



Integra Coal Operations Pty Ltd

ABN: 96 118 030 998

Environmental Assessment

Glennies Creek Open Cut Coal Mine

Prepared by:



R.W. CORKERY & CO. PTY. LIMITED

October 2007



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Author's Certification

for the submission of an Environmental Assessment prepared in accordance with the
Environmental Planning and Assessment Act 1979 (Part 3A – Section 75).

(a) EA prepared by:

name: Robert W. Corkery
qualifications: M.Appl.Sc, B.Appl.Sc(Hons)
address: 75 Kite Street
ORANGE NSW 2800

(b) Planning Approval application by:

applicant name: Integra Coal Operations Pty Ltd
PMB 7
SINGLETON NSW 2330

(c) Application Number: 06_0073

(d) Address/land details

properties to be developed

Land Description:

The Project Site is located 12km north of Singleton and covers an area of approximately 376ha.

Open Cut Area:

Parish of Auckland, County of Durham,
Lot 792/DP586255, Part Lot 791/DP580967,
Part Lot 710/DP624852, Part Lot 4/DP606344,
Part Lot 93/DP752442, Part Lot 1/DP783398,
Part Lot 1 and 2/DP1083482, Part Lot 100/DP633743,
Parish of Broughton, County of Durham,
Part Lot 1, 2 and 10/DP752450.

Coal Haul Route D Corridor:

Parish of Auckland, County of Durham,
Part Lot 1/DP752450, Part Lot 11/DP1013180,
Part Lot 92/DP752442, Part Lot 3/DP752455,
Former Railway Line Easement within Lot 3/DP752455.

Coal Haul Route E:

Parish of Auckland, County of Durham,
Part Lot 1 and 2/DP1083482, Part Lot 1/DP810309,
Part Lot 1/DP246434, Part Lot 1/DP212284,
Part Lot 22/DP752442,
Parish of Darlington, County of Durham,
Part Lot 3/DP752455.

Coal Handling and Preparation Plant:

Parish of Darlington, County of Durham,
Part Lot 3/DP752455, Former Railway Line Easement
within Lot 3/DP752455.

(e) Project Outline:

The development and operation of an open cut coal mine involving:

- open cut mining and associated activities including placement of waste rock and transportation of run-of-mine coal.
- beneficiation of run-of-mine coal within the existing Camberwell Coal Handling and Preparation Plant; and
- progressive and final rehabilitation of areas of surface disturbance.



(f) Assessment of

Environmental Impact: The assessment of environmental impacts of this project includes the matters referred to in Director-General's Requirements provided to the Proponent on 25 January 2007 under Section 75F of the *Environmental Planning and Assessment Act 1979*.

(g) Declaration:

I, Robert William Corkery, hereby declare that I have overseen the preparation of the contents of this assessment and to the best of my knowledge:

- it has addressed the Director-General's Requirements as provided by the Department on 25 January 2007;
- the assessment contains all available information that is relevant to the environmental assessment of the project; and
- the information contained in the statement is neither false nor misleading.

Signature: _____

Name: _____

Date: _____



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Executive Summary

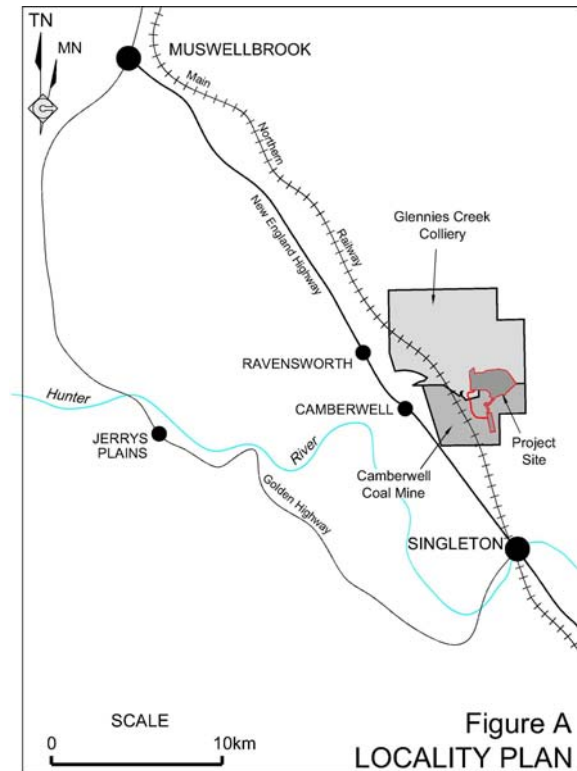
INTRODUCTION

This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty. Limited to accompany an application for project approval by Integra Coal Operations Pty Ltd (“the Proponent”), for and on behalf of its joint venture partners, for an open cut coal mine to be known as the Glennies Creek Open Cut Coal Mine (“the Project”). The Project includes the following mining and mining-related activities.

- Extraction of coal, overburden and interburden material, as well as the construction of a waste rock emplacement within and adjacent to the proposed open cut.
- Transportation of Run-of-Mine (ROM) coal to the Camberwell Coal Handling and Preparation Plant (CHPP) either directly or via intermediate stockpiles.
- Processing and despatch of coal within and from the existing Camberwell CHPP.

As illustrated in **Figure A**, the Project Site is located approximately 12km north of Singleton in the Hunter Valley, within the Glennies Creek Colliery and adjacent to the Camberwell Coal Mine.

The application for project approval relates to extraction of 7.7 million tonnes of ROM coal by open cut mining methods and associated activities. A further 1.3 million tonnes of ROM coal may potentially be amenable to future open cut mining. However, recovery of this resource does not form part of this application.



PLANNING CONTEXT

The Project Site lies wholly within land zoned Rural 1(a) under the *Singleton Local Environment Plan 1996*. The Plan states that ‘coal mining’ is a permissible land use within this zone.

The Project is classified as a Major Project under Schedule 1 of the *State Environmental Planning Policy (Major Projects) 2005* and hence the application for project approval (Major Projects No. 06-0073) is to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*. The Act requires that an *Environmental Assessment* accompany the application for project approval.



THE PROPONENT

The Proponent, Integra Coal Operations Pty Ltd, is the management company responsible for the operation of the Glennies Creek Colliery and Camberwell Coal Mine and is wholly owned by the parties to the Integra Coal Joint Venture. The parties to the joint venture are as follows.

- CVRD Australia Pty Ltd (CVRD) (61.2%) - through its subsidiary companies CVRD Australia (GC) Pty Ltd (36%) and Maitland Main Collieries (MMC) (25.2%).
- NS Glennies Creek Pty Limited (3.6%).
- POS-GC Pty Ltd (3.6%).
- JS Glennies Creek Pty Ltd (1.8%).
- JFE Steel Australia (GC) Pty Ltd (1.8%).
- Toyota Tsusho Mining (Australia) Pty Ltd (11.2%).
- Navidale Pty Ltd (14%).
- Toyota Tsusho Corporation (Australia) Pty Ltd (2.8%).

PROJECT SITE

The Project Site covers an area of approximately 376 hectares of which 207 hectares (55%) is presently disturbed. All land within the Project Site is owned by companies associated with the Proponent.

The Project Site incorporates the following components, presented on **Figure B**, namely:

- the Open Cut Area;
- Haul Route Corridor D;

- Haul Route E (the existing RL 100 Haul Route); and
- the Camberwell CHPP and coal loading facility.

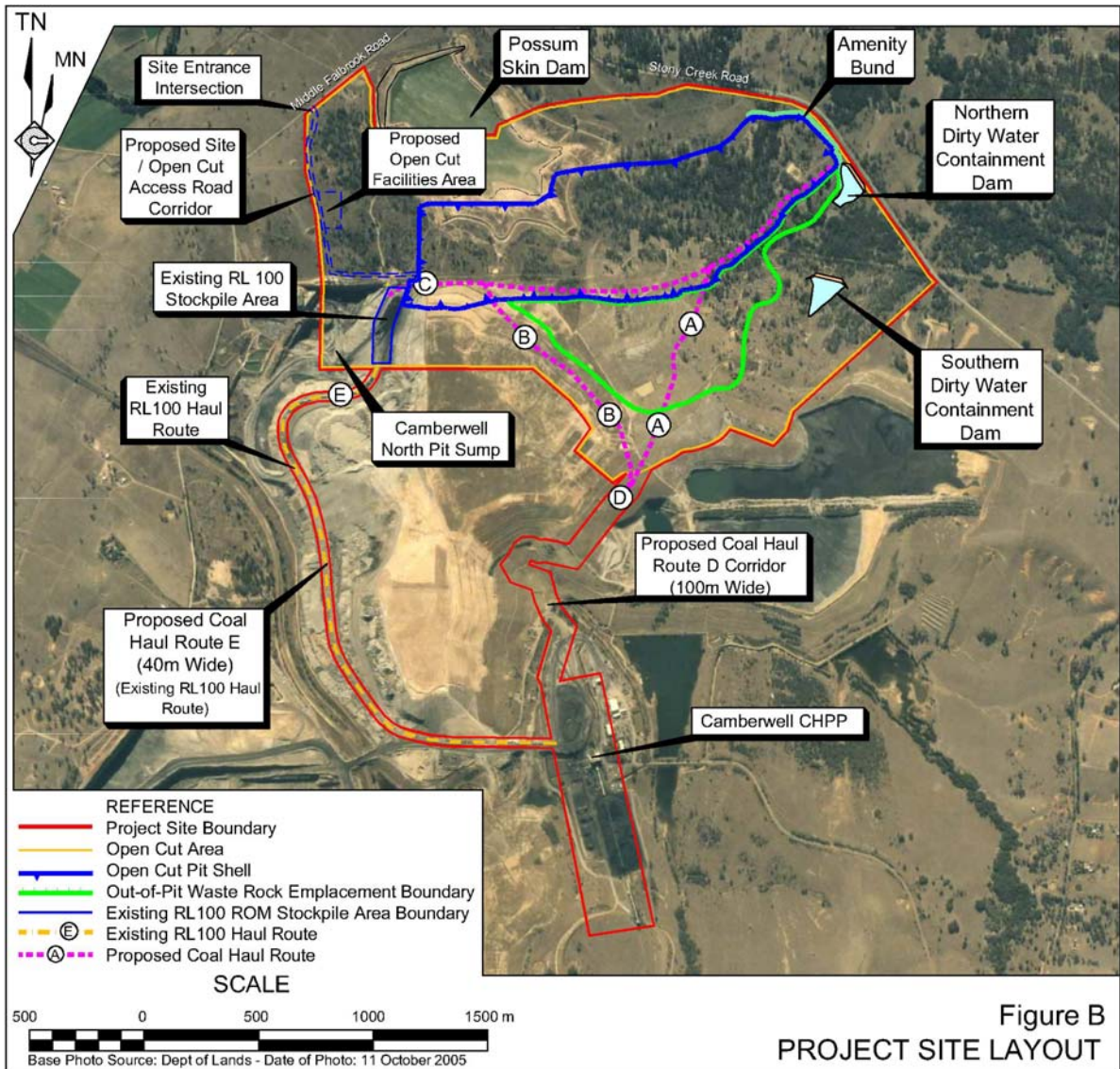
PROJECT DESCRIPTION

Overview

The Project would involve the following activities, the locations of which are displayed on **Figure B**.

- Construction of the site and open cut access road and open cut facilities area.
- Extraction of coal by open cut mining methods at a rate of up to 1.5 million tonnes/year for a period of approximately 6 to 8 years and within an area covering approximately 90 hectares.
- Highwall or auger mining may be undertaken, where practicable.
- Stockpiling of coal at temporary stockpile locations within the open cut mine or at the existing RL100 Stockpile Area, when required.
- Transportation of coal to the Camberwell CHPP via a network of internal haul roads.
- Processing of coal at the existing Camberwell CHPP and loading / despatch of product coal by rail.
- Programmed placement of waste rock materials initially to an out-of-pit waste rock emplacement, with subsequent placement both out-of-pit and in-pit.
- Progressive reshaping and rehabilitation of all areas of mining-related disturbance.
- Establishment and management of a number of biodiversity offset areas.





It is noted that the Camberwell CHPP and Haul Route E are the subject of existing approvals. However, as those existing approvals do not contemplate the use of coal sourced from the proposed open cut, this application contains further assessment of those activities. The Camberwell CHPP will be the subject of a future application to extend the life of that facility.

Site Preparation

Where present within the areas to be disturbed, larger vegetation, ie. trees and shrubs, would be cleared and suitable

vegetation either immediately used in the rehabilitation of completed areas of the final landform or stored for subsequent use in this manner. Topsoil and subsoil would be stripped separately and preferentially placed in areas undergoing progressive rehabilitation, or stockpiled.

Mining Operations

Mining operations would involve conventional open cut methods with waste rock (overburden and interburden) removed and placed initially within an out-of-pit waste rock emplacement. As sections of

the open cut are completed, waste rock would be placed within both in-pit and out-of-pit waste rock emplacements (**Figure B**).

Mining would commence within a box cut at the northeastern end of the proposed open cut and would move progressively to the west. Blasting would occur below the weathered zone, from approximately 2m to 10m below surface.

Blasts would typically fragment up to 150 000m³ of rock and would occur between 9.00am and 5.00pm on weekdays, unless required for safety or misfire reasons. Up to five blasts would be initiated each week. Blast designs would be modified to ensure all blast impact assessment criteria are satisfied at all surrounding residences. No explosives would be stored on site.

Coal would be preferentially transported directly to the Camberwell CHPP. However, when stockpiling is required, coal would be stockpiled at the existing RL100 Stockpile Area, or at temporary stockpiles at the top of the active open cut ramp within the Open Cut Pit Shell. Coal would be transported to the Camberwell CHPP from the proposed open cut or ramp top stockpiles via the following haul routes (see **Figure B**).

- Haul Routes A and D.
- Haul Routes B and D.
- Haul Routes C and E.

Haul Routes A and D would be used when mining is underway in the eastern section of the proposed open cut. Haul Routes B and D would be used when mining is underway in the western section of the open cut. Haul Routes A and B would not be used concurrently.

Haul Routes C and E would principally, but not exclusively, be used when coal is being stockpiled within the RL100 Stockpile Area.

All processing of ROM coal, stockpiling and despatch of product coal, and coarse reject and fine tailings management would be undertaken within the existing Camberwell CHPP in accordance with the present approval for this facility. The approved tailings storage facility has sufficient capacity to store fine tailings from the Glennies Creek Colliery, Camberwell Open Cut and the proposed open cut.

The proposed open cut would be progressively backfilled with waste rock. The final void at the end of mining would be backfilled to the surface using reject material from the Camberwell CHPP or breaker stone from the pre-treatment plant at the Glennies Creek Colliery. However, prior to commencing to backfill the final void, the Proponent would review the potential for the void to be used as an entry for underground mining to access the Barrett or Hebden coal seams and, if feasible, would seek approval for an alternative land use in a subsequent application for project approval.

Production Rate and Project Life

The maximum ROM coal production rate would be 1.5 million tonnes/year over an anticipated mine life of approximately 6 to 8 years.

Hours of Operation

Site preparation activities, open cut mining activities, transportation of coal via Haul Routes A to D and rehabilitation-related activities would be undertaken between 7.00am and 10.00pm, 7 days per week. Transportation of coal via Haul Route E and



coal processing related activities would be undertaken 24 hours per day, 7 days per week. Highwall or auger mining would be undertaken on a campaign basis 24 hours per day, 7 days per week.

Employment

The Project would directly generate approximately 45 full time equivalent positions, with an estimated additional 65 full time equivalent indirect positions created within the Hunter Valley and a further 68 full time equivalent indirect positions throughout NSW.

Traffic and Transportation

The Project would generate an estimated maximum of 130 light vehicle movements per day on Middle Falbrook and Stony Creek Roads, with most of these vehicle movements likely to occur before and after shift change-overs. In addition, up to 10 Project-related heavy vehicle movements are anticipated on these roads daily. All product coal would be transported from the Camberwell CHPP by rail.

Facilities and Services

An open cut facilities area would be established as part of the Project (**Figure B**). This area would include a site office, cribroom, storage and ablutions facilities, car park and muster area, as well as maintenance buildings, bunded fuel storage and a hardstand area.

The existing 66kV transmission line that supplies the Glennies Creek Colliery would be relocated. Mains power to the buildings within the open cut facilities area would be supplied by an extension of the existing power supply to the Glennies Creek Colliery.

Diesel fuel would be stored in two tanks in a bunded fuel bay, each with a capacity of 50 000L. Other bulk hydrocarbons would also be stored in appropriate containers within an appropriately bunded area. Alternatively, the tanks may be self bunded. A sealed refuelling bay would be constructed, with surface water runoff from this area, and from the area around the maintenance building, directed through an oil/water separator.

Potable water would be supplied in bulk and stored in tanks within the open cut facilities area. Water for operational purposes would be sourced from groundwater inflows and rainfall collected in the open cut, or from the Camberwell North Pit sump or Possum Skin Dam (**Figure B**).

Sewage from the ablutions building would be treated through a biocycle (or equivalent) sewage treatment system.

Safety

The Proponent would ensure that the Project Site is securely fenced to prevent unauthorised access. In addition, the Proponent would develop a Safety Management System, including appropriate recruitment criteria, employee and contractor inductions and appropriate procedures to ensure compliance with all statutory and conditional requirements.

Rehabilitation

The Proponent would undertake progressive rehabilitation throughout the life of the Project. The short-term objectives of this program would be as follows.

- Stabilise all disturbed areas no longer required for mining-related activities through progressive reshaping, spreading of topsoil and revegetation.



- Reduce the visual impact of the Project upon surrounding residents by early establishment of tree screens and progressive rehabilitation.
- Establish, enhance and maintain the biodiversity offset areas and undisturbed areas within the Open Cut Area.

The long-term objectives of the rehabilitation program would be as follows.

- Provide a low maintenance, geotechnically stable and safe landform which blends with surrounding landforms and provides a landform suitable for nature conservation as the final land use.
- Manage the biodiversity offset areas to ensure:
 - the long term enhancement of the biodiversity value of the areas for native species;
 - an increase in the area of high quality, native vegetation; and
 - provision of biodiversity linkages with the rehabilitated and protected areas in accordance with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* and the *Glennies Creek Catchment – Total Catchment Management Study – Management Strategy*.

Progressive rehabilitation would include the following activities.

- Progressive shaping of the waste rock emplacements to enable the emplacements to blend with the existing natural and man-made landform.
- Contour banks and flumes would be progressively installed on the rehabilitated landform, as required.

- Where practicable, weathered to partly weathered overburden would be placed on the shaped landform.
- Subsoil and then topsoil would be placed on the shaped landform with the materials being preferentially sourced from active stripping areas.
- Selected vegetation would be placed over the areas to be rehabilitated following soil placement.
- The topsoiled surfaces would be initially stabilised with a non-persistent cover crop. A selection of locally occurring tree and shrub species would then be planted as tubestock or direct seeded.

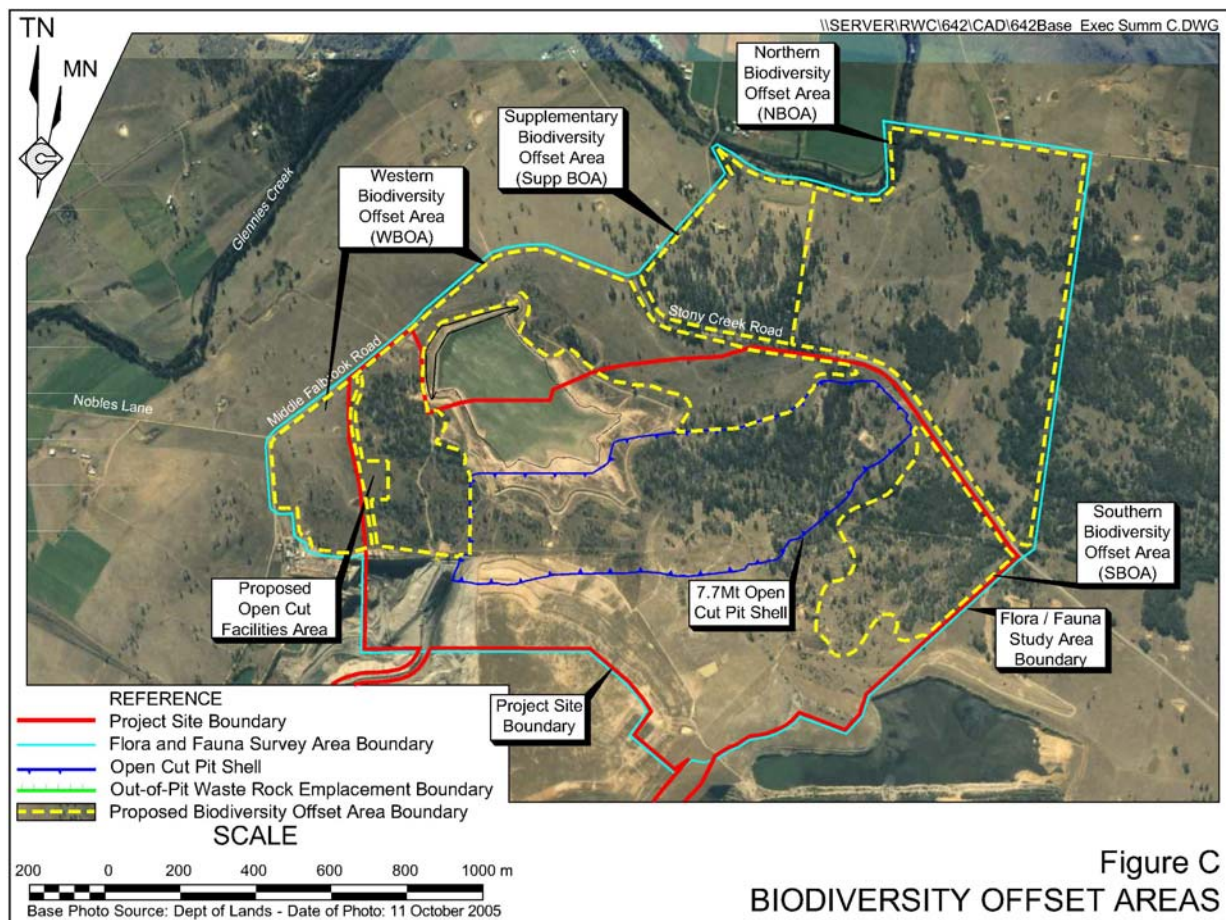
Areas undergoing rehabilitation or enhancement would be regularly inspected and assessed against the short- and long-term rehabilitation objectives and remedial action undertaken, where appropriate.

Biodiversity Offsets

The Proponent intends to compensate for the removal of approximately 75 hectares of native vegetation by protecting and enhancing approximately 254 hectares of Project-related land, namely the Northern, Southern and Western Biodiversity Offset Areas. In addition, the Proponent would seek to protect and enhance an additional 33 hectares of non-Project-related land, namely the Supplementary Biodiversity Offset Area, subject to a suitable arrangement being negotiated with the owners of that land (**Figure C**).

The Proponent would secure the biodiversity offset areas through an enduring covenant or restriction on the use of the land to the satisfaction of the relevant government agencies. The Proponent would undertake to manage the biodiversity offset areas for the purpose of native vegetation conservation while ever it retains ownership of the biodiversity offset areas.





Specific actions that would be undertaken within these areas include:

- continued exclusion of stock;
- erection of fences where necessary to prevent stock from surrounding properties entering the biodiversity offset areas;
- ongoing implementation of pest and weed control programs;
- planting of approximately 10 hectares of seedlings of River Oak, Swamp Oak, Forest Red Gum, Grey Box and species representative of the Narrow-Leaved Ironbark – Spotted Gum – Forest Red Gum Community adjacent to Glennies Creek; and
- erection of nesting boxes for Brush-tailed Phascogale and roosting tubes for microbats within the biodiversity offset areas.

Remediation of the Glennies Creek Riparian Zone

The Proponent would, subject to obtaining the appropriate approvals, undertake the following remediation work within land owned or controlled by companies associated with the Proponent, adjacent to and within the banks of Glennies Creek.

- Weed control programs.
- Revegetation with appropriate species.
- Fencing of the revegetated area to exclude stock or provision of individual tree guards.
- Ongoing maintenance of remediated areas.

In addition, the Proponent would view favourably any request by surrounding land owners for assistance in remediating other sections of the riparian zone of Glennies Creek in the vicinity of the Project Site.



ISSUE IDENTIFICATION AND PRIORITISATION

In order to undertake a comprehensive environmental assessment of the Project, the Proponent undertook the following steps to identify and prioritise potential environmental impacts associated with the Project.

Issue Identification

Community consultation was undertaken via a newsletter, community forums and information sessions, targeted interviews and discussions with individual landholders. In addition, feedback was sought from:

- the Glennies Creek Community Consultative Committee;
- government agencies through a Planning Focus Meeting; and
- relevant State Environmental Planning Policies.

This process identified 12 potential environmental issues as follows.

- Air Quality.
- Noise and Blasting.
- Fauna.
- Flora.
- Aboriginal Heritage.
- Soils and Land Capability.
- Visual Amenity.
- Surface Water.
- Ground Water.
- Traffic and Transportation.
- European Heritage.
- Socio-economic Environment.

