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SECTION 4 – TECHNICAL SPECIFICATION

4.1 BACKGROUND

Oakdale Colliery was established in 1948 and it had produced high quality coking coal that was exported. In late 1999 mining ceased when the parent company went into voluntary receivership.

Minor rehabilitation works have been undertaken at the site since 1999 that included a general clean up of the site, removal of waste product and fencing of mine shafts. Following this initial cleanup the site is classified as a "derelict mine" site.

One of major concerns to Department of Primary Industries (DPI) is the safety issues related to the site particularly the open mine shafts. Although they are fenced, vandals continually gain access to the shafts and the remnant buildings on the site.

DPI now wishes to demolish the derelict buildings and steel structures on the site and secure the area around the mine shafts and have a "clean site" that poses minimal safety risk to the public at large.

4.2 SCOPE OF WORKS

The scope of works is as follows:

Hazardous Materials

- Removal and disposal of asbestos cement roof and wall sheeting plus broken asbestos cement fragments in various locations around the site.(for Stages 1 & 2 demolition of buildings)
- Removal and disposal of small amounts of friable materials from brake linings of the cable winders and pipe lagging. (for Stages 1 & 2 demolition of buildings)
- Clearance, inspection and certification by an occupational hygienist
- Removal, Cleaning and safe disposal of oil and other greasy materials on the floors of the building prior to commencement of demolition. (for Stages 1 & 2 demolition of buildings)

The hazardous material assessment undertaken is included in Appendix A.

Temporary capping of mine-shafts

- Erection of perimeter man proof fence, complete with warning signs and locked access gate/s
- Undertake temporary capping and associated works detailed in Drawings 1455-001 to 1455- 003, 14455- 7 & 8 (Shaft No 1) and drawings 1455 – 004 to 1455- 006 and 1455- 009 to 1455-012 (Shaft No 2) including the wind drift on Mine Shaft No 2.
- Install appropriate perimeter vehicular barriers (possibly from demolition rubble) to prevent vehicular access.

- Implement safety procedures that comply with Occupational Health and Safety Act, MDG 25 (Appendix B) and to the satisfaction of the mine inspector.

Building Demolition

Stage 1

- Demolition of the switch-room building at the entry gate
- Demolition of transformer bases at the front gate
- Demolition of the bathroom/administration builduing
- Demolition of the 3 storey brick tower and ramp
- Demolition of amenities/office building
- Demolition of the switch-room
- Demolition of the winder house
- Demolition of concrete retaining walls to the levels of the surrounding ground
- Demolition of all plant contained within the winder house
- Demolition of the steel shed adjacent to the winder house
- Demolition of the steel towers over No 1 & No 2 mine shafts
- Demolition of buildings associated with the towers

Stage 2

- Demolition of the workshop building (west of the site)

Waste Disposal

- Disposal of nominated wastes to Department of Environment and Conservation approved dumping facility

Wastes to be segregated and disposed of as follows

Waste Type	**Disposal Location**
Asbestos	Offsite-Landfill
PCB's	Offsite-Treatment
General building debris (rubbish, plasterboard, glass)	Offsite/Landfill
Oil & Grease on the floor and elsewhere in the building	Offsite/Landfill
Steel	Offsite-recycling
Bricks	Onsite-stockpile in nominated area
Concrete	Onsite-stockpile in nominated area
Non-ferrous metals	Offsite recycling

On-site stockpiled material

The demolished inert building materials shall be stockpiled in the nominated area as shown in Figure 3. The maximum size of the demolished material should not exceed 250mmx250mmx250mm.

Materials to be Salavaged

The following items are to be salvaged and placed on site in a location as shown in Figure 3.

- The new and used spools of steel wire ropes.Similarly any lengths of ropes not on spools would be determined closer to award of the contract.

- The shaft fill hopper located on the western side of the No.2 shaft. This hopper is to be removed as a part of the temporary capping process and will remain on site.

- The suspension gear (chains etc), capel and detaching hook from the shaft conveyance on both shafts.

Infrastructure to be Protected

The bitumen road entrance from the front gate to the buildings needs to be protected from construction activities. If areas of the road damaged they shall be repaired and reinstated to its original conditions. The contractor shall undertake a dilapidation report on the condition of the road prior to commencement construction activities. A copy of the Dilapidation report shall be provided to the Principal prior to commencement of site works.

The existing large tank and associated pipework shall be left on site. This tank is available for contractor's use for storing water for fire fighting purposes on site. The contractor shall undertake necessary modifications to the pipe work at his/her cost for its use.

4.3 WORKING NEAR MINE SHAFTS

The area in the vicinity of the mine-shafts is considered as a hazardous area. The works associated with the mine shafts are governed by :

- Coal Mines Health & Safety Act 2002 (http://www.legislation.nsw.gov.au/maintop/scanact/inforce/NONE/0)
- Coal Mines Regulation 2006 (http://www.legislation.nsw.gov.au/maintop/scanact/inforce/NONE/0)
- Mines Inspection Act 1901 (http://www.legislation.nsw.gov.au/maintop/scanact/inforce/NONE/0)
- MDG 25 - Guildline for safe cutting and welding at mines (Appendix B)
- Occupational Health safety Act 2000 and its Regulations pertaining to mining activities

The work undertaken in the vicinity of mine shafts shall be supervised by a person who is qualified as a Mine Deputy 3rd Class Certificate of Competency.or coal mines under manager's certificate of competency.

The contractor shall undertake its own risk assessment for work associated with the temporary capping of the mine shafts and the wind drift on Shaft no 2 and implement the risk mitigative strategies in the delivery of the project.

The following information is provided to the contractor as background information and to assist in the risk planning and management for the temporary capping works on both mine shafts.

Investigations and a Risk Assessment was conducted in August 2006, which identified the most significant risk to the pr oject was the gaseous emissions from the two shafts, and moderate risks from the capping and heights safety associated with the shafts. The risk assessment was conducted 23 November 2006, related to the planning and installation of temporary shaft capping at Oakdale Colliery No 1 shaft and No 2 shaft. This risk assessment addresses specifically the installation of temporary capping of both shafts and the wind drift of shaft No 2 only. At a later stage permanent capping will be undertaken by the Department of Primary Industries. The temporary capping arrangements have been designed to provide a straightforward facility for the future shaft filling operations and subsequent permanent capping. The proposed temporary caps, with a nominal design life of 5 years, are to act as barriers for personal safety to unauthorised access, prevention of materials entering the shafts and to provide a safe workplace for the subsequent demolition of the head frames and the general sire rehabilitation works. The structural capacity of the temporary cappings for mone shafts No 1 & 2, shaft collars are rated for:

- A pedestrian uniformly distributed load of 2.5 kPa
- Future concentrated load allowance of 50 KN for shaft filling equipment (fill hopper and material load) when the shafts are permanently capped.
- The temporary cappings are not rated for vehicular loads. As such appropriate perimeter vehicular barriers will be installed, (possibly from demolition rubble).

The temporary caps are to be installed and sealed to the existing structures and surrounds to provide a gas seal.(the seal may not be gas tight). Gas emissions from the shafts will be controlled with a gas vent pipe complete with flame trap, and suitably located valved sampling outlet.

The risks that are identified associated with the temporary capping work are as follows:

- Falling Down the shaft
- Falling from heights
- Mine gases near the shaft
- Isolating plant/Energy sources
- Objects falling down the shafts
- Fire
- Entry of unauthorised persons
- Communications with outside Services
- Steel Lead Paint

The risk assessment table from the preliminary assessment is included in Appendix C for contractor's information only. It is stressed that the contractor has to undertake its own risk assessment and formulate risk management strategies to the satisfaction of the mine inspector.

The contractor shall give at least days notice prior to completion of shaft work so that Principal can carry out the inspection if elects to do so.

4.4 CONTROLS FOR SHAFT CAPPING

The contractor shall implement controls specific to shaft capping. As a guide the following has been suggested.

- Risk assessments undertaken and appropriate Safe work method statements prepared .
- Isolate job area and perimeter fencing of a work exclusion zone established around each shaft
- Approved person (Deputy;third class certificate of competency CMRA) to conduct gas monitoring
- Hot work requirements to comply with MDG 25 (see Appendix B)
- Securing bottom of the pit with stone dust.

The above dot points are only a guide to the contractor and the contractor has to formulate its control measure based on risk assessment.

4.5 CAPPING SEQUENCE FOR SHAFT NO 1

The suggested capping sequence given below is only a guide to the contractor. The contractor shall formulate its own sequence based on risk assessment undertaken for capping of the shaft No 1.

1. Identify areas of active spontaneous combustion and install visible barrier.
2. Erect perimeter man proof fence, complete with warning signs and locked access gate/s
3. Clear all vegetation adjacent to work area
4. Clear debris and rubbish from the work area
5. Confirm isolations of electrical power, control cables and stored energy (wire ropes, water pipes)
6. Remove western metal clad awning for access.
7. No drawings are available for the reinforced concrete slab design of the Shaft collar. Confirm load capacity of slab by test load or other means prior to mobile equipment access onto slab.
8. Remove west wall of air box for access/light to conveyance
9. Detach head rope from head frame
10. Remove head rope from head frame.
11. Cold cut guide ropes to fall down mine shaft.
12. Removal of conveyance away from shaft, chairing platform remains
13. Install steel cover plate and/or retain chairing platform with fire blanket surround
14. Remove water pipe and install blanking flange
15. Drop control and power power down cables down shaft

16. Remove structural steel steel supports of control and power cables
17. Supply and install structural steel frame complete with blanking plate and gas vent, flame trap. Installed within air box.
18. Apply shotcrete barrier to seal all holes, penetrations prior to removal of head frame and air box.
19. On removal of air box and remaining structures, seal any exposed additional holes and penetrations within collar with shotcrete.

4.6 CAPPING SEQUENCE FOR SHAFT NO 2

The suggested capping sequence given below is only a guide to the contractor. The contractor shall formulate its own sequence based on risk assessment undertaken for capping of the shaft No 2.

1. Remove and install new chain mesh perimeter fence.
2. Remove FEL hopper for access to collar west side
3. Remove surge bin and structure for access to collar north side
4. Confirm stability of chaired west skip
5. Remove east and west head ropes
6. Cold cut 2 groups of 4 guide ropes and drop down shaft
7. Remove intermediate guard panels around collar perimeter for access.
8. Remove existing access bridge east skip side.
9. Remove floor slab concrete north and west sides to expose original reinforced concrete perimeter collar bea. Relative level should match that of southern beam.
10. Install new fabricated access bridge between skip guides, secure with masonry anchors to RC perimeter beam.
11. Remove swivel skip guides, located on south side, 4 places.
12. Install shuttering for infill panels
13. Apply light/heavy mesh for foam support infill.
14. Apply shotcrete to infill sealed panel at collar level, to seal complete collar including complex shapes around the secondary structural guide steelwork penetrating through the collar level.
15. Supply & install structural steel frame complete with blanking plate and gas vent pipe/flame trap.
16. Apply wet sand/steel sheet to prepare for hot work in removing steel at collar level
17. Cut away and remove secondary steelwork (skip guides and vertical steelwork) at collar level individually
18. Lay mesh over shotcrete layer and pour concrete slab over complete collar to effective 100mm thick.

4.7 CAPPING SEQUENCE FOR SHAFT NO 2 WIND DRIFT

The suggested capping sequence given below is only a guide to the contractor. The contractor shall formulate its own sequence based on risk assessment undertaken for capping of the shaft No 2

1. Remove and install new chain mesh perimeter fence
2. Expose and prove extent and structural capacity of 25 thick plate over decommissioned decking gear pit.

3. Supply and install 150 UC column extensions to match existing wall mounted columns
4. Install additional structural fixings to 150 UC Columns
5. Install vertical structural steel formwork (king Flor or equivalent) to 150 UC Columns using self drilling hex head screws. Formwork to be positioned across to vertical reinforced concrete lintel.
6. Install and support light seel mesh to face of framework.
7. Apply shotcrete layer to formwork and steel floor plate for gas seal/structural bulk.
8. Seal top section of new wall adjacent to existing shaft sinking foundation at upper extent of new wall.

4.8 GENERAL SITE REQUIREMENTS

Prior to any preparation and installation works the contractor shall comply with the following

- Comply with SCA "Standard conditions of entry and activities"
- Maintain accurate log book recording of all preparation works and installation works
- Develop a fire safety management plan prior to any works commencing
- Clear all dried vegetation from work areas (minimise fire risks)
- At all times have a water tanker (or water source available) and extinguishers on standby
- Prior to any hot works commencing inform the local fire brigade
- All hot works undertaken shall comply with "guideline for safe cutting and Welding at Mines" – MDG 25TR March 2003.
- Existing helicopter pad to be made serviceable for emergencies
- At least one member from the contractor shall have a valid first aid certificate

Contractor will be required to provide

- Potable water for personal use
- Portable Toilet facilities
- Lunch room facilities and waste disposal bins
- Site construction office
- First aid station
- A designated First aid officer whenever work is being undertaken onsite.
- Defined construction areas with controlled access
- Suitable fire prevention and fire fighting equipment
- Suitable communications between site and emergency services
- An Emergency Assembly and incident location, evacuation and communications systems.

4.9 SITE ACCESS AND CONTROL

The access to the site is via Stevies Forest Road leading from Oakdale.All site accesses are on sealed roads. The site shall be secured at all times to prevent illegal access by public, vadalism to infrastructure, contractor's equipment falling into shafts

and illegal dumping on site. Contractor shall undertake its own risk assessment. Some suggested mitigative measures are:

- Limit gate to key to one person
- Lock gate at all times
- Frequent patrolling of the site
- Security fencing around the construction
- Provision adequate site signage

4.10 ENVIRONMENTAL MANAGEMENT PLAN

The mine site is in the Sydney Catchment Authority (SCA) catchment area. The activities on the site are generally regulated by the SCA. Non compliance with SCA requirements would result in on the spot fines and suspension and /or delays to construction activities.

The contractor shall prepare an Environmental Management Plan (EMP) incorporating soil and water management and sediment and erosion control. EMP shall provide in sufficient detail to ensure that the contractor has addressed each environmental safe guards specific to the project. The EMP shall be consistent with "Rehabilitation of Oakdale Colliery – Review of Environmental Factors" dated October 2006 (see Appendix D). The EMP shall be completed to the satisfaction of Depatment of Primary Industries (DPI) and SCA.

The important component of the EMP is the implementation of the environmental safe guards pertaining to site activities. The environmental safe guards are categorised into :

- Public Health
- Public Amenity
- Water and Soil
- Flora & Fauna
- Waste Management

4.10.1 Public Safety

All works are to be conducted in accordance with Occupational Health and safety Act 2000 and its Regulation.

At night and during periods when the works site and general work is inactive, all construction equipment and/or material are to be safely stored and/or secured. Any vehicles kept on site are to be secured and rendered safe. Construction holes and/or access chambers are to be covered and/or the lids replaced when the works are inactive e,g, overnight. Adequate lighting (hoarding lamps) and other safety devices are to be included on the exclusion fences and barriers during works execution to increase the visibility of the works site at night and in low light conditions. **At no time the mine shafts (1 & 2 and the wind drift) are to be left open and unsecured overnight.**

Signs are to be erected where necessary (with adequate lighting) to warn the general public of changed conditions arising from the works.

4.10.2 Notification to affected property owners

Prior to any work being carried out the contractor shall notify affected property owners/occupiers by letter drop an initial general letter of notification. At least seven days prior work beginning, the contractor shall notify the property owners/occupiers by letter drop of a second notification letter. The notification letters approved by the Principal Representative shall be delivered by the contractor. The letters shall contain information on:

- Commencement and completion dates
- Days and hours of work
- Description of the work
- Purpose and benefit of the work
- Contact name and phone number of the contractor representative

SCA are to be advised of the commencement of work at least 7 days prior to commencement.

4.10.3 Utility Services

All services for example gas, telecommunications, power and water lines in the vicinity of the work will be located in the field prior to demolition and commencement of the site works. The contractor has to undertake its own investigations to ensure that these services have been disconnected and that the lines are not charged with water or wastewater. The contractor shall liaise with the utility service providers regarding the status of the services.

Attention is directed to the Integral Energy power lines that traverse across the site any queries regarding the lines should be directed to Keven Krapez on 0418 967980 or Greg Nance 0418 464259.

4.10.4 Traffic Control

The Contractor shall liaise with the traffic authority (either local council or the RTA) with regard to the use of the roads gaining access to the site. The contractor shall prepare a Traffic Management Plan for the works and the plan shall address the allowable loads permissible on the roads as well as the bridge structures when heavy vehicles are used to transport materials for construction and demolished materials for disposal/re-use etc.

4.10.5 Noise Control

Noise generated during execution of the work shall comply with the Department of Environment and Conservation (DEC). The contractor to comply with DEC's guidelines and take mitigative measures as appropriate.

