mine land.

Two (2) profile meters are proposed for each of the above areas so that 2 different slope lengths per area can be monitored.

The suggested rehabilitated success criterion is that soil loss should be less than 40 tonnes/ha/year.

Fauna

An understanding of what species are present at different ages would be most useful. These results can be subjectively compared with surrounding unmined forest although a fair and true comparison would not be achievable until approximately 15 to 20 years and when trees mature. Even then the absence of hollow bearing trees in rehabilitated areas would make a comparison difficult.

Consequently, it is strongly recommended that current fauna monitoring be extended into rehabilitated areas with a view to comparing data over time.

General

In addition to monitoring the above plots, an annual walk-through of all rehabilitated areas should be undertaken to assess the need for remedial action. This assessment would examine:

- Adequacy of vegetation cover/need for resowing of bare areas, modification of seed mix.

- Presence of weeds.
- Presence of unacceptable erosion, washouts etc.
- Need for fertilizer addition and/or other maintenance.
- Recommended improvements in topsoiling, timber debris respreading and site preparation.

5.0 RAPID ASSESSMENT PRIOR TO SIGNOFF

When, on the basis of site inspections, monitoring and research data, Donaldson mine staff conclude that the mine rehabilitation is ready for signoff, the following procedures will need to be undertaken:

- Collation of all relevant records, monitoring and research data, including any 'Initial Post-establishment Monitoring Checklists' (see **Table 1**) completed, to determine whether all completion criteria standards and milestones have been met.
- If the site has been monitored, much of the information required will be available from this, together with rehabilitation records, checklists and research findings.
- If the site has not been monitored, a rapid belt transect procedure should be used to determine whether all measurable standards and milestones have been met.
- Regardless of whether an 'Initial Post-establishment Monitoring Checklist' has been completed or not, a general inspection will be required to confirm that rehabilitation operations have been carried out as required (or as best as can be determined, for older sites).
- During long-term monitoring or rapid assessment, a site worksheet should be prepared, which summarises key rehabilitation operations, describes the rehabilitation in general terms, and notes any remedial actions that may be required to meet particular standards and milestone (eg. repair of waterways or eroded areas, establishment of trees where initial establishment was poor).
- When all records have been collated and any required remedial work completed, a Lease Relinquishment Report (LRR) should be prepared, as described in DMR's EDG174: Reporting Requirements for Mine Closure and Lease Relinquishment.
- Submission of the Lease Relinquishment Report (LRR) must be followed by a site inspection with DPI/DMR staff (and other nominated stakeholders as required) to confirm their agreement that requirements have been fulfilled, or if not, determine what further work is needed.

6.0 REFERENCE

Nichols, O.G. (2005). Development of rehabilitation completion criteria for native ecosystem establishment on coal mines in the Hunter Valley. Australian Coal Association Research Program Project C13048.

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