Issue Prioritisation

An environmental risk analysis based on the likelihood and consequence of potential environmental issues identified was completed. The results of this analysis were used to determine the appropriate level of environmental assessment to be undertaken, together with the order that the issues are presented in this summary and throughout the *Environmental Assessment*.

ENVIRONMENTAL SAFEGUARDS AND RESIDUAL IMPACTS

The components and features of the existing environment on and around the Project Site have been studied in detail and the Project designed to avoid or minimise impacts on the environment. A brief overview of the main components of the surrounding environment, the proposed safeguards and the residual impacts are set out below.

Air Quality

Air quality impacts primarily include the dispersion of particulate material in the atmosphere and greenhouse gas emissions. In order to reduce the generation of airborne dust, the Proponent would:

- minimise areas to be cleared;
- progressively revegetate and/or rehabilitate cleared areas;
- use water sprays, where required, to prevent lift-off of dust;
- adopt dust control measures during drilling operations; and
- adequately stem all blast holes.

Notwithstanding the incorporation of the above safeguards, dust dispersion modelling predicted that Residences 32, 33, 36 and 42 (**Figure D**) would be likely to receive dust levels in excess of the Department of Environment and Climate Change (DECC) assessment criteria.



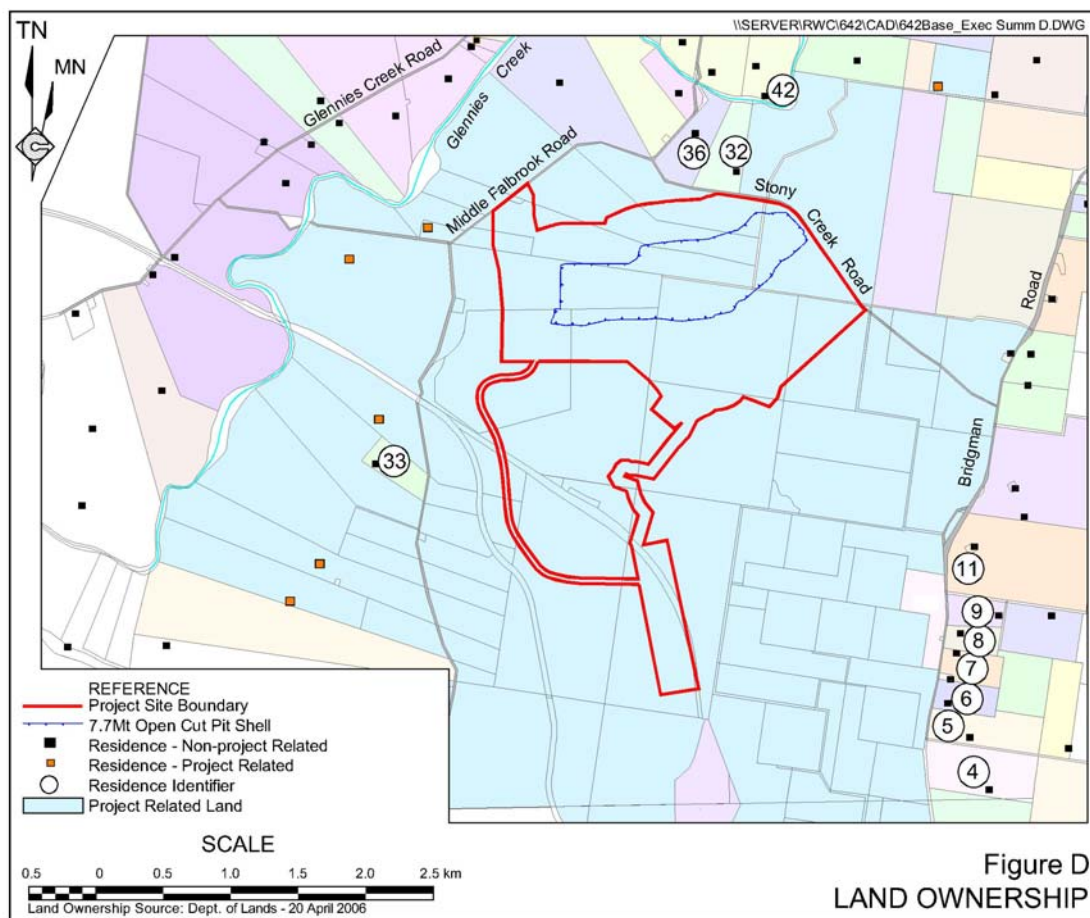


Figure D
LAND OWNERSHIP

The greenhouse gas assessment concluded that Project extraction, processing and transportation-related activities, together with the combustion of the product coal, would contribute an estimated 0.008% of global annual greenhouse gas emissions and account for an estimated 0.00001°C of global warming.

Noise and Blasting

The sources of noise around the Project Site are typical of a rural environment within the Hunter Valley, with contributions from farming activities, existing mining operations, insect noise, livestock, wind through vegetation and vehicles on local roads. Rating background noise levels were calculated for eight representative locations surrounding the Project Site and Project specific noise

assessment criteria for eight noise assessment groups were established in accordance with the Industrial Noise Policy. A rating background level established during a previous noise assessment was used for a ninth noise assessment group.

The Proponent would adopt the following safeguards with regards to noise and blasting issues.

- Hours of operation would be limited to between 7.00am and 10.00pm, with the exception of coal transportation via Haul Route E, coal processing and despatch activities and, intermittently, highwall or auger mining which would occur 24-hours per day, 7 days per week.
- Noise-mitigated equipment would be used.

- Acoustic bunds would be constructed where practicable adjacent to the active haul route and at the margins of the waste rock emplacement.
- Mining-related activities would be scheduled such that evening operations (between 6:00pm and 10:00pm) would occur in the deepest areas of the proposed open cut or behind acoustic bunds.
- Each blast would be designed by a suitably qualified Drill & Blast Engineer to achieve the Australian and New Zealand Environment and Conservation Council (ANZECC) recommended guidelines for ground vibration and airblast at all residences surrounding the Project Site.
- All blasts would, where appropriate be monitored on site and off site. Blast designs would be modified where necessary.

Noise modelling incorporating the proposed safeguards and simulating calm conditions predicts that the Project-specific intrusive noise assessment criteria would likely be exceeded at Residences 32 and 36 during the day and evening, as a result of the proposed mining-related activities. In addition, noise attributable to the Camberwell CHPP received at seven residences (Residences 4, 5, 6, 7, 8, 9 and 11) is predicted to exceed the Project-specific noise assessment criteria during the night under adverse weather conditions, ie. temperature inversions (**Figure D**).

The cumulative or amenity noise impacts are predicted to exceed the assessment criteria at Residences 32 and 36 (**Figure D**).

Off-site road transportation noise impacts are predicted to be within the DECC assessment criteria at distances of greater than 25m from Middle Falbrook and Stony Creek Roads.

The number of trains transporting coal from the Camberwell CHPP would be unchanged from the existing number of trains. The noise assessment indicates that the assessment criteria would be achieved at distances greater than 36m and 150m from the track during the daytime and night-time respectively.

The blasting assessment indicates that no residence would experience blasting-related impacts in excess of the ANZECC recommended “acceptable” impact assessment criteria.

Fauna

A total of 106 fauna species were identified within the Fauna Survey Area (**Figure C**). Of these, five are listed as threatened under the *Threatened Species Conservation Act 1995* (TSC Act). A further 63 species listed under the schedules of the TSC Act and/or the *Environment Protection and Biodiversity Conservation Act 1999* have been observed or are considered likely to occur within the Singleton Local Government Area.

Six fauna habitat areas were identified within the Fauna Survey Area, namely:

- Open Pastures Habitat;
- Open Woodland Habitat;
- Woodland Habitat;
- Riparian Oaks Habitat;
- Wetland/Dams Habitat; and
- Existing Mine Disturbance.

The following safeguards have been or would be implemented by the Proponent to minimise Project-related impacts on fauna.

- The out-of-pit waste rock emplacement, site access road, facilities area and dirty water containment dams were designed to avoid areas of native vegetation and fauna habitat.



- Removal of vegetation would be undertaken progressively and would be limited to those areas required for operational purposes during the subsequent 12 months.
- Large trees would be removed in late spring or early autumn and would be inspected for nesting fauna prior to removal.
- Where practicable, cleared vegetation would be relocated to areas undergoing rehabilitation or areas that would not be disturbed.
- Three biodiversity offset areas comprising approximately 254 hectares of Project-related land and a further area covering approximately 33 hectares of non-Project-related land (subject to a suitable arrangement with the landholders being negotiated) would be created to offset the loss of vegetation communities and fauna habitat as a result of the Project (**Figure C**).
- Stock has been and would continue to be excluded from the Open Cut Area and biodiversity offset areas.
- Nesting boxes suitable for Brush-tailed Phascogale and roosting tubes suitable for microbats would be erected in trees within the biodiversity offset areas.
- Weed control and habitat enhancement programs, including establishment of native vegetation in an area of approximately 10 hectares adjacent to Glennies Creek within the Northern and Supplementary Biodiversity Offset Areas, would be undertaken.
- A 20m wide section of Project-related land adjacent to and south of Stony Creek Road would be revegetated to enhance the roadside vegetation corridor.

- Species Management Plans would be prepared for the Brush-tailed Phascogale and Grey-crowned Babbler prior to commencement of mining activities.

The fauna assessment concluded that the Brush-tailed Phascogale and the Grey-crowned Babbler may be significantly impacted by the Project. However, the proposed ameliorative and management measures and Biodiversity Offset Strategy would mitigate the Project-related impacts on these species.

In addition, the fauna assessment concluded that the Project would not significantly impact on any other threatened or listed species.

Flora

Six vegetation communities were identified within the Flora Survey Area (**Figure C**), namely:

- Tussock Grassland Community;
- Regenerating Native Woodland / Shrubland Community;
- Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community;
- Bull Oak Community;
- Swamp Oak Community; and
- River Oak Community.

A further two disturbed vegetation communities were identified, namely:

- Rehabilitated Disturbed Land; and
- Disturbed Land.

In addition to the safeguards described previously, the Proponent would adopt the following safeguards to minimise flora-related impacts associated with the Project.

- Areas to be cleared would be clearly defined and marked and would be sprayed for weeds prior to stripping the topsoil.



- Clearing of vegetation would be undertaken with a bulldozer with the blade positioned just above the ground. The remaining vegetation would be removed with the topsoil.
- Topsoil would be retained on site to limit the spread of ‘onion grass.’
- Weed and pest control programs would be maintained and expanded.

The flora assessment found that no threatened flora species, endangered ecological communities or flora populations occur, or are likely to occur, within the Open Cut Area.

The Western Golden Wattle is listed as threatened in the *Hunter Bushland Resource Kit* (HCMT, 2003). This species was identified within the Flora Survey Area. The impact of the Project on this species, together with the impacts associated with the clearing of approximately 75 hectares of native vegetation, would be mitigated by the preservation and enhancement of the biodiversity offset areas (**Figure C**). The mitigated flora-related impacts are not considered to be significant.

Biodiversity Offset Strategy

The areas of each vegetation community and fauna habitat that would be preserved within the biodiversity offset areas or would be disturbed as a result of the Project are presented with the “Key Statistics” at the end of this Executive Summary.

In assessing the Biodiversity Offset Strategy, the fauna assessment concluded the following.

- All mammal and amphibian species observed or likely to occur within the areas to be disturbed would also occur or would be likely to occur within the biodiversity offset areas.

- There is a greater abundance of insectivorous birds and a lower abundance of grassland, blossom-feeding and waterbird species within the Northern Biodiversity Offset Area than others areas within the Fauna Survey Area.
- The threatened Grey-crowned Babbler was only observed within the areas to be disturbed, however, this species is also expected to utilise resources within the biodiversity offset areas.
- Reptiles are more likely to be found within the Northern and Supplementary Biodiversity Offset Areas than other areas within the Fauna Survey Area.
- The Biodiversity Offset Strategy would be likely to result in short-term benefits for 18 listed species and long-term benefits for 38 listed species.

Similarly, in assessing the Biodiversity Offset Strategy, the flora assessment concluded the following.

- The Tussock Grassland, Regenerating Native Woodland / Shrubland and Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Communities have similar biodiversity value in both the areas to be disturbed and the biodiversity offset areas.
- Native tree and shrub species are rapidly regenerating within the Tussock Grassland and Regenerating Native Woodland / Shrubland Communities and sections of these communities may be expected to develop into Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum or Bull Oak Community with time.



- The Bull Oak and Swamp Oak Communities, which would not be disturbed by the Project, add to the biodiversity value of the biodiversity offset areas.
- The biodiversity value of the River Oak Community would be increased by the proposed remediation and revegetation activities.

Finally, an assessment of the Biodiversity Offset Strategy against the requirements of the *Principles for the use of Biodiversity Offsets in NSW* indicates that the Biodiversity Offset Strategy complies with each of the guidelines' component principles.

Aboriginal Heritage

A total of 19 sites containing isolated or scattered Aboriginal artefacts were identified within the Open Cut Area. The artefacts are predominantly flakes interpreted to be by-products of the tool making process and are unlikely to have been used. The remainder of the area surveyed is considered to have a low archaeological sensitivity.

The Proponent would develop a Management Protocol in consultation with the Aboriginal community to recover the identified objects.

Soils and Land Capability

Two soil types were identified within the Open Cut Area. Soils of Soil Mapping Unit 1 (SMU 1) are largely associated with elevated ridgelines, while soils of SMU 2 are generally found on mid-to lower-slopes and drainage depressions.

Soils of both SMUs have variable dispersibility ratings, are non-saline to moderately saline and have a pH that is mostly between 6.0 and 6.5. The topsoil

and subsoil of both SMUs are suitable for stripping and stockpiling with soils of the same SMU and soil class.

The land capability of the Open Cut Area is predominantly Class V, with disturbed areas being Class M. The agricultural suitability of the Open Cut Area is predominantly Classes 3 and 4. The areas to be disturbed by open cut mining and related activities would be likely to have a final land capability of Class V and VII, and an agricultural suitability of Class 5, with limited areas of Class 3 and 4.

Visual Amenity

The existing outlook from most residences surrounding the Project Site includes land used for agricultural, nature conservation and/or mining purposes. While the Proponent's activities would be visible from a number of residences, intervening topography and vegetation completely or partially screens the Project Site from many residences. Notwithstanding this, the Proponent would undertake the following measures to mitigate the visual impact of the Project.

- Construction of a visual amenity bund adjacent to Stony Creek Road (**Figure B**).
- Waste rock emplacements would be progressively reshaped and revegetated.
- Consideration of any request by an affected resident for assistance to create a visual screen between a residence and the Open Cut Area.
- Where lighting is required within the Open Cut Area, lighting plants would preferentially be placed in the deeper portions of the open cut or would be directed towards the existing mining infrastructure and not towards residences surrounding the Project Site.



Surface Water

The Open Cut Area is located within the Glennies Creek catchment. Three small sub-catchments draining into Reedy Creek (a tributary of Glennies Creek) or directly into Glennies Creek occur within the Open Cut Area.

The surface water management system for the proposed open cut would be integrated with the existing Glennies Creek / Camberwell water management system. This system includes, or would include, the following safeguards.

- Diversion of all clean water to Reedy or Glennies Creek.
- Construction of two dirty water containment dams to the east of the out-of-pit waste rock emplacement as well as associated catch drains and diversion structures (**Figure B**).
- Containment of all dirty water in the existing and proposed dirty water containment dams, Possum Skin Dam or the Camberwell North Pit sump.
- Use of dirty water within the Camberwell CHPP, as well as for other mining-related activities.
- Export of dirty water to nearby Collieries for mining-related purposes.

The surface water assessment concludes that the integrated surface water management system, including the proposed open cut mine, would, taking into consideration long-term rainfall and estimated groundwater inflows, have an average surplus of approximately 850m³/day. However, taking into account existing agreements to export between 1 400m³/day and 3 900m³/day, the integrated surface water management system would be readily maintained in balance, with a potential to export an additional 550m³/day to 3 050m³/day if

excess water should be available. As a result, no off-site dirty water discharge would be required, and total on-site containment of all dirty water would be achievable.

Groundwater

Two aquifers were identified within the vicinity of the Open Cut Area, namely:

- alluvial aquifers associated with surface drainage; and
- Permian-aged aquifers associated with coal seams.

The groundwater within the alluvial aquifers is of high quality, while the groundwater within the Permian-aged aquifers is comparatively saline. The groundwater assessment concludes that connectivity between these aquifers is low. No groundwater dependent ecosystems or agricultural users of water from the Permian-aged aquifers were identified.

The Project would impact on the Permian-aged aquifers only. Groundwater modelling indicates inflows to the proposed open cut of between 44m³/day and 261m³/day. This water would be incorporated into the integrated Glennies Creek and Camberwell surface water management system. Groundwater modelling indicates the zone of groundwater depression associated with the Project would extend approximately 1km east of the proposed open cut, but that the extent of drawdown attributed to the surrounding coal mines would be significantly greater than that associated with the Project.

Traffic and Transportation

Access to the Project Site would typically be via Stony Creek Road and Middle Falbrook Road. Both these roads comprise a sealed pavement between 6.5m and 7.0m



wide with unsealed 2.0m wide shoulders on both sides in good condition. Traffic monitoring data indicates existing average daily total vehicle movements of approximately 550 and 410 on Stony Creek and Middle Falbrook Roads respectively.

The Project would be likely to generate a maximum of approximately 130 light vehicle and 10 heavy vehicle movements per day, resulting in maximum average daily vehicle movements of 690 and 550 on Stony Creek and Middle Falbrook Roads respectively. These anticipated traffic volumes are well within the RTA design criteria for roads of the standard of Stony Creek and Middle Falbrook Roads.

European Heritage

The Middle Falbrook Road Bridge over Glennies Creek is the only item of European heritage significance identified from a search of National, State and local heritage registers in the vicinity of the Project Site. The Project would have no impact on this structure.

Socio-economic Environment

The Project is located within the Singleton Local Government Area (LGA). The mining industry is the largest employer within the Singleton LGA, with other significant industries including retail, manufacturing and health and community services.

The Project is predicted to have the following social and economic benefits.

- Generation of approximately 110 full-time equivalent jobs within the Hunter Valley.
- Generation of an additional approximately 68 indirect fulltime equivalent jobs within the rest of NSW.

- An estimated increase in household expenditure in the Hunter Valley of approximately \$253.9 million.
- Additional royalty and tax payments to State and Commonwealth governments.

Potential community-wide socio-economic costs or impacts include the following.

- Minor and temporary reductions in property values as a result of noise impacts.
- Costs associated with Project-related greenhouse gas emissions.
- Costs associated with reduced surface water flows into Glennies Creek.

Other community-wide adverse socio-economic impacts associated with the Project were considered to be insignificant. It is acknowledged, however, socio-economic impacts on individual members of the community may be greater than the community-wide impact depending on the individual's susceptibility to a particular impact.

JUSTIFICATION AND EVALUATION

The proposed Glennies Creek Open Cut Coal Mine has been evaluated and justified principally through consideration of its potential impacts on the environment and potential benefits to the local and wider community.

An evaluation of the Project was undertaken by firstly reassessing the risks posed to the local environment by Project-related activities following the implementation of all operational controls, safeguards and/or mitigation measures, and secondly through consideration of the principles of ecologically sustainable development.



This evaluation found that with the implementation of the proposed operational safeguards and mitigation measures, the residual risk posed by most potential environmental issues or impacts was reduced from the original risk level. The majority of identified residual environmental risks or potential impacts, taking into account the proposed safeguards, were assessed to have a low to moderate risk of occurrence, and are therefore considered to be acceptable.

In addition, the design of the Project has addressed each of the ecological sustainable development principles, and on balance, it is concluded that the Project achieves a sustainable outcome for the local and wider environment.

The Project and associated activities have been assessed in terms of a wide range of biophysical, social and economic issues. These impacts can be justified in terms of the positive economic and social benefits to the Glennies Creek community and the Singleton LGA, as well as the communities and economies of the Hunter Valley, NSW and Australia. The Project is also consistent with the principles of ecologically sustainable development.

CONCLUSION

The proposed Glennies Creek Open Cut Coal Mine has, to the extent feasible, been designed to address the various issues raised by the local community and all levels of government, as well as the principles of ecologically sustainable development. The Project provides for the mining, processing and despatch of a high quality coal product and would generate significant employment opportunities, boosting the economies of local communities surrounding the Project Site.

The post-mining landform would be used for nature conservation, and together with the proposed biodiversity offset areas, would be consistent with the *Glennies Creek Total Catchment Management Strategy* and the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley*.

The *Environmental Assessment*, supported by the range of specialist consultant studies, has established that if the Project proceeds, it would:

- contribute to satisfying the demand for high quality coal;
- satisfy ecological sustainable development principles;
- have a minimal and manageable impact on the biophysical environment;
- address the perceived social impacts; and
- contribute to the continued economic activity of Singleton Local Government Area and surrounding communities.



Key Statistics

Areas		Approximate Area		
Project Site		Currently Disturbed	Currently Undisturbed	Total
Project Site		207ha	169ha	376ha
Open Cut Area		151ha	169ha	320ha
Haul Route Corridor D		14ha	-	14ha
Haul Route Corridor E		11ha	-	11ha
Camberwell CHPP		31ha	-	31ha
Biodiversity Offset Areas				Total
Northern Biodiversity Offset Area				121ha
Southern Biodiversity Offset Area				39ha
Western Biodiversity Offset Area				94ha
Supplementary Biodiversity Offset Area				33ha
Areas to be Disturbed		Currently Disturbed	Currently Undisturbed	Total
Open Cut		24.7ha	65.3ha	90ha
Out-of-pit Waste Rock Emplacement		31.8ha	11.2ha	43ha
Open Cut Facilities Area		-	1.5ha	1.5ha
Site / Open Cut Access Road		-	1.0ha	1.0ha
Haul Routes A, B and C		12.5ha	3.2ha	15.7ha
Stony Creek Road Amenity Bund		-	1.0ha	1.0ha
Northern Dirty Water Containment Dam		-	1.4ha	1.4ha
Southern Dirty Water Containment Dam		-	1.7ha	1.7ha
Vegetation Communities	Area proposed to be disturbed	Biodiversity Offset Areas		
		Northern, Southern and Western	Supplementary	Total
Tussock Grassland	6.1ha	38.6ha	5.8ha	44.4ha
Regenerating Native Woodland / Shrubland	0.7ha	74.0ha	-	74.6ha
Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum	68.3ha	85.5ha	27.6ha	113.1ha
Bull Oak	-	20.9ha	-	20.9ha
Swamp Oak	-	33.4ha	-	33.4ha
River Oak	-	1.5ha	-	1.5ha
Rehabilitated Disturbed Land	47.6ha	-	-	-
Disturbed land	12.3ha	0.4ha	-	0.4ha
Fauna Habitat Areas	Area proposed to be disturbed	Biodiversity Offset Areas		
		Northern, Southern and Western	Supplementary	Total
Open Pastures	3.8ha	123.4ha	12.2ha	135.6ha
Open Woodland	34.3ha	60.9ha	-	60.9ha
Woodland	42.4ha	25.5ha	21.5ha	47.0ha
Riparian Oaks	-	41.5ha	-	41.5ha
Wetland / Dams	8.7ha	1.1ha	-	1.1ha
Existing Mine Disturbance	45.8ha	-	-	-



Key Statistics (Cont'd)

Volumes		
ROM coal to be extracted	7.7 million tonnes	
Waste Rock to be extracted	43.9 million bcm	
Topography and Residences		
Maximum elevation of proposed waste rock emplacement	135mAHD	
Maximum elevation of existing waste rock emplacement	140mAHD (20m- 35m above the natural landform).	
Slope of natural landforms within the Project Site	Max 1:5 (V:H)	
	Average 1:28 (V:H)	
Slope of the proposed waste rock emplacement	Max 1:5 (V:H)	
	Average 1:20 (V:H)	
Number of Residences within 1km and 2.5km of the Open Cut Pit Shell	1km	3
	2.5km	40
Mining		
Proposed Project Life	Approximately 6 to 8 years	
Coal Reserve	7.7 million tonnes ROM coal	
Proposed Extraction Rate	Up to 1.5 million tonnes / year	
Coal Seams to be extracted	Liddell Seam (4.0m thick) Upper Barrett Seam (3.8m thick) Hebden Seam (1.7m thick)	
Cumulative thickness of coal to be extracted	Approximately 9.5m	
Mining Methods	Conventional Open cut Terrace Open cut Highwall or Auger Mining	
Frequency of Blasting	Up to 5 times per week	
Maximum internal truck movements per hour	60 (30 loads) (Cat 785 trucks)	
	44 (22 loads) (Cat 789 trucks)	
Hours of Operation		
Site preparation	7.00am – 10.00pm; 7 days / week	
Open cut mining	7.00am – 10.00pm; 7 days / week	
Blasting	9.00am – 5.00pm; up to 5 days per week	
Highwall or auger mining (intermittent activity)	24 hours, 7 days per week	
Coal transportation (Haul Routes A to D)	7.00am – 10.00pm; 7 days / week	
Coal transportation (Haul Route E)	24 hours, 7 days per week	
Coal Handling and Preparation	24 hours, 7 days per week	
Site rehabilitation	7.00am – 10.00pm; 7 days / week	
Economic Contribution		
Employment (in the Hunter Region)	Up to 110 additional full time equivalent positions	
Net Revenue	\$58.1 million	
Additional household expenditure	\$253.9 million	
Increase in the Gross Regional Product	0.11% to 0.13%	
Increase in rate of full time employment	0.05% to 0.07%	



Part A

Introduction

Preamble

This Part introduces the proposal to develop an open cut coal mine within and adjacent to the existing Glennies Creek Colliery (the "Project"). This Part provides information on:

- the scope and format of the document;*
- the Proponent;*
- the importance and uses of coal resources in NSW, Australia and globally;*
- the history of mining at the Glennies Creek Colliery and the Camberwell Coal Mine and the background to the Project;*
- other Part 3A applications currently being assessed for the Glennies Creek Colliery;*
- the proposed approach towards environmental management and further documentation; and*
- the personnel involved in the Project design, document preparation and specialist consultant investigations.*



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A1 SCOPE

Integra Coal Operations Pty Ltd (ICO), “the Proponent”, proposes to further develop the coal resources within and immediately adjacent to the Glennies Creek Colliery, approximately 12km north of Singleton in the Hunter Valley coal mining district of NSW (**Figure A1**). The proposed “Glennies Creek Open Cut Coal Mine” (“the Project”) would target coal recoverable by open cut methods within an area referred to as the “Project Site” adjacent to the northern boundary of the former Camberwell North Pit.