The general construction works should be limited to 7.00 a.m. to 5.00 p.m. Mondays to Fridays and 8.00 a.m. to 1.00 p.m. Saturdays. No construction work shall be undertaken on Sundays and public holidays. Where works are required outside the standard construction hours the local council and/or DEC shall be informed prior to work commencing.

All possible steps should be taken to silence the construction site equipment.

Residents likely to be affected by noise generated during works execution shall be notified.

4.10.6 Dust Control

The works site and general works area are to be monitored closely for dust generation and the source of dust removed where possible or the dust suppressed through water spraying. All spills/droppings of soil and/or clay clods are to be immediately removed from the road surfaces by manual means.

Any complaints from residents in relation to dust generation from the works site are to be promptly addressed and the dust source eliminated.

4.10.7 Incident Management

Contractor shall manage all incidents in a manner which conforms with the requirements of relevant legislation and minimises the adverse effects of the incidents. The contractor shall before commencing any works provide to the Principal's Representatives's agent an incident management plan, which shall deal with issues including:

- A clear statement of accountabilities
- Identification and analysis of the risks
- Prevention of incidents
- Preparedness for incidents
- Declaration of incidents
- Early notification of incidents
- Response and recovery from incidents

4.10.8 Surface Drainage

Any surface run off or storm water flow that could potentially interfere with or affect works execution or the environmental performance of works execution, is to be diverted away from the works site and/or disturbed surfaces until such surfaces are fully restored or revegetated. Care should be taken to ensure that any diversion of surface drainage does not present risk of erosion and/or other environmental impacts. The contractor shall refer to Soil Services "erosion control hand book" and device suitable erosion control measures for the site.

4.10.9 Stormwater Protection

Haybales, sandbags or other suitable materials are to be secured around all entry points to the storm water system potentially received surface run off from the works site. In the event of storm or heavy rainfall condition developing during works execution, all construction materials and equipment in the vicinity of disturbed surfaces are to removed and the site made secure against prospect of erosion and damage to the works before rainfall becomes excessive.

A bunded equipment wash down area shall be constructed/bunded if required and all equipment maintenance and wash down shall be done in this area.

4.10.10 Stockpile Protection

Soil or fill materials stockpiles established for any longer than one day are to be covered/bunded with suitable sediment control materials e.g. shademesh hay bales and/or silt fencing, and secured from any dispersive elements i.e. wind, rain machinery etc to minimise risk of contaminating run off.

4.10.11 Protection and Restoration of Surfaces

All surfaces disturbed or damaged by the works are to be re-instated or restored as near as practicable to the pre-existing condition.

All erosion control devices used protecting disturbed surfaces and/or diverting surface run offs are to be maintained throughout the execution of works.

4.10.12 Removal of Waste

The contractor shall remove from the site and properly dispose of all surplus material and debris resulting from the works. Every effort is to be made by the contractor to have any recyclable material appropriately handled and disposed.

All waste removal and disposal activities will be in accordance with the provision of the “Waste Resource Recovery Act” and DEC’s “waste Assessment guidelines”.

4.10.13 Hazardous Materials

All chemicals/materials harmful to the environment are to be stored or stockpiled in a fashion that will minimise risk of site contamination in the event of spills and/or accidents. This includes provision of sand bag bunded areas for storage of noxious chemicals and the standby provision of absorptive materials in the event of spills.

Incident provisions management for incidents involving noxious chemicals are to be considered as a specific element of the contractor’s incident management responsibilities defined in xxx – Incident Management.

4.14 BUSH FIRE MANAGEMENT

The contractor shall prepare a Bush Fire Management Plan. The plan should satis The Rural Fire Services (RFS) and the Sydney Catchment Authority (SCA). As a guide the plan should address the following areas:

- Inform RFS & SCA prior to undertaking any hot work on site.
- Water cart to be on standby.
- Designate the site as a “non smoking” site
- Maintain adequate co-ordination with the RFS.

The Contact numbers for the RFS is 4677 1971and the SCA is 4720 0317.

4.11 HAZARDOUS AREAS (NO-GO AREAS) WITHIN THE SITE

Contractor’s attention is drawn to a number of areas within the site that are considered hazardous and these areas are shown in Fig 3. A section of the road that leads to the wind drift on Shaft No 2 which has subsided. Contractor shall exercise caution in using heavy machinery in this area. An area adjacent to Shaft No 1 has slow combustible carbonaneous material which poses health and safety risks. Contract shall provide adequate signages and barriers to deal with safety issues.

END OF SECTION – TECHNICAL SPECIFICATION

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Tender Document

for

REMEDIATION OF THE OAKDALE COLLIERY

AT OAKDALE

Contract No: 0602805

APPENDICES

VOLUME 3 OF 3

January 2007

APPENDIX 8

RISK TABLE: Sorted (by Risk Ranking)

#	IDENTIFIED HAZARDS/ASPECT	Incident	Consequence / Impact	EXISTING RISK REDUCTIONS	CONSQUENCE	LIKELIHOOD	RISK	PROPOSED STRATEGIES	Residual Risk
1	Fall down shaft	Falling in mine shaft	- Fall injuries - Death	- Existing barrier	Maj	Poss	Extreme	- SWMS - Approved fall arrest systems - Rescue Plan in place	Low
2	Fall from heights	Falling from head frame Shaft 1 & Shaft 2 Falling from collar perimeter around shaft	- Fall injuries - Death	- Existing barrier	Maj	Poss	Extreme	- SWMS - Approved fall arrest systems - Rescue Plan in place	Low
3	Atmosphere – CH4 and CO2	Explosion Asphyxiation	- Death - Explosion / Fire	- Monitoring	Maj	Unlikely	High	- Monitoring - Approved person (Deputy) - Auxiliary fan option to contractor - Highlight to tenderer - Existing Intake Airway - Mini Gas monitoring	Low
4	Isolating Plant/Energy Sources	Electrocution, high pressure injection Uncontrolled Movement	- Lost Time Injury, Death	- Apparent removal of electrical and hydraulic service	Major	Unlikely	High	- All isolations to be confirmed as a part of SWMS	Low
5	Objects Falling Down Shaft	Sparking causing incendive spark causing an ignition of gas / explosion	- Death	- Existing barriers in place at surface level - Seam level unknown atmosphere	Major	Unlikely	High	- Gas monitoring - Securing pit bottom with stone dust - SWMS, (cutting ropes away)	Low
6	Fire	Hot works causing fire	- Bush fire - Death	Fire safety management plan	Ext	Un	High	- Hot work permit - Fire mgt Plan - Emergency Response Plan - SWMS - No Dross / No hot sparks down shaft - Procedure no hot cutting ropes - Clearance of dried	Low

Risk Assessment

#	IDENTIFIED HAZARDS/ASPECT	Incident	Consequence / Impact	EXISTING RISK REDUCTIONS	CONSQUENCE	LIKELIHOOD	RISK	PROPOSED STRATEGIES	Residual Risk
								vegetation - Presence of water tanker	
7	Unauthorised People	Falling in mine shaft	- Injury/Death	- Sign in - Inducted Person	Major	unlikely	high	- 2 supervisors - Inductions - Procedures - Isolated Area - SWMS	Low
8	Communications with outside Services	No mobile phone service	- Delayed Response to Emergency	None	Mod	Likely	High	Use of Satellite Phones	Low
9	#1 Shaft; adjacent areas of site affected / active with spontaneous combustion	Mobile equipment stability - subsidence	- bush fire - death	Areas identified	Mod	Unlikely	High	-Cordon off spon com areas, visible barrier tape or similar -highlight in site inductions	Low
10	#1 Shaft; mobile equipment access to collar concrete slab	Mobile equipment stability – RC slab failure over ventilation evasse	- fall injuries - death	none	Major	Unlikely	High	-prove slab load capacity by test load or other means prior to equipment	Low
11	Steel Lead Paint	Burning Paint due to Oxy cutting	Illness due to ingestion of heavy metal fumes / dusts	Test undertaken on Shaft 2, Check and confirm test results	Mod	Rare	Low	No further actions	low

Department of Primary Industries-Mineral Resources

Rehabilitation of Oakdale Colliery

Former Mining Lease 1378

Review of Environmental Factors

October 2006

International Environmental Consultants Pty Ltd

Department of Primary Industries-Mineral Resources

Rehabilitation of Oakdale Colliery

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List of Figures

1. Introduction

This report addresses both the rehabilitation requirements for the old Oakdale Mine site as shown on **Figure 1**, including proposed rehabilitation methodologies as well as the potential environmental consequences of carrying out the works. The report will be used as a supporting document for the required environmental approvals under both Part IV and Part V of the Environmental Planning and Assessment Act.

Although the proponent for the work will be DPI (Mineral Resources), Sydney Catchment Authority (SCA) will play a key role in the ongoing management for the site given its sensitive location within the inner catchment of Lake Burragorang. Therefore the standard of rehabilitation and its ongoing management requires close and ongoing liaison with the SCA. An assessment of potential environmental implications is provided in Chapter 6.

The work will also involve the demolition of buildings and structures. This aspect of the work will require consent from Wollondilly Shire Council.

Some aspects of the rehabilitation plan may change during the course of the project. Any changes will be discussed with the SCA to obtain their agreement prior to finalisation of the work. If the changes are significant, a revised plan will be prepared and lodged with the SCA as required.

A number of supporting studies have been carried out for the site which form the basis of the proposed rehabilitation methodologies and impact assessment. These are:

Appendix A – Oakdale Preliminary Site Investigation, Hyder Consulting September 2005. This report provides an assessment and classification of materials on site which were intended for use in the rehabilitation program. The report also provided an assessment of soil contamination at a number of target locations and recommended various recommendations which have been adopted.

Appendix B - Classification of Imported Fill Material in Area 11 Upper Dam and Demolition Waste Stockpile Area, David Lane and Associates July 2006. This report provides a more specific assessment of the imported fill material located on site.

Appendix C - Specification for the supply of recycled material for mine site rehabilitation, Department of Primary Industries, Mineral Resources 2005. This report was prepared specifically for the Oakdale rehabilitation program and assessed the requirements of the NSW Waste Avoidance and Resource Recovery Strategy 2003.

1.1 Background

Oakdale Colliery was established in 1948 and was originally known as the Burragorang State Coal mine, operating within Mining Lease 1378 (originally part of Consolidated Coal Lease 740), which covers a total area of 4,289.75

hectares in the southern coalfields of NSW, as shown on **Figure 1**. The Colliery surface area itself covers approximately 2.8 ha, and is located within the Warragamba Special Area, a sensitive part of Sydney's drinking water catchment.

Oakdale Colliery produced high quality coking coal which was exported through Port Kembla Coal Terminal, with all ROM coal road hauled to Wollondilly Washery for processing. Oakdale Colliery comprises two separate surface facilities areas. The first is No 1 and No 2 Shafts which are located near the junction of Steveys Forest Road and Ridge Road and includes buildings, workshop, ROM coal stockpile area, some remaining surface infrastructure and bathhouse building. These shafts provided downcast air to the mine.

The second site is the No 3 Shaft located in Egans Road. This was an upcast shaft located on the south bank of Hurricane Creek and has administration, stores, bathhouse facilities and support infrastructure.

In late 1999 mining ceased when the parent company went into voluntary receivership. As a result, limited rehabilitation work was carried out, and the site became a derelict and abandoned mine site. The No 3 Shaft property and buildings were purchased by a private company for use as an office and equipment storage area. The lease was extinguished by the Minister for Minerals and Energy on closure of the mine however responsibility for filling the shafts and rehabilitating the remaining property associated with the No 1 and 2 Shaft site rests with the Department of Primary Industries (Mineral Resources) through the Derelict Mines Program.

1.2 Statutory Requirements for Rehabilitation

The statutory requirements for rehabilitation work in relation to surface disturbance within Coal Leases in NSW are principally governed by environmental provisions of the Mining Act 1992, which is administered by the Department of Primary Industries (Mineral Resources).

Since Oakdale Colliery is located within Sydney Water's Warragamba Catchment (Special Area) in the Burragorang Valley, the Sydney Catchment Authority is a key stakeholder and for the proposed rehabilitation program. The old mine site currently covers vacant crown land, and given the location within the Warragamba Dam water catchment, future land management and responsibility for post rehabilitation maintenance would rest with the Sydney Catchment Authority. The sensitive nature of the site has been taken into consideration in the formulation of this rehabilitation plan, particularly with regard to use of imported materials, surface water management during the rehabilitation process, and waste management.

The general rehabilitation requirements of the DPI are listed below:

- removal of buildings, plant and infrastructure, making each site safe for subsequent use. This will involve demolition of structures and removal of

infrastructure to ground level. The hard stand areas and sealed roads will be rehabilitated where appropriate;

- Filling and capping of mine access and ventilation shafts;
- generation of a final land use in keeping with its location, that is, native vegetation compatible with surrounding systems;
- retention of pollution control systems to protect water ways and surrounding ecosystems;
- removal or capping of remaining carbonaceous material;
- reshaping of some areas to ensure that the final slopes are stable and can be vegetated;
- rehabilitation of all nominated areas to safe and stable land forms compatible with the surrounding land fabric;
- investigation and provision of adequate treatment of potentially contaminated waste remaining on site;
- prevention of soil erosion; and
- control of noxious weeds and vermin.

It is proposed to rehabilitate the Oakdale Colliery surface facilities areas to a standard that will facilitate the sites gradually returning to native ecosystems compatible with the surrounding vegetation systems.

Irrespective of the final land use, in terms of overall rehabilitation objectives, the DPI will require the site to be effectively managed during the rehabilitation works until the final contours are produced and vegetation cover is self sustaining. The final landform must allow long term stability with no future liability from surface and subsurface contamination and resulting leachate quality.

1.3 SEPP 58 – Protecting Sydney's Water Supply

Under SEPP 58, Scheduled activities listed in the policy require either concurrence from, or notification to the Sydney Catchment Authority for proposed works, depending on the location in either a Special Area or Outer Catchment of Sydney's water supply.

The Oakdale Colliery is located within the Warragamba Special Area catchment. Although rehabilitation works are not listed under Schedule 1 or 2 of the policy, the Sydney Catchment Authority represents a key stakeholder for the project. The works will be managed by the DPI (Mineral Resources) under the Derelict Mines Program. The rehabilitation program will be approved and managed by DPI while the shaft filling, sealing design and safety considerations will require approval of the District Inspector of Mines.

Given the sensitive location of the Oakdale site, this plan has taken into account a number of specific recommendations from the SCA, DEC and DPI in its preparation, including:

- Provision of background information on the site, its history, external areas associated with the operation such as services, areas of weed infestation and heritage potential.

- Options for the filling of the shafts and their respective longevity, risk of reopening and current best practice. These options will be assessed and separately approved by DPI. Once completed it will be the responsibility of the District Mines Inspector to sign off on the sealing program before the site is relinquished as vacant Crown Land.

- Details of source materials to be used in the rehabilitation process. SCA is not in favour of using materials that have been generated offsite in the rehabilitation process unless it meets Department of Environment and Conservation legislation. These issues have been addressed in detail in this report.

- Potential site contamination issues and matters to be considered under SEPP 55 – Remediation of Land. A site contamination assessment has been undertaken as part of the rehabilitation program.

- Discussion of management principles covering soil and water, pest control, native revegetation, fire management and ongoing environmental monitoring. Further details of these aspects may be provided by DPI prior to undertaking the works if required by SCA.

DPI also has the ability to condition its approval with any specific matter raised by SCA, DEC and Council as relevant stakeholders. Separate approvals for the demolition of buildings is required by Wollondilly Shire Council.

1.4 Department of Environment and Conservation

The views of the Department of Environment and Conservation (DEC) were sought in the formulation of this Rehabilitation Plan. The DEC raised a number of issues including:

- Clearly identifying the different wastes on site, including information on whether each waste type has been generated from demolition of buildings on site or has been brought to the site from elsewhere.

- Quantification of each waste type on site and the quantity of coal rejects or Virgin Excavated Natural Materials (VENM).

- Define building rubble and waste and the need to sort on site wastes from other wastes and to remove unsuitable material for offsite disposal at an appropriate licensed waste facility.

- Clearly demonstrate how asbestos will be removed and transported from the site in accordance with Clause 29 of the Protection of the Environment Operations (Waste) Regulation 1996.

- Investigate and assess site contamination and specifically, matters included in SEPP 55 – Remediation of Land. The DEC expects that any site contamination be appropriate remediated to meet soil contaminant benchmarks and to the satisfaction of an accredited site auditor as well as to ensure that surface and ground waters are not being impacted by the migration of contaminates off the site.

Matters raised by the DEC have been incorporated into this Rehabilitation Plan. The site contamination assessment and specific matters raised in an earlier Cleanup Notice have been addressed in Appendix A, B and C.