The Project Site which is the subject of this assessment lies wholly within land zoned 1(a) under Singleton Local Environmental Plan (LEP) 1996. The plan identifies that “coal mining” is a permissible land use within the Project Site, ie. with development consent (or project approval) under the *Environmental Planning and Assessment Act 1979*.

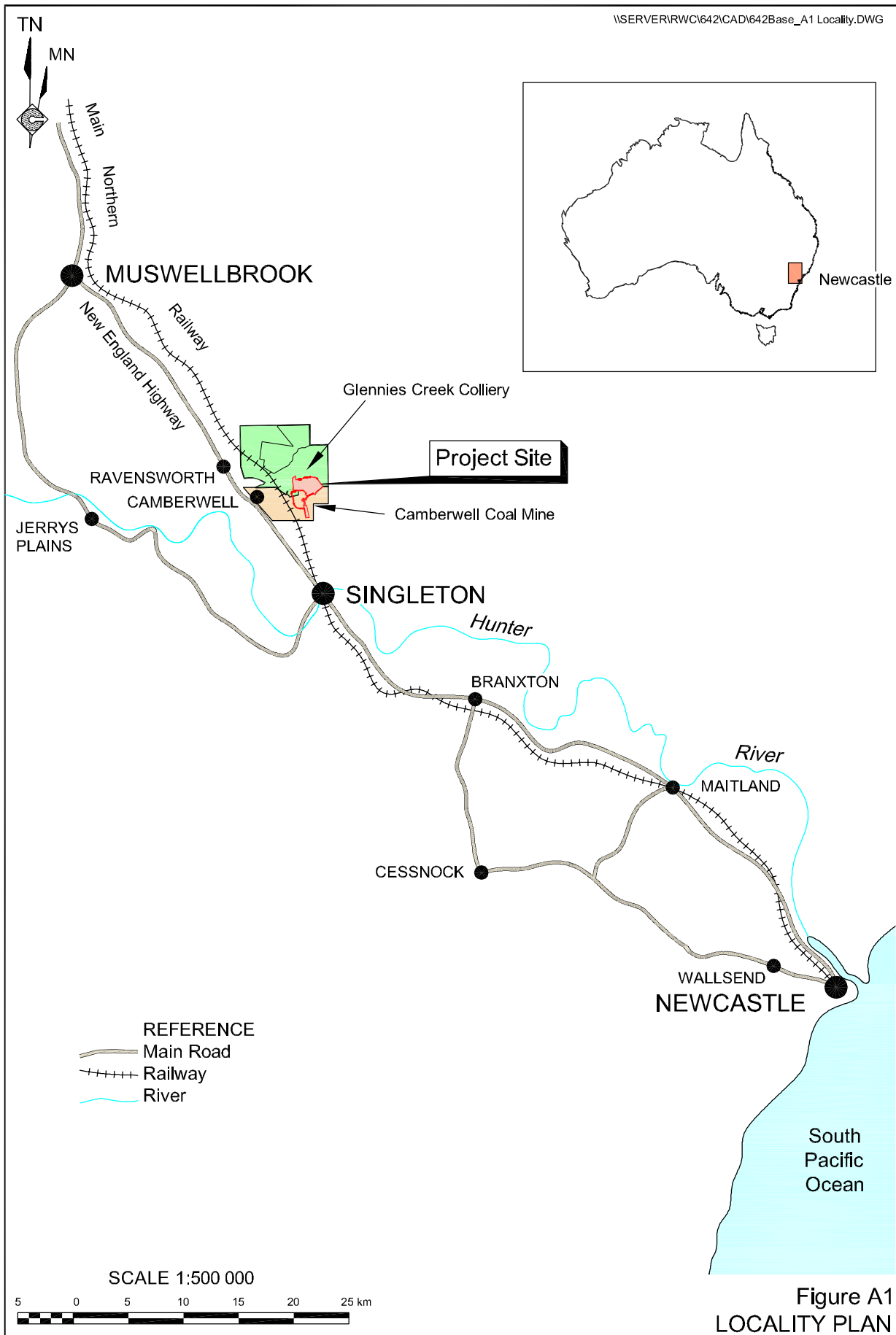
This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty Ltd to accompany the Proponent’s application for project approval for the Project. A copy of the Major Projects Application lodged with the Department of Planning on 23 February 2006 for the Project is reproduced in **Appendix 1**. The *Environmental Assessment* describes the Project and presents a comprehensive environmental assessment undertaken for the Project, including management controls and measures identified to mitigate potential impacts and ensure the defined coal resource is mined in an environmentally responsible manner.

The Project is classified as a ‘Major Project’ under the *State Environmental Planning Policy (Major Projects) 2005* and hence the application for project approval is to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*, with the Minister for Planning as the approval authority.

The application for project approval relates to the following proposed activities.

- Extraction of 7.7Mt of run-of-mine (ROM) coal by open cut mining methods over approximately 6 years at a maximum rate of extraction of 1.5Mt of ROM coal per year.
- Extraction of additional ROM coal through highwall or auger mining methods. The quantity of coal to be extracted by this method would be dependent upon economic, geological, geotechnical and operational constraints during the operation of the proposed open cut.
- Extraction of overburden and interburden material, as well as construction of an overburden emplacement within and adjacent to the proposed open cut.
- Transportation of ROM coal to the Camberwell Coal Handling and Preparation Plant (CHPP) either directly from the open cut or via intermediate stockpiles within the area of the proposed open cut or the approved Glennies Creek RL100 Stockpile Area.
- Storage and washing of ROM coal, despatch of product coal from the Camberwell CHPP and placement of fine reject material.
- Ancillary activities, including construction and use of an access road and site facilities area, as well as clearing and stripping of the areas to be disturbed.





Project approval is sought for each of these activities for the life of the proposed open cut.

It is noted that the Camberwell CHPP and Haul Route E are the subject of previous approvals for the Glennies Creek Colliery and Camberwell Coal Mine. However, as those previous approvals do not contemplate the use of coal sourced from the proposed Glennies Creek Open Cut Mine, this application contains further assessment of those activities having regard to the transportation and processing of coal from the Glennies Creek Open Cut Mine using Haul Route E and the Camberwell CHPP.

The information provided in this document is presented to a level of detail which adequately addresses all relevant issues identified by the various stakeholders including Government agencies, surrounding residents and the local community (refer to Part C). Emphasis has been placed upon comprehensively addressing the key issues and limiting coverage of those issues that are not central to the determination of the project approval application. This approach is consistent with Director-General's requirements issued for the Project (see **Appendix 2**).

A2 DOCUMENT FORMAT

This *Environmental Assessment* has been structured to satisfy the directives included in the Director-General's requirements, particularly as they relate to the expectations of the Department of Planning for the environmental assessment of a Major Project to focus upon key issues of interest to the community and relevant State and local government agencies.

The format of the *Environmental Assessment* is as follows.

- Part A:** introduces the Project and the Proponent and explains the relationship of the Project to the existing Glennies Creek Colliery and other Part 3A applications being prepared for the Colliery's ongoing operations. A brief overview of the Colliery's history is provided. Information is also presented on the ongoing documentation (ie. Mining Operations Plan and Annual Environmental Management Reports) intended for the Project as well as details related to the management of investigations during the preparation of this *Environmental Assessment*.
- Part B:** provides a description of the proposed Glennies Creek Open Cut Coal Mine including the Project's objectives, the coal resources, and activities required to establish and operate the mine. Details of the proposed open cut mining, waste rock emplacement, hours of operation and mine life, progressive and final rehabilitation and a description of the Biodiversity Offset Strategy are provided.
- Part C:** outlines the results of the consultation undertaken with Government agencies and the community and issues raised for coverage in this document. This Part also outlines the relevant State and regional planning instruments and provides the outcomes of a general environmental risk analysis undertaken to establish the specific environmental risk(s) posed by issues identified.
- Part D:** provides a description of various aspects of the existing environment, proposed impact mitigation measures and management controls, and an assessment of the residual impacts of the Project. Where appropriate, proposed environmental monitoring is outlined.



- Part E:** provides a draft statement of commitments the Proponent proposes to implement with respect to environmental management and monitoring from site establishment, through the operational phase of the proposed open cut to decommissioning.
- Part F:** presents an evaluation of the entire Project assuming the adoption of all of the Proponent's commitments. The proposed direct and indirect impacts are then justified, particularly in light of the principles of Ecologically Sustainable Development.
- Part G:** lists the various source documents referred to for information and data used during the preparation of the *Environmental Assessment*.
- Part H:** presents a glossary of acronyms, technical terms, symbols and units used throughout this document.
- Appendices:** present the following additional information.

Appendix 1. A copy of the Proponent's Major Projects Application.

Appendix 2. A copy of the Director-General's requirements and a tabulated summary of those requirements and the *Environmental Assessment* requirements provided by other government agencies which identifies where each requirement is addressed in the *Environmental Assessment*.

Appendix 3. A copy of the initial Glennies Creek Community Newsletter and a table which summarises all comments made and concerns raised by the community regarding the proposed Glennies Creek Open Cut Coal Mine.

This *Environmental Assessment* is supported by a two-volume *Specialist Consultant Studies Compendium* incorporating reports prepared by eight specialist environmental consultancies covering nine different environmental aspects of the Project. The contents of these reports, including the identified key issues, have been summarised into the appropriate Part(s) of this *Environmental Assessment*.

A3 THE PROPONENT

Integra Coal Operations Pty Ltd (Integra) is the management Company responsible for the operation of the Glennies Creek Colliery and the Camberwell Coal Mine. The Integra Coal Project was formed in August 2006 through the integration of the Glennies Creek and Camberwell joint ventures. Both Glennies Creek Coal Management Pty Ltd (GCCM) and Camberwell Coal Pty Ltd (Camberwell) are wholly owned by Integra Coal Operations Pty Ltd. The participants of the Integra joint venture are as follows.

- CVRD Australia Pty Ltd (61.2%) through subsidiary companies CVRD Australia (GC) Pty Ltd (36%) and Maitland Main Collieries Pty Ltd (25.2%) *
- NS Glennies Creek Pty Limited (3.6%) *



- POS – GC Pty Ltd (3.6%) *
- JS Glennies Creek Pty Ltd (1.8%) *
- JFE Steel (GC) Pty Ltd (1.8%) *
- Toyota Tsusho Mining (Australia) Pty Ltd (11.2%)
- Navidale Pty Ltd (14%)
- Toyota Tsusho Corporation (Australia) Pty Ltd (2.8%).

The joint venture parties identified with an asterisk comprise the Glennies Creek joint venture participants.

The major shareholder, CVRD Australia Pty Ltd is a subsidiary of Comanhia Vale to Rio Doce, a Brazilian mining company which ranks as the second largest mining company in the world.

A4 COAL USE AND MARKETS

Coal is primarily used in electricity production, with 39% of global electricity production generated from coal. Smaller amounts of coal are used for industrial, residential and metallurgical coking purposes. Coal is the principal form of reductant in the metallurgical industries, with around 70% of world steel production dependent on coal (Australian Coal Association, 2007).

Coal from seams in the Glennies Creek area are bituminous, high volatile, low sulphur and vitrinite rich and, after washing, are of low ash content. The low sulphur content of the Glennies Creek Open Cut coal provides potential for it to be blended with higher sulphur coals to allow strict environmental standards to be met. The low ash content after washing meets export specifications for coking and thermal purposes.

Black coal is Australia's largest commodity export, with exports worth approximately \$24.5 billion in 2005-06. Australia is also the world's largest single coal exporter with exports of 233 Mt in 2005-06, or approximately 30% of the world total. Total production of saleable black coal in Australia in 2005 was approximately 308Mt (Australian Coal Association 2007).

With respect to overseas coal markets, Australia's share in 2004 represented 20% of thermal coal sales and 60% of metallurgical coal sales worldwide (Australian Coal Association, 2007).

Australian coal is exported to more than 35 countries around the world. Japan and other Asian economies account for more than 80% of the export market for Australian coal, with smaller amounts exported to Europe, South America and South Africa (Australian Coal Association, 2007).



A5 GLENNIES CREEK COLLIERY AND CAMBERWELL COAL MINE OPERATIONS

A5.1 Introduction

Since August 2006, both the Glennies Creek Colliery and Camberwell Coal Mine have been integrated as the Integra Coal Project although the underlying mining tenements continue to be held by the original participants in the relevant joint ventures. It is noted that mining leases and other formal documents respectively remain in the names of Glennies Creek Coal Management Pty Ltd and Camberwell Coal Pty Ltd, the operating companies prior to the integration of the operations in August 2006.

This section provides an overview of both operations, given the planned inter-relationships between each operation and the proposed Glennies Creek Open Cut Coal Mine.

Figure A2 presents the various mining tenements for the Glennies Creek Colliery and the Camberwell Coal Mine.

A5.2 Glennies Creek Colliery

A5.2.1 History and Existing Approvals

Major interest in the development of the coal resource in the area now referred to as the Glennies Creek Colliery commenced in the mid 1970s with the extensive exploration culminating in the lodgement of a development application for an underground mine in August 1990. Following a Commission of Inquiry in mid 1991, development consent was granted in November 1991. Details of this development consent and other relevant approvals, licences and leases are as follows.

- Development Consent (DA 105/90) – granted 1 November 1991 by the then Minister for Planning. This consent has been modified five times since it was first granted to allow for minor modifications/upgrades to the overall mining operation.
- Project Approval 06_0057 – granted 30 January 2007 for surface facilities and activities.
- Mining Leases – a coal lease (CL382), a total of three mining leases (MLs 1437, 1518 and 1551), a Mining Lease Application (MLA303) and an exploration licence (EL5824) have been issued for the Glennies Creek Colliery by the Department of Primary Industries – Mineral Resources or its predecessor Departments. **Table A1** presents details of each of the leases which are relevant to the proposed open cut, together with Camberwell's Coal Lease (CL357), while **Figure A2** presents a plan showing the location of the relevant tenements. Each of the Glennies Creek Colliery leases is held in the names of the Glennies Creek joint venture participants listed in Part A3.



\\SERVER\RW\642\CAD\642Base_A2 Tenements.DWG

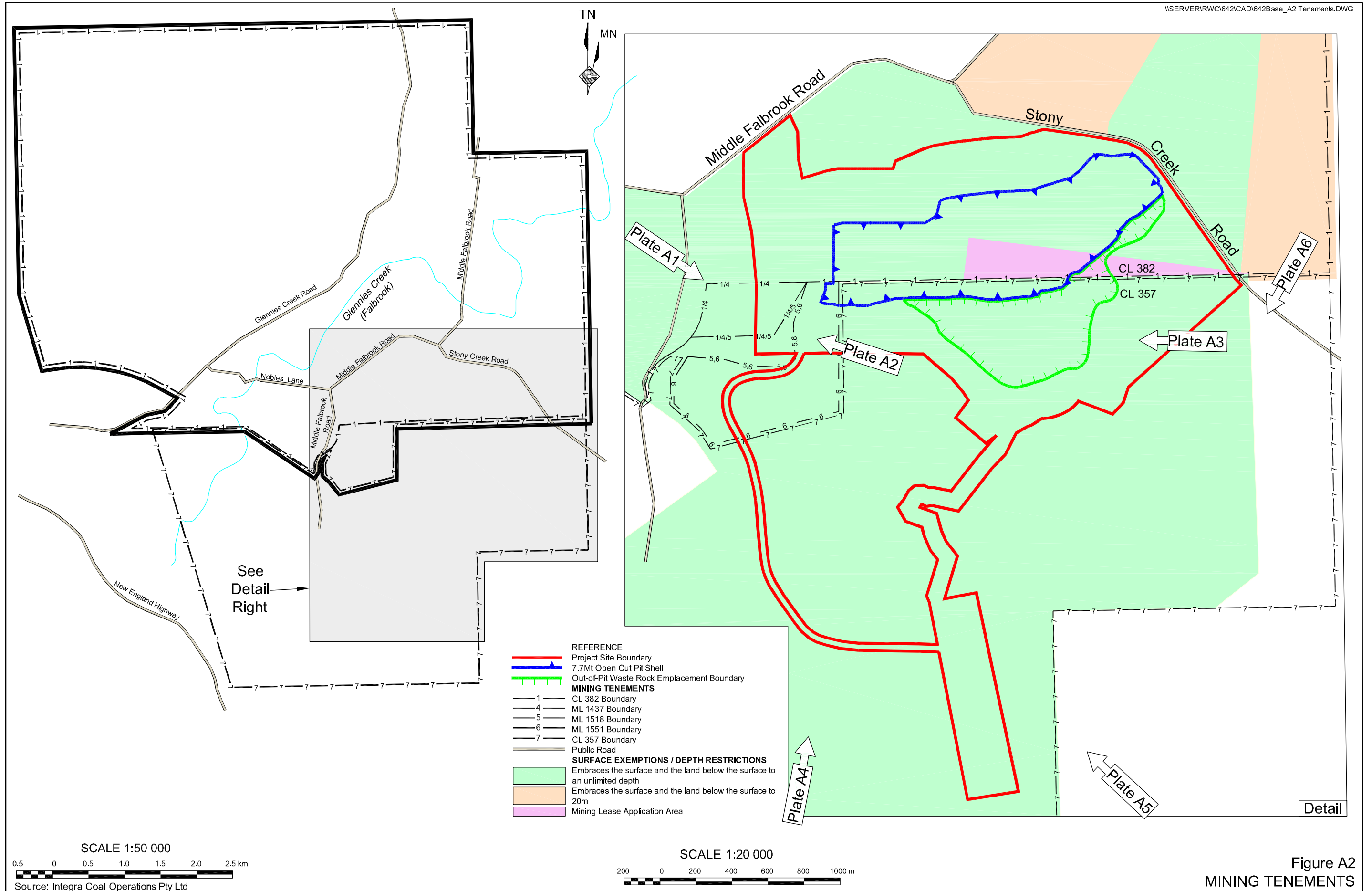


Table A1
Mining Tenements Relevant to Proposed Open Cut

Lease*	Area (ha)	Expiry Date	Relevance
CL 382	4 070	11.11.2012	The proposed open cut mining operation is located largely within the southern corner of this lease.
CL357	1 667	27.03.2011	This lease is held by Camberwell Coal Pty. Ltd.
ML 1437	14.8	27.03.2011	Encompasses Glennies Creek Colliery portal area.
ML 1518	9.6	27.03.2011	Encompasses the RL100 Stockpile Area.
ML 1551	43.13	27.03.2011	Encompasses a Part of Haul Route E.
MLA303	19.6	-	Encompasses a section of CL 382 with a restriction on mining-related activities from the surface to a depth of 20m.

* See Figure A2

- Environment Protection Licence (EPL) 7622 for coal mining, including coal works – conveyor and stockpile, on a scale of 3 500 000tpa to 5 000 000tpa saleable coal produced.
- Dangerous Goods Licence 35/034651.
- A total of eight Water Access Licences (484, 485, 690, 691, 1172, 1173, 1242 and 10095) and six Bore Licences (20BL/ 167917, 169571, 169573, 169574, 169862 and 169864) for the dewatering of the underground mine workings and for monitoring purposes, all of which are issued in perpetuity.
- Approvals for longwall mining from Department of Primary Industries – Mineral Resources for Longwall Panels LW1 to LW9 (within the Middle Liddell seam).

Each of the tenements identified in **Table A1** and relevant surface exemptions/depth restrictions are shown on **Figure A2**. It is noted that applications will be lodged by the appropriate parties with the Department of Primary Industries - Mineral Resources to extend the tenure of each of the leases listed in **Table A1**. In addition, the participants in the Glennies Creek joint venture have initiated an application for a new mining lease to cover an area subject to the surface exemption and depth restriction.

A5.2.2 Operations to Date

Initial mining operations commenced in October 1996 with major on-site activities commencing in December 1998. Underground mine development commenced in May 1999. Since that time, the Glennies Creek Colliery has been developed in three stages.

- **Stage 1** - Development of three entries in the Middle Liddell seam from the highwall of the Camberwell North Pit (May 1999 to April 2000).
- **Stage 2** - Development of the five heading Northwest Mains to prove mining conditions, and the installation of the initial longwall gateroads (June 2000 to August 2002).



- **Stage 3** - Installation and operation of a longwall unit with a maximum face width to date of 250m and associated development workings (August 2002 to date).

The surface facilities, located adjacent to the former Oak Park School House, were primarily established during Stages 1 and 2.

Plates A1 and **A2** display the current components of the existing operations within the Glennies Creek Colliery. The Pit Top Area boundary is highlighted on both plates.

Underground operations at the Glennies Creek Colliery produce a high quality, semi-hard coking coal for the export market, with the current approved coal production level set at 4.5 million tonnes per annum (Mtpa) ROM coal.



Plate A1: An oblique aerial view to the southeast across the Glennies Creek Colliery Pit Top Facilities in the foreground and Camberwell CHPP in the middle distance. Ref: E642-F128.



Plate A2: An oblique aerial view to the northwest towards the Glennies Creek Colliery Portal Area and Pit Top Facilities. Ref: E642-F019.



A5.2.3 Ongoing and Proposed Operations

Planned future underground operations include:

- completion of coal extraction within Longwall Panels 10 to 17 in the Middle Liddell seam (by financial year 2012 - 2013);
- development of underground access and infrastructure to enable mining of the Hebden and Barrett seams; and
- transfer of underground operations to the Hebden and Barrett seams.

In addition to the Part 3A application for the proposed open cut mine, the Proponent has prepared a separate application for project approval for underground coal mining of Longwall Panels 10 to 17 within the Middle Liddell seam in order to bring the activities at the Colliery under Part 3A of the EP&A Act. The respective areas covered by these applications are identified on **Figure A3**.

A5.2.4 Environmental Management and Performance

The Proponent operates the Glennies Creek Colliery in accordance with an environmental management system incorporating a range of elements designed to ensure that all environmental issues are proactively managed.

Environmental management on site is managed by Integra's Manager Safety and Environment with the assistance of GCCM's Safety and Environment Advisor. The Manager Safety and Environment reports directly to Integra's General Manager who has ultimate responsibility for environmental management on site. In addition to these two dedicated positions, all site personnel have environmental responsibilities included as part of their current work descriptions. Environmental issues are regularly covered in site toolbox meetings.

Glennies Creek Coal Management Pty Ltd has held Environment Protection Licence (EPL) 7622 since 1999 and, prior to that time, held Pollution Control Licence 7622. Since coal production commenced in 1999, the Colliery has only recorded two non-compliances against its licence, both related to longwall emulsion spills in 2003.

A5.2.5 Community / Stakeholder Relationship

In 1999, a Community Consultative Committee was established for the Glennies Creek Colliery. This Committee, which has operated continuously since that time, meets on a six monthly basis to discuss issues that members of the local community have raised with committee members relating to the operation of Glennies Creek Colliery, and to inform committee members of current and proposed operations and activities at the Colliery. The Committee includes a Singleton Shire Councillor, an officer of Singleton Shire Council, two landowner/residents from the surrounding local area, and two representatives from the mine, including the Safety and Environment Advisor.

Complaints with respect to the Colliery's performance are managed through an established management procedure involving complaints recording, follow-up and investigation. Complaint levels have typically ranged between 10 and 18 per year since 2005, with the majority of complaints pertaining to noise or lighting.

A5.3 Camberwell Coal Mine

A5.3.1 History and Existing Approvals

Operations at the Camberwell Coal Mine commenced in 1991 and include an open cut coal mine, a coal handling and preparation plant (Camberwell CHPP) and associated coal handling and rail loading facilities. The operations are managed by Integra Coal Operations Pty Ltd.



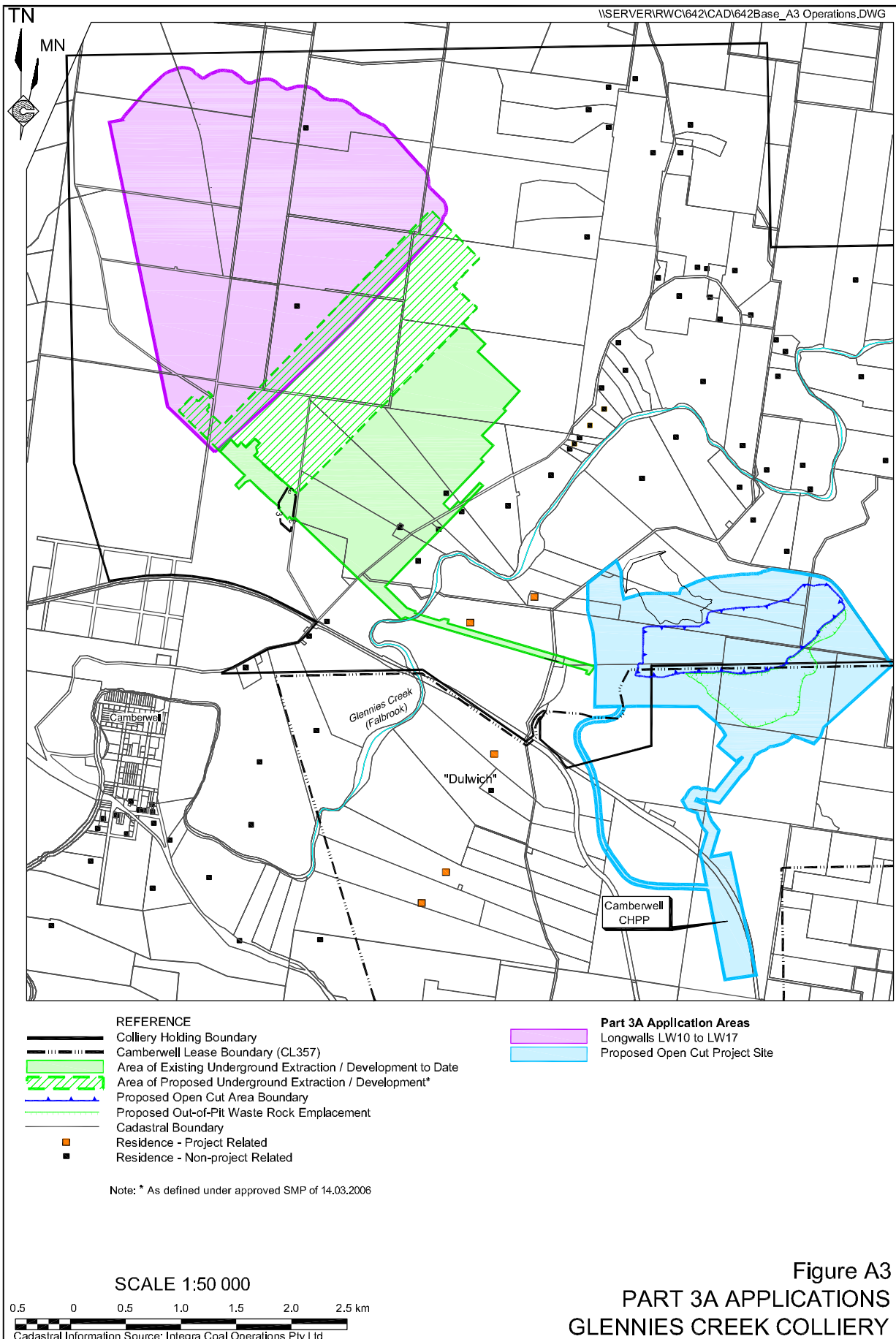


Figure A3
 PART 3A APPLICATIONS
 GLENNIES CREEK COLLIERY



Details of the various approvals and leases are as follows.

- Development Consent (DA 86/2889) – granted on 18 March 1990 by the then Minister for Planning. This consent has been modified on five occasions, including to provide for an increase in throughput in the CHPP (to 1200 tph) and to process coal originating from the Glennies Creek Underground Mine.
- Mining Leases – three tenements are held covering the operations across the Camberwell Coal Mine namely Coal Lease 357 (Renewal Date 27/02/2011) and Authorisations A44 and A81 (Renewals pending).
- Environment Protection Licence (EPL) 3390 for coal mining and coal works. The licence is relevant to a scale of 2 000 000tpa to 3500 000tpa saleable coal produced and >5 million tonnes of coal products loaded.
- Dangerous Goods Licence No 07-100005-001.
- A total of seven Water Access Licences (20CA / 201042, 200941, 200531, 200847, 200847 (supplementary), 201232 and 20BL169513), all of which are extraction licences.

A5.3.2 Operations to Date

Since 1991, multi-seam open cut mining has occurred principally within two pits, referred to as the North and South Pits. Mining ceased in the North Pit in 1999 and the bulk of the pit was backfilled leaving a small section in the northwestern corner without backfill to enable access to the Glennies Creek Colliery via a portal on the former highwall. Mining commenced in the South Pit in 1997 and is approved to yield up to 3.8Mtpa ROM coal by open cut methods. **Plates A3** and **A4** display the largely backfilled North Pit and the activities in the South Pit.

The Camberwell CHPP has approval to process coal from both the Camberwell South Pit and the Glennies Creek Underground Mine until 18 March 2011 after which a further approval will be required. **Plate A5** displays the Camberwell CHPP and **Plate A6** shows Tailings Dam TD2, the tailings dam currently used to store tailings from the Camberwell CHPP.

A5.3.3 Ongoing and Proposed Operations

Planned operations within the Camberwell Coal Mine include the continuation of open cut mining in the South Pit until late 2009 after which it is proposed to develop a western extension in CL357 covering an area of up to 350ha, ie. subject to receipt of the necessary approvals.

Prior to March 2011, ie. the expiry of DA 86/2889, Integra Coal Operations Pty Limited intends to seek a further project approval for the long term use of the Camberwell CHPP, train loader and related facilities given that those facilities are to be used for the processing and despatch of coal from the Glennies Creek Colliery over the life of that operation.





Plate A3: View to the west across the rehabilitated northern slopes of the Camberwell North Pit.
Ref. E642-F085



Plate A4: View to the north across the Camberwell South Pit.
Ref. E642-F118



Plate A5: View to northwest across Camberwell CHPP.
Ref. E642-F140.



Plate A6: View to the southwest across the Camberwell Tailings Storage Dam TD2.
Ref. E642-F106.



A5.3.4 Environmental Management and Performance

The Proponent operates Camberwell Coal Mine in accordance with an environmental management system incorporating a range of elements designed to ensure that all environmental issues are proactively managed.

Environmental management of the Camberwell Coal Mine is managed by Integra's Manager Safety and Environment with the assistance of Camberwell's Environmental Advisor. As is the case at the Glennies Creek Colliery, all site personnel have environmental responsibilities included as part of their current work descriptions and environmental issues are regularly covered in site toolbox and management meetings.

A5.3.5 Community / Stakeholder Relationship

A Community Consultative Committee was established for Camberwell Coal in December 2002. This Committee, which has operated continuously since that time, meets on a six monthly basis to discuss issues that members of the local community have raised with committee members relating to the operation of Camberwell Coal Mine, and to inform committee members of current and proposed operations and activities at the Coal Mine. The Committee includes a Singleton Shire Councillor, an officer of Singleton Shire Council, four landowner/residents from the surrounding local area, and two representatives from the mine, including Camberwell's Environmental Advisor.

Camberwell Coal Mine provides newsletters to surrounding residents and supports many local community organisations.

Camberwell Coal Mine has a complaints management procedure in place and, in all cases, complaints are followed up and, where possible, issues resolved by consultation. Complaint levels have averaged 23 per year since 2002, with the majority of concerns related to blasting.

A6 ENVIRONMENTAL MANAGEMENT AND DOCUMENTATION

Ongoing environmental management at the Glennies Creek Open Cut Coal Mine, including the Proponent's performance with respect to this document and the implementation of all relevant approval, licence or lease conditions, would be the responsibility of the General Manager. The Manager Safety and Environment would be responsible for managing all day-to-day environment-related matters in accordance with the site's overall environmental management system. The existing system would be updated to reflect the range of commitments and conditional requirements associated with the open cut mine.

An important component of the ongoing environmental management of the proposed open cut mine would be the development and use of the documentation required by the Department of Primary Industries - Mineral Resources and Department of Planning, including the Mining Operations Plan and Annual Environmental Management Reports.



Mining Operations Plan (MOP)

A MOP, accepted by Department of Primary Industries – Mineral Resources, would be required prior to the commencement of open cut mining. The MOP would provide a greater level of detail with respect to mining operations, rehabilitation and site environmental management than the *Environmental Assessment*, as well as including any additional procedures or management controls required to meet relevant project approval conditions. Notwithstanding the limited life of the project, it is envisaged that an initial MOP would be prepared covering the first four years of the Project, with a subsequent MOP submitted covering the final years of the Project and incorporating a mine closure plan.

The MOP would include the following information.

- **Introduction** - including a brief history of the operation, approvals, leases and licences and background information, mine geology, land ownership and consultation, reporting procedures and management responsibilities.
- **Pre-MOP Environment** - providing a brief description of topography, drainage, groundwater, soils, heritage, ecology, surrounding residences and services. This information would effectively be drawn from this *Environmental Assessment*.
- **Land Preparation** - providing details on land clearing, soil types and their physical and chemical characteristics, soil stripping, stockpiling and management.
- **Mining-related Activities** - describing buildings, facilities and services to be installed and maintained, and detailing mining operations (including sequencing) as well as in-pit and out-of-pit waste rock emplacement design and construction.
- **Rehabilitation** - describing the short term and long term rehabilitation objectives, the final landform and land uses, rehabilitation procedures to be employed and the sequence of progressive rehabilitation.
 - detailing the biodiversity offset strategy for the Project.
- **Environmental and Rehabilitation Risk Assessment** - presenting an evaluation of the risk of environmental harm as a result of each of the mine's component activities.
- **Environmental Management Controls** - describing the management, ie. diversion, storage and disposal of clean and/or sediment-laden water, and erosion and sediment management. Design details for all water management structures to be installed during the life of the mine would be presented.
 - describing the noise and air quality design controls for each stage of the Project including mining, waste rock emplacement and internal transportation.



- outlining the ecological controls to provide for the appropriate clearing, storage, re-spreading of vegetation and establishment of future corridors for native vegetation.
- outlining the monitoring program for aspects such as air quality, noise, water, blasting and meteorology and the contingency plans to respond to emergencies, incidents or any deficiency in environmental performance identified through monitoring or consultation.

Annual Environmental Management Report (AEMR)

An AEMR would be required annually for submission to the Department of Planning, Department of Primary Industries – Mineral Resources, Department of Environment and Climate Change, Department of Water and Energy and Singleton Council. Each AEMR would provide the opportunity to record actual performance and environmental impacts and to compare the impacts against those predicted in this *Environmental Assessment*, as well as to evaluate the effectiveness of the environmental management controls and monitoring and amend them, as required.

Each AEMR would provide the following information, where relevant.

- **Introduction:** - Environmental objectives of the Project and reporting period for the report.
- **Summary of Operations:** - Information on site establishment and/or construction activities, coal production levels, ROM coal transport, overburden / interburden emplacement, water use and dewatering levels and progressive rehabilitation / final landform preparation.
 - Plans for the following 12 months of operations relating to coal production levels, ROM coal transport, overburden / interburden emplacement, progressive rehabilitation and final landform preparation.
- **Environmental Management and Monitoring:** - Monitoring data and a comparison with statutory criteria and predictions.
 - Alterations/improvements to environmental management.
 - An assessment of compliance with lease, licence and project approval conditions.
- **Community Relations** - Results of consultation with surrounding landholders, the wider community and the Community Consultative Committee.
- **Rehabilitation** - Activities undertaken during the reporting period including a review of progress with previous rehabilitation activities.



The initial AEMR would be submitted approximately 12 months after the commencement of mining-related activities.

A7 MANAGEMENT OF INVESTIGATIONS

This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty. Limited. Rob Corkery (B.Sc.(Hons), M.Appl.(Sc)) co-ordinated the preparation of the document and also undertook the internal review. The formative work for the document was compiled by Kim Ferguson ((B.Env.Sc) Merit Honours) who also managed the Community Consultation component relating to the Project. Management of the completion of the document was undertaken by Mitchell Bland (B.Sc(Hons), M.EconGeol).

The document was compiled with the assistance of the following personnel from the Proponent.

- Sean Egan (B.E. (Min)), General Manager Business Development, AMCI Australia Pty. Ltd.
- Bob Corbett (B.Sc. (For)), Group Manager Environment, AMCI Australia Pty. Ltd.
- Mr Steve Kovac (B.E. (Mining)), Manager Technical Services, Integra Coal Operations Pty Ltd.
- Mr Chris Smith (B.E. (Mining), MBA), Project Manager, Integra Coal Operations Pty Ltd.
- Geoff MacKenzie, Manager Safety and Environment, Integra Coal Operations Pty Ltd.
- Ken Barry (B.Env.Sc; GradCert.Min.Res), Safety and Environment Advisor, Glennies Creek Coal Management Pty Ltd.

The team of specialist consultants which assisted in the preparation of the various assessments incorporated into the *Environmental Assessment* are listed below with reference to the number of their individual reports in the *Specialist Consultant Studies Compendium*.

- Part 1 (Volume 1) – Holmes Air Sciences Pty Ltd (*Air Quality Assessment*).
- Part 2 (Volume 1) – Heggies Pty Ltd (*Noise and Blasting Assessment*).
- Part 3 (Volume 1) – Countrywide Ecological Service (*Fauna Assessment*).
- Part 4 (Volume 1) – Geoff Cunningham Natural Resource Consultants Pty Ltd (*Flora Assessment*).
- Part 5 (Volume 2) – HLA Envirosciences Pty Ltd (*Aboriginal Heritage Assessment*).
- Part 6 (Volume 2) – Geoff Cunningham Natural Resource Consultants Pty Ltd (*Soils Assessment*).
- Part 7 (Volume 2) – PSM Australia Pty Ltd (*Surface Water Assessment*).
- Part 8 (Volume 2) – Australasian Groundwater and Environmental Consultants Pty Ltd (*Groundwater Assessment*).
- Part 9 (Volume 2) – The Allen Consulting Group (*Socio-Economic Assessment*).



Part B

Description of the Project

Preamble

This part of the Environmental Assessment describes the proposed Glennies Creek Open Cut Coal Mine including:

- the objectives of the Project;*
- the geological setting and coal resources;*
- proposed mine design and operations;*
- proposed rehabilitation of the Open Cut Area; and*
- the Biodiversity Offset Strategy.*

The proposed mine design, operation and rehabilitation procedures described within this Part reflect all environmental constraints identified and recommendations made throughout the environmental assessment process.

The information presented in this Part is presented at a level of detail sufficient for the Minister to determine the Major Projects Application.



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B1 OUTLINE OF THE PROJECT

B1.1 Project Objectives

The proposed Glennies Creek Open Cut Coal Mine has been designed, and would operate, in accordance with the following objectives.

- To safely mine the identified coal reserve to produce export quality coal.
- To operate in a manner that would minimise surface disturbance and impacts on surrounding residents and the local environment.
- To implement a level of management control and mitigation measures that ensures compliance with appropriate environmental criteria and reasonable community expectations.
- To develop and operate the mine in compliance with all relevant statutory requirements.
- To create a final landform that blends with the surrounding landscape, is suitable for post-mining areas of native vegetation conservation and is consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* and the *Glennies Creek Catchment – Total Catchment Management Study – Management Strategy*.
- To continue to maintain an open and honest relationship with the surrounding community.
- To achieve the above objectives in a cost-effective manner to ensure security of employment and the continued economic viability of the Proponent.

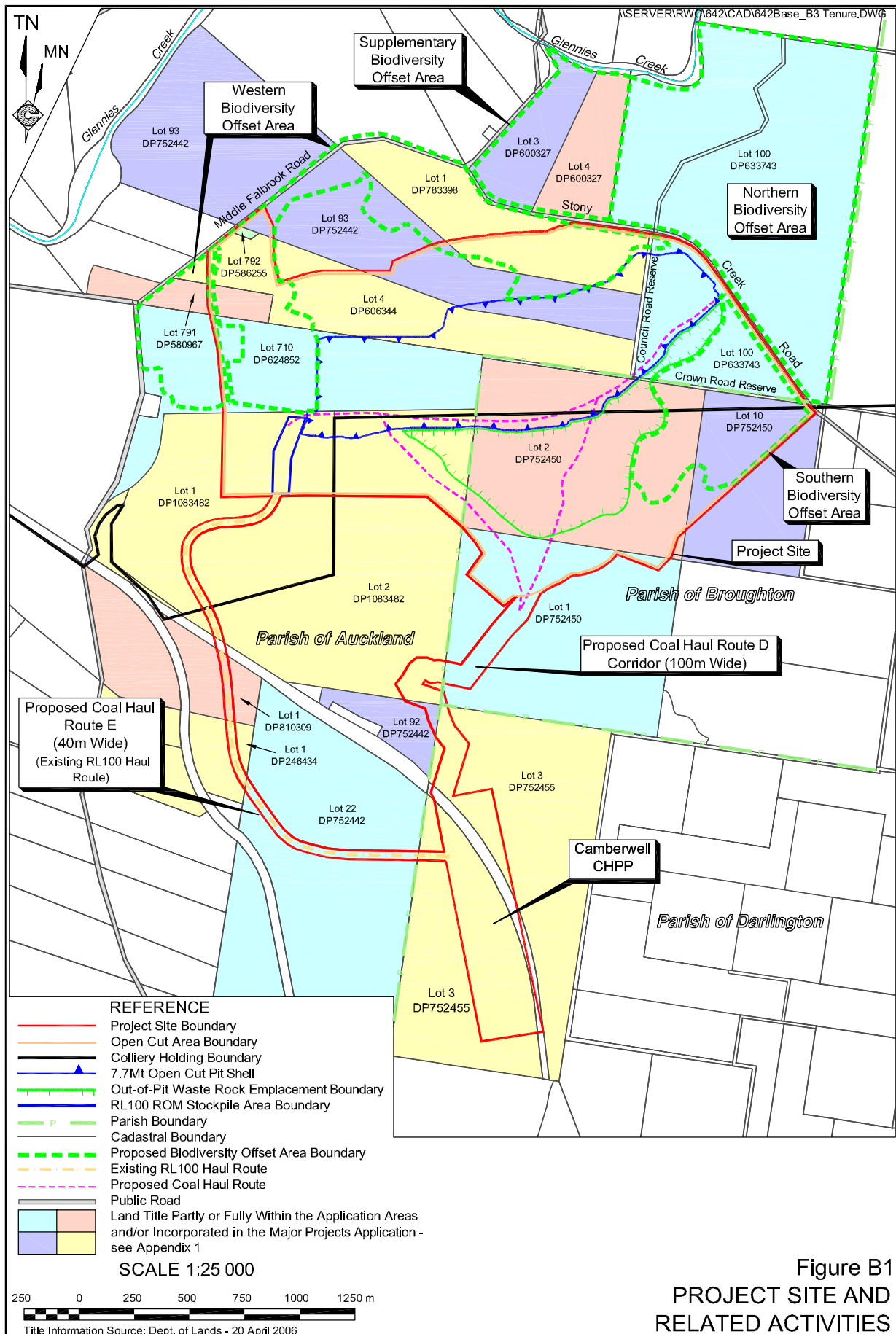
B1.2 Project Site

The Project Site (**Figure B1**) incorporates all areas of disturbance associated with proposed project-related activities, and includes:

- the Open Cut Area (320ha incorporating a 90ha mine area);
- Haul Route Corridor D (100m wide x 1 400m long);
- Haul Route Corridor E (40m wide x 2 700m long) (the existing RL 100 Haul Route); and
- the Camberwell CHPP area (31ha). The Camberwell CHPP area includes the preparation plant, ROM and product coal stockpiles, the trainloader and associated facilities.

Haul Route Corridors D and E, as well as the Camberwell CHPP and parts of the Open Cut Area have previously been disturbed by mining operations or are presently being utilised for such purposes. The Haul Route Corridor D is 100m wide to allow some flexibility with the selection of the exact route of Haul Route D. The Haul Route Corridor E incorporates the existing RL100 Haul Route, the location of which would not be modified by the Project.





The Project Site covers a total area of approximately 376ha, of which approximately 207ha, or 55% of land, is presently disturbed.

The proposed activities lie within the following parcels of land within the Singleton Local Government Area, all of which are owned by companies associated with the Proponent (**Figure B1**).

Open Cut Area

- | | |
|--|---|
| – Parish of Auckland, County of Durham | – Parish of Broughton, County of Durham |
| - Lot 792 DP 586255 | - Part Lot 1 DP 752450 |
| - Part Lot 791 DP 580967 | - Part Lot 2 DP 752450 |
| - Part Lot 710 DP 624852 | - Part Lot 10 DP 752450 |
| - Part Lot 4 DP 606344 | |
| - Part Lot 93 DP 752442 | |
| - Part Lot 1 DP 783398 | |
| - Part Lot 1 DP 1083482 | |
| - Part Lot 2 DP 1083482 | |
| - Part Lot 100 DP 633743 | |

The Open Cut Area also encompasses approximately 0.6 km Council road reserve and 1.5 km of Crown road reserve.

Coal Haul Route D Corridor

- Parish of Auckland, County of Durham
 - Part Lot 1 DP 752450
 - Part Lot 11 DP 1013180
 - Part Lot 92 DP 752442
 - Part Lot 3 DP 752455
 - Former Railway Line Easement within Lot 3 DP 752455

Coal Haul Route E Corridor

- | | |
|--|--|
| – Parish of Auckland, County of Durham | • Parish of Darlington, County of Durham |
| - Part Lot 1 DP 1083482 | - Part Lot 3 DP 752455 |
| - Part Lot 2 DP 1083482 | |
| - Part Lot 1 DP 810309 | |
| - Part Lot 1 DP 246434 | |
| - Part Lot 1 DP 212284 | |
| - Part Lot 22 DP 752442 | |

Camberwell Coal Handling and Preparation Plant (CHPP)

- Parish of Darlington, County of Durham
 - Part Lot 3 DP 752455
 - Former Railway Line Easement within Lot 3 DP 752455



In addition to the Project-related activities, the Proponent proposes to protect and enhance three areas of Project-related land and one area of non-Project-related land to offset the disturbance of approximately 68ha of Narrow-leaf Ironbark-Spotted Gum-Forest Red Gum Community, 1ha of Regenerating Native Woodland / Shrubland Community and 6ha of Tussock Grassland Community. For the purpose of this application, the offset areas are referred to as:

- the Northern Biodiversity Offset Area (approximately 121ha);
- the Southern Biodiversity Offset Area (approximately 39ha);
- the Western Biodiversity Offset Area (approximately 94ha); and
- the Supplementary Biodiversity Offset Area (approximately 33ha) (**Figure B1**).

Further details of these areas are presented in Part B15.10.2. The land titles covered by the biodiversity offset areas are as follows.