1.5 Scope of This Report

The purpose of this report is to provide details of the proposed rehabilitation plan and environmental assessment requirements of the DPI. The report has been structured in the following manner:

Section 2 - outlines the existing situation at each of the sites. Each site has been subdivided into discrete units for the purposes of discussing rehabilitation requirements and methodologies.

Section 3 - identifies the main environmental parameters which influence potential rehabilitation methodologies and outlines the principle elements of the existing pollution control system which will remain in operation throughout the rehabilitation program.

Section 4 - describes the rehabilitation plan including proposed methodologies and design criteria for the final land form.

Section 5 - identifies the proposed rehabilitation schedule.

Section 6 – provides an environmental assessment of the proposed works in terms of Part 5 of the Environmental Planning and Assessment Act.

1.5.1 Risk Assessment

In developing the Rehabilitation Plan for Oakdale Colliery, a Risk Assessment was carried out by the Australian Centre for Value Management (ACVM) to more accurately determine a budget and a suitable procurement method for the demolition of the main structures. Participants present in the Risk Assessment included representatives from the Department of Primary Industries, Sydney Catchment Authority, Department of Commerce, Wollondilly Shire Council, and ACVM.

As a result of the inspection and risk assessment workshop the participants were able to:

- Confirm that the risks to the project are seen as manageable provided a competent contractor is engaged to ensure reliable performance; and

- Agree to a range of actions and risk management measures that enable Commerce to provide recommendations to DPI as to how to structure and procure the works, develop contract documentation, as well as provide a reliable budget for DPI.

The most significant risks at this point of the project were recognised as:

- **Gasseous Emissions -** The emission of CO_2 and methane gases is an ever-present hazard at both shafts and will require air quality testing and monitoring measures as well as supplementary air handling to ensure workers are protected during their on-site activities around the shafts.

  Evidence of break-ins to the structures at the top of both shaft heads reinforces the importance of taking prompt action to demolish the main structures and install tamper proof covers.

- **Cost Estimates Reliability & Cash-Flow Control -** DPI has determined to break-down the site rehabilitation activities into distinct stages to enable a clearer appreciation of the scope of works and more effective budget control.

  This process will be assisted with the tendering of the main demolition works as a separate contract. Uncertainty has been lessened by separately removing existing general rubbish around the structures before the site is given over to the demolition contractor.

  Should the existing authorised funds prove inadequate against the results of the tenders then DPI will be able to move quickly to obtain approval of additional funds.

Other Moderate risks include:

- Illegal site access leading to vandalism of infrastructure and contractors equipment; people falling into shafts and illegal dumping;

- Leaving the front gate unlocked or unattended – leads to illegal entry;

- Lack of warning signage to visitors/trespassers leading to illegal access into unsafe areas;

- Lack of telephone coverage for the site means that there is an inability to make contact in an emergency;

- Poor communication between the site land the front gate leads to injuries to people and works disruptions;

- Design and performance responsibility for shaft 1 & 2 caps to be installed at conclusion of demolition works could result in a delay until approval is obtained;
- The shafts and associated structures pose a hazard with the risk of people falling in or materials falling into the shaft;
- Exposure of shaft after demolition;
- High working heights required on structures could lead to people being injured, falling, or things being dropped on people or equipment below;
- Sparks arising from the collapse of the tower structures with the potential to result in explosion if gasses ignited, bush fire, possible injuries to people, additional costs, potential works delays with Work Cover investigations;
- Subsided roads may result in harm to people or machinery;
- Cash flow issues may result in an inability to fund completion of the works, disruption to other projects and the need to source supplementary funding;
- The suitability of the contract could lead to work problems;
- Heavy equipment operations may be associated with people injured, collisions or equipment damage;
- Equipment damage or collapses could result in injuries to people, damage to more equipment and delays to the work;
- Traffic accidents and disruptions may cause injuries to people and possible work disruptions and work cover involvement;
- Non-inert wastes will result in the inability to use the material to fill the shaft and extra costs to remove the material off site; and
- Existing sub-surface fires may cause injuries to people and damage equipment;

All of these potential risks have been taken into due consideration during the preparation of this REF for the implementation of the site Rehabilitation Plan.

2. Site Details

This section describes the existing colliery sites and areas to be rehabilitated. The areas have been subdivided into discrete units for the purposes of discussing rehabilitation requirements and methodologies. Rehabilitation work proposed is provided in Section 4.

2.1 Oakdale Colliery

Oakdale Colliery operated in the Bulli seam using longwall methods. Raw coal was winched to the surface via the No 2 Shaft where it was stockpiled prior to road transport to Wollondilly Washery. The No 3 Shaft was used for men and materials and this site included office and bath house facilities.

2.2 No 3 Shaft

This site is now owned by a private company however the shaft remains a potential safety issue. All other facilities on site have become the responsibility of the current owners.

2.3 No 1 and 2 Shaft Site

Figure 2 shows the layout of the site. The site has been divided into eleven separate areas, as shown on **Figure 3**. These areas are listed below while a description of the required rehabilitation works for each is provided in Section 4:

- Area 1 – Coal Storage Area;
- Area 2 – Lower Access Road;
- Area 3 –Equipment Storage Area;
- Area 4–Yard Area;
- Area 5 – No 2 Shaft Drift;
- Area 6 – No 2 Shaft and Structure;
- Area 7 – No 1 Shaft and Structure;
- Area 8 – Surface Buildings and Hardstand;
- Area 9 – Office and Carpark Area;
- Area 10 – Mine Water Storage Dam;
- Area 11 – Mine Pump Out Dam and Surrounds;
- Miscellaneous Items such as the power line, weed infestation etc.

2.3.1 Coal Storage Area (Area 1)

This area is located on the northern end of the site and was used as the main coal stockpiling and handling area. All coal material has been removed and the area has been capped, topdressed and revegetated. Topdressing material used to rehabilitate this area was imported onto the site for the purposes of rehabilitation and undertaken in accordance with the provisions of the Mining Lease at the time. There are several pollution control ponds located around the site which will remain.

2.3.2 Lower Access Road (Area 2)

This was the main haulage road from the site to Wollondilly Washery. The road is degraded in sections due to combustion of carbonaceous sub-base material ignited by bushfires in 2001-02. There is also carbonaceous material experiencing heating in the batter above Area 2.

2.3.3 Equipment Storage Area (Area 3)

This area was used to store mine supplies and equipment. The site had an oil separator, sump and silt trap and was generally concreted. The site now stores fill for the purposes of shaft filling as well as general rehabilitation work if found to be free of contamination. It is understood that there is approximately 1,800 m^3 of largely imported fill stored in this area. There is no evidence of oil contamination, however large sections are currently not accessible. The use of the fill for both the filling of the shafts and general rehabilitation work is being negotiated between the DPI and DEC and will likely be dependent on the results of further contamination testing and assessment.

2.3.4 Yard Area (Area 4)

This area has been identified separately because there is a patch of hot carbonaceous material near the silt trap. It is understood this was caused by bushfire, but will now require excavation and cooling prior to rehabilitation.

2.3.5 No 2 Shaft Drift (Area 5)

This cutting leads from the lower access road to the No 2 Shaft and was used drive mine equipment or heavy materials into and out of the Shaft. It was also used as a "wind drift" allowing air intake into the shaft without affecting the support structure. As described in Section 4, the cutting will be filled with material sourced from site prior to capping and rehabilitating.

2.3.6 No 2 Shaft and Structure (Area 6)

The No 2 Shaft is understood to be 6 m in diameter and approximately 500 m deep. The approximate volume of the shaft is therefore approximately 14,200 m^3. Above the Shaft is the support structure for the skip. This is a heavily reinforced metal structure which supports the cables, breaking drums and skip.

2.3.7 No 1 Shaft and Structure (Area 7)

This shaft is of a similar size as the No 2 Shaft and would have an approximate internal volume of 14,000 m^3. This is shaft includes some ventilation and winding infrastructure as well as wind drift cutting.

2.3.8 Surface Buildings and Hardstand (Area 8)

This area contains the two winder buildings, lamp room and bathroom, workshop hardstand areas. The buildings are mainly brick construction however the winder buildings and workshop house substantial steel superstructures. Most have reinforced concrete floors of various thickness and condition. One winder

building has been demolished and the subfloor cavity infilled with material. The source of this fill material is unknown and will therefore be included in the contamination investigation.

An Asbestos Survey was undertaken in March 1998 by Noel Arnold and Associates. This survey found that the major sources of asbestos on site was in the form of asbestos cement sheeting which line the exterior walls of the office, sections of the bathroom building roof, walls and awnings and the walls and ceiling of the walkway leading from the lamp room. There were also some synthetic mineral fibre materials insulating pipework and hot water heaters.

Asbestos cement sheeting is generally stable unless disturbed by breaking or cutting. Disturbance would occur in the process of demolition and therefore specific control procedures will need to be undertaken. The work will need to conform to Regulations 84 A-J Construction Safety Act and the guidelines of the Worksafe Australia Asbestos Code of Practice and their latest amendments.

2.3.9 Entry Area (Area 9)

This area is generally clean and consists of asphalt hardstand, old gardens and carpark. There is also the 200,000 litre mine water tank and office building.

2.3.10 Mine Dams (Area 10 and 11)

Water pumped from the No 3 Shaft site was held in the No 2 Storage Dam (labelled Area 10) with overflow entering the No 1 Storage Dam. Water was held for use at the No 3 Shaft site via a 200,000 l storage tank. Water was also pumped from Brimstone Colliery into the No 2 Storage Dam.

Excess water was pumped from the No 2 Shaft site to the Wollondilly Washery. This was the main water supply for the Washery when operating. It is understood that the pipeline between Oakdale Colliery and Wollondilly Washery has been decommissioned and substantially removed. It therefore does not form part of this plan. However, the location of the pipeline and any internal connections will be checked during the rehabilitation program. If located, the pipe will be removed if considered a safety or environmental hazard.

As described in Section 4, the main pollution control dams around the site will remain. They will initially form part of the rehabilitation program by providing control of run off during the earthworks component as well as longterm controls needed until the revegetation work has become self sustaining. It is then proposed to leave these facilities on completion for use as a source of water for wildlife.

The No 2 dam has been previously partially filled and shaped. The origin of this material is unknown and has since been the subject of a detailed contamination assessment. This results, contained in Appendix B demonstrate that the material is suitable to remain in situ. The area will be further shaped and revegetated.

3. Environmental Management

This section identifies the main environmental parameters which influence rehabilitation methodologies and outlines the principle elements of the existing pollution control system which will remain in operation throughout the rehabilitation program. Some will also be used in the final landform produced. Background environmental data is also provided which forms part of the Rehabilitation Plan described in Section 4.

3.1 Regional Details

The Burragorang Valley is located about 95 km by road south west of Sydney and approximately 35 km west of Camden. The valley is over 80 km in length and varies in width from under 3 km to over 16 km. The valley has been formed through the action of water which has dissected an uplift of the south western portion of the Sydney sedimentary basin. The rivers have cut their way through Triassic sandstone and shales and through rocks forming the Permo-Carboniferous series which includes high quality coal seams.

3.2 Climate

The prevailing climatic conditions of Oakdale Colliery is important in determining appropriate revegetation methodologies. There is a seasonal factor in the distribution of annual rainfall, with a greater proportion occurring during the summer months and immediately preceding summer. The minimums are generally recorded in the winter months with intermediate values spread over the remaining months.

The mean monthly values of daily maximum and minimum temperatures measured at Picton show that hot conditions occur during the summer months with temperatures in excess of 34^0C being recorded on occasions. Minimum temperatures occur during the winter months with ground frost being quite frequent between May and September and sometimes severe during July and August.

Based on this data, the best planting times would be early Spring to early Summer and late Summer to Autumn. Sowing should be avoided during the hotter Summer period as well as late Autumn to Winter due to frosts.

3.3 Geology and Soils of Area

At Oakdale, coal is produced from the uppermost, or Bulli Seam, of the Illawarra Coal Measures. The coal is of Permian age overlain by Triassic sediments. The Bulli Seam outcrops along the west facing cliff of the Burragorang Valley, dipping at about 1 in 20 to the east. Seam thickness varies from 1.5 to 2.8 metres.

Soils occurring on site and immediately surrounding the Oakdale surface area include, clayey sandy loam derived from the Narrabeen Group, a yellowy brown clay loam formed from weathering of siltstone and shale parent material and minor areas of lithosol derived from Hawkesbury Sandstone. None of the soils located on site or in the surrounding area represent a high erosion risk due to the lack of dispersive clays. They do however, lack structure and depth, have generally low soil moisture and nutrients and would, without some treatment, have limited value in revegetation work.

3.4 Flora

There are essentially five vegetation communities occurring in the Oakdale Lease Area. These are: rainforest which occurs in deep moist valleys and gorges; Open Forest which occurs on Hawkesbury Sandstone with gentle to moderate slopes; Open Forest/Woodland which occurs on Wianamatta Group with relatively flat topography; Woodland/Heathland which also occurs on Hawkesbury Sandstone on broad ridge tops with flat topography; and cleared land.

The main vegetation systems found within the area is outlined below.

Angophora costata/Eucalyptus piperita Open Forest

Structure: Open forest about 20 to 25 metres tall with a generally dense shrub or heath understorey and ground cover.

Description: Open forest dominated by *Angophora costata* and *Eucalyptus piperita*. Other canopy species occur less frequently in the community. These include *Eucalyptus agglomerata*, *Syncarpia glomulifera* and *E. eugenioides*. *Melaleuca linariifolia* was found on one moist site. Middle-canopy trees include *Exocarpos cupressiformis, Allocasuarina torulosa* and *A. littoralis*. Characteristic shrubs of the understorey include *Acacia linifolia, Daviesia corymbosa, Bossiaea lenticularis, Grevillea phylicoides, Persoonia mollis, Leptospermum spp.* and *Banksia spinulosa*. Many other shrub species characteristic of the Hawkesbury Sandstone are also present.

Characteristic Species:

Acacia linifolia	*Eucalyptus piperita*
Acacia myrtifolia	*Grevillea phylicoides*
Acacia terminalis	*Leptospermum spp.*
Angophora costata	*Lomandra longifolia*
Banksia spinulosa	*Persoonia mollis*
Bossiaea lenticularis	*Pteridium esculentum*
Daviesia corymbosa	*Pultenaea villosa*
Dodonaea triquetra	

E. paniculata/E. punctata - Open Forest/Woodland

Structure: Open forest or woodland with a rather dense middle-canopy and understorey.

Description: This community is characterised by a group of species which occur only infrequently on the adjacent Hawkesbury Sandstone. Dominant trees are *Eucalyptus paniculata* and *E. punctata*. *Acacia mearnsii* is a common middle-canopy species. Shrubs are much less common than in the communities on the Hawkesbury Sandstone.

Grasses are common in the ground cover of this community, particularly *Themeda australis*.

Characteristic Species:

Acacia mearnsii	*Eucalyptus punctata*
Adiantum aethiopicum	*Helichrysum diosmifolium*
Allocasuarina torulosa	*Hibbertia aspera*
Bursaria spinosa	*Olearia viscidula*
Clematis aristata	*Syncarpia glomulifera*
Dianella caerulea	*Themeda australis*
Eucalyptus eugenioides	*Tylophora barbata*
Eucalyptus paniculata	

3.4.1 Species of Conservation Significance

A search of the NPWS Wildlife Atlas records only 1 flora species of conservation significance within a 10 km x 10 km area around the Oakdale Colliery pit top – *Acacia pubescens* (Downy Wattle) with a conservation rating as Vulnerable under the *Threatened Species Conservation Act 1995*.

There have been 4 sightings of the species, with the closest located 4.5 km south/east of the colliery. This species does not occur on the mine site, and therefore will not be impacted by the proposed rehabilitation works. No assessment under part 5A of the *Environmental Planning and Assessment Act 1979* is deemed necessary.

3.5 Fauna

The species known from the area are found within areas of similar geology and topography elsewhere in the Region, and are typical inhabitants of forest and woodland areas.

3.5.1 Fauna of Conservation Significance

A search of the NPWS Wildlife Atlas showed 9 species of conservation significance that have been previously recorded within a 10 km x 10 km area around Oakdale Colliery. These are listed in Table 3.1.

Table 3.1 - Fauna of Conservation Significance Recorded Around Oakdale Colliery

Scientific Name	Common Name	Conservation Status	App distance from Oakdale Colliery
Callocephalon fimbriatum	Gang-gang Cockatoo	V	3 km
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	1.5 km
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	4.5 km
Ninox strenua	Powerful Owl	V	5.5 km
Meridolum corneovirens	Cumberland Plain Land Snail	E1	4.5 km
Dasyurus maculatus	Spotted-tailed Quoll	V	2 km
Petaurus australis	Yellow-bellied Glider	V	7 km
Chalinolobus dwyeri	Large-eared Pied Bat	V	5 km
Miniopterus schreibersii oceanensis	Eastern Bentwing-Bat	V	4.5 km

While none of the species listed in Table 3.1 have been observed at Oakdale Colliery, the mine site may be within the home range of some of the species (based on the assumption that the sightings recorded on the Wildlife Atlas are the centre point for the individuals home range) such as the Yellow-bellied Glider that may travel up to 2 km per night, with a home range in the order of 35 hectares.