Northern Biodiversity Offset Area	Supplementary Biodiversity Offset Area
– Parish of Auckland, County of Durham	– Parish of Auckland, County of Durham
– Part Lot 100 DP 633743	– Lot 3 DP 600327
	– Lot 4 DP 600327
Western Biodiversity Offset Area	Southern Biodiversity Offset Area
• Parish of Auckland, County of Durham	• Parish of Auckland, County of Durham
– Part Lot 1 DP 783398	– Part Lot 100 DP 633743
– Part Lot 93 DP 752442	
– Lot 792 DP 586255	• Parish of Broughton, County of Durham
– Part Lot 4 DP 606344	– Part Lot 2 DP 752450
– Part Lot 791 DP 580967	– Part Lot 10 DP 752450
– Part Lot 710 DP 624852	
– Part Lot 1 DP 1083482	

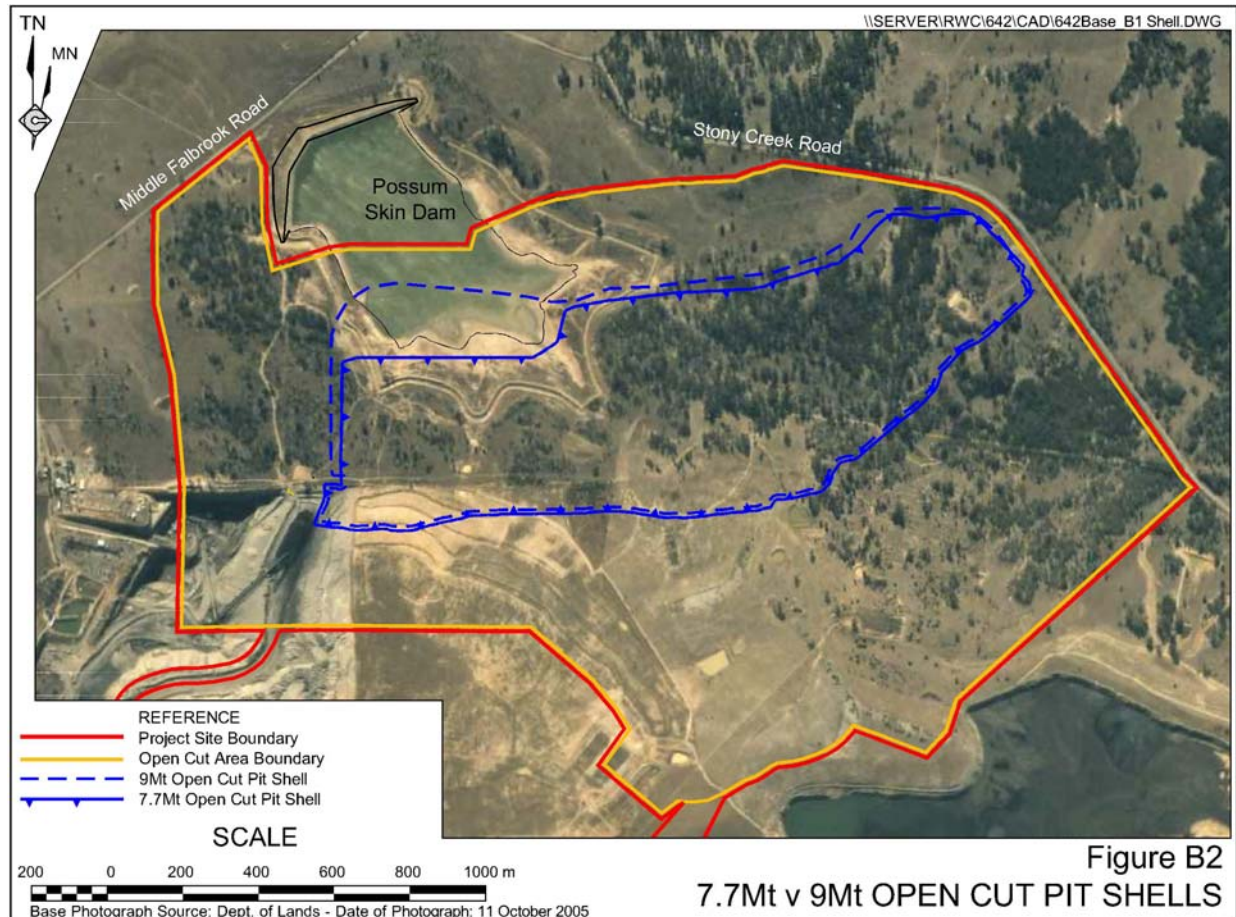
B1.3 Overview of the Project

B1.3.1 9Mt Reserve and 7.7Mt Reserve

Total coal reserves within the Open Cut Area that may potentially be recoverable by open cut mining methods have been identified as approximately 9 million tonnes (Mt) of run-of-mine (ROM) coal (**Figure B2**), of which approximately 1.3Mt lies beneath the limits of the Possum Skin Dam, a dam constructed in 2004 to provide additional water storage capacity for the Glennies Creek Colliery. Accordingly, at this stage, the Proponent intends to develop a smaller, 7.7Mt reserve which would not impact measurably on the storage capacity of the dam. However, the potential remains to increase the reserve to the 9Mt limit if it can be determined that the Possum Skin Dam is no longer required in its current form.



This *Environmental Assessment* and accompanying application for project approval therefore relates only to the smaller, 7.7Mt open cut. Should the Proponent elect to develop the remaining coal reserve beneath Possum Skin Dam in the future, a subsequent modification application and related environmental assessment would be submitted to the Department of Planning in accordance with the provisions of Section 75W of the *Environmental Planning and Assessment Act 1979*.



B1.3.2 Overview of Proposed Activities

The Project would involve the following activities (**Figure B3**).

- Construction of a site access road off Middle Falbrook Road.
- Construction of the open cut facilities area (including transportable offices, a bathhouse, a crib room, a report room, first aid facilities, stores, workshop, lay-down areas, parking facilities and associated infrastructure).
- Coal mining by open cut methods within a pit shell covering approximately 90ha (7.7Mt reserve). Within this area, drilling has identified three principal coal seams amenable to mining by open cut methods, namely the:
 - Middle / Lower Liddell;
 - Barrett; and
 - Hebden seams.

- Transportation of ROM coal to the Camberwell CHPP via a combination of internal haul routes A to E (see **Figure B3**).
- When required, stockpiling of ROM coal at a temporary ROM coal stockpile area located at the top of the active open cut ramp (see Part B6.2) or within the existing RL100 Stockpile Area, with subsequent transportation to the Camberwell CHPP (see **Figure B3**).
- Highwall / auger mining. During the course of the open cut mining, there may be opportunities to undertake mining from the northern highwall using either highwall or auger mining methods to extract additional coal. These methods of mining would result in underground extraction for a maximum length of approximately 300m from the base of the highwall (see **Figure B3**). The final distance would depend on the type of mining undertaken. Highwall or auger mining would not occur outside the Project Site boundaries, and would not result in subsidence of the ground surface. The coal that would be extracted by this method would be in addition to the 7.7Mt to be extracted by open cut mining methods.
- Programmed placement of waste rock materials from the open cut. Initially, this would be to an out-of-pit emplacement, with subsequent placement out-of-pit as well as in-pit in areas where mining has been completed. The proposed out-of-pit emplacement would have a disturbance footprint of approximately 43ha (see **Figure B3**).
- Progressive construction of surface water control structures, including two dirty water containment dams (**Figure B3**).
- Storage and washing of ROM coal, despatch of product coal from the Camberwell CHPP and placement of fine tailings material.
- Progressive reshaping and rehabilitation of all areas of mining-related disturbance.
- Implementing and maintaining comprehensive systems to manage noise, vibration, air quality, visibility, surface water, groundwater, flora, fauna and Aboriginal heritage issues.

Table B1
Areas of Project-related Disturbance

Areas to be Disturbed	Currently Disturbed	Currently Undisturbed	Total
Open Cut	24.7ha	65.3ha	90ha
Out-of-pit Waste Rock Emplacement	31.8ha	11.2ha	43ha
Open Cut Facilities Area	-	1.5ha	1.5ha
Site / Open Cut Access Road	-	1.0ha	1.0ha
Haul Routes A, B and C	12.5ha	3.2ha	15.7ha
Stony Creek Road Amenity Bund	-	1.0ha	1.0ha
Northern Dirty Water Containment Dam	-	1.4ha	1.4ha
Southern Dirty Water Containment Dam	-	1.7ha	1.7ha



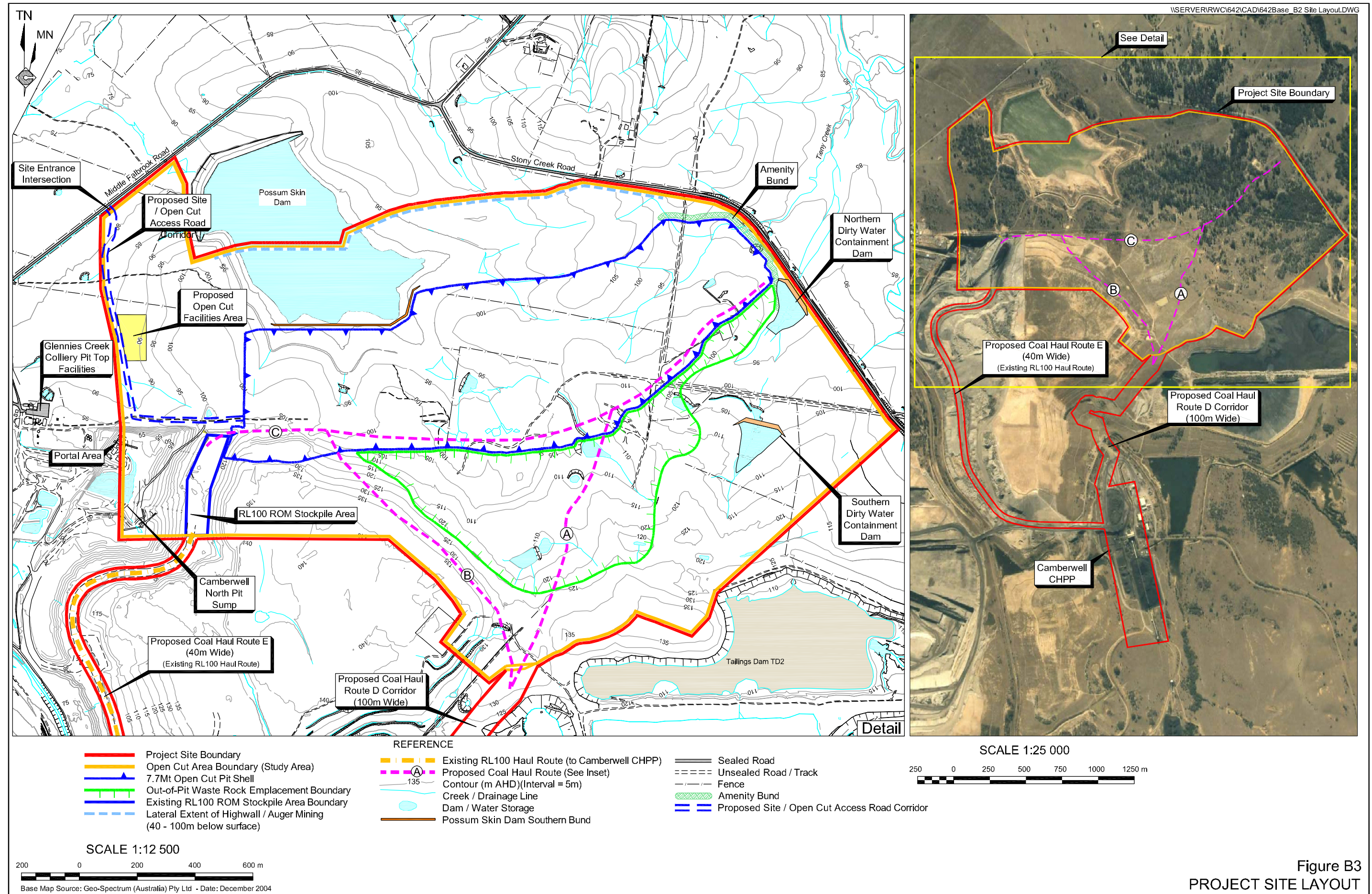


Figure B3
PROJECT SITE LAYOUT

A related activity to the coal mining, transportation and washing of coal would be the provision of various offsets in response to the clearing of approximately 68.3ha of Narrow-leaf Ironbark - Spotted Gum - Forest Red Gum Community, approximately 0.7ha of Regenerating Native Woodland / Shrubland Community and approximately 6.1ha of Tussock Grassland Community. These offset strategies include the protection and enhancement of:

- approximately 121ha of Project-related land to the north of Stony Creek Road (Northern Biodiversity Offset Area);
- approximately 39ha of Project-related land to the south of Stony Creek Road and east of the out-of-pit waste rock emplacement (Southern Biodiversity Offset Area);
- approximately 94ha of Project-related land to the south of Stony Creek and Middle Falbrook Roads and north and west of the areas of existing and proposed disturbance (Western Biodiversity Offset Area); and
- approximately 33ha of non-Project related land to the north of Stony Creek Road and west of the Northern Biodiversity Offset Area, subject to the receipt of project approval and acquisition or negotiation of a suitable alternative arrangement with the owners of this land (Supplementary Biodiversity Offset Area) (see **Figure B1**).

B1.4 Approvals Required

The following approvals are required for the proposed open cut coal mine.

- Project Approval – Minister for Planning
Project approval is required from the Minister for Planning for the Project in its entirety under Part 3A of the *Environmental Planning and Assessment Act 1979*. As detailed in Part B1.2.1, a subsequent modification application for the extraction of a further 1.3Mt of coal may be submitted at a later date.
- Environment Protection Licence – Department of Environment and Climate Change (Environment Protection Authority).
Glennies Creek Coal Management Pty Ltd (GCCM) currently holds an Environment Protection Licence (EPL7622) for the production of up to 5.0Mtpa of product coal. GCCM would apply to amend the licence to reflect the proposed open cut mining activities.
- Mining Lease – Department of Primary Industries - Mineral Resources.
As noted in Part A5.1, the proposed open cut mine lies within the boundary of CL382 and CL357 (**Figure A2**), with approximately 19ha of CL382 currently affected by a surface exemption and 20m depth restriction. The participants to the Glennies Creek joint venture have initiated an application for a new mining lease to cover the area subject to the surface exemption and depth restriction.



- Excision of Part CL357 – Department of Primary Industries - Mineral Resources.
The proposed activities within CL357, held by Camberwell Coal Pty Ltd (CC), may require the excision of 43.1ha of that lease and its transfer to GCCM. If required, an application regarding this would be submitted.
- Water Licence – Department of Water and Energy
A Water Licence is required for the construction and use of water retention works.
- Water Access Licence – Department of Water and Energy
A water access licence is required for the amount of groundwater that is predicted to seep into the open cut mine and require dewatering. Subject to the timing of the implementation of the *Water Management Act 2000*, an Aquifer Interference Approval may also be required.
- Road Construction Approval – Singleton Shire Council
A Section 138 Permit from Singleton Shire Council is required under the *Roads Act 1993* for road intersection works on Middle Falbrook Road and road interference activities on Stony Creek Road. The Stony Creek Road interference would involve closure of the road when blasts are initiated within 500m of the road, ie. during the early stages of mining. The construction plans and Traffic Management Plan for the construction of the intersection would be submitted to Council following the granting of project approval.

Subsequent approvals would be required in accordance with the Mining Operations Plan requirements of the *Mining Act 1992* and mining lease conditions.

Additionally, when the open cut mine has been developed to the degree that would allow access to the northern highwall for highwall or auger mining (see Part B4.3), an approval from Department of Primary Industries - Mineral Resources (DPI-MR) for this activity would be sought.

B2 GEOLOGY, RESOURCES AND RESERVES

B2.1 Regional Geology

The Hunter Coalfield comprises Permian sediments overlain in the west by Triassic sediments and overthrust in the east by Carboniferous strata. The Permian sediments have been folded into a series of generally north-south structures formed by compression of the depositional basin by the New England Fold Belt. Some of these structures were synsedimentary and active into the Triassic but the major stresses were taken up by the Hunter Thrust Fault, a continental scale structure. Deposition was largely controlled by cyclic periods of marine transgression and regression, although syn-depositional faulting and folding had some influence.



Two major coal measure sequences are present in the Hunter Coalfield. These are, in ascending order, the Greta Coal Measures and the Singleton Super Group. These coal measures are separated by a marine sequence referred to as the Maitland Group. The Singleton Super Group is subdivided into the Wittingham Coal Measures and the Newcastle Coal Measures which are separated by marine strata of the Denman Formation. The lower part of the Wittingham Coal Measures is known as the Vane Subgroup (see **Figure B4**).

The Vane Subgroup is subdivided into two formations, namely the coal-bearing Foybrook Formation and the overlying Bulga Formation. The Foybrook Formation contains up to six potentially minable coal seams. These are, in ascending order, the Hebden, Barrett, Liddell, Arties, Pikes Gully and Lemington seams. The coal seams frequently split. Interseam lithologies include siltstone, lithic sandstone and conglomerate.

B2.2 Open Cut Area Geology

Of the six coal seams within the Foybrook Formation, three occur within the area of proposed open cut mine, namely the Liddell, Barrett and Hebden seams. Within the Open Cut Area, these seams are split into multiple coal plies and, accordingly, it is appropriate to describe the plies and their reserves using the already-established and recognised Camberwell nomenclature system.

Figure B5 displays the plies, or working sections, of the coal seams within the sequence to be mined. The proposed open cut mine lies on the eastern limb of the generally north-south trending Rixs Creek Syncline, but the local dip direction is generally to the north and northwest. Collectively, approximately 9.5m thickness of coal is present within the proposed open cut. The depth of overburden varies from approximately 10m at the southern subcrop to approximately 100m along the northern perimeter of the proposed open cut pit shell. Unconsolidated surface material is generally less than 5m thick. Weathering depths range from 7m to 20m, but are generally less than 15m.

Both normal and reverse faults associated with a dyke system, referred to as the Camberwell Horst, were recorded in the adjacent Camberwell North Pit, and may have been intersected during drilling of groundwater monitoring bores during the *Environmental Assessment* (see Part D11.2). Interpreted displacements range up to approximately 2m. It is not possible from the available data to infer a strike or any lateral continuity for these faults. Most faults have been recorded in the Barrett seam, which appears to be a preferential horizon for structural disturbance.



GLENNIES CREEK OPEN CUT
 (based on drillhole SD495)

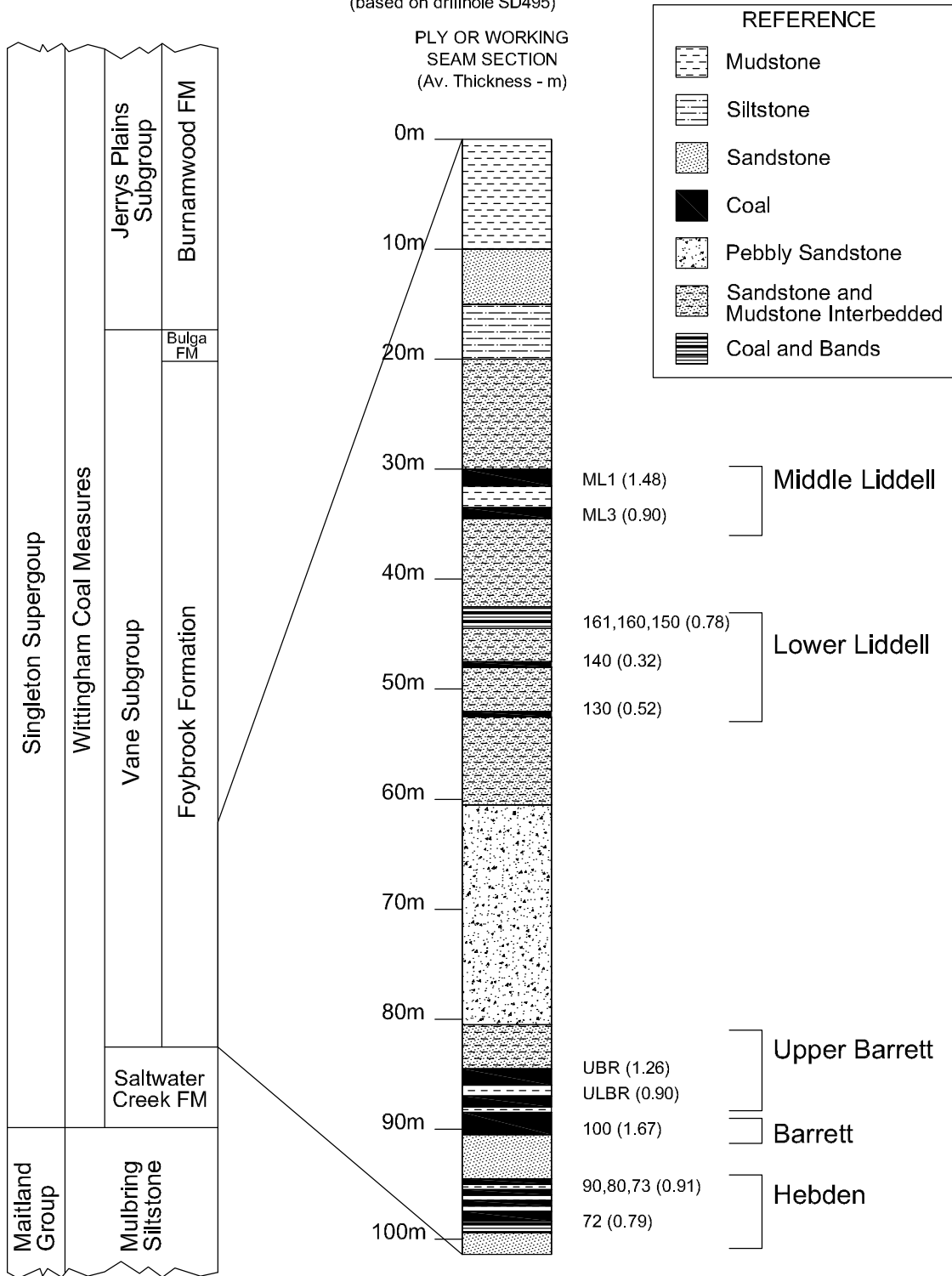
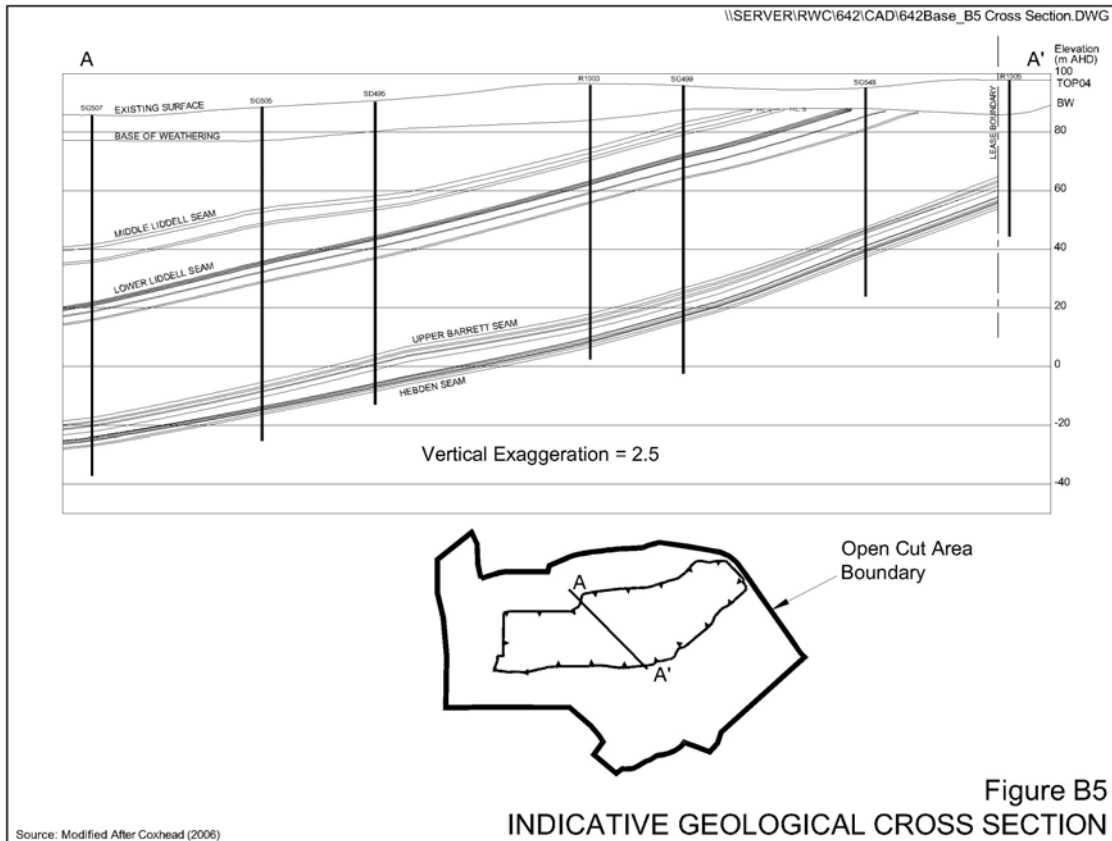


Figure B4
 STRATIGRAPHY AND COAL SEAMS

Source: Integra Coal Operations Pty Ltd





B2.3 Resources and Reserves

Resource and Reserve Statements for the proposed open cut have been prepared by Coxhead (2006) and Australian Mine Design and Development Pty Ltd (2006) respectively.

The details of each coal seam within the proposed open cut are presented in **Table B2**.

Table B2
Description of Coal Seams within the Proposed Open Cut

Coal Seam	Ply Nomenclature	Approximate Reserve (7.7Mt Pit Shell)	Estimated Thickness	Average Depth Below Surface
Liddell	Middle Liddell = ML1 ML3 Lower Liddell = S161 S160 S150 S140 S130	2.48Mt	<ul style="list-style-type: none"> Middle Liddell 0.65m to 2.1m and thickens to the southeast Lower Liddell 0.22m to 0.50m 	32m
Barrett	Upper Barrett = UBR Barrett = ULBR S100	3.86Mt	<ul style="list-style-type: none"> Upper Barrett <1.0m to 1.7m thinning to the east Barrett 0.5m to 1.5m 	52m
Hebden	S080 S073 S072	1.36Mt	<ul style="list-style-type: none"> <0.2m to 1.1m 	62m

Source: Coxhead (2006) and Australian Mine Design and Development Pty Ltd (2006)



The size of the proposed open cut pit shell is limited by the following factors.

- Extension to the northeast would require relocation of Stony Creek Road.
- Extension to the north would encounter prohibitive strip ratios, rendering such an extension uneconomic under current market conditions.
- Extension to the northwest would encroach upon Possum Skin Dam (see Part B1.3.1) and potentially impact on the existing surface water management system for the Glennies Creek Underground Coal Mine.
- Extension to the south and west is limited by exposure of the coal seams at surface, and the extent of former mining activities.

B2.4 Coal Quality

Coal seams within the Foybrook Formation within the proposed Glennies Creek Open Cut are bituminous, high volatile, low sulphur and vitrinite rich. Although the coal seams are banded, the coal has a low inherent ash content and can be washed to meet export specifications.

B2.5 Spontaneous Combustion

There are a number of measures available to assess the spontaneous combustion potential of coal, including Self Heating Temperature and R70 tests. Results from test work on samples sourced from the Liddell, Barrett and Hebden coal seams within the Glennies Creek Underground Coal Mine are summarised in **Table B3**. This is followed by a description of each test and a discussion of the results.