However, with the Oakdale mine only fairly recently being vacated, it is considered unlikely that any of the species listed in Table 3.1 above would have as yet colonised the site or infrastructure. Furthermore, the site does not contain suitable habitat for any of these species, nor does it contain substantial food resources.

The rehabilitation plan proposed for Oakdale Colliery requires only minimal clearing of vegetation, and is restricted to poor quality regrowth. It is therefore considered highly unlikely that there would be any impact on native fauna species or their habitat, including species of conservation significance that may be present in the surrounding areas.

The implications for the rehabilitation plan is the need to replicate as far as practical the vegetation communities surrounding the No 2 Shaft site in order to provide additional habitat for fauna species in the future.

3.6 Hydrogeology

The Bulli Seam is a known aquifer in the Southern Coalfields. At Oakdale, the seam is at considerable depths ranging from 300 m to over 500 m depending on surface topography. No groundwater will be encountered during the rehabilitation program with the exception of the shaft filling. The base of each shaft is at the Bulli Seam floor, which although extracted and open, is technically an aquifer. Both shafts are concrete lined and therefore interaction with other aquifers between the surface and the Bulli Seam cannot occur.

The Bulli Seam outcrops along the west facing cliff of the Burragorang Valley, and dips at about 1 in 20 to the east. These entries, which are now sealed, have

always been dry with any water, either mine related or groundwater, flowing to the east. The easterly dip of Bulli Seam along with a similar local dip in the Hawkesbury Sandstone would necessarily prevent any ground water release into surface drainage systems.

Sealing the shafts using material that has been certified as being free of contamination would not cause any implications on groundwater in the area.

3.7 Topography and Land Use

The No 1 and 2 Shaft site is surrounded by Crown land forming part of the Warragamba Special Area, surrounding Lake Burragorang. Land use activities are highly restricted and the predominant use of the land is the management of native forest. Private land occurs around the No 3 Shaft site with the township of Oakdale. Private dwellings extend along the main road leading to the Burragorang Lookout and Steveys Forest Road in Oakdale, while larger properties and commercial agriculture occur off the main road close to the Oakdale No 1 and 2 Shaft site.

The No 1 and 2 Shaft site is located on a ridge which drops steeply away on both sides. The site itself however is relatively flat and poses no physical restrictions on the rehabilitation plan.

3.8 Water Management

Existing pollution control systems at both sites still remain and will be used as part of the rehabilitation program.

3.8.1 No 1 and 2 Shaft Water Management System

Surface water from the old stockpiles, truck turning pad and from near the No 1 winder house, is directed to two silt traps. These overflow during periods of heavy rainfall and discharge to a settlement dam located west and below the 2000 tonne coal bin. Overflow from this dam then flows towards Brimstone Gorge. This dam was a licensed discharge point when the mine was operational.

Run off from the truck wash is directed to two settlement dams. Two further settlement dams are located west of the workshop and receive run off water from around the workshop area, from the areas around the No 1 winder, from the site office buildings and from the storage yards.

All these dams were originally designed to retain runoff from a 1 in 10 years storm of 1 hour duration with additional storage provided for the accumulation of silt.

In the car parks, around the workshop, winder buildings and surface storage areas, diversion drains are provided to collect and direct run off and contaminated water to the required flow paths. The Settlement Dam west of the coal dump was cleaned out and rebuilt prior to the mine closure.

These structures will continue to control sediment during the rehabilitation program and will remain once completed as a source of water for wildlife.

3.8.2 No 3 Shaft Water Management System

No 3 Shaft and its surrounding infrastructure, is situated on the south bank of Hurricane Creek.

Rainwater runoff from the bushland above the shaft installation is diverted around the site by a dish drain. The clean water diversion system allows uncontaminated water to be directed either north to the creek, or east of the shaft, or makes use of a culvert under the car park to have the water discharge upstream of the weir located north of the car park.

Car park run off is treated differently in that it is all collected by kerb and guttering, passes through gravel traps in the drains, and then to a drive-in sedimentation pit. Water then passes through a covered culvert to a stormwater settlement dam.

The dam also incorporates an emergency overflow spillway to Hurricane Creek. The silt trap itself also has an overflow spillway direct to the creek in case of exceptionally heavy rainfall. Both discharges to the creek are upstream of the weir.

Run off from the storage yard north-west of the shaft is directed to a drive-in sedimentation pit. This then overflows to a primary separation tank incorporating a baffle. This water is then directed to a culvert under the storage yard where it joins the car park run off.

This system now forms part of the future owners use of the site, however it will serve the filling of the shaft without the need for augmentation.

3.9 Dust Suppression

The sites are currently stable and do not generate visible dust. However, during rehabilitation works land will be disturbed with the potential to generate dust. A water cart will be available to suppress dust generated during the initial earthworks. In addition, activities which generate a high amount of dust will not be undertaken during periods of high winds.

Ultimately, the revegetation works proposed will significantly reduce the potential for dust generation.

3.10 Heritage

A heritage assessment of Oakdale Colliery was carried out by Stedinger Associates for the DPI in October 2006. A photographic record was made of the

mine site, however the mine is not listed as a heritage item in the Wollondilly LEP, or the State Heritage Register.

The mine was established around 1950, with the buildings constructed in the 1960s and 1970s. As a more recent mine, the Oakdale Colliery is not considered to be of heritage significance and no European heritage issues appear to be relevant to the site.

3.11 Fire Management

The following fire management controls will be adopted:

- maintaining access to the site during rehabilitation works;
- maintain a cleared firebreak of 20 m around the burning carbonaceous material;
- no vegetation will be burnt on site;
- the water cart can be made available to fight fires if necessary;
- maintain access to the existing dam structures at all times.

The Rural Fire Service will be informed immediately any bush fire is detected in the surrounding area.

There is an area on the western side of Area 4 which is currently hot and there is evidence of past burning. To effectively extinguish a coal or reject generated fire will require either the removal of the fuel, eliminating available oxygen or cooling the material below the ignition temperature of the carbonaceous material.

Each ton of burning reject has a nominal temperature of 482^0 C and a heat content of approximately 500,000 BTU. To remove this heat rapidly by water cooling would require approximately 296 litres applied uniformly over the burning reject (RF Chaiken, US Bureau of Mines, National Symposium 1984).

Rapid quenching of burning reject has the potential to produce explosive concentrations of hydrogen gas as well as hazardous quantities of hot steam and gases. However, the method is quick and considered more effective than sealing and slow cooling. The latter may require several years with the ongoing potential for re-ignition.

Excavation and air cooling is considered the most appropriate for the material at Oakdale. However it would be necessary to have water pumps and hoses available for cooling and extinguishment of spot fires should they occur. The following methodology is proposed but will form part of a separate heating management plan to be prepared by DPI (Mineral Resources):

- Commencing at the spent reject areas, hot material will be progressively excavated and spread from the top of the batter.

- The material will be allowed to cool before reconstructing the batter with a berm constructed mid slope.

- Cold material will then be compacted using normal action of excavation equipment in progressive lifts of less than 1 m.

The above procedure needs to be undertaken with extreme care. It is proposed to prepare a Fire Management Plan prior to commencing work in this area. This will include matters relating to spontaneous combustion.

The process will also likely to be done in stages depending on water availability and weather conditions. Hot dry and particularly windy days should be avoided. Once the material has been completely cooled and compacted in its new location the risk of further ignition is considered remote. It is therefore not necessary to complete the entire process in one operation and will likely extend for a period of 4 months. However, the time between stages should not extend beyond two months otherwise any benefits of the initial water irrigation would have been lost.

If appropriate and depending on the exposed natural surface, the remaining material will be shaped to produce a final landform slope of 3:1 (H:V) with batter slopes of 2.5:1 (H:V) with each 10 m lift and 2 m berm width. The drainage system will be directed into each bench.

The initial revegetation program for this area will not include any tree or shrub seed. Once a self-sustaining grass community is established and no re-heating events have occurred for a period of two years, natural tree regeneration can occur.

This area will likely be the last to be fully rehabilitated.

3.12 Contamination Issues

Potential site contamination is a key concern of stakeholders. This includes contamination caused by previous mining operations as well as potential additional contamination caused by importation of materials onto the site. There was also a period following mine closure and sale of assets when additional contaminating activities may have occurred.

DPI (Mineral Resources) commissioned Hyder Consulting to undertake a contamination assessment. The scope of work was discussed in detail with SCA and DEC prior to commencing. The final report is provided in full as Appendix A. A separate assessment was undertaken on stockpiled fill material as a result of a Cleanup Notice issued by DEC. This report is contained as Appendix B.

3.12.1 Sewerage Waste

When operational, Oakdale No 1 and 2 Shaft site operated a "pump out" septic system. Solid material from septic tanks was removed from the tanks on an as need to basis by Wollondilly Waste.

The majority of the workforce entered and bathed at the No 3 Shaft site which has a package sewerage treatment plant with two maturation ponds. This system is now owned and operated by Brefni and is not part of this assessment.

3.12.2 Oil and Grease Containment and Disposal

There were several oil, grease and diesel fuel containment systems in use at the mine site. Fuel tanks and oil and grease storage was located north-east of No 2 Shaft in Area 3. A small diesel tank was elevated above the ground and had a concrete bund surrounding it. This bund also incorporated a settlement tank. The bunded area was pumped out on an as need to basis, and was checked each day by colliery staff.

The area surrounding this tank was also bunded so that run off and spillage was contained and flowed to a drive-in sedimentation pit. This had an emergency overflow that prevented discharge of floating oil, grease or debris being released to the drain beside the sealed coal plant road and eventually flows to the sedimentation pit to a Licensed Discharge Point. Otherwise, overflow from the drive-in sedimentation pit was diverted to a Monier oil and grease separator. Again, this was pumped out on an as need to basis, and checked each day.

These areas, along with the Substation and Switchroom (Area 8) will be examined during the contamination assessment.

Workshop Oil and Grease Trap
Drainage from the Workshop and equipment steam cleaning was directed to a drive-in sedimentation pit. An emergency overflow prevented discharge of floating oil, grease or debris. Normal overflow from the pit was also directed to a Monier oil and grease separator. Decanted liquid from the separator and emergency overflow discharged to a drain between the oil and grease trap and the No 1 Shaft. This drain flows to the settlement dams located west of the workshop.

No 1 Shaft
Oil and grease collected from No 1 winder building was piped to a sump situated in the south-western corner of the concrete pad below the No 1 Shaft headframe. Oil and grease from the three compressors located on the concrete pad also drained to this sump. This was pumped out on an as need to basis.

No 2 Shaft

Oil and grease in the No 2 Shaft winder building was directed to a sump below the winder drums. This was pumped out on an as need to basis. An oil and grease arrestor pit was located prior to the Licensed Discharge Point.

It is understood that the monier oil separators and tanks have been removed from site, the bunds were pumped out and the sumps cleaned following closure. The formwork and bunding still exist and these would be targeted for future sampling.

3.12.3 Bulli Seam Contamination Issues

A key feature of the Bulli Seam is the fact that it is benign. This includes coal reject produced from the Bulli Seam. Unlike other coal reject produced in the Hunter Valley and in some cases in the Western Coalfields, reject produced from the Bulli and lower Wongawilli Seams is stable, contains low concentrations of metals and salts and has no propensity to produce acid leachate. This fact has been demonstrated over many years.

Over the past 100 years, coal reject produced from the Bulli Seam has been used in the Illawarra for:

- General filling for subdivisions.
- Construction of public facilities such as playing fields, tennis courts, golf courses and general landscaping.
- Road construction, usually as a sub-base with good examples being the F6 Freeway and M5 tollgate developments.
- Re-use options including topdressing and industrial uses.

The main limiting factor in its use has been the cost of transport from the source mine to the end user. For this reason, reject is often used as a building material on the source mine and is likely to have been used for coal pads and general filling at Oakdale.

There are established procedures for the emplacement of coal reject, largely involving the engineering properties of the material rather than environmental issues. The material is easily compacted and has good engineering characteristics which enable a wide range of end uses. Since there are no growth limiting elements, the material can be used for both foundations for structures as well as surrounding landscaping treatments in the same area.

3.12.4 Other Materials On Site

Other materials have been brought onto the site since the mine closed. This material was intended to be used for the filling of the shafts and general rehabilitation work however, there is the potential for this material to be contaminated. It is understood that the origin of the material included demolition of buildings and concrete hardstands and general excavations in the local area.

The material has been primarily emplaced in Area 4 and will need to be tested prior to possible use in the rehabilitation program. It is understood that approximately 1,800 m^3 is available and would otherwise conform to the definition of VENM, for the purposes of this report it will classed as all offsite

demolition waste. The material would therefore need to be classified as "Green Specification" prior to any reuse on site. DPI has undertaken to consider these issues prior to commencing the rehabilitation program. Inert material sourced on site can be used for shaft fill.

David Lane Associates (DLA) were commissioned to determine the composition and depth of the material located in the Demolition Waste Stockpile, and Area 11, in accordance with the NSW EPA *Enviornmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (1999).* The report is contained in full in Appendix B.

As a result of testing and reference to relevant guidelines, the Area 11 Upper Dam Imported Fill Material and the Demolition Waste Stockpile were found to meet all chemical assessment criteria to be classified as Inert Waste and may be reused offsite or disposed of in a licensed landfill. The materials also comply with residential or open space end landuse criteria.

The material in the Demolition Waste Stockpile may also be beneficially reused on site with due consideration to the Geotechnical conditions, potentially for the filling of the shafts.

A minor localised area of the Stockpile was found to contain fragments of asbestos, with a volume of approximately 20 m^3. This material is classified as Industrial Waste and will be removed from site to a licensed landfill.

3.12.5 Recyclable Materials

There are other general recyclable materials which may also be generated in the rehabilitation program. These will include metals, glass, timber, plastics and regrowth vegetation. Native vegetation that may be removed during the course of rehabilitation may be reused on site as a part of the revegetation component.

Commercial recycling would only be available for the metals, particularly the shaft headframes and building gantries. Some intact glass windows may be salvaged however it is likely that these will be included in waste to be transported offsite to a licensed landfill along with broken timber and felled exotic trees and shrubs.

Other recyclable materials such as timber, glass and plastics will be mechanically sorted and separated on site. The material will be stored on site until the main demolition work is complete and then transported to recycling centres as appropriate.

There is also a number of car bodies and rubbish which has been illegally dumped on site in recent years. This material will be sorted along with other general building waste and either:

- Collected by a licensed contractor for recycling.

- Collected by a licensed contractor for disposal in a licensed waste disposal facility.
- Included in the definition of "Green Spec" and used on site in the rehabilitation program.

3.12.6 Preliminary Contamination Assessment

As part of the rehabilitation plan, an inspection was carried out of the No 1 and 2 Shaft site to determine the requirements for clean up of any contaminated soils and wastes. The overall objective of the investigation was to assess the potential impacts posed to human health and the environment from any residual contamination that may be present and to determine requirements for the clean up of contaminated soil and waste.

Hyder Consulting were commissioned to undertake further testing and analysis to categorise and determine existing contamination levels on site. Their report is contained in Appendix A. Additional work was carried out by David Lane Associates, with their report contained in full in Appendix B.

The investigation findings and recommendations are as follows:

Area 11 – The Area 11 Upper Dam Imported Fill Material meets all chemical assessment criteria to be classified as *Inert Waste* in accordance with the *NSW EPA Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (1999),* and complies with residential or open space end landuse criteria.

- The imported fill material that has been spread out over Area 11 was sampled and analysed, resulting in its classification as inert waste. It is recommended the area be capped with a minimum of 300 mm of clean fill either sourced from on-site or from off-site VENM and then topsoiled to prevent exposure or spread of waste fragments to surrounding environment and catchment area. Capping will require acceptance from the DEC and SCA.
  Area 11 Brefni imported fill – The Brefni imported fill material is located in stockpiles at Area 11. The material in the Demolition Waste Stockpile meets all chemical assessment criteria to be classified as Inert Waste in accordance with the *NSW EPA Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (1999),* and in addition complies with the most applicable end landuse criteria – NEPM 1999 Table 5A Column E - Open Space.

  The material contained within the Stockpile may be disposed of at a landfill as per the *NSW EPA (1999) Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes Table 7*: Disposal of wastes to the different classes of landfills. The landfills licensed to accept this waste are identified as *Inert Waste Landfills Class 1 and 2*.

  The inert and end landuse compliant material may also be beneficially reused on site with due consideration to the geotechnical and special

conditions for materials as outlined in the *Specification for the Supply of Recycled Material for Mine Site Rehabilitation (DPI, 2005).*

A minor localised area of the Stockpile contains **asbestos fragments**. The volume of this material is estimated to be 20 m^3. This material in accordance with the NSW EPA *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (1999) is classified as Industrial Waste. The material can be disposed of in accordance with Table 7 of these guidelines as **Solid Waste**. Licensed landfill Solid Waste Class 1 and Class 2 are suitable to accept this waste.

- Former Sump Area – A soil sample was taken adjacent to the former concrete sump outside the workshop. No substantial health or environmental risks are considered to be posed by the material sampled from this area of the site. Should the concrete from this area be removed in the future, additional assessment should be undertaken to ensure that the underlying soil is within relevant guideline levels.

- Workshop and No. 2 Winder House Floors – Preliminary data for hydrocarbons indicates that the oil and grease contaminated material covering the floors of the Workshop and No. 2 Shaft Winder House is likely to be classified within the 'hazardous' waste category. It is recommended that the floor material be scrapped up and landfarmed in a suitable location on-site before the material is disposed off-site to a DEC licensed landfill after further classification testing.

- Winder Engine Site No.1 Shaft – The near surface fill material covering the No. 1 winder house was sampled and analysed. Based on the results obtained, no substantial health or environmental risks are considered to be posed by the fill material encountered at this location. It is recommended that the material be left insitu and no further action be taken at this location.

- Rehabilitated Coal Stockpile Pad – The cover material in this area had been imported from both on-site and off-site sources to cap and level this area of the site. Sample analysis shows the cover material that fulfils criteria for 'open space' land use and the 'inert' waste classification. As the fill material does not contain waste such as concrete, bricks, plastic, glass, etc… in any great quantities, it can be considered as VENM. It is recommended that the material be left insitu and no further action be taken at this location.

- Imported Fill Stockpile – Fine soil material from the imported fill stockpile was sampled and analysed. The majority of the stockpile was classified as inert waste with the exception of the north eastern area that was contaminated with asbestos fragments. It is recommended that the asbestos contaminated material be disposed off-site to a DEC licensed landfill as 'friable asbestos contaminated inert waste' in accordance with regulatory requirements. It is recommended that the remainder of the stockpile be sorted and disposed of in the following ways with the agreement of DEC and SCA:

- materials that meet Mine Fill Specifications be stockpile separately for disposal in the shafts,

- materials that can be recycled (metals, glass) be sent off-site for recycling, and
- inert waste materials not suitable as mine fill or for recycling be disposed off-site to a DEC licensed landfill.

- Transformer Area – The surface soil in the transformer area was sampled and analysed. Based on the results, the hydrocarbon concentrations were above relevant health-based criteria. It is recommended that the visually contaminated material from this area be scrapped up and landfarmed in a suitable location on-site until the hydrocarbon levels fall below inert waste guidelines.

Concentrations of hydrocarbons can reduce with time by the natural process of biodegradation. Depending on the concentrations and composition of hydrocarbons encountered during the rehabilitation and excavation process beneath the oil store/fuel storage area, several options are possible including:

- composting the impacted soil and burying it beneath a layer of clean soil to allow natural bioremediation to occur in the ground;

- composting the impacted soil and treating it by landfarming above ground to speed up the process of bioremediation;

- treating the soil if required and disposing of the soil to an offsite landfill.

Although visual hydrocarbon impacted soil are generally low, further surface and subsurface testing would be necessary in order to determine appropriate treatment. Depending on the level of contamination ultimately found, there are essentially two remediation methods. The first is complete removal to a licensed waste disposal site while the second is on site bioremediation. The second option would involve spreading the contaminated soil over the available hardstand areas, sowing a cover crop and then mulching this prior to reuse in the rehabilitation program. Medium to long chain length hydrocarbons are relatively immobile and benign in the environment and easily removed by natural processes.

There are however, significant amounts of asbestos remaining in the buildings. Although the majority are in a stable condition, the process of demolition of the buildings will create airborne asbestos fibres. The removal of this material will require specialised handling and treatment procedures and should be carried out by an experienced and licensed contractor. The types of protection measures required will include, but not limited to:

- Stabilisation of the asbestos material prior to removal. This can be achieved by applying appropriate sealants or plastic wrapping.

- Manual removal to minimise breaking up of the material.

- Avoiding the use of power tools or machinery in the removal process.

- All workers handling asbestos materials should be fully trained and wear full protective clothing and breathing apparatus approved for the protection against asbestos fibres.

Asbestos cement sheeting will be removed from site by a fully licensed contractor and disposed at an appropriately licensed waste disposal facility. Records of the asbestos material removed from site, including chain of custody documents will be provided to the SCA.

4. Rehabilitation Plan

This section outlines the proposed rehabilitation plan for Oakdale Colliery. The plan includes design criteria for the final site topography and details of revegetation methodologies. A final landform has been developed as well as the suggested final land use for the site.

4.1 Introduction

The preceding sections have described the general context and environmental issues which have a bearing on the final land use and rehabilitation requirements for the colliery. There will however, be a number of additional investigations required by SCA prior to the works commencing. These studies will likely include:

- A Soil and Erosion Control Plan. This plan will be prepared by DPI (Mineral Resources) and would involve the contractor undertaking the works. The plan would include care of water considerations as well as general pollution control.

- Fire Management Plan. His plan will manage both the fire risk created by the rehabilitation works and the management of spontaneous combustion in 2 separate parts.

- Shaft Sealing and Abandonment Plan. This is a requirement of the Mining Act and would be prepared by DPI (Mineral Resources). Approval of the plan and final sign off is the responsibility of the District Mines Inspector.

- Weed Management Plan. This plan will form part of the ongoing management of the site following relinquishment by DPI. The initial plan will be prepared by DPI but would require input from SCA.

The principles for each plan is discussed in the following sections. The No 1 and 2 Shaft site has been divided into rehabilitation units, based on a combination of topography, general rehabilitation requirements, existing infrastructure on site and the staging intentions for rehabilitation. The No 3 Shaft is discussed separately.

4.2 Rehabilitation Areas

The areas requiring rehabilitation are described below, while a schedule of works is provided in Section 5. The rehabilitation areas described below are not in chronological order and in many cases are interrelated. The following sections outline the range of physical works required while rehabilitation methodologies are described in Section 4.3, which includes a description of the proposed extraction of available coal reserves. The rehabilitation areas described below are shown on **Figure 3**.

4.2.1 Coal Storage Area (Area 1)

All coal material and the stockpile pad has been previously removed and the area rehabilitated. The material used in the rehabilitation work would necessarily have

been imported to the site and would therefore form part of the contamination assessment.

It will also be necessary to sow a mixture of native tree and shrub seed to assist in returning the site to a native vegetation community. There are several pollution control ponds located around the site which will remain as these provide containment of runoff from the site. Weed control strategies would be required for this area.

4.2.2 Lower Access Road (Area 2)

Due to the degradation of the road it is now considered unsafe. The following works are proposed:

- Removal of the asphalt and underlying coarse reject sub-base. It is possible that the sub-base will still be hot and will require separation.

- Spread hot material over available hardstand and allow to cool in accordance with the procedure outlined in Section 3.11.

- Emplace all excavated material within the No 2 Shaft wind drift

- Shape remaining area to a slope of no greater than 1 in 3 (V:H). The slope should be tied into the batter slope of Area 3. This will likely involve creation of a second bench and bringing the toe of the batter to the middle of the road. The shaped batter should extend towards the wind drift until no more hot material is encountered.

- Topdress and rehabilitate as described in Section 4.4.

Sediment controls will be necessary and will include the construction of a silt stop fence below the area of disturbance. The filter fabric will have a permeability coefficient of 0.02 cm/s which will allow sufficient flow during minor storm events without water build up. The fence will be inspected following rainfall and cleaned as necessary. The fence will remain until revegetation works are considered self sustaining and water runoff is considered clean.

A Soil and Water Management Plan is to be prepared to the satisfaction of the SCA prior to the commencement of any works.

4.2.3 Equipment Storage Area (Area 3)

This area currently stores imported fill which is intended to be used to fill the shaft. Should the fill be cleared for use in the shaft filling and removed the remaining hardstand area should be rehabilitated in the following manner:

- Remove remaining concrete sumps, slabs, footings and pavement and place within the No 2 Shaft wind drift cutting.

- Separately excavate earth beneath the oil separators and sumps and spread over available hardstand within Area 8. Bioremediate as required depending on level of contamination. The material is to be tested prior to removal and again following bioremediation. The results should determine the level of mixing required, bioremediation effort and design and need for offsite disposal if necessary.

- Shape batter leading to the lower access road (Area 2) to a grade of less than 1 in 3.

- Construct a drain with 1% fall leading to the existing sump at the end of the No 2 Shaft drift.

- Topdress and revegetate as described in Section 4.4.

4.2.4 Yard Area (Area 4)

This area contains a patch of hot carbonaceous material near the silt trap on the western side. The remaining area is generally clean and contains no concrete structures or hardstand. The following works are proposed:

- Separately excavate all hot materials and spread over available hardstand in Area 8. Once cool, the material can be returned, compacted and buried.

- The batter slope will need to be regraded to an overall slope of 1 in 3 (V:H). There will be at least one bench of no greater than 3 m wide with a batter angle of no greater than 1 in 2.5 (V:H). To achieve this will require accessing the toe of the existing batter using the existing lower access track. Some native regrowth will need to be cleared in this process.

- Topsoil should be spread over the finished batter and revegetated in accordance with Section 4.4.

- The remaining area to be lightly ripped to break up the surface compaction. Ripping should be done along the contour.

- Topdress and revegetate as described in Section 4.4.

4.2.5 No 2 Shaft Drift (Area 5)

This cutting will be filled with approved building rubble and concrete generated on site. Building rubble will include bricks, concrete and steel (rio that cannot be removed from prestressed concrete) that conforms to the definition of VENM. All glass and any fibrous asbestos will be sorted out and disposed of at an appropriately licensed waste management facility.

The sequence of filling should be:

- Careful placement of non-asbestos bearing materials such as plasterbord in the floor of the cutting. All contaminated material including asbestos will be removed from site.

- ❒ Place a layer of approved clean fill over asbestos and compact.

- ❒ Emplace remaining building waste and rubble with the larger lumps to be used first.

- ❒ The filled cutting should then be capped with at least 1 m of clean fill prior to todressing and sowing.

The filled cutting should be free draining to east toward the existing dam at the entrance of the cutting. The lip of the cutting should be dozed over the filled area as part of the final capping. This will reduce the potential for cracks to occur between the filled section and original cut rock.

4.2.6 No 2 Shaft and Structure (Area 6)

Removal of the structure and filling of the shaft will require careful planning and risk assessment. The method currently proposed is to construct a hopper on the western side of the shaft which will allow trucks to back up and discharge directly down the shaft.

A report on the Specification for the Supply of Recycled Material for Mine Site Rehabilitation was prepared by the DPI (Mineral Resources), and is attached as Appendix C. The report provides the specification for the supply of recycled materials, primarily concrete, brick and tiles for use in the remediation of mine voids.

In line with the recommendations contained in the report, and consistent with the NSW Waste Avoidance and Rsource Recovery Strategy 2003, recycled building materials will be used for the filling and rehabilitation of the No 2 Shaft at Oakdale Colliery.

Based on the specifications contained in the report, the No 2 Shaft will be filled to meet engineering standards to meet long term stability of the fill material. The general methodology will be to use Class 1 material (concrete, reclaimed asphalt, brick, tile, crushed rock and other materials) to fill the base of the shaft and the area where the shaft meets intersecting workings at higher elevations, and the remainder of the shaft will be filled with Class 2 materials, including VENM, coal washery reject and/or inert waste generated on site.

DPI will prepare the Shaft Sealing and Abandonment Plan for approval under the provisions of the Mining Act prior to the works proceeding.

4.2.7 No 1 Shaft and Structure (Area 7)

This shaft will be filled and rehabilitated in the same fashion as the No 2 Shaft. The ventilation evase within the cutting has already been rehabilitated but the cutting formation will remain since it would not be possible to control any runoff from leaving the site at this point. The cutting is stable and does not constitute an environmental hazard in its current form.

4.2.8 Surface Buildings and Hardstand (Area 8)

All buildings and structures are to be removed to ground level and the foundations made safe. The floor of the Winder House is below natural ground level and will require filling and grading to meet surrounding levels. Elevated concrete supports are to be removed however the main concrete footings are to remain but made safe. This will involve removal of protruding reinforcement rods, concrete hobs and debris.

All on site waste building material is to be emplaced in the No 2 Shaft cutting with the exception of the larger lumps of concrete which should be put down the shaft prior to backfilling.

The remaining hardstand, not covered by concrete or asphalt should be lightly ripped prior to topdressing and revegetation. The asphalt is to remain but ripped in sections for planting with trees.

4.2.9 Entry Area (Area 9)

This area is generally clean and consists of asphalt hardstand, old gardens and carpark. There is also the 200,000 L mine water tank and office building. All structures, including the water tank are to be removed to ground level and the asphalt ripped in sections for planting. Rip lines should be approximately 5 m apart. It is not considered necessary to remove the asphalt.

The existing trees should remain but other disturbed areas planted with native species. Some weed control will be necessary around the old garden areas with particular emphasis on removal of kikuyu.

4.2.10 Mine Dams (Area 10 and 11)

The No 1 Dam (Area 10) should remain as is. The structure appears stable and there is some catchment feeding the dam which should allow water levels to remain relatively constant. This dam will provide a source of water for native fauna.

Dam No 2 (Area 11) has little available catchment and will likely remain relatively dry. The dam will be rehabilitated as follows:

- ❒ Any contained water should be pumped to the No 1 Dam.
- ❒ The dam wall will be left but shaped to be consistent with the disturbed area to the north of the dam, near the helipad.
- ❒ The area is to be shaped to enable free drainage to the west, that is, towards the No 1 Dam. This will ensure that no dirty runoff leaves the site.
- ❒ The area can then be lightly ripped along the contour, topdressed and sown.

There is some imported material that was used to partially fill the No 2 Dam. This material has been tested by David Lane Associates and classified as Inert

Waste, in accordance with the NSW EPA *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (1999).

4.3 Rehabilitation Earthworks

Since there are no topsoil resources or borrow areas available, the primary purpose of the earthworks component is to generate clean overburden for the rehabilitation program. The volume however will be limited and will require careful selection when undertaking shaping activities. Likely sources will include Areas 3 and 4, as the remaining material will be building refuse. This material conforms to the definition of Virgin Excavated Natural Materials.

Overburden will be extracted by dozer ripping and loading by excavator into trucks. The initial overburden will be placed adjacent to rehabilitation areas for use as cover material.

4.4 Revegetation Methodologies

The success of rehabilitation works will depend on the following:

- Establishing acceptable final grades.
- Providing suitable topdressing material conducive to healthy plant growth.
- Actively managing revegetation works in the early stages to ensure longterm self sustainability.

4.4.1 Surface Treatment

Surface preparation will generally include the following:

- Contour ripping of the final prepared surface as a means of increasing moisture infiltration and thus improving and prolonging the available moisture to the establishing vegetation. This process provides the complementary benefit of reducing surface runoff, reducing erosion hazard. This operation will also promote tree root penetration which would otherwise be limited due to the effects of compaction.
- Depending on the quantity of clay within the available topdressing material, an application of gypsum at a rate of up to 8 tonnes/ha to improve the structure of the material and avoid surface sealing.
- Adding an appropriate fertiliser prior to cultivation to achieve at least a partial burial of the fertiliser below the seed. This encourages early root development down towards the fertiliser. The principal aim of cultivation is to produce a very coarse seed bed with deep furrows which trap and retain runoff and resist the formation of a surface crust or seal.

The use of fertiliser will be limited due to the proximity to Lake Burragorang and the objective of re-establishing a native forest system compatible with the

surrounding area. It is considered necessary to use at least an initial application of around 125 kg/ha. This will assist in establishing the cover crop of sterile grasses as discussed in Section 4.4.3 which will be important in reducing weed invasion prior establishment of native vegetation. Slow release fertilisers specific to native trees along with water absorbing gels can be included if preferred by SCA.

4.4.2 Topdressing

At best, only minor a minor amount of topsoil will be generated during the rehabilitation program. This material will be stockpiled on adjacent hardstand areas. Alternative topdressing material will be generated by the earthworks component. This material will consist of the weathered surface overburden material which will be more friable and conducive to plant growth so long as adequate organic material and nutrients are applied.

Spreading of available topsoil or alternative topdressing material over the final landform will be carried out as rehabilitation areas are reshaped. Revegetation of these latter areas will be carried out as soon as possible to minimise erosion potential and reduce the volume of dirty water. All runoff will be contained within on site ponds.