Table B3
Spontaneous Combustion Indicators

Coal Seam	Self Heating Temp °C (calculated)	Number of Determinations	R70 Test °C/hr	Number of Determinations
M.Liddell	74 - 90	4	0.67 – 1.28	5
L.Liddell	75 - 86	4	ND	-
Barrett	75 - 85	5	ND	-
Hebden	80 - 87	4	ND	-

Source: Colin Coxhead (pers. comm.) ND = Not Determined

Self Heating Temperature Test

The Self Heating Temperature test gives the minimum initial temperature (SHT_{min}) that produces a sustained exothermic (heat producing) reaction. Therefore, the lower the SHT_{min} , the higher the potential of the coal to spontaneously combust.

The United States Bureau of Mines has published the following guidelines.

- $SHT < 70$ - a high spontaneous combustion potential.
- $70 < SHT < 100$ - a medium spontaneous combustion potential.
- $SHT > 100$ - low spontaneous combustion potential.



As shown in **Table B3**, the results for all seams indicate a medium spontaneous combustion potential.

R70 Test

During a R70 test, a coal sample is crushed, dried and loaded into a vacuum flask. Oxygen is pumped through the flask until the temperature of the coal reaches 70°C. The rate of temperature rise gives a relative measure of the oxidation rate of the coal. The following guidelines have been suggested Dr B Basil Beamish (UniQuest Pty Ltd, 2006) for evaluating the R70 index as an indicator of the propensity of coal to spontaneous combustion.

- $R70 < 0.5$ low propensity
- $0.5 < R70 < 1$ low-medium propensity
- $1 < R70 < 2$ medium propensity
- $2 < R70 < 4$ high propensity
- $4 < R70 < 8$ very high propensity
- $8 < R70 < 16$ extremely high propensity
- $R70 > 16$ exceptionally high propensity

The results from the Middle Liddell seam indicate a low-medium to medium propensity for spontaneous combustion.

The data presented in **Table B3** indicate that for Glennies Creek Underground Coal Mine both indicators fall within the range known for other Hunter coalfield samples. This, combined with the fact that neither the Camberwell Coal Mine nor the Glennies Creek Colliery have had any identified incidents of spontaneous combustion within the mine or in any stockpiles since production commenced, suggests that the risk of spontaneous combustion of the coal from the coal seams exposed by the proposed open cut is low.

The potential for spontaneous combustion in ROM stockpiles would be minimised through the application of standard stockpile management principles.

B3 SITE ESTABLISHMENT AND PREPARATION

B3.1 Infrastructure Establishment

Infrastructure establishment on the Project Site would involve the following activities.

- Development of the site access road off Middle Falbrook Road (see Part B9.1).
- Establishment of the open cut facilities area including a site office, cribroom, ablutions building, muster area and car park (see Part B10).



- Establishment of a workshop and associated fuel storage, and hardstand area to service the open cut operation (see Part B10). This would also be located within the open cut facilities area.
- Construction of Haul Routes A, C and D (see **Figure B3**). Haul Route B would be constructed once mining has progressed beyond the northern end of Haul Route A.
- Construction of the Northern Dirty Water Containment Dam and clean water bypass.

It is anticipated that this infrastructure would be established over approximately 12 weeks.

In addition, the Southern Dirty Water Containment Dam and clean water bypass would be constructed once the catchment for the Northern Dirty Water Containment Dam reaches approximately 11ha. Details of the proposed dirty water containment dams are present in Part D10.

B3.2 Project Site Preparation

B3.2.1 Introduction

Site preparation within the Project Site would involve vegetation clearing and topsoil / subsoil stripping of the initial areas of disturbance, namely:

- the initial box cut and Year 1 mining area (approximately 24ha);
- the initial out-of-pit waste rock emplacement area (approximately 20ha);
- the site access road area (approximately 0.5ha);
- the open cut facilities area (approximately 1.5ha);
- Haul Routes A, C and D;
- the Stony Creek Road amenity bund (approximately 1ha); and
- the Northern Dirty Water Containment Dam (approximately 1.7ha, ie. including the storage area).

All of Haul Route C would be within the open cut footprint while the majority of Haul Route A and all of Haul Route D would be within areas disturbed by previous mining-related activities. Approximately 1.1ha of Haul Route A would be located on previously rehabilitated land.

Following the initial site preparation phase, vegetation clearing and topsoil / subsoil stripping over the remainder of the disturbance footprints for the open cut and out-of-pit waste rock emplacement would be undertaken progressively as described in Part B 3.2.2. In accordance with the recommendations of GCNRC (2007c), neither the vegetation nor the soil would be removed from the existing waste rock emplacement because of the thin nature of the soil and the presence of large rocks close to the surface of the emplacement.



B3.2.2 Vegetation Clearing

Following the initial site preparation activities, clearing of vegetation for the progression of the open cut would be undertaken on an annual campaign basis, with each campaign covering an area of approximately 13ha. Trees would be felled while smaller vegetation (primarily groundcover) would subsequently be scraped up with the topsoil to ensure the retention of the seed bank and nutrients, as well as to minimise opportunities for erosion and dust creation between clearing and soil stripping.

To the extent practicable, the tree clearing campaigns would be scheduled during the late spring to early autumn period to minimise potential impacts on any fauna frequenting the area of disturbance. Additionally, prior to any tree clearing, a visual inspection of the trees would be made and any nesting or roosting threatened fauna appropriately relocated. The inspection for fauna would be undertaken immediately prior to the commencement of clearing operations or, alternatively, procedures would be implemented to ensure that hollows are not occupied by roosting or nesting fauna between the visual inspection and the commencement of tree clearing operations.

Any vegetation suitable for commercial timber, if present, would be felled and removed prior to the commencement of mining operations. Clearing of the remainder of the larger vegetation would be undertaken by bulldozer with the blade positioned just above the ground to minimise soil disturbance and retain the groundcover.

Once felled, logs and branches would be cut or broken into manageable lengths and placed on areas within the Open Cut Area or biodiversity offset areas, or stockpiled for subsequent replacement as part of the Proponent's progressive rehabilitation program. Use of the cleared vegetation in the above manner would assist in reducing erosion, assist vegetation establishment and would provide fauna habitat.

Once the area to be cleared for each campaign has been defined, appropriate surface water management, erosion and sediment control structures would be installed around the area. Details of the proposed water, erosion and sediment control structures are presented in Part D10.

B3.2.3 Soil Stripping

B3.2.3.1 Introduction

The soil materials within the proposed areas of disturbance were assessed by GCNRC (2007c) in order to determine:

- the requirement for specific stripping and stockpiling or erosion control measures; and
- the suitability of the soil for use as a growth substrate on the post-mining landform.

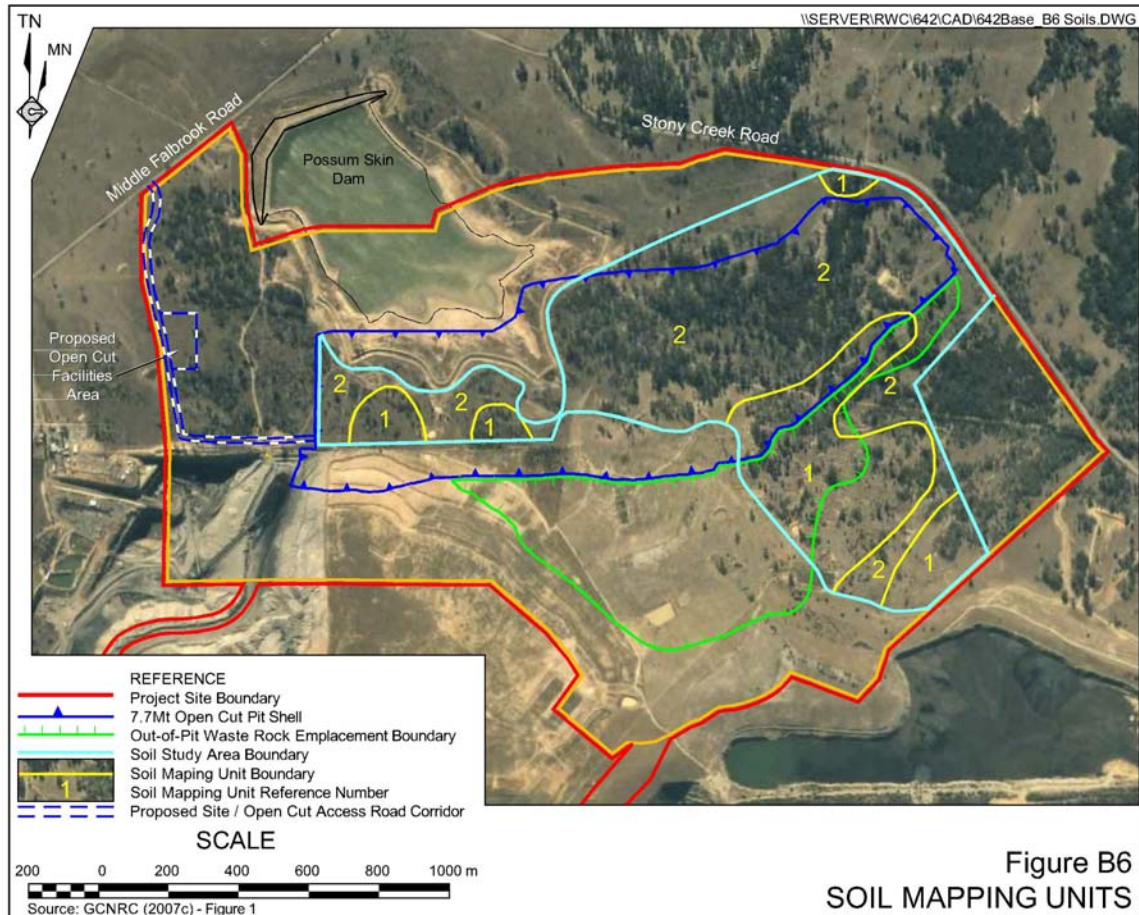
The assessment, based on field and laboratory examinations of key physical and chemical attributes, is described in greater detail in Part D8.

B3.2.4 Soil Categories and Stripping

The following two soil mapping units (SMUs) were identified within the undisturbed areas of the Open Cut Area (**Figure B6**).



- SMU1: occurring on the more elevated rises of the Open Cut Area with some scattered areas through SMU2. Generally consists of deeper topsoiled duplex soils, usually with two horizons and overlying clayey material.
- SMU2: the soils of the remainder of the Open Cut Area which comprise the mid and lower elevations, generally consists of a single, shallower horizon overlying clay.



The soils within other areas of the Project Site, namely Haul Route Corridors D and E and the Camberwell CHPP, as well as sections of the Open Cut Area disturbed by mining-related activities, such as Possum Skin Dam and the Camberwell waste rock emplacement, were not mapped as they were assumed to be skeletal or disturbed and provide limited rehabilitation value. As such, these soils would not be recovered prior to mining or the construction of the proposed out-of-pit emplacement.

Subsoils of both SMUs exhibit moderate to very high dispersibility and range from non-saline to moderately saline. These characteristics require subsoil stockpiles to be stabilised within three months to minimise erosion.

The soil stripping suitability and procedures are summarised in **Table B4** and are based on the physical and chemical properties of the SMU soils, as detailed in Part D8.2.

**Table B4
Soil Stripping Suitability and Procedures**

Layer (Thickness)	Material	Stripping Suitability	Area	Soil Stripping Procedures
SMU1				
0 – 20cm (20cm)	Topsoil	Suitable – although there is texture variation, all SMU1 topsoils can be mixed and stored in the same stockpiles.	All areas to be disturbed including any soil stockpile areas.	<ul style="list-style-type: none"> Clearly identify the area for stripping. Strip soils in identified area to specified depth and stockpile. Do not strip soils when too moist.
20 – 70cm (50cm)	Subsoil	Suitable – although there is texture variation, all SMU1 subsoils can be mixed and stored in the same stockpiles.	Pit shell and out-of-pit waste rock emplacement. *1	<ul style="list-style-type: none"> Clearly mark area to be stripped. Strip soils in marked area to specified depth (less if bedrock is encountered). Do not strip soils when too moist. Stabilise stockpiles as soon as possible after forming.
SMU2				
0 – 10cm (10cm)	Topsoil	Suitable – although there are some textural variations, all SMU2 topsoils can be mixed and stored in the same stockpiles.	All areas to be disturbed including soil stockpile areas.	<ul style="list-style-type: none"> Clearly identify the area for stripping. Strip soils identified area to specified depth and stockpile. Do not strip soils when too moist.
10 – 70cm (60cm)	Subsoil	Suitable – although there are textural variations, subsoils from all parts of SMU2 can be mixed and stockpiled together.	Pit shell and out-of-pit waste rock emplacement. *2	<ul style="list-style-type: none"> Clearly mark area to be stripped. Strip soils in marked area to specified depth (less if bedrock is encountered). Do not strip soils when too moist. Stabilise stockpiles as soon as possible after forming.
Note 1: Excluding former Camberwell waste rock emplacement				
Note 2: Excluding former Camberwell waste rock emplacement and areas of disturbance around Possum Skin Dam.				
Source: Compiled from GCNRC (2007c) – Sections 7 and 8.				

B3.2.5 Soil Stockpiling Methods

Open Cut and Waste Rock Emplacement Footprint Areas

The box cut and the initial 12 months of mining would require soil stripping over an area of approximately 24ha across the northeastern end of the open cut. Following this initial disturbance, soil would be progressively removed in strips approximately 75m wide (east to west width) across the width of the open cut ahead of the progressing mine. This equates to approximately 13ha of disturbance per year and would be undertaken in about three stripping campaigns during each 12 month period. Soil would not be stripped from areas of previous disturbance because the soil profile in such areas is generally too thin and contains too many large rocks to be suitable for rehabilitation purposes.

Wherever practicable, stripped topsoil and subsoil would be directly replaced on completed sections of the final landform. It is anticipated that this would be common practice during and beyond approximately Year 3. As such, soil stockpiles would generally only be created up until this time. It is anticipated that storage for up to approximately 95 000m³ of topsoil and 450 000m³ of subsoil would be required.



When soil stockpiling is necessary, topsoil and subsoil would be stockpiled separately with topsoil stockpiles not exceeding 2m in height (not exceeding 1m, where possible) and subsoil stockpiles not exceeding 3m in height. The individual stockpiles would be constructed using scrapers or bulldozers, with the dimensions and shape of each stockpile reflecting the method of construction, the area available and the need to avoid surface water drainage lines.

Any stockpiles, that are to be retained in excess of 3 months would be seeded using a non-persistent cover crop to reduce erosion potential and assist in the maintenance of the biological viability of the soil resource. The stockpile surfaces would be left with a 'rough' surface to assist in runoff control, seed retention and germination.

Where possible, soil stockpiles would be positioned within the proposed disturbance footprint or on previously disturbed areas. The positioning of the individual topsoil and subsoil stockpiles within these areas would utilise the existing surface topography to avoid overland and/or concentrated surface water flows that would exacerbate stockpile erosion. Where natural protection from surface water flows is not readily achievable, the Proponent would install upslope protective earthworks such as contour banks or straw bale protection. Where appropriate, silt-stop fencing or similar protection would be placed immediately downslope of stockpiles and retained until such time as the stockpiles develop a stable cover of vegetation.

Other Areas of Disturbance

Topsoil stripped from other areas of disturbance on the site such as the open cut facilities area, the site access road and the internal haul routes would be placed in separate stockpiles adjacent to the area stripped and managed in the same manner as the mining area stockpiles. Each stockpile would then be available for re-spreading over the disturbed area during subsequent rehabilitation activities. In accordance with the recommendations of the soil assessment, no subsoil would be stripped from these areas of disturbance.

Following establishment, the operation of machinery on all topsoil and subsoil stockpiles would be avoided in order to prevent their compaction and maintain soil aggregation.

B3.2.6 Soil Inventory and Reconciliation

In order to effectively manage the topsoil and subsoil stripped, the Proponent would maintain an inventory of all soils stripped, re-spread and/or stockpiled throughout the life of the mine.

This soil inventory would serve three purposes.

- (i) To ensure appropriate volumes of soil are retained consistent with the rehabilitation requirements of the final landform.
- (ii) To ensure soil replacement thicknesses throughout the life of the mine are consistent with the available soil resource.
- (iii) To identify the age of various stockpiles on the Project Site and therefore assist in minimising the length of time soils remain stockpiled prior to their use in progressive rehabilitation.



Regular reconciliation of soil availability and requirements would ensure sufficient topsoil and subsoil would be available to cover the entire waste rock emplacement as mining nears completion.

Table B5 presents the approximate volumes of soils that would be stripped over the life of the Project.

Table B5
Approximate Soil Volumes

Area	SMU	Approximate Volume (m ³)		Total
		Topsoil	Subsoil	
Open Cut Pit Shell ¹	1	17 200	43 000	60 200
	2	52 200	313 200	365 400
Out-of-Pit Emplacement ²	1	20 000	50 000	70 000
	2	4 600	27 600	32 200
Ancillary Disturbance ² (Haul Roads and amenity bund)	1	0	0	0
	2	3 000	18 000	21 000
TOTALS		97 000	451 800	548 800
Note 1: Not including the soils within the Possum Skin Dam area of disturbance				
Note 2: Not including the soils on the Camberwell Waste Rock Emplacement				
Source: Calculated based on areas of disturbance and thickness to be stripped				

B3.2.7 Amenity Bund Construction

The Stony Creek Road Amenity Bund would be constructed using approximately 20 000m³ of weathered overburden material removed from the box cut as described in Part B4.2. This amenity bund would be constructed along the northeastern margin of the proposed open cut, set back approximately 20m from the southern side of Stony Creek Road (**Figure B3**). The bund would be constructed with a 1m wide crest width, an outer batter slope of approximately 15° for stability and would be approximately 4m high. The bund would be approximately 550m long and the outer face vegetated with pasture grasses and some local native species. The amenity bund would provide a visual and noise shield from Stony Creek Road. Ultimately, this amenity bund would become the toe of a portion of the in-pit waste rock emplacement as it is blended with the waste rock placed over the backfilled open cut void.

B4 MINING OPERATIONS

B4.1 Introduction

Project approval is sought for the mining of coal, primarily by open cut mining methods, with some highwall and/or auger mining, with the extent of each mining technique undertaken dependent on economic, geological, geotechnical and operational constraints. The following subsections describe each of the mining techniques, together with the projected mining rate, sequence and equipment to be used.



For the purposes of this document, the overburden and interburden materials to be removed to access the coal are collectively referred to as ‘waste rock’ where:

- ‘overburden’ refers to weathered and consolidated material situated above the upper-most coal seam; and
- ‘interburden’ refers to consolidated material situated between the various coal seams.

B4.2 Open Cut Mining Methods

Following the removal of the vegetation, topsoil and subsoil as described in Sections B3.2.2 and B3.2.3, mining would commence with the development of a box cut at the northeastern end of the proposed open cut. Overburden removed from the box cut area would be placed within the amenity bund or out-of-pit waste rock emplacement footprints. Following the removal of overburden, the surface of the upper-most coal seam would be cleaned using a dozer and/or grader. The coal seam would then be excavated, with or without prior ripping, loaded into haul trucks and transported, either directly, or indirectly via a temporary ROM coal stockpile, to the Camberwell CHPP.

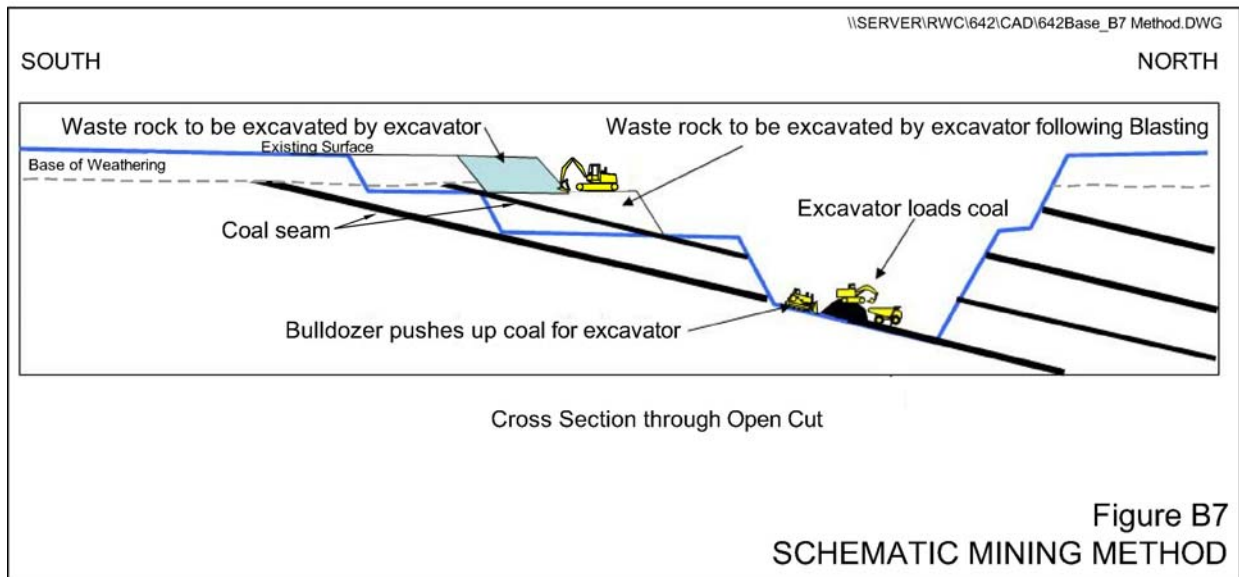
Within the proposed open cut, the coal seams dip to the north at approximately 1 in 5 (V:H) at the subcrop, with dips reducing to 1 in 10 (V:H) as the seams become deeper to the north. Depending on the dip of the coal seam, terrace and/or conventional mining methods would be employed.

Ongoing mining operations would involve the removal of topsoil and subsoil, followed by the removal of weathered overburden, ie. to a depth from the surface of between 2m and 10m. Once the weathered overburden materials are removed, blasting would be required to fragment the unweathered overburden prior to excavation. The following indicative design parameters would apply for blast faces.

- Bench face height: 15m divided into 5m faces with small benches for terrace mining areas
- Bench face angle: 70°
- Berm width: 15m between sub-blocks

The coal and interburden removal in the steeper dipping sections would be undertaken by establishing a series of horizontal working benches that intersect the floor of each coal seam above the basal seam. On each bench, a slot would be developed from the highwall side to allow mining of interburden up to the intersection of the bench with the roof of each coal seam (**Figure B7**). The interburden above each coal seam would then be excavated to expose the coal. Once a coal seam is exposed, a dozer would be used to push the coal down to enable loading into haul trucks. Working benches would be indicatively 75m wide (east to west width). This process would continue down to the basal seam.





Various thicknesses of interburden occur throughout the sequence of coal seams. Where an interburden layer is greater than approximately 0.3m thick, it would be mined separately from the coal seams, as this thickness represents the practical limit to mining these layers separately. Generally, where an interburden layer is less than approximately 0.3m thick, it would be mined with the coal, although this would depend on the type of interburden material, the hardness of the coal, the thickness of the adjacent coal seams and the coal quality.

Internal haul roads would be located across the floor of the open cut and on the advancing in-pit waste rock emplacement face.

B4.3 Highwall and Auger Coal Mining Methods

B4.3.1 Introduction

Up to 300m lateral distance of additional coal could potentially be accessed from the northern highwall of the open cut mine by using highwall or auger mining methods. Both highwall and auger mining techniques enable coal to be mined without the need for overburden or interburden removal and therefore reduce the overall stripping ratio applicable to the Project and hence, the cost per unit of coal mined. The seam or seams to be targeted for highwall or auger mining would be determined at the time of mining based on the economic, geological, geotechnical and operational constraints, but could potentially involve each of the identified seams.

The ultimate method to be used, ie. highwall or auger mining, would depend on the dip of the seam and economic conditions at the time, and as such, would be decided as the highwall and the coal seam are progressively exposed.

Any highwall or auger mining would be limited to the Open Cut Area, even where the Open Cut Area boundary is within 300m of the highwall. Coal to be extracted by highwall or auger mining would be in addition to the 7.7Mt of coal identified within the open cut pit shell. The quantity of coal that may be extracted by this method cannot be determined at present as a number of important considerations such as coal seam geometry, thickness and distribution, mining method and economic environment cannot be adequately estimated until mining operations have commenced.

Prior to the commencement of either of these mining methods, the Proponent would seek approval from the Department of Primary Industries - Mineral Resources through an amendment to the Mining Operations Plan. The Proponent would undertake appropriate geotechnical and safety related assessments at that time. In addition, a full set of safe operating procedures for the proposed highwall or auger mining operation would be provided to the Department of Primary Industries – Mineral Resources as part of a formal application for a highwall or auger mining approval prior to commencement. Neither highwall nor auger mining would commence prior to the receipt of approval for those activities from that Department.