4.4.3 Weed Management

The main weed present on site which will need some control is Kikuyu. This is an aggressive grass which would limit the success of native vegetation establishment. Kikuyu is well established in Area 4 and around the gardens and carpark area. A Weed Management Plan will be prepared by DPI prior to the works proceeding. This plan would include any specific conditions imposed by SCA as the Authority would ultimately have an interest in the ongoing management of the property. The following protocol is suggested as appropriate:

- At least 28 days prior to construction activities commencing, areas infested with Kikuyu will be sprayed with a general none specific herbicide such as “Roundup Bioactive” in accordance with manufacturers specifications. Any woody weeds will be treated with “Grazon” or equivalent.

- At least 14 days prior to rehabilitation activities commencing, areas where soil disturbance will be necessary will be inspected and resprayed if necessary.

- Immediately prior to rehabilitation commencing, the DPI and/or SCA representatives would inspect the site to ensure that all visible weeds have been killed.

- Construction vehicles working on the property should remain dedicated to the Oakdale project until each work phase is complete. All vehicles must “present clean” prior to works commencing.

- Once rehabilitation activities have ceased, all areas previously sprayed will be sown with a sterile cover crop of oats or rye depending on season and

suitability. The purpose of this will be to cleanse the site prior to sowing the final seed mix.

Ongoing maintenance of the treated areas will be required twice per year for two years following completion of rehabilitation works. Further treatment would assessed by SCA and undertaken as required. Maintenance in the form of additional sowing, fertiliser application and spot spraying may be required.

Timing of weed spraying is also important. Late Winter to early Spring is usually the best time for Kikuyu and Pampas Grass, however some woody weeds such as Blackberry are generally dormant between Autumn and early Spring in cooler areas. Aggressive woody weeds should be spot sprayed when actively growing.

Other general matters include the range of established but exotic trees on site. These include pines, fruit trees and ornamentals which formed part of the original landscaping works. If preferred by SCA, these can be removed. Cuttings and mulch created from these trees and shrubs should not be used in the rehabilitation program.

4.4.4 Revegetation

The revegetation program aims to recreate a vegetation unit similar to that surrounding the site. Several methods have been used at other mines, with the preferred method being direct seeding with native species. This method has proved successful despite the severe drought conditions prevailing over recent years.

Following shaping and topdressing, a sterile cover crop will be sown. This will involve direct seeding with sterile oats or similar, followed by sowing with a mixture of native tree and shrub species. The advantage of this method is that the sterile cover crop is fast growing and will provide soil stabilisation until the native species become established. The sterile crop will provide good vegetative cover for a single growing seed and will not re-establish. An application rate of 40 kg/ha should be applied.

The native seed mixture will include species naturally occurring in the surrounding area, such as *Angophora costata, Eucalyptus piperita, Eucalyptus punctata, Eucalyptus paniculata, Melaleuca linariifolia, Allocasuarina littoralis, Acacia sp., Banksia spinulosa, Themeda australis, Bursaria spinosa.* Total native seed should be applied at a rate of 7 kg/ha. Seed collected from the surrounding area should be used in preference to general commercial seed.

In addition, seed from adjacent bushland will find its way to the site by natural means. Revegetation will be accelerated with proper site preparation and soil treatment.

The DPI's general success criteria for rehabilitation works include:

- Self sustaining vegetation cover, that is, vegetation that shows evidence of seed formation or regeneration.

- At least 70% coverage or at least comparable with surrounding vegetation communities.
- Comparable density to target land use. In this case it is the immediate surrounding vegetation is an open forest/woodland.
- Equal or lower concentration of weeds compared with target land use.

To achieve this standard can take several years. The management responsibility between DPI and SCA during this period will need to be negotiated.

4.5 Soil and Erosion Control

The site has an established water management systems which allow for the separation of clean and dirty water streams and provides pollution control ponds to treat dirty runoff from all exposed areas.

The pollution control ponds will contain dirty runoff generated during and immediately after the rehabilitation works. Following revegetation of the sites and stabilisation of the earthworks, the amount of dirty water generated from the sites will decrease and runoff will improve in quality.

The batter slope on the western side of Area 4 lies outside the existing pollution control system. Work in this area may generate sediment loss from the site during rainfall. It will therefore be necessary to construct a silt control fence on the western side (down stream) of the access track. This fence should be removed once the work is completed, revegetation works are established and runoff from the area is considered clean.

It is proposed to leave the existing pollution control ponds and diversion drains intact as part of the final landform. These ponds will serve as pollution control structures until all revegetation works are established and generating clean runoff. This may take two to three years following completion of the rehabilitation works. In the long term, these ponds will serve as a sustainable, clean water storages for local wildlife which will enhance the ecological value of the site. It is anticipated that runoff from the final land form will comply with the relevant water quality objectives for the catchment.

This proposed rehabilitation plan will offer a great benefit to the water quality in the area and Sydney's drinking water by effectively replacing a "dirty" site with a "clean" site. Adequate pollution control structures are in place to ensure that there is no detrimental effect on the surface water runoff through the rehabilitation process.

4.6 Environmental Monitoring

Monitoring of the rehabilitation works will continue until self sustaining. This may require several years and the ongoing management responsibility will need to be negotiated between DPI and SCA. An appropriate inspection and maintenance regime may include:

- Fortnightly inspection covering security provisions and illegal access and rubbish dumping.

- Monthly inspection of sediment ponds and drainage lines. Clean out of these structures will be on an as needs basis. which is anticipated to progressively reduce once rehabilitation works become established.

- Monthly inspection of revegetation works. This inspection will cover health and vigour, evidence of failure or maintenance requirements.

- Six monthly weed control including spot spraying as required.

- On site progress meetings with DPI, DEC and SCA as required with a minimum annual progress reports to DEC and SCA.

Visual inspection of the pollution control ponds will be carried out to determine their efficiency and operability. Testing to determine level of nutrients and sediment contained in collected runoff may be undertaken if requested by SCA or considered necessary by DPI.

The aim will be to avoid any discharges of runoff from the site during the rehabilitation works. This will be achieved by ensuring the maximum available pond storage volume is available at all times. Following heavy rainfall events, excess sediment contained within the pollution control storages will be removed in order to maximise available storage volume.

The status of plant growth will be monitored to assess the success of the revegetation techniques and the planting media used on site. All revegetation works will be inspected monthly until established. It may be necessary to apply additional fertiliser treatment, water in drier conditions or reseeding in the event of failure.

It is anticipated that the work will be regularly inspected by officers of the Department of Primary Industries (Mineral Resources) and Sydney Catchment Authority. Both the Catchment Authority and Department of Environment and Conservation will also be kept informed of the progress of the rehabilitation program.

5. Rehabilitation Schedule

It is proposed to progressively rehabilitate the site over a 5 year period. It is considered that several years may be required before a self sustaining vegetation cover is achieved.

The work will be subject to competitive tender but it is expected to be undertaken progressively over a 36 month period. It is not possible at this stage to confirm the timing of each work item.

The optimum planting time is generally late winter, however spring to early summer is also possible provided additional watering is available to avoid die off during the hotter months of summer. First planting is scheduled for late 2009 with earthworks generally scheduled for the preceding winter months.

Native seed can be sown at any time but preference should be given to avoiding late Autumn which may result in failure during winter frosts.

The program will remain flexible to cater for extended periods of rain and equipment delays as well as the prospect of speeding up the program should additional equipment or personnel be available.

The program includes several separate periods for weed control and revegetation works. The weed eradication program will be targeted mainly at Kikuyu and pampas grass. Pampas grass is best treated in late winter prior to seed heads forming in spring. Kikuyu can be treated at the same time so long as there is active growth occurring.

The revegetation program will be undertaken primarily in one phase commencing late winter/spring of 2009. Depending on success rate, a re-application of either seed or fertiliser has been scheduled for the same period in the following year. This second phase may not ultimately be required.

6. Environmental Assessment

Section 111 of the Environmental Planning and Assessment (EP&A) Act 1979 requires that a determining authority examines and takes into account to fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

Section 112 of the EP& A Act 1979 also requires that a determining authority shall not grant approval to an activity, that is likely to significantly affect the environment, without first considering an Environmental Impact Statement (EIS). In this case, the responsibility for deciding whether an EIS is required rests with DPI (Minerals Resources) although SCA is also a key stakeholder. Matters listed in Clause 228 of the Environmental Planning and Assessment Regulation governs the determination of whether or not an activity will have a significant impact on the environment, and therefore the requirement for the preparation of an EIS.

To assist in the determination process, the Department of Planning produced a guideline entitled "Is an EIS Required?" This document provides a systematic analysis of the full range of potential environmental consequences of carrying out an activity.

The results of the analysis is provided in the following tables. The analysis shows that the potential impacts from rehabilitating the Oakdale Mine Site is minor and are far outweighed by the potential environmental and social impacts of not carrying the work. Once rehabilitation works are completed there are no likely residual impacts.

A key feature of the analysis of significance is duration and mitigation potential. The ranking of each issue becomes low when the duration of impact is short and/or reversible. Other factors considered include the capacity and resilience of the environment to cope with the expected impacts. With active management in the form of erosion and weed control, rehabilitation to be consistent with surrounding land systems, the residual impacts are assessed as being low while there is the potential for overall positive impacts on the environment.

There are very few remaining issues which need to be considered. Noise and dust issues, are not significant because they will not affect on any residences. There are no negative community or social issues, matters of State or National Significance, polluting activities, hazardous or offensive activities.

Given that the site is currently a major public safety hazard matters of public interest become limited to improved safety considerations and reduced public liability. The analysis concludes that the project will not have a significant impact on the environment and can be confidently approved without the need for an EIS.

Rehabilitation of the Oakdale No 1 and 2 Shaft site
Environmental Assessment in accordance with
Department of Urban Affairs and Planning *"Is an EIS Required?"*

This report presents the state of existing environmental resources in the project area and assesses the likely potential impacts of the proposed rehabilitation of the old Oakdale mine site on the environment. The methodology provided in the DOP guideline, "*Is An EIS Required?"* was used to assist in identification of environmental issues of potential relevance to the proposal. As outlined in the guideline:

- ❒The potential environmental issues associated with the project are identified in Table 1;
- ❒The extent of the potential impacts is identified Table 2A;
- ❒Table 2B analyses the extent of potential adverse impacts in sensitive locations;
- ❒an analysis of the nature of the impacts is given in Table 2C;
- ❒An evaluation of the likely significance of the potential impacts on the environment is provided in the final table.

Description of proposed activity	Proposed Rehabilitation of the Oakdale No 1 and 2 Shaft site
Activity:	DPI (Mineral Resources) propose to rehabilitate the old Oakdale No 1 No 2 Shaft site.
Objectives:	The primary objective of the activity is to rehabilitate a derelict mine site, to reduce its impacts on the environment and to remove a significant public liability by sealing two existing shafts.
Major elements including any environmental impact mitigation measures:	The rehabilitation of the Oakdale site will result in some surface disturbance which will need to be controlled during the course of the works. The potential impacts of the activity include: ❒ Soil erosion and sedimentation impacts offsite ❒ Water quality impacts ❒ Weed invasion offsite ❒ Contamination as a result of previously imported material ❒ Increased bushfire. ❒ Public safety risk if the works do not proceed. The mitigation measures proposed include: ❒ Utilising the existing pollution control structures currently on site during the rehabilitation program. The majority of runoff from nominated rehabilitation areas reports to these existing structures. ❒ For all areas outside the existing water management structures, silt stop fencing would be used to contain sediment during the earthworks component. These fences will be inspected following rainfall and cleaned as necessary. They remain in operation until the rehabilitation works are completed and runoff is considered clean. ❒ A Weed Management Plan will be prepared and implemented prior to the works commencing. The principles of the plan will include prior spraying of weeds with an approved general herbicide, construction vehicles presenting clean and remaining on site until each stage is complete. Ongoing weed control will be required. ❒ A contamination assessment has been completed. This covered the entire site but specifically included nominated areas of concern such as imported material and its appropriateness for use in the rehabilitation program. All material found to be inappropriate for rehabilitation will be removed from site. This includes all asbestos material.

Description of proposed activity	Proposed Rehabilitation of the Oakdale No 1 and 2 Shaft site
	❒ The risk of bushfire is a result of existing hot carbonaceous material on site. A 20 m wide fire break will be established prior to works involving hot materials. Other initiatives to be undertaken include: ❒ The Shaft Sealing and Abandonment Plan is to be prepared by DPI prior to the sealing of the shafts. The shafts are currently open and represent a significant public safety hazard. ❒ If the DPI Environmental Officer identifies any threatened fauna or significant impacts on threatened or regionally significant fauna, a qualified fauna consultant will be employed to advise on appropriate mitigation measures; ❒ An environmental monitoring program is proposed which includes regular inspection of pollution control structures, revegetation works and weeds; This work will provide a significant improvement to the area to be affected by the proposed activity.
Any ancillary works:	The only ancillary works include removal of power poles leading to the site and the removal of a small shed located near the front entrance.
Outline of construction of methods:	The rehabilitation program will require a dozer, front end load or excavator, trucks, crane and/or lifting equipment and general site vehicles.
Outline of operations:	Oakdale Colliery is closed and the lease has been extinguished. The rehabilitation works represent a once off activity. Once complete and self sustaining, no further activities would occur on site.
Location(s):	Oakdale Colliery was established in 1948 and was originally known as the Burragorang State Coal mine, operating within Mining Lease 1378 (originally part of Consolidated Coal Lease 740), which covers a total area of 4,289.75 hectares in the southern coalfields of NSW, as shown on Figure 1. The Colliery surface area itself covers approximately 2.8 ha, and is located within the Warragamba Special Area, a sensitive part of Sydney's drinking water catchment. The No 1 and No 2 Shafts are located near the junction of Steveys Forest Road and Ridge Road Oakdale.
Time frame:	The work will commence in 2005 and continue till late 2006. Ongoing maintenance may occur for several years.

Table 1 – Identify the Issues

Characteristics of the activity (during construction and operation)	Potential Issues
How is the proposal likely to affect the physical aspects of the environment or introduce pollution or safety risk factors?	
1. Disturbs the topography or above or below ground features including filling, excavation, dredging, tunnelling: eg landforming, site preparation, quarrying, reclamation, creation of islands, water bodies, etc; involves the disposal of large quantities of spoil.	The rehabilitation work will involve removal of buildings, some land shaping and revegetation works.
2. Affects a natural waterbody, wetland or groundwater aquifer or the natural water drainage pattern; affects the quality or quantity of water in the systems.	There are no surface water courses affected however the filling of the shafts may involve groundwater systems. At around 500 m depth and with the seam dipping to the east, the potential for groundwater effects on local streams or Lake Burragorang is extremely limited
3. Uses groundwater or surface water from a natural waterbody; stores water in a dam or artificial waterbody.	There are no dams or artificial water bodies affected. There are no groundwater users in the area to be affected.
4. Changes the flood or tidal regimes or is affected by flooding or tides.	None
5. Uses, stores, disposes or transports hazardous substances (flammable, explosive, toxic, radioactive, carcinogenic or mutagenic substances); uses or generates pesticides, herbicides, fertilisers or other chemicals which may build up residues in the environment.	None
6. Generates or disposes of gaseous, liquid or solid waste (industrial, medical or domestic waste, sewage, sludge or effluent, spoil or overburden); generates greenhouse gas emissions or releases chemicals which affect the ozone layer or a precursors to photochemical smog; generates or disposes of hazardous waste.	All waste generated by the rehabilitation project will be used on site. All contaminated material is to be removed to a licensed facility.
7. Emits dust, odours, noise, vibrations, blasts, electromagnetic fields or radiation in the proximity of residential areas or landuses likely to be affected.	potential for dust and noise for short periods during earthworks will be minor and will not be in the vicinity of residential dwellings.
8. Any other matters.	Erodible soils are present which will require implementation of appropriate erosion and sedimentation controls.
	If no impacts identified this section can be ignored in Tables 2(a) and 2(c)
How is the proposal likely to affect the biological aspects of the environment?	
1. Clears or modifies (including by modifying the drainage) native vegetation (including trees, shrubs, grasses, herbs or aquatic species).	Some vegetation may need to be cleared as part of the rehabilitation program, however this represents either previously revegetated land or regrowth following closure of the mine.
2. Displaces or disturbs fauna (terrestrial or aquatic) or creates a barrier to fauna movement; clears remnant vegetation or wildlife corridors.	None
3. Introduces noxious weeds, vermin, feral species or disease or releases genetically modified organisms.	The project is not expected to introduce weeds to area. A weed management plan is proposed as part of the project.
4. Undertakes activity that affects revegetation or replenishment of native species following a disturbance.	None, the project will have a temporary impact only
5. Introduces high bushfire risk factors or changes the fire regime.	None
6. Any other issues.	None
	If no impacts identified this section can be ignored in Tables 2(a) and 2(c)
How is the proposal likely to affect natural or community resources?	
1. Uses or results in the use of community services or infrastructure including roads, power, water, drainage, waste management, education, medical or social services.	No longterm impact. Project will provide improved community safety by reducing the risk of injury on site.
2. Uses or results in the use of natural resources including water (ground or surface), fuels, timber, extractive material, minerals, prime agricultural land, etc.	The project will not require any additional water, power or other services however diesel fuel will be used during the rehabilitation program.
3. Affects future potential of commercial deposits of minerals or extractive material or areas important for fishing, agriculture or forestry.	None
4. Changes the demographics of an area.	None

Table 1 – Identify the Issues

Characteristics of the activity (during construction and operation)	Potential Issues
5. Changes the transport requirement of an area.	None
6. Creates a new route alignment for the provision of infrastructure (eg rail, roads, power, etc).	None.
7. Any other issues.	The project is important in that the current site represents a public safety concern as well as an ongoing environmental liability within a sensitive water catchment area.
	If no impacts identified in this section can be ignored in Tables 2(a) and 2(c)
How is the proposal likely to affect the community?	
1. Generates population movements including influx or departure of the workforce.	None
2. Changes the workforce or industry structure of the area/region.	None
3. Affects employment opportunities in areas of high population densities or established development patterns.	None
4. Affects access to an area, building or items of aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, recreational, aesthetic or social significance or other special value for present or future generations.	None, any implications will be transient.
5. Affects the visual or scenic landscape (including major cuts/fills, towers, projects on escarpments, etc).	No significant impacts or issues
6. Affects sunlight or views of another property.	None
7. Affects the amenity of publicly owned land (particularly recreational areas, national parks or reserves).	No longterm implications.
8. Changes surrounding land uses as a direct or indirect result of the activity; forms a barrier to movement within the community or access to existing properties; leads to a loss of housing.	None
9. Generates significant volume of traffic (road, rail, air, pedestrian, etc).	None
10. Generates nuisance, health or safety risks including air pollution, odour, noise or vibration, blasting, electromagnetic fields or radiation; releases diseases or genetically modified organisms; changes the bush fire regime.	No longterm implications or affects. Some minor emission from equipment during rehabilitation works.
11. Any other issues.	No
	If no impacts identified this section can be ignored in Tables 2(a) and 2(c)
How is the proposal likely to affect areas sensitive because of physical factors?	
1. Coastline and dune fields, alpine areas, deserts, caves or other unique landforms.	No impact
2. Land with high agricultural capability.	No impact
3. Natural waterbodies, riparian zones, wetlands, drinking water catchments or flood prone areas.	No significant impact. Final result will be an improvement in drinking water catchment
4. Groundwater recharge areas or areas with high water table.	No significant impact
5. Erosion prone area; areas with slopes of greater than 18 degrees.	No significant impact
6. Subsidence or slip areas.	No significant impact
7. Areas with acid sulphate, sodic or highly permeable soils.	No significant impact
8. Areas with salinity or potential salinity problems.	No significant impact
9. Areas with degraded air quality.	No significant impact
10. Areas with degraded or contaminated soil area or degraded or contaminated water (ground or surface).	No significant impact)
11. Any other sensitive areas.	None identified
	If no impacts identified this section can be ignored in Tables 2(a) and 2(c)
How is the proposal likely to affect areas sensitive because of biological factors?	
1. Corals and seagrass beds, wetland communities (coastal, peatlands or inland), native forests, urban bushland, arid and semi-arid communities.	No significant impact

Table 1 – Identify the Issues

Characteristics of the activity (during construction and operation)	Potential Issues
2. Critical habitats or the habitats of threatened fauna or flora species, populations or ecological communities (within the meaning of the TSC Act).	No significant impact
3. Habitat of species listed under international agreements including Japan-Australia Migratory Birds Agreement (JAMBA) and China-Australia Migratory Birds Agreement (CAMBA).	No impact
4. Wildlife corridors and remnant vegetation.	No significant impact. Revegetation works will enhance wildlife corridors within the catchment area. Resultant impacts from the project will be beneficial.
5. Habitat of protected aquatic species (within the meaning of Fisheries Management (General) regulation 1994) or of aquatic species having conservation status under Conference on Australian Threatened Fishes.	No impact
6. Fishing grounds and commercial fish breeding or nursery areas.	No impact
7. Bushfire prone areas.	No significant impact. Management of hot coal areas will be important
8. Any other sensitive issues.	None identified
	If no impacts identified this section can be ignored in Tables 2(a) and 2(c)
How is the proposal likely to affect areas allocated for conservation purposes?	
1. National parks and other areas reserved or dedicated under the NP&W Act.	No impact
2. Land reserved or dedicated within the meaning of the *Crown Lands Act 1989* for preservation or other environmental protection purposes.	No impact. The land is not currently conserved however, mitigation measures proposed will ensure no longterm implications as well as potential benefits with the bushland improvement.
3. World heritage areas.	No impact
4. Environmental protection zones in environmental planning instruments or lands protected under SEPP 14 – Coastal Wetlands or SEPP 26 - Littoral Rainforests.	No impact
5. Land identified as wilderness under the *Wilderness Act 1987* or declared as wilderness under the NP&W Act.	No impact
6. Aquatic reserves dedicated under the *Fisheries Management Act 1994*.	No impact
7. Wetlands areas dedicated under the Ramsar Wetlands Convention.	No impact.
8. Heritage items identified on the Register of the National Estate, under the NSW Heritage Act or an environmental planning instrument.	No impacts to known or registered items
9. Community land under the Local Government Act (for which a plan of management has been prepared).	No impact
10. Land subject to a 'conservation agreement' under the NP&W Act.	No impact
11. Any other areas.	None identified
	If no impacts identified this section can be ignored in Tables 2(a) and 2(c)
How is the proposal likely to affect areas sensitive because of community factors?	
1. Aboriginal communities or areas subject to land rights claims.	No impact.
2. Communities with a strong sense of identity.	No impact
3. Disadvantaged communities (reduced economic, social or cultural indicators).	No impact
4. Areas with degraded amenity from noise, traffic congestion or odour.	No measurable impact
5. Areas or items or high anthropological, archaeological, architectural, cultural, heritage, historical, recreational or scientific value.	Low potential for impact. Oakdale mine site is not an example of mine architecture worthy of protection.
6. Areas or items of high aesthetic or scenic value.	No impact
7. Any other areas	None identified
	If no impacts identified this section can be ignored in Tables 2(a) and 2(c)

Table 2A – Analysis of the extent of the potential impacts

Characteristics of potential impacts (adverse & beneficial)	Type of potential impacts	Evaluation criteria		Ranking of potential significance of extent
		size, scope & intensity	duration	
Physical or pollution impacts (during operation and construction)				
(a) Air impacts				
1. air quality impacts (eg dust, smoke, grit, odours, precursors to photochemical smog, fumes, toxic or radioactive gaseous emissions) with economic, health, ecosystem or amenity considerations	Potential for dust and noise generation during rehabilitation works	Very minor amounts anticipated to be generated	Short term impacts during construction only. No nearby residential receptors	Low
2. air impacts with greenhouse or ozone damage considerations	none			Low
3. any other air impacts	none			Low
(b) Water impacts				Low
1. impacts from changes in surface or groundwater quantity	Minor and temporary changes to surface flow	No groundwater users or drainage sensitive ecosystems. Rehabilitation works will provide overall improvement in surface water quality	Short term while rehabilitation works are being undertaken	Moderate
2. impacts from use of water	none			Low
3. impacts from changes to natural waterbodies, wetlands or runoff patterns	Minor changes to water quality during earthworks component	Moderate impact in short term, minimal impact in longterm	Short term during rehabilitation	Moderate
4. impacts from changes to flooding or tidal regimes	None	Nil	None	Low
5. impacts from changes in water quality with economic, health, ecosystem or amenity considerations-eg salinity, colour, odour, turbidity, temperature, dissolved oxygen, nutrients, pH factors or pollutants intentional or unintentional releases of oil, fuels, toxins - including heavy metals and anti-foulants, spoil, sediment, sewage or other waste	Possible sediment movement during rehabilitation works. No discharges required or associated with activity	Small areas exposed for short periods of time. Minor risk during rehabilitation of disturbed sites. Longterm improved water quality	Sediment exposure following earthworks plus rehabilitation time	Low
6. any other impacts on water or from the use or storage of water	none			Low
(c) Soil and stability impacts				
1. degradation of soil quality including contamination (intentional or unintentional), salinisation or acidification	none	Rehabilitation works will generally involve shaping of material on site.	Short term	Low
2. loss of soil from wind or water erosion	Surfaces may erode prior to completion of rehabilitation works	Minor potential for some erosion should high intensity storms occur after damage but prior to erosion control works established	High risk period only 1-2 months during disturbance and rehabilitation. No long term risks	Low
3. loss of structural integrity of the soil	none			Low

Table 2A – Analysis of the extent of the potential impacts

Characteristics of potential impacts (adverse & beneficial)	Type of potential impacts	Evaluation criteria		Ranking of potential significance of extent
		size, scope & intensity	duration	
4. increased land instability with high risks from land slides or subsidence	None	None	None	Low
5. any other soil impacts	none			Low
(d) Noise and vibration impacts				
1. results in increased noise or vibrations to unacceptable levels for the surrounding communities	none			Low
2. affects sensitive properties (educational, hospitals, residential, heritage)	none			Low
3. any other impacts from noise, blasting or vibration	None identified	No nearby residences		Low
(e) Any other physical or pollution impacts				
Accumulation of physical or pollution impacts - Low				
Biological impacts (during operation and construction)				
(a) Fauna impacts				
1. any endangering or displacement of fauna species (including animals, birds, frogs, reptiles, insects, fish or crustaceans)	No endangering of fauna. Potential for minor displacement during rehabilitation works	Low impacts	Short term	Low
2. any reduction of critical habitat of any unique, threatened or endangered fauna (within the meaning of the NP&W Act)	No impacts	Low impacting activity	Short term with longterm positive benefits	Low
3. impacts which create significant barriers to fauna movement	Required rehabilitation works will not create barriers to fauna	Low impacting activity	Short term	Low
4. any other impacts	None identified	Low impacting activity	Short term	Low
(b) Flora impacts				
1. any endangering of flora species (including trees, shrubs, grasses, herbs or aquatic plants)	No rare species identified on site	Very low, particularly with implementation of mitigation measures including revegetation with locally indigenous plant species	Short term	Low
2. impacts from the clearing or modifying of extensive areas of relatively undisturbed native vegetation or wetlands	Minor clearing for access to rehabilitation sites below the existing site. All access roads will also be rehabilitated.	Areas to be impacted would generally be less than 2 ha	Short term	Moderate
3. any other impacts	None identified			Low
(c) Ecological impacts				
1. any threat to the biological diversity or ecological integrity of species or communities	None	Low and temporary implications during	Short term	Low

Table 2A – Analysis of the extent of the potential impacts

Characteristics of potential impacts (adverse & beneficial)	Type of potential impacts	Evaluation criteria		Ranking of potential significance of extent
		size, scope & intensity	duration	
		rehabilitation		
2. any barrier to the normal replenishment or revegetation of existing species following disturbance	None			Low
3. impacts from the introduction of noxious weeds, vermin, feral species or diseases or releases of genetically modified organisms	Potential for minor impacts due to weeds	Very low, particularly with implementation of mitigation measures and proposed weed management plan	Medium to long term	Low
4. impacts from the uses of pesticides, herbicides, fertilisers or other chemicals which may build up residues in the environment	None			Low
5. high bushfire risk impacts	None			Low
6. any other impacts	None identified			Low
Accumulation of biological impacts- Low				
Resource use impacts (during operation and construction)				
(a) Community resources				
1. any significant increase in the demand for services and infrastructure resources including roads, power, water supply and drainage, waste including sewage management, education, medical and social services	No			Low
2. any significant resource recycling or reuse schemes to reduce resource usage	No			Low
3. any diversion of resources to the detriment of other communities or natural systems	No			
4. any degradation of infrastructure such as roads, bridges	No			Low
5. any other impacts	No			Low
(b) Natural resources				Low
1. any disruption or destruction of natural resources (eg fish habitat or fish species) with impacts on industries based on these resources	No			Low
2. any disruption of existing activities (or reduction of options for future options) because of the natural resource demands of the proposal	No			Low
3. any use which results in the wasteful use of large amounts of natural resources	No			Low
4. any use which results in the substantial depletion of natural resources	No			Low
5. any use which results in the degradation of any area reserved for conservation purposes	No			Low
6. any other impacts	No			Low
Accumulation of resource use impacts - Low				
Community impacts (during operation and construction)				
(a) Social factors				
1. any impacts which result in a change in the community's demographic structure	No			Low
2. any environmental impact that may cause substantial change or disruption to the community (loss of neighbourhood cohesion, access to facilities, links to other communities, community identity or cultural character)	No			Low

Table 2A – Analysis of the extent of the potential impacts

Characteristics of potential impacts (adverse & beneficial)	Type of potential impacts	Evaluation criteria		Ranking of potential significance of extent
		size, scope & intensity	duration	
3. any impacts which result in some individuals or communities being significantly disadvantaged	No			Low
4. any impacts on the health, safety, security, privacy or welfare of individuals or communities because of factors such as: i) air pollution or odour ii) noise, vibration, blasting, electromagnetic fields or radiation iii) release of disease or genetically modified organisms iv) lighting, overshadowing or visual impacts	No			Low
5. any impacts that result in a change in the level of demand for community resources (eg facilities, services and labour force)	No			Low
6. any other social impacts	No			Low
(b) Economic factors (including impacts on employment, industry and property value)				
1. any impacts which result in a decrease to net economic welfare	No			Low
2. any impacts that result in a direct cost to the community or individuals	No			Low
3. any impacts that result in a decrease in the community's economic stability	No			Low
4. any impacts which result in a change to the public sector revenue or expenditure base	No			Low
5. any other economic impacts	No			Low
(c) Heritage, aesthetic and cultural impacts				
1. any impacts on a locality, place, building or natural landmark having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, recreational, scenic or social significance or other special value for present or future generations	None known, the site has been an active mine site since 1948			Low
2. any impacts from new lighting, glare or shadows	None			
3. any other heritage, aesthetic or cultural impacts	None known and unlikely	Low impact	Long term	Low
(d) Land use impacts				Low
1. any major changes in land use	None			Low
2. any curtailment of other beneficial use	None			Low
3. any property value impacts with land use implications	None			Low
4. any other land use impacts	None			Low
(e) Transportation Impacts (during construction and operation)				
1. substantial impacts on existing transportation systems (rail, water, road, air or pedestrian – both public and private), altering present patterns of circulation, modal split or movement of people and/or goods	None			Low
2. directly or indirectly encouraging additional traffic: i) during construction ii) during operation	No			Low
3. increased demand for parking (off and on street including residential areas)	No			Low
4. any other impacts on transport or traffic	No			Low
Accumulation of community impacts - Low				

Table 2B – Analysis of the extent of the potential adverse impacts in sensitive locations

Characteristics of potential impacts (adverse & beneficial)	Type of potential impacts	Evaluation criteria		Ranking of potential significance of extent
		size, scope & intensity	duration	
On areas sensitive because of physical factors				
1. coastline and dune fields, alpine areas, deserts, caves or other unique landforms	None			
2. land with high agricultural capability	None			
3. natural waterbodies, riparian zones, wetlands, drinking water catchments or flood prone areas	Physical displacement and/or temporary removal of small areas of habitat	Minor and temporary impacts until rehabilitation works are established	Short term	Low
4. groundwater recharge areas or areas with high water table	None			Low
5. erosion prone areas; areas with slopes of greater than 18 degrees	None			Low
6. subsidence or slip areas	None			Low
7. areas with acid sulfate, sodic or highly permeable soils	None			Low
8. areas with salinity or potential salinity problems	None			Low
9. areas with degraded air quality	None			Low
10. areas with degraded or contaminated soil area or degraded or contaminated water (ground or surface)	Movement of contaminated soil & water	Low impact	Short and long term	Moderate
11. any other factors	None identified			
Accumulation of impacts: Low				
On areas sensitive because of biological factors				
1. corals and seagrass beds, wetland communities (coastal, peatlands or inland), native forests, urban bushland, arid and semi-arid communities	Minor and temporary	Some clearing may be required to access rehabilitation areas	Short term	Moderate
2. habitat of endangered terrestrial or aquatic fauna species and of species listed under international agreements including Japan-Australia Migratory Birds Agreement (JAMBA) and China-Australia Migratory Birds Agreement (CAMBA)	affects until rehabilitation works are complete	Minor with incorporation of management controls	Short term	Low
3. habitat/wildlife corridors and remnant vegetation	No significant impact	Rehabilitation works will correct any damage	Short term	Low
4. protected, rare or threatened plant species or inadequately reserved plant communities	No significant impact	Local native species will be used in rehabilitation	Short term	Low
5. bushfire prone areas	No impact			Low
6. fishing grounds and fish breeding or nursery areas	No impact			Low
Accumulation of impacts - Low				
On areas sensitive because of conservation factors				