B4.3.2 Highwall Mining

This mining method would involve the establishment of a series of rectangular tunnels, or ‘drives’ for up to 300m for the exposed highwall, each separated by a barrier to support the overlying strata and prevent surface subsidence. The size of the individual barriers would be determined on the basis of geological and geotechnical conditions and/or subsidence-related issues (barriers would be sized to prevent surface subsidence). Highwall mining drives would be established using a purpose-built remotely-controlled continuous miner which would be “launched” from within an open cut mine. The continuous miner would be controlled from within the open cut mine, with the operator located in a cabin positioned at a safe distance from the toe of the highwall. Shielding would be provided on the front and sides of the launch vehicle to protect the workers. Conveyor cars, each incorporating a sloped conveyor belt, are progressively added to the rear of the miner (using a front-end loader), thereby enabling the coal to be transferred from the drive face to a stacker conveyor and hence to a stockpile on the floor of the open cut void to await loading and transportation to the temporary ROM coal stockpiles or the Camberwell CHPP.

In order to limit the possibility of frictional ignition, an inertisation system such as the pumping of nitrogen to the drive face would be employed, if required. This type of system creates an inert atmosphere at the drive face, thus reducing the risk of a gas ignition. Should nitrogen be employed, it would most likely be produced by an in-pit nitrogen generator which would extract the nitrogen from the air, or utilise a system which pumps nitrogen delivered in tankers.

B4.3.3 Auger Mining

Auger mining would involve drilling a series of holes at variable centres and of variable lengths into the coal seam, leaving the intervening strata as support. The auger holes would be drilled at right angles to the highwall using Archimedean spirals and a head laced with tungsten tipped picks. Hole diameters, spacings and lengths would be determined based on geological and geotechnical considerations.

Any auger mining undertaken would be set back a safe distance from the active open cut mining operations to minimise interaction of equipment and ensure both operations are undertaken safely.

In addition to the auger miner, a Cat 994 loader or equivalent would be used to remove coal extracted by the auger miner from the toe of the highwall for stockpiling within the active extraction area.



Coal extracted by either highwall or auger mining methods would be transported to the Camberwell CHPP, short-term ROM coal stockpiles at the top of the active ramp or RL100 Stockpile Area between the hours of 7.00am and 10.00pm only.

The progression of the in-pit waste rock emplacement after highwall or auger mining would result in the covering / burial of the highwall entry holes.

B4.4 Mining Rate

It is proposed that maximum annual production from the open cut, ie. from open cut and highwall / auger mining methods, would be approximately 1.5Mtpa. **Table B6** provides the indicative annual coal production over the mine life. It is possible that coal production may be not always reach 1.5Mtpa. In this case, this would result in a longer mine life. In addition, should highwall or auger mining be undertaken, coal won by this method would displace coal to be extracted by open cut mining methods and extend the indicative production schedule outlined in **Table B6**, resulting in a longer mine life. It is anticipated, however, that the maximum life of the mine would be approximately 8 years.

Table B6
Indicative Coal Production by Open Cut Methods Throughout the Mine Life

Coal Seam	Coal Seam Ply *	Year of Operation (x1 000 tonnes)						Total ROM Coal (x 1 000t)	% of Total Coal Mined
		1	2	3	4	5	6		
Middle Liddell	ML1	97.9	153.8	151.3	220.3	283.4	0	906.6	11.8
	ML3	55.5	82.3	96.3	200.4	209.6	0	644.3	8.4
Lower Liddell	S161	0	56.2	61.7	67.3	56.2	0	241.4	3.1
	S160	32.4	56.7	27.1	1.1	33.7	0	150.8	2.0
	S150	0	0	0	0	14.5	0	14.6	0.2
	S140	7.6	26.0	4.2	31.0	62.5	0	131.0	1.7
	S130	62.0	80.4	67.9	77.9	104.6	0	392.8	5.1
Upper Barrett	UBR	282.5	251.8	323.8	224.6	218.6	25.1	1326.4	17.2
	ULBR	384.6	379.0	244.4	160.8	147.0	18.4	1334.3	17.3
Barrett	S100	259.3	138.9	290.4	261.4	190.3	59.2	1199.6	15.6
Hebden	S080	137.2	102.3	109.7	110.7	95.9	57.9	613.9	8.0
	S073	0	12.1	0	0	0	0	12.1	0.2
	S072	181.1	159.9	123.4	144.7	83.8	39.9	732.7	9.5
	Total	1 500	1 500	1 500	1 500	1500	200.5	7 700.5	100.0

* Consistent with nomenclature used for the Camberwell North Pit

B4.5 Mining Sequence

Mining would commence at the northeastern extremity of the proposed open cut. The open cut would be developed progressively to the southwest in indicatively 75m wide strips perpendicular to the direction of mining (ie. in a northeast to southwest direction), with benches oriented along the direction of mining. This mining orientation allows for optimal access to the steeply dipping coal seams in the eastern part of the open cut and a relatively consistent stripping ratio throughout the life of the mine.



Figure B8 illustrates the conceptual mining sequence at representative years during the mine life based on a maximum production of 1.5Mtpa of coal and assuming a full year's production in Year 1.

B4.6 Mining Equipment

An indicative list of the major items of mining and support equipment anticipated to be used for the open cut mining operations is presented in **Table B7**, along with the likely use and proposed hours of operation for each item. Not all equipment would be operated concurrently and only one of either highwall or auger mining techniques would be undertaken at any one time.

B4.7 Dewatering

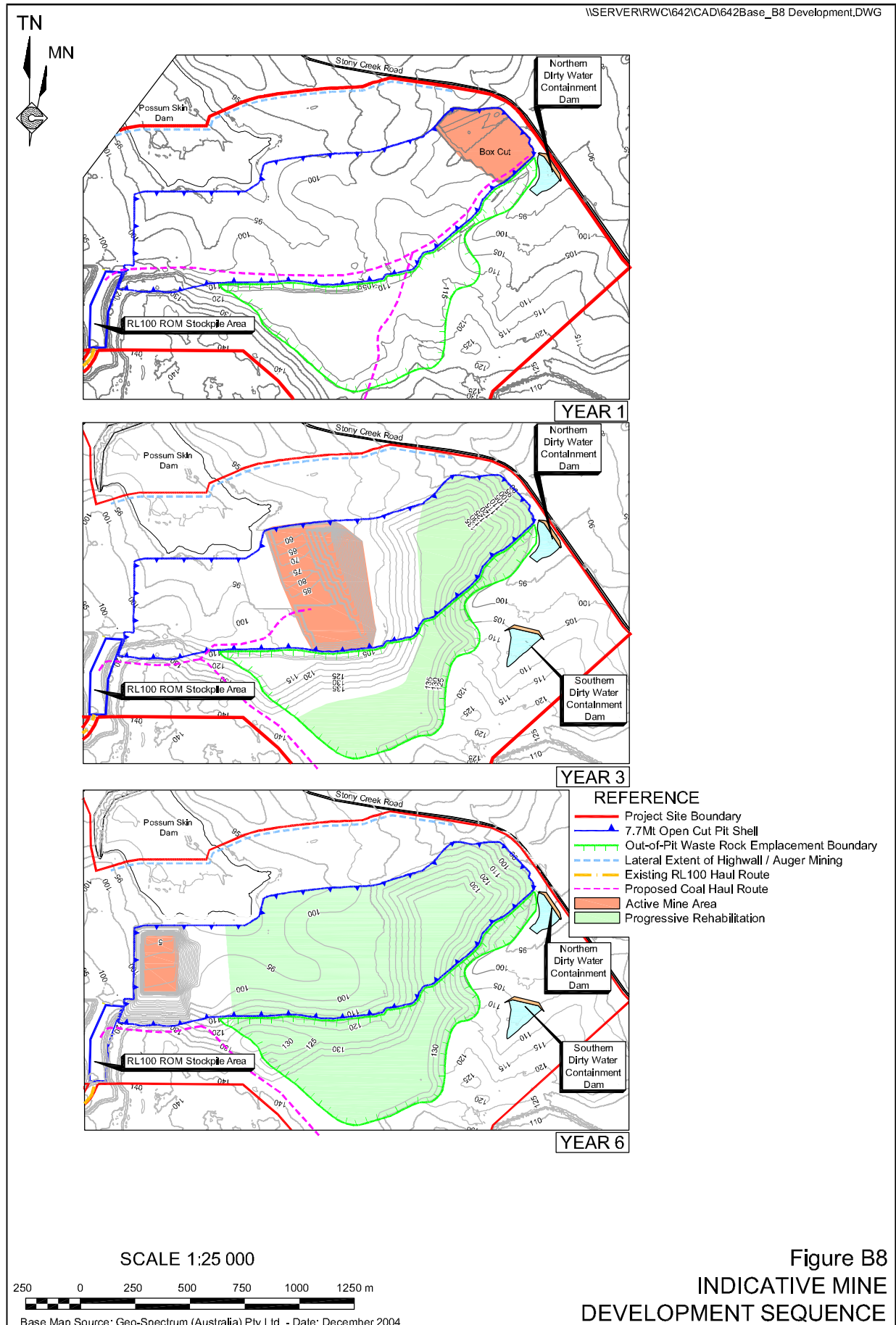
The open cut would intersect groundwater resulting in seepage into the void. However, predictive modelling by Australasian Groundwater and Environmental Consultants Pty Ltd (see Part D11) suggests the inflows would be minor, with a maximum inflow of around 260m³/day, decreasing to around 36m³/day at the completion of mining. Based upon these predicted inflows, dewatering in advance of mining would not be required. This inflow water, together with incident rainfall and seepage from the in-pit waste rock emplacement, would be directed via a graded pit floor to an in-pit sump. The water would then be managed in accordance with the overall Dirty Water Management Plan which specifies total containment of all mine-related surface water (see Part D10).

The modelling undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd suggests that the proposed open cut would not intersect the shallow, alluvial aquifer(s) associated with Glennies, Station or Reedy Creeks.

B5 DRILL AND BLAST

Blasting would occur principally below the weathered overburden zone, ie. from 2m to 10m below surface level. With the exception of the top bench, where the bench height would vary due to changes in topography, all benches would be near horizontal with 15m high faces. A drill rig would drill either 229mm or 127mm diameter blast holes to a depth of 15m or the depth of the bench, whichever is the lesser. Indicatively, 150 000m³ of material would be insitu fractured during each blast. This would be particularly important where coal is within the blast section. However, where appropriate, throw blasting of overburden material where no coal is present would be employed to minimise the handling of this material. Where the blast holes pass through coal seams, the holes would be decked through the seam sections.





**Table B7
Indicative Mining Equipment Fleet**

Equipment	Use	Proposed Hours of Operation
Major Equipment – Open Cut Mine		
1 x Liebherr Excavator (350t)	Waste rock excavation	7:00am to 10:00pm, 7 days per week, 52 weeks per year
7 x Cat 785B and / or 789 Rear Dump Trucks.	Coal, waste rock transportation	7:00am to 10:00pm, 7 days per week, 52 weeks per year
1 x Hitachi Hydraulic Excavator (250t)	Coal, waste rock excavation	7:00am to 10:00pm, 7 days per week, 52 weeks per year
Major Equipment – Highwall or Auger Mining		
Highwall miner	Highwall mining	24 hours, 7 days per week, for the duration of each campaign
Auger	Auger mining	24 hours, 7 days per week, for the duration of each campaign
Support Equipment		
1 x D11 Dozer	Ripping of coal seams < 2m thickness, shaping of waste rock emplacement, clearing of benches, general site maintenance	7:00am to 10:00pm, 7 days per week, 52 weeks per year
1 x D10 Dozer		7:00am to 10:00pm, 7 days per week, 52 weeks per year
1 x GD5000, and 1 x DM45 Drilling Rig	Drilling blast holes	7:00am to 10:00pm, 7 days per week, 52 weeks per year
1 x Cat 16H Grader	General site and haul road maintenance	Campaign basis - 7:00am to 10:00pm, 7 days per week, 52 weeks per year
1 x 20 tonne Water Truck Cat 773	Dust suppression	Campaign basis - 7:00am to 10:00pm, 7 days per week, 52 weeks per year
1 x Scraper Cat 637	Topsoil and subsoil stripping and rehabilitation works	Campaign basis - 7:00am to 10:00pm, 7 days per week, 52 weeks per year
Diesel Generators	Pump sump, mobile lighting towers, nitrogen generators	The proposed hours of operation would be as per the campaign requiring generator support, ie. highwall or auger mining (24 hours, 7 days per week) or soil stripping, overburden removal, coal extraction (7:00am to 10:00pm, 7 days per week)
Front-end loader Cat 994	Support for open cut operations	7:00am to 10:00pm, 7 days per week, 52 weeks per year
	Support for highwall/auger miner	24 hours, 7 days per week, for the duration of each campaign

In those areas where a bench intersects the basal coal seam, and the bench height is greater than 2m but less than 15m high, a track-mounted drill rig would be used to drill 127mm blast holes rather than 229mm blast holes. Interburden thicknesses of less than 2m would be ripped instead of blasted.

No explosives or detonators would be stored on the Project Site but rather, would be brought on site for each blast.



Table B8 provides the indicative parameters to be used in the open cut blasts. The variation in parameters is due to the anticipated variation in blast bench height and dip, with the most appropriate parameters being selected for each blast. All noise and air quality impact assessments have been based on worst case scenario parameters (ie. the maximum of parameter ranges). Notwithstanding, the actual blast parameters for each blast would be designed to satisfy the ANZECC recommended guidelines for assessing potential discomfort and disturbance to residents from blast emissions at all residences surrounding the Project Site. As a result, actual blast parameters may vary from the indicative parameters presented in **Table B8**.

Table B8
Indicative Blast Design Parameters

Blast Hole Diameter	127mm and 229mm
Blast Hole Depth	Up to 15m
Blast Hole Spacing	5.6m x 6.5m
Depth of Stemming	6.2m
Area of Blast	10 000m ²
Size of Blast	150 000m ³
Bulk Explosive Type	ANFO
Powder Factor	0.5kg/bcm* to 0.6kg/bcm*
Maximum Instantaneous Charge (MIC)	500kg
Maximum Charge per Hole	40kg to 500kg
Initiation System	Nonel / electronic
*bcm = bank cubic metre	

At a maximum production rate of 1.5Mtpa, blasting may occur up to five times per week. However, as blasting-related impacts are primarily related to the MIC and the distance between the blast and the receiver location, it would be the Proponent's desire to undertake less frequent blasts yielding larger volumes where such blasts could be undertaken and continue to satisfy the blast impact criteria.

Unless for safety reasons, only one blast would be fired on any given day.

Blasting would be conducted between the hours of 9.00am and 5.00pm, Monday to Friday, except where, due to a misfire or other exceptional and/or safety-related circumstance, blasting is required after 5.00pm or on a weekend. During the first two years of mining in the northeastern section of the open cut, ie. within 500m of Stony Creek Road, the proximity of blasting may require the temporary closure of Stony Creek Road for between approximately 5 and 10 minutes per blast. This period is necessary to enable the initiation of the blast and confirmation that all explosives were detonated. Blasting would be scheduled to avoid road closures during peak morning and afternoon traffic times, including during the scheduled periods when school buses travel on these roads.



A number of members of the local community raised various concerns regarding the requirement to close Stony Creek Road. The Proponent would develop a detailed Blasting Management Protocol, including, as far as practicable, the following.

- Notification of road closure times in local media outlets and via automated SMS text messages.
- Minimising the duration of each road closure.
- Co-ordination of blast times with Ashton Coal Operations Pty Ltd to ensure that both Glennies Creek Road and Stony Creek Road are not closed at the same time.
- Procedures to allow emergency vehicles to pass through or avoid the road block by, for example suspending the blast where practicable or developing alternative access arrangements.

The basis for the Blasting Management Protocol, which is to be incorporated in the Mining Operations Plan for the open cut mine, is discussed further in Part D3.

B6 COAL STOCKPILING AND PROCESSING

B6.1 Introduction

All coal from the Glennies Creek Underground Coal Mine is currently stockpiled in the Pit Top Area (principally within the RL100 Stockpile Area), transported to the Camberwell CHPP via the RL100 haul road (Haul Route E) and processed at the Camberwell CHPP.

The coal mined from the open cut would also be transported to the Camberwell CHPP, either directly from the open cut or indirectly via the open cut ramp-top stockpile or the RL100 Stockpile Area.

B6.2 Coal Stockpiling

Mined coal would be preferentially hauled directly from the open cut to the Camberwell CHPP.

On occasions, when the coal quality between coal seams varies and multiple coal seams are being mined simultaneously, some coal may require stockpiling. When this is required, coal would be transported to, and temporarily stored at either short term ROM coal stockpiles created at the top of the active open cut mine ramp, or within the existing RL100 Stockpile Area.

The short-term ROM coal stockpiles created on an as-needs basis at the top of the active open cut mine ramp would be less than 1ha in area and less than 10m high. Surface water management controls would be designed to ensure any runoff from the temporary ROM coal stockpile would be contained within the open cut.

The RL100 Stockpile Area, which lies within the existing Glennies Creek dirty water management system, has adequate capacity for the temporary storage of approximately 500 000t of coal.



B6.3 Processing

All coal from the open cut would be processed at the Camberwell CHPP. The plant has a nominal capacity of 1 200tph, which is adequate for the processing of the forecast production from the Glennies Creek Underground Coal Mine, Camberwell Open Cut and the proposed Glennies Creek Open Cut.

The 7.7Mt of ROM coal delivered to the Camberwell CHPP from the proposed open cut would be washed to yield approximately 4.7Mt of product coal, comprising the following.

- Metallurgical coal: approximately 3.0Mt (64%).
- Thermal coal: approximately 1.7Mt (36%).

The product coal represents approximately 61% of the ROM coal, with the remaining 39% being process waste (ie. coarse reject or fine tailings) which would be managed through the Camberwell reject management system. The volume of tailings produced by the Camberwell CHPP to 2013, ie. the projected completion of the Glennies Creek Open Cut, from processing coal sourced from the existing Camberwell Open Cut, the Glennies Creek Underground and Glennies Creek Open Cut would total approximately 2 000 000m³. Available storage capacity within the tailings storage facilities is approximately 2 400 000m³. However, as noted in Section A5.3.3, Integra intends to seek a further project approval for the long-term use of the Camberwell CHPP, train loader and related facilities prior to March 2011 to enable their use for the life of the Glennies Creek Colliery, with the long-term management of both coarse reject and tailings forming part of that project approval application.

B7 WASTE ROCK MANAGEMENT

B7.1 Waste Rock Characterisation

Overburden strata within the open cut are variable in nature, comprising conglomerate, sandstones, mudstones and claystones, and range from moderate to high strength.

No site specific data on the acid generating potential of the overburden and interburden within the proposed pit shell has been compiled given the knowledge of the waste rock characteristics of the materials in the adjoining areas. Previous analyses of the interburden between the Liddell and Barrett seams within the adjacent Camberwell North Pit indicated the various materials exhibit sulphur concentrations within the range of 0.01% to 0.95% and displayed a negative Net Acid Producing Potential (NAPP). Samples with the higher sulphur content were also recorded to have high levels of soluble salts. The negative NAPP values have been verified through monitoring of mine water at the Camberwell Coal Mine and within the Camberwell North Pit sump which indicates the water leaching through the waste rock has a neutral to alkaline pH. As such, the potential for acid rock drainage problems to arise from the proposed waste rock emplacements is considered to be low.



B7.2 Waste Rock Volumes

Over the life of the Project, a total of 43.9Mbcm (million bank cubic metres) of waste rock would be removed from the open cut mine. This volume includes approximately 1.5Mlcm (million loose cubic metres) of previously placed material that forms part of the existing Camberwell waste rock emplacement that would require relocation to permit mining along the southwestern margin of the proposed open cut.

Once mined, the waste rock volume would ‘swell’ by approximately 25%, resulting in approximately 54.6Mlcm of waste rock that would require placement either in pit or out of pit. The Project has been designed to provide for the maximum feasible in-pit placement of waste rock, with 42.5Mlcm of material, or 78%, to be placed in-pit to partially fill the mined void to surface level. The remaining 12.1Mlcm would be placed above the pre-mine land surface, and in the out-of-pit emplacement to create a raised final landform which would blend with the existing landform.

B7.3 Waste Rock Management

B7.3.1 Waste Rock Emplacement Design

The out-of-pit waste rock emplacement, and that proportion of the in-pit waste rock emplacement to be created above the pre-mine land surface, would be constructed, as far as practical, to emulate the form of the existing local topography and has been designed to blend into a single landform which, in turn would, blend with the existing Camberwell waste rock emplacement.

The existing Camberwell waste rock emplacement (**Plate A4**) has a maximum elevation of approximately 140m AHD, or a height of 32m above the previous land surface. The proposed waste rock emplacement has been designed with a maximum elevation of approximately 135m AHD or 27m above the present land surface and 5m lower than the top of the adjacent Camberwell waste rock emplacement. The emplacement has been designed with an undulating surface and, as a result, only some areas of the emplacement would reach this maximum height. This would reduce the visual impact of the proposed out-of-pit emplacement.

The proposed out-of-pit waste rock emplacement disturbance footprint has been designed in order to:

- avoid as much surrounding native vegetation as possible, including known Phascogale habitat;
- maintain an efficient emplacement design with respect to height, slope, haul distance and associated haulage costs; and
- create a final landform which blends with the adjacent Camberwell emplacement and the surrounding landforms.

Should the extra 1.3Mt resource be mined (see Part B1.3.1), the out-of-pit waste rock emplacement footprint would not need to be increased. Rather, the proportion of the surface of the emplacement at around 135m AHD would be increased.



Due to the proposed sequence and timing of mining, as well as the shape of the open cut, initially, the majority of the waste rock would be placed out-of-pit. This would result in the out-of-pit waste rock emplacement footprint reaching its maximum size early during mining (see **Figure B8** – Year 3). However, as development of the open cut progresses, the waste rock would be primarily placed in pit.

B7.3.2 Waste Rock Removal and Emplacement Construction

Weathered waste rock would be free dug using an excavator loading haul trucks for transportation to the active waste rock emplacement area(s). The unweathered waste rock from below 2m to 10m beneath the natural surface would require blasting. Wherever possible, throw blasting of waste rock into the areas of the open cut where coal extraction had been completed (the in-pit emplacement) would be implemented instead of waste rock haulage. This method of waste rock placement reduces the need for waste rock excavation and haulage in pit. Waste rock that cannot be throw blasted, or that is destined for the out-of-pit waste rock emplacement, would be loaded onto haul trucks by excavator for transportation to the active waste rock emplacement area. Blasting is covered in more detail in Part B5.

Waste rock transportation would utilise a combination of permanent and temporary ramps and haul roads depending on the position of the active emplacement face.

The majority of the waste rock removed from the box cut would be transported to the out-of-pit emplacement and paddock dumped. The out-of-pit emplacement would be constructed in 3m to 5m layers or lifts across a portion of the entire footprint and progressively moved upward and to the southwest. Each subsequent layer would be constructed using paddock dumping from the outer limits toward the centre. The paddock dumped piles would be pushed into a flat surface by a dozer.

As mining progresses to the west from the box cut, and in-pit waste rock emplacement becomes possible, throw blasting and end dumping of waste rock in the void would commence. In-pit waste rock placement is anticipated to commence approximately 6 months after the commencement of mining. From this time, waste rock would be placed on both the out-of-pit and in-pit emplacements concurrently, with placement in-pit undertaken preferentially and surplus placed in the out-of-pit emplacement. In addition, where practicable, waste rock would be preferentially placed on the outer margins of the out-of-pit waste rock emplacement and those portions of the in-pit waste rock emplacement above the level of the natural surface during daytime hours on weekdays, ie. 7:00am to 6:00pm Monday to Friday. During the weekday evening periods, ie. between the hours of 6:00pm and 10:00pm and on weekends waste rock would be preferentially placed in the deepest portion of the in-pit waste rock emplacement, or in the central areas of the out-of-pit or in-pit waste rock emplacement. This would provide some acoustic and visual shielding of mining-related activities during evening hours and on weekends.

The outer batters of the out-of-pit waste rock emplacement, together with the outer batters of the in-pit waste rock emplacement that occur above the natural surface would, to the extent practicable, be shaped as they are created to allow for progressive rehabilitation. Where possible, weathered waste rock from the upper level of the open cut would be placed on the outer batters prior to shaping as this provides a more suitable growth substrate than the blasted waste rock.



The disturbance footprint of the out-of-pit emplacement is approximately 43ha. The final footprint of the combined out-of-pit and in-pit emplacement would be approximately 133ha.

If required, some waste rock would be transported to the Camberwell tailings dams for use as a capping material. However, due to the limited area available to store waste rock adjacent to the tailings dams and the high cost of double handling this material, this would only occur if the timing of capping coincided with open cut mining and waste rock could be hauled directly to the appropriate tailings dam.

B8 MANAGEMENT OF NON-PRODUCTION WASTES

Table B9 provides an estimate of likely non-production wastes that would be generated at the site and briefly describes how they would be stored and subsequently removed from site. Non-production wastes would be managed in accordance with the existing Glennies Creek Underground Coal Mine total waste management plan.