Table 2B – Analysis of the extent of the potential adverse impacts in sensitive locations

Characteristics of potential impacts (adverse & beneficial)	Type of potential impacts	Evaluation criteria		Ranking of potential significance of extent
		size, scope & intensity	duration	
1. National Parks and other areas reserved or dedicated under the *National Parks and Wildlife Act 1974*	None			Low
2. land reserved or dedicated within the meaning of the *Crown Lands Act 1989* for reservation or other environmental protection purposes	None			Low
3. World Heritage areas	None			Low
4. environmental protection zones in environmental planning instruments or lands protected under SEPP 14 - *Coastal Wetlands* or SEPP 26 - *Littoral Rainforest*	None			Low
5. land identified as wilderness under the *Wilderness Act 1987* or declared as wilderness under the *National Parks and Wildlife Act 1974*	None			Low
6. aquatic reserves dedicated under the *Fisheries Management Act 1994*	None			Low
7. wetlands areas dedicated under the Ramsar Wetlands Convention	None			Low
8. heritage items identified on the Register of the National Estate, under the *Heritage Act 1977* (NSW) or an environmental planning instrument	None			Low
9. community land under the *Local Government Act 1993* (for which a plan of management has been prepared)	None			Low
10. land subject to a 'conservation agreement' under the *National Parks and Wildlife Act 1974*	None			Low
11. any other factors	None identified			Low
Accumulation of impacts: Low				
On areas sensitive because of community factors				
1. Aboriginal communities or areas subject to land rights claims	None			
2. communities with a strong sense of identity	None			Low
3. disadvantaged communities (reduced economic, social or cultural indicators)	None			Low
4. areas with degraded amenity from noise, traffic congestion or odour	None			Low
5. areas or items of high anthropological, archaeological, architectural, cultural, heritage, historical, recreational or scientific value	None			Low
6. areas or items of high aesthetic or scenic value	None			Low
7. any other factors	None			Low
Accumulation of impacts: Low				

Table 2C - Analysis of the Nature of the Potential Impacts

	Evaluation Criteria							
Characteristics of potential impacts (adverse & beneficial)	**What is the confidence in predicting impacts?**	**How resilient is the environment to cope with impacts?**	**Can the impact be reversed?**	**How well can the impacts be mitigated?**	**Do the impacts comply with plans, policies?**	**What is the level of public concern?**	**Are further studies required on impacts or mitigation?**	**Ranking of potential significance**
Physical impacts or pollution impacts (during operation and construction)								
(a) Air impacts								
1. air quality impacts (eg dust, smoke, grit, odours, precursors to photo- chemical smog, fumes, toxic or radioactive gaseous emissions) with economic, health, ecosystem or amenity considerations	High	Highly	Yes	Highly due to distance from local residences	Yes	Very low	No	Low
2. air impacts with green- house or ozone damage consideration	High	Highly	Yes	Highly	Yes	Very low	No	Low
3. any other air impacts	None identified							
(b) Water impacts								
1. impacts from changes in surface or ground water quantity	Moderate	Moderately	Yes	Adequately through rehabilitation	Yes	Low	No	Low
2. impacts from use of water	High	Moderately	Yes	N/a	Yes	Low	No	Low
3. impacts from changes to natural waterbodies, wetlands or runoff patterns	High	Moderately	Yes	Adequately through rehabilitation	Yes	Low	No	Low
4. impacts from changes to flooding or tidal regimes	High	Moderately	Yes	Adequately through rehabilitation	Yes	Low	No	Low
5. impacts from changes in water quality with economic, health, ecosystem or amenity considerations – eg salinity, colour, odour, turbidity, temperature, dissolved oxygen, nutrients, pH factors or pollutants (intentional or unintentional releases of oil, fuels, toxins including	High	Highly	Yes	Adequately, though rehabilitation and proposed erosion controls	Yes	Low	No	Low

Table 2C - Analysis of the Nature of the Potential Impacts

	Evaluation Criteria							
Characteristics of potential impacts (adverse & beneficial)	**What is the confidence in predicting impacts?**	**How resilient is the environment to cope with impacts?**	**Can the impact be reversed?**	**How well can the impacts be mitigated?**	**Do the impacts comply with plans, policies?**	**What is the level of public concern?**	**Are further studies required on impacts or mitigation?**	**Ranking of potential significance**
heavy metals, and anti-foulants), spoil, sediment, sewage or other waste 6. any other impacts on water or from the use or storage of water	None Identified	N/A	N/A	N/A	N/A	N/A	N/A	Low
(c) Soil and stability impacts								
1. degradation of soil quality including contamination (intentional or unintentional), salinisation or acidification	High	Moderately	Yes	Highly	Yes	Low	No	Low
2. loss of soil from wind or water erosion	High	Highly	Yes	Adequately with proposed erosion controls	Yes	Low	No	Low
3. loss of structural integrity of the soil	High	Highly	No	Adequately through rehabilitation but some soil structure loss in two areas may occur	Yes	Low	No	Low
4. increased land instability with high risks from land slides or subsidence	Moderately	Highly	No	Adequately through rehabilitation	Yes	Low	Yes, ongoing subsidence modelling and monitoring	Moderate
5. any other soil impacts	N/a							Low
(d) Noise and vibration impacts								
1. results in increased noise or vibrations to unacceptable levels for the surrounding communities	High	Highly	Yes	Highly due to distance from local	Yes	Low	No	Low

Table 2C - Analysis of the Nature of the Potential Impacts

	Evaluation Criteria							
Characteristics of potential impacts (adverse & beneficial)	**What is the confidence in predicting impacts?**	**How resilient is the environment to cope with impacts?**	**Can the impact be reversed?**	**How well can the impacts be mitigated?**	**Do the impacts comply with plans, policies?**	**What is the level of public concern?**	**Are further studies required on impacts or mitigation?**	**Ranking of potential significance**
				residences				
2. affects sensitive properties (educational, hospitals, residential, heritage)	High	Highly	Yes	Highly due to distance	Yes	Low	No	Low
3. any other impacts from noise, blasting or vibrations	High	Highly	Yes	Highly due to distance	Yes	Low	No	Low
(e) Any other physical or pollution impacts								
Accumulation of physical or pollution impacts - Low								
Biological impacts (during operation and construction)								
(a) Fauna impacts								
1. any endangering or displacement of fauna species (including animals, birds, frogs, reptiles, insects, fish or crustaceans)	High	Moderately	Yes, displace-ment temporary	Adequately through rehabilitation	Yes	Moderate	Yes, ongoing assessment by environmental professionals	Low
2. any reduction of critical habitat of any unique, threatened or endangered fauna (within the meaning of the NP&W Act)	High	Moderately	Yes, through rehabilitation	Adequately through rehabilitation	Yes	Moderate	Yes, ongoing assessment by environmental professionals	Low
3. impacts which create significant barriers to fauna movement	High	Highly	Yes, through rehabilitation	Adequately through rehabilitation	Yes	Moderate	Yes, ongoing assessment by environmental professionals	Low
4. any other impacts	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low
(b) Flora impacts								
1. any endangering of flora species including trees, shrubs, grasses, herbs or aquatic plants	High	Highly	Potential but controlled by further assessment	Adequately through rehabilitation	Yes	Moderate	Yes, ongoing assessment by environmental professionals	Low

Table 2C - Analysis of the Nature of the Potential Impacts

	Evaluation Criteria							
Characteristics of potential impacts (adverse & beneficial)	**What is the confidence in predicting impacts?**	**How resilient is the environment to cope with impacts?**	**Can the impact be reversed?**	**How well can the impacts be mitigated?**	**Do the impacts comply with plans, policies?**	**What is the level of public concern?**	**Are further studies required on impacts or mitigation?**	**Ranking of potential significance**
2. impacts from the clearing or modifying of extensive areas of relatively undisturbed native vegetation or wetlands	Moderate	Highly	Yes, through rehabilitation	Adequately through rehabilitation	Yes	Moderate	Yes, ongoing assessment by environmental professionals	Low
3. any other impacts	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Low
(c) Ecological impacts								
1. any threat to the biological diversity or ecological integrity of species or communities	High	Highly	Yes					
2. any barrier to the normal replenishment or revegetation of existing species following disturbance	N/a (see Table 1)							
3. impacts from the introduction of noxious weeds, vermin, feral species or diseases or releases of genetically modified organisms	High	Mitigation measures required to ensure spread of weeds is minimised	no	Well	Yes	low	no	Low
4. impacts from the uses of pesticides, herbicides, fertilisers or other chemicals which may build up residues in the environment	High	Highly	Yes	N/a	Yes	Low	No	Low
5. high bushfire risk impacts	High	Highly	Yes	N/a	Yes	Low	No	Low
6. any other impacts	High	Highly	Yes	N/a	Yes	Low	No	Low
Resource use impacts (during operation and construction)								
(a) Community resources								
1. any significant increase in the demand for services and infrastructure resources including roads, power, water supply and	High	Highly	Yes	N/a	Yes	Low	No	Low

Table 2C - Analysis of the Nature of the Potential Impacts

	Evaluation Criteria							
Characteristics of potential impacts (adverse & beneficial)	**What is the confidence in predicting impacts?**	**How resilient is the environment to cope with impacts?**	**Can the impact be reversed?**	**How well can the impacts be mitigated?**	**Do the impacts comply with plans, policies?**	**What is the level of public concern?**	**Are further studies required on impacts or mitigation?**	**Ranking of potential significance**
drainage, waste (including sewage) management, education, medical and social services								
2. any significant resource recycling or reuse schemes to reduce resource usage	High	Highly	Yes	N/a	Yes	Low	No	Low
3. any diversion of resources to the detriment of other communities or natural systems	High	Highly	Yes	N/a	Yes	Low	No	Low
4. any degradation of infrastructure such as roads, bridges	High	Highly	Yes	N/a	Yes	Low	No	Low
5. any other impacts	High	Highly	Yes	N/a	Yes	Low	No	Low
(b) Natural resources								
1. any disruption or destruction of natural resources (eg fish habitat or fish species) with impacts on industries based on these resources	High	Highly	Yes	N/a	Yes	Low	No	Low
2. any disruption of existing activities (or reduction of options for future options) because of the natural resource demands of the proposal	High	Highly	Yes	N/a	Yes	Low	No	Low
3. any use which results in the wasteful use of large amounts of natural resources	High	Highly	Yes	N/a	Yes	Low	No	Low
4. any use which results in the substantial depletion of natural resources	High	Highly	Yes	N/a	Yes	Low	No	Low
5. any use that results in the degradation of any area reserved for conservation purposes	High	Highly	Yes	N/a	Yes	Low	No	Low
Accumulation of resource use impacts: Low								
Community impacts (during operation and construction)								

Table 2C - Analysis of the Nature of the Potential Impacts

	Evaluation Criteria							
Characteristics of potential impacts (adverse & beneficial)	**What is the confidence in predicting impacts?**	**How resilient is the environment to cope with impacts?**	**Can the impact be reversed?**	**How well can the impacts be mitigated?**	**Do the impacts comply with plans, policies?**	**What is the level of public concern?**	**Are further studies required on impacts or mitigation?**	**Ranking of potential significance**
(a) Social impacts								
1. any impacts which result in a change in the community's demographic structure	High	Highly	Yes	N/a	Yes	Low	No	Low
2. any environmental impact that may cause substantial change or disruption to the community (loss of neighbour cohesion, access to facilities, links to other communities, community identity or cultural character)	High	Highly	Yes	N/a	Yes	Low	No	Low
3. any impacts which result in some individuals or communities being significantly disadvantaged	High	Highly	Yes	N/a	Yes	Low	No	Low
4. any impacts on the health, safety, security, privacy or welfare of individuals or communities because of factors such as	High	Highly	Yes	N/a	Yes	Low	No	Low
i) air pollution or odour, noise								
ii) vibration, blasting, electro-magnetic fields or radiation								
iii) release of disease or genetically modified organisms								
iv) lighting, overshadowing or visual impacts								
5. any impacts that result in a change in the level of demand for community resources (eg facilities, services and labour force)	High	Highly	Yes	N/a	Yes	Low	No	Low
6. any other social impacts	N/a							Low
(b) Economic factors (including impacts on employment, industry and property value)								

Table 2C - Analysis of the Nature of the Potential Impacts

	Evaluation Criteria							
Characteristics of potential impacts (adverse & beneficial)	**What is the confidence in predicting impacts?**	**How resilient is the environment to cope with impacts?**	**Can the impact be reversed?**	**How well can the impacts be mitigated?**	**Do the impacts comply with plans, policies?**	**What is the level of public concern?**	**Are further studies required on impacts or mitigation?**	**Ranking of potential significance**
1. any impacts which result in a decrease to net economic welfare	High	Highly	Yes	N/a	Yes	Low	No	Low
2. any impacts that result in a direct cost to the community or individuals	High	Highly	Yes	N/a	Yes	Low	No	Low
3. any impacts that result in a decrease in the community's economic stability	High	Highly	Yes	N/a	Yes	Low	No	Low
4. any impacts which result in a change to the public sector revenue or expenditure base	High	Highly	Yes	N/a	Yes	Low	No	Low
5. any other economic impacts	High	Highly	Yes	N/a	Yes	Low	No	Low
(c) Heritage, aesthetic and cultural impacts								
1. any impacts on a locality, place, building or natural landmark having aesthetic anthropological, archaeological, architectural, cultural, historical, scientific, recreational, scenic or social significance or other special value for present or future generations	High	Highly	Yes	N/a	Yes	Low	No	Low
2. any impacts from new lighting, glare or shadows	High	Highly	Yes	N/a	Yes	Low	No	Low
3. any other heritage, aesthetic, cultural impacts	high	high	no	Very well	yes	low	No	Low
(d) Land use impacts								
1. any major changes in land use	High	Highly	Yes	N/a	Yes	Low	No	Low
2. any curtailment of other beneficial uses	High	Highly	Yes	N/a	Yes	Low	No	Low
3. any property value impacts with land use implications	High	Highly	Yes	N/a	Yes	Low	No	Low
4. any other land use impacts	High	Highly	Yes	N/a	Yes	Low	No	Low
(e) Transportation impacts)								

Table 2C - Analysis of the Nature of the Potential Impacts

	Evaluation Criteria							
Characteristics of potential impacts (adverse & beneficial)	**What is the confidence in predicting impacts?**	**How resilient is the environment to cope with impacts?**	**Can the impact be reversed?**	**How well can the impacts be mitigated?**	**Do the impacts comply with plans, policies?**	**What is the level of public concern?**	**Are further studies required on impacts or mitigation?**	**Ranking of potential significance**
1. substantial impacts on existing transportation systems (rail, water, road air or pedestrian – both public and private), altering present patterns of circulation, modal split or movement of people and/or goods	High	Highly	Yes	N/a	Yes	Low	No	Low
2. directly or indirectly encouraging additional traffic	High	Highly	Yes	N/a	Yes	Low	No	Low
i) during construction								
ii) during operation								
3. increased demand for parking (off and on street including residential areas)	High	Highly	Yes	N/a	Yes	Low	No	Low
4. any other impacts on transportation or traffic	High	Highly	Yes	N/a	Yes	Low	No	Low
Accumulation of community impacts - Low								

TABLE 3 EVALUATE THE LIKELY SIGNIFICANCE OF POTENTIAL IMPACTS ON THE ENVIRONMENT

Impacts	Potential significance considering the extent of impacts	Potential significance considering the level of adverse impacts on environmentally sensitive areas	Potential significance considering the nature of the impacts
Physical and pollution			
a) air impacts	low	low	low
b) water impacts	low	low	low
c) soil impacts	low	low	low
d) noise and vibration	low	low	low
Biological			
a) fauna	low	low	low
b) flora	low	low	low
c) ecological	low	low	low
Resource Use			
a) community resources	low	low	low
b) natural resources	low	low	low
Community			
a) social impacts	low	low	low
b) economic impacts	low	low	low
c) heritage, aesthetic, cultural impacts	low	low	low
d) land use impacts	low	low	low
e) transportation impacts	low	low	low
Activity as a whole	low	low	low

This activity is **not likely** to significantly affect the environment. No EIS is required. ☑

or

This activity is **likely** to significantly affect the environment. An EIS is required. ☐

Person responsible for analysing the potential impacts
(eg preparing the REF if necessary)

Robert Byrnes,
Project Manager
International Environmental Consultants

Signature:

Date:

6 October 2006