Table B9
Non-Process Waste Management

Waste Type	Storage*	Removal
General waste (including food scraps)	Covered bins located adjacent to the site office.	Collected on a regular basis by licensed waste contractor.
Waste oils and greases	Place within a tank within the fuel storage bund.	Collected on a regular basis by a licensed waste contractor.
Scrap Steel/Metal	Stored in a specified area.	Collected on a regular basis by a scrap metal recycler.
General Recyclables	Covered bins	Collected on a regular basis by a licensed recycling contractor.
* Within Open Cut Facilities Area		

B9 TRANSPORTATION

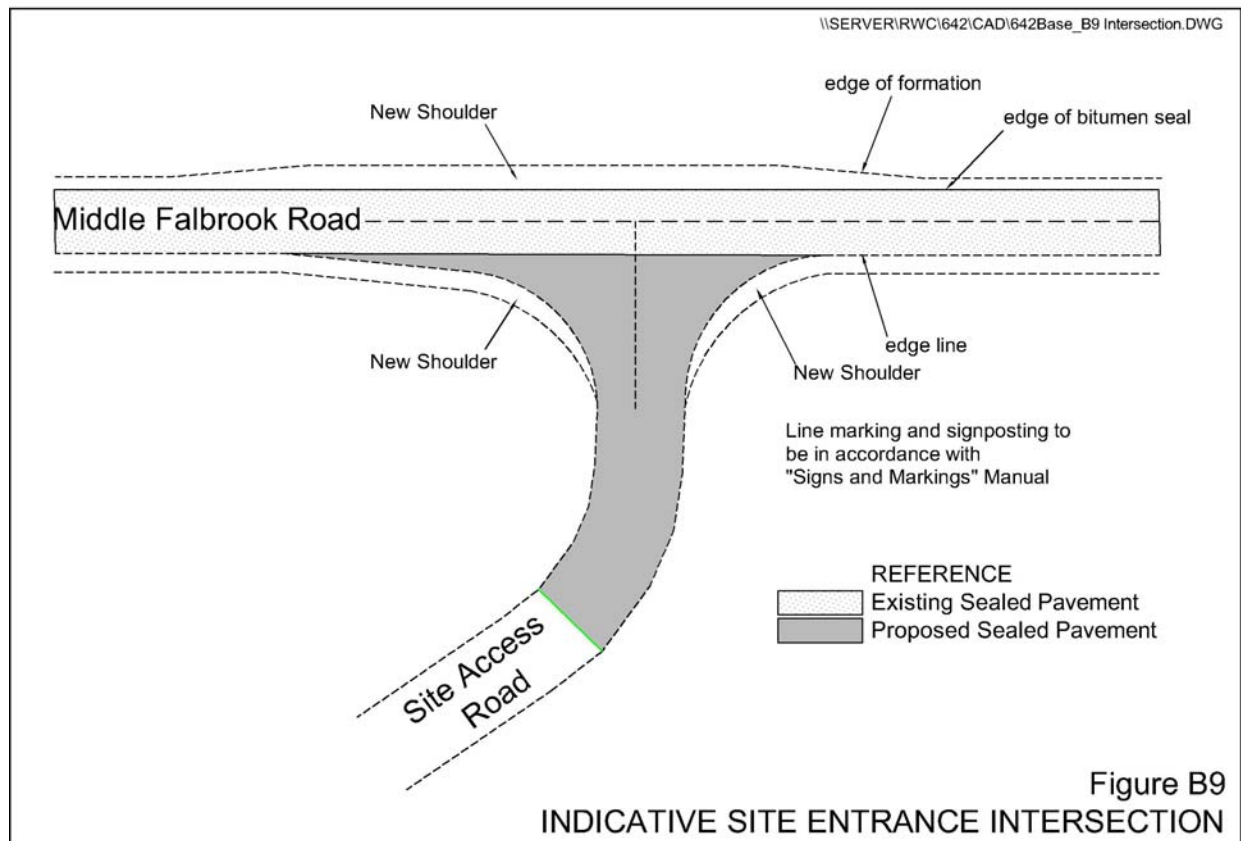
B9.1 Site Access Road and Intersection

The site access road would extend from Middle Falbrook Road, with the intersection designed in accordance with the requirements of the *Singleton Council Development Engineering Specifications Development Control Plan – Design and Construction Specifications*.

Apart from a 30m section adjacent to the intersection, the site access road would be unsealed, comprise an 8m pavement with table and/or mitre drains on both sides, and be constructed to an all weather road standard. Although the indicative location of the site access road is provided on **Figure B3**, the exact location would be influenced by the detailed Council and Austroads requirements for the intersection and would be clarified in the construction plans provided as part of an application under Section 138 of the *Roads Act 1993* (see Part B1.3).

Given that Middle Falbrook Road is classified as a Rural road, the intersection would be designed as a BAR intersection as defined by Austroads *Part 5 – Intersections at Grade* (1998) (**Figure B9**).





A Traffic Management Plan would be prepared by the roadworks contractor to the satisfaction of Council to ensure appropriate procedures are in place for the management of both mine-related and public traffic during the intersection construction activities.

B9.2 Internal Road Network

B9.2.1 Introduction

Development and operation of the open cut mine would require the construction of a number of internal haul roads to permit the transportation of topsoil, subsoil, waste rock and ROM coal within and from the mine area and associated areas of disturbance. Where transportation of materials is required external to the open cut and waste rock emplacement footprint, the Proponent intends to utilise the proposed or existing haul roads, where possible, to minimise the overall area of disturbance, maintenance costs and opportunities for dust generation.

B9.2.2 Internal Haul Roads

The internal haul roads, including temporary in-pit haul roads and haul roads associated with Haul Routes A to E, would be designed, constructed and/or maintained in accordance with the following parameters.

- The width would be a minimum of three times the width of the largest haul truck. Typically total haul road width would be 30m wide, for dual access roads.

- A safety bund, a minimum of half the wheel height of the largest vehicle likely to travel the road, would be positioned on the downslope side of all internal haul roads where the haul roads are located adjacent to, or traverse, steep slopes.
- Haul roads would typically be constructed with a gradient of no more than 10% to 12%.
- To maintain all weather access, the surfaces would be sheeted with suitable waste rock materials recovered during the mining activities.
- The roads would be routinely maintained and watered to suppress the generation of dust.
- All haul roads would be constructed to avoid excessive erosion during rain events. Surface runoff from these haul roads would be contained as part of the overall dirty water management system outlined in Part D10. Briefly, this system specifies total containment of all mine-affected surface water.

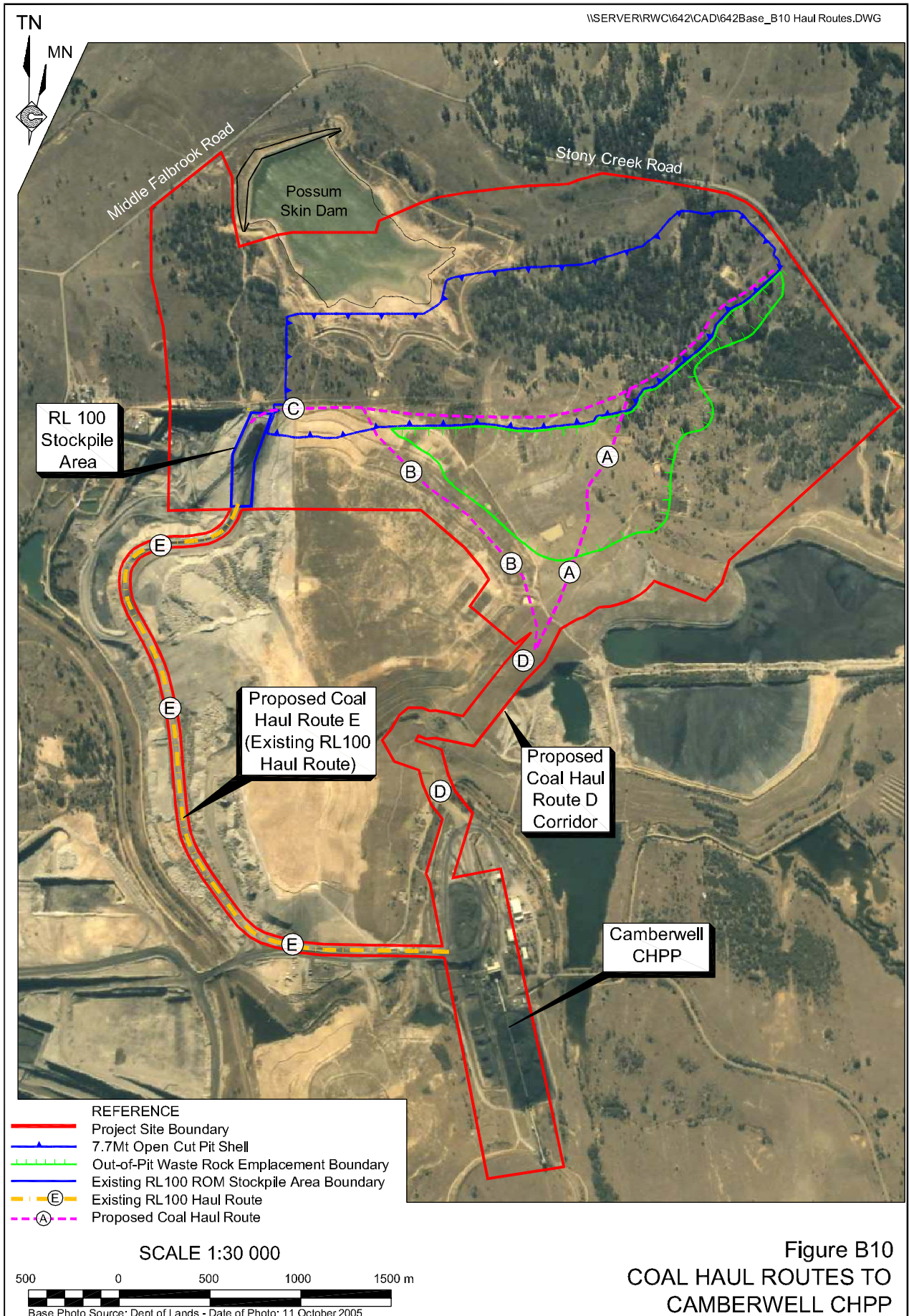
Visual impacts associated with any internal haul roads, where they are likely to occur, would be managed, wherever practicable, through appropriate orientation of the haul road having regard to surrounding topography and the location of residences, as well as appropriate placement of road-side bunds.

B9.2.3 Coal Haul Routes

ROM coal from the proposed open cut would be transported to the Camberwell CHPP either directly or via temporary ROM coal stockpiles at the top of the open cut mine ramp or within the RL100 Stockpile Area. Coal transportation would utilise the following haul routes (**Figure B10**).

- ROM coal to be transported directly from the proposed open cut or from the temporary ramp-top stockpile to the Camberwell CHPP would be transported via one of three routes.
 1. Haul Routes A and D – when mining is underway in the eastern section of the open cut mine.
 2. Haul Routes B and D – when mining is underway in the western section of the open cut mine.
 3. Haul Routes C and E – when coal is transported via the RL 100 Stockpile Area.
- The Proponent would utilise a range of vehicles for transporting ROM coal to the Camberwell CHPP subject to availability, namely CAT 777, 785 or 789 haul trucks, or prime movers with semi-tipper or B-Double tipping truck configurations.
- Any coal required to be stockpiled on the RL100 Stockpile Area would be transported via Haul Route C by Cat 785 or 789 haul trucks.
- Coal to be transported from the RL100 Stockpile Area to the Camberwell CHPP would be transported by prime movers with semi-tipper or B-Double tipping truck configurations, or by Cat 777 haul trucks or similar during periods of semi-tipper or B-Double unavailability. The coal would be transported via Haul Route E.





B9.3 External Road Network

Employees, contractors, supplier representatives and other visitors, together with supplies required for ongoing mining activities, such as fuel, would access the site via Middle Falbrook Road. The site access road would be constructed from Middle Falbrook Road to the Open Cut Facilities Area (see Part B9.1). Large mobile equipment would be brought to site by low loader via Bridgman Road and the Camberwell operational area.

B9.4 Transport Levels

B9.4.1 Site Access

During site establishment and mining operations, all light vehicles and the majority of heavy vehicles would access the Project Site via Stony Creek Road and Middle Falbrook Road. Large mobile equipment would be intermittently brought to site by low loader via Bridgman Road and the Camberwell operation area with multiple movements required for some larger pieces of mobile equipment.

The Open Cut Project Area may also be accessed by light vehicles from Glennies Creek Road via Nobels Lane (**Figure A2**). Nobels Lane incorporates a natural ford across Glennies Creek which is unsuitable for regular traffic. The Proponent would actively discourage the use of this access route by all employees and contractors.

The indicative additional vehicle movements on Middle Falbrook Road as a result of the proposed project are provided in **Table B10**.

Table B10
Indicative Vehicle Movements During Site Establishment and Mining Operations

Activity	Vehicle Type	Estimated Daily Vehicle Movements		
		Site Establishment	Mining Operations	
			Average	Maximum
Equipment / supplies deliveries	Semi-trailer, rigid truck	0 to 6	2 to 4	10
Workforce	Passenger vehicles	Up to 40	80*	120
Miscellaneous	Various light vehicles	-	4	10
TOTAL	Heavy	6	4	10
	Light	40	84	130**
One round trip = 2 movements		Assumes 365 days per year operations		*Assumes 1.5 employees/vehicle
**Conservatively assumes concurrent maxima on one day				

B9.4.2 Open Cut to Out-of-Pit Waste Rock Emplacement

All waste rock material from the box cut would be placed in the out-of-pit waste rock emplacement or used to construct the amenity bund adjacent to Stony Creek Road. It is possible that during this period, both excavators and all seven haul trucks could be engaged in waste rock removal at one time. The number of truck movements would depend on whether Cat 785B or Cat 789 trucks are ultimately used. Using Cat 785B trucks (150t capacity), movement of the required materials would involve a maximum of approximately 30 truck loads, or 60 truck movements per hour whereas using Cat 789 trucks (190t capacity), a maximum of approximately 22 truck loads, or 44 truck movements per hour would be required.



B9.4.3 Open Cut to Camberwell CHPP

It is likely that there would be a maximum of four Cat 785B or 789 haul trucks hauling coal to the Camberwell CHPP at any one time, either directly from the open cut or from the temporary ramp-top stockpile. The maximum number of haul truck movements related to ROM coal transportation would be approximately 17 truck loads, or 34 movements per hour for Cat 785B haul trucks, and approximately 7 truck loads, or 14 movements per hour for Cat 789 haul trucks.

It is likely that there would be a maximum number of four semi-tipper or B-Double trucks hauling coal at one time from the proposed open cut or RL 100 Stockpile Area. The maximum number of semi-tipper or B-Double truck loads hauling from the proposed open cut would be 6 or 12 movements per hour.

Haul Route E would be used to transport coal from both the existing Glennies Creek Underground Coal Mine and the proposed open cut. The maximum amount of coal transported via Haul Route E from both these operations would not exceed the currently approved maximum rate of 4.0Mt per year.

B9.5 Product Coal Despatch

The washed coal from the Camberwell CHPP would continue to be loaded into 7 600t capacity Pacific National trains at the 5500tph (nominal) Camberwell loadout facility at the southern end of the Camberwell CHPP Area illustrated in **Figure B3**. During 2006, an average of two trains were loaded each day, with the maximum number of trains loaded in a single day being seven trains. Trains are loaded per day, 7 days a week.

B10 FACILITIES

The open cut facilities area covering approximately 1.5ha would be established as part of the Project. The principal facilities that would be established in this area are as follows and their locations are presented in the indicative layout in **Figure B11**.

- Office and meeting rooms – small demountable buildings.
- Cribroom – small demountable building.
- Stores – shipping containers.
- Ablutions – male and female demountable ablution facilities.

A car park sufficient for 60 vehicles would be constructed adjacent to the facilities to provide parking for employees, contractors and visitors. A covered muster area would be established adjacent to the office for use in pre-start or toolbox meetings and in the event of an emergency.



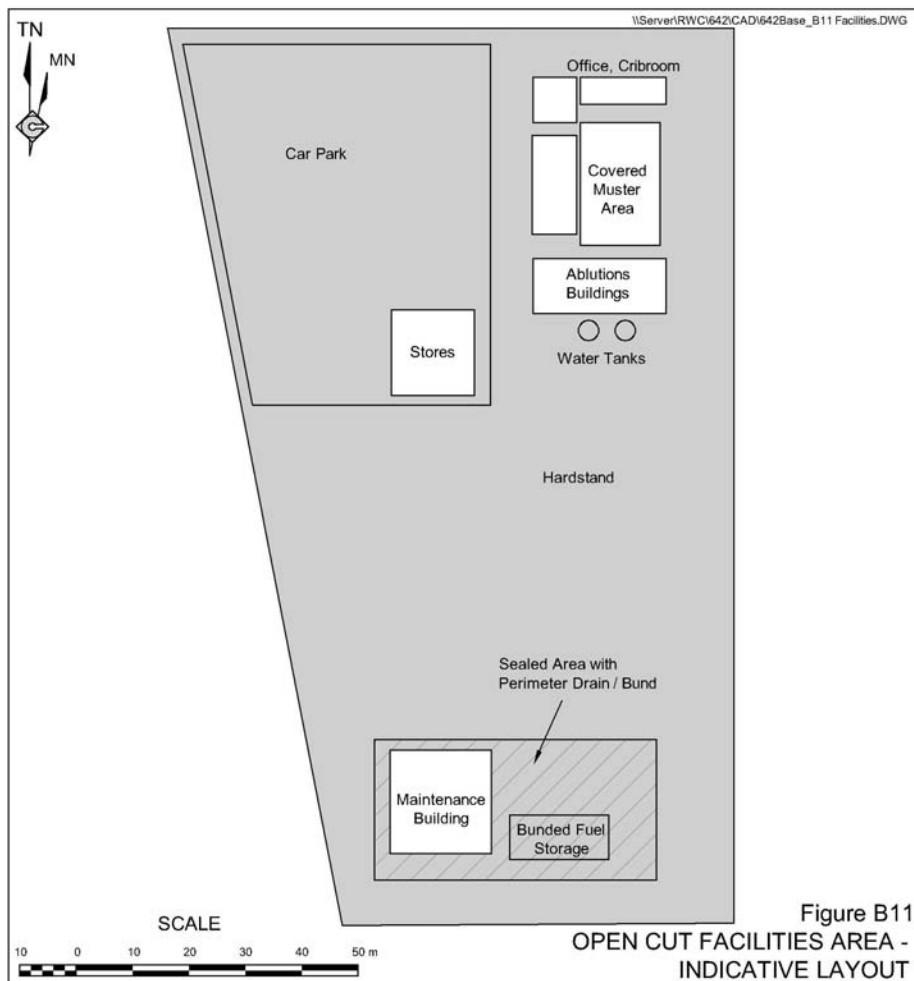


Figure B11

OPEN CUT FACILITIES AREA -
INDICATIVE LAYOUT

Additionally, a workshop area would be established which would include the following facilities.

- Maintenance building – located on a concrete slab with a small bund or drain around the perimeter to contain potentially contaminated runoff. An oil/water separator would be incorporated in the drainage plan for the maintenance building and surrounds.
- Hardstand area – an unsealed area of up to 0.75ha for storage of excess equipment awaiting use or removal from site, or parking of mobile equipment.
- Fuel bay and Refuelling Area – incorporating a concrete bunded storage area containing fuel tanks, unused oil and grease and a waste oil tank and a concrete sealed refuelling area. All potentially contaminated surface water runoff would be directed to an oil / water separator.
- Any additional facilities required in addition to those identified above would be confined to the nominated area and be consistent with the identified facilities in terms of scale, coloration etc.

B11 SERVICES

B11.1 Electricity Supply

Power for the various buildings within the open cut facilities area would be provided by an extension of the existing electricity supply to the Glennies Creek Colliery Pit Top Facilities. Relocation of the existing 66kV line which passes across the area of the proposed out-of-pit emplacement (**Figure B12**) and pit shell, would precede the mining activities.

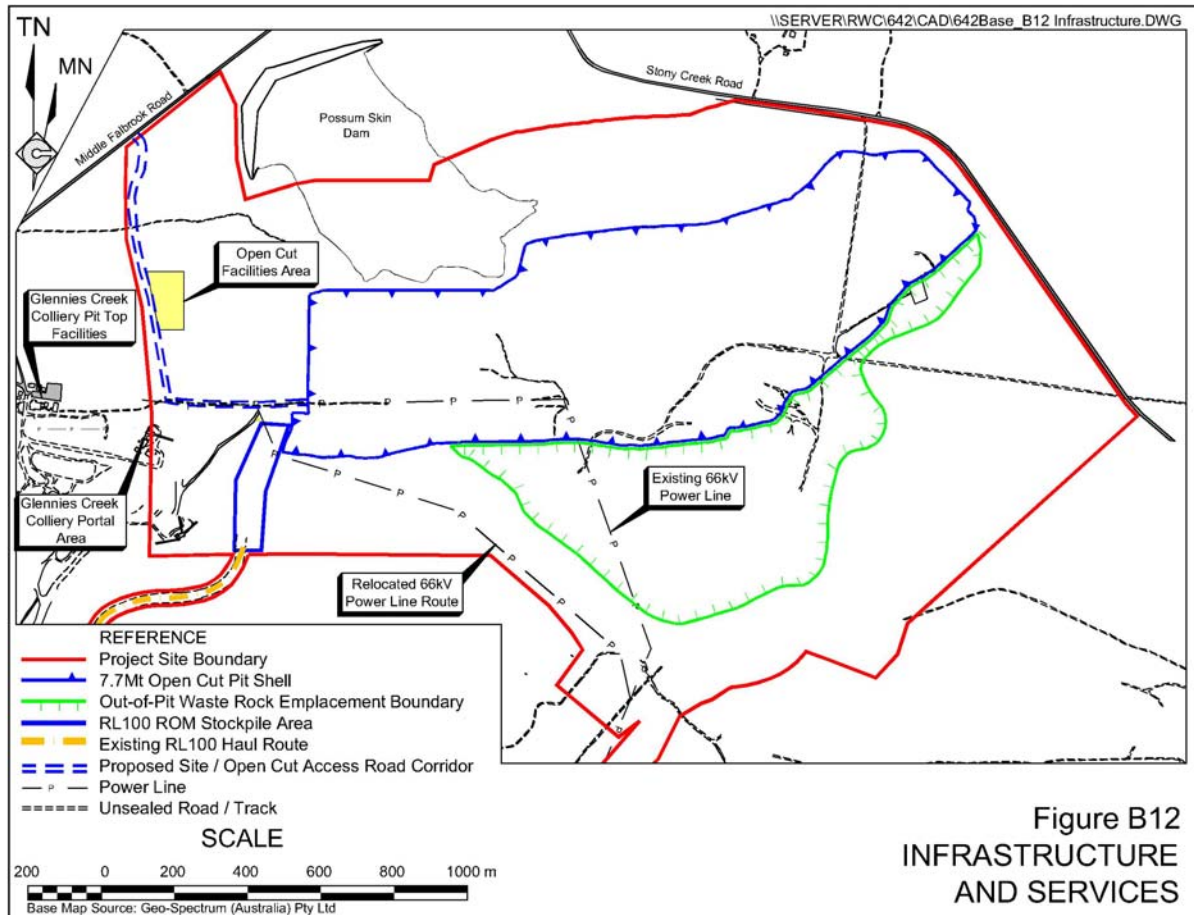


Figure B12
INFRASTRUCTURE
AND SERVICES

A separate generator (approximately 1600kVA) would be positioned on the floor of the open cut mine to supply the power requirements of the highwall miner (and inertisation system) during any highwall mining campaigns.

Power for sump pumps and mobile lighting towers would be supplied by diesel generators.

Haul trucks using Haul Route C and E would be required to pass under existing power lines. However, these power lines are already elevated to enable the safe passage of Cat 789 haul trucks.

B11.2 Communications

The site office may be serviced by a telephone land line. Alternatively, all communications within the Project Site would be via two-way radio and mobile telephone.

B11.3 Fuel

All diesel fuel for the mobile equipment would be stored in two tanks with an indicative capacity of 50 000L which would be either self bunded or located within a bunded fuel bay. Bunding, if required, would be sized to meet the DECC (EPA) containment requirements and AS 1940:2004. Any bulk oils, greases and waste oils would also be stored within this bunded fuel bay or alternative appropriately-sized bunds. A sealed refuelling area would be located adjacent to the fuel bay with all drainage from both areas directed to an oil/water separator.

All haul trucks, graders and light vehicles would utilise the refuelling area while the excavators, dozers and generators would be refuelled at their work site using a mobile fuel tanker.

It is anticipated that the proposed coal and waste rock mining and transport activities, combined with generators, pumps and lighting towers would use approximately 9ML of diesel per year.

There would be no requirement for LPG on site.

B11.4 Water

Potable and Ablutions

Potable water and water for the ablutions facilities would be transported from Singleton and / or collected from the roofs of the buildings in rainwater tanks.

Operational

Operational water requirements, ie. for dust suppression and workshop washdown, are estimated to be up to 100ML per year. This water would be sourced from groundwater inflows or incident rainfall accumulating in sumps within the proposed open cut, Possum Skin Dam and/or the Camberwell North Pit sump. No “clean” surface water would be used for operational purposes.

The Dirty Water Management Plan is detailed in Part D10.

B11.5 Sewage

Sewage from the ablutions building would be treated through a biocycle (or equivalent) sewage treatment system as approved by Singleton Shire Council. This facility would be serviced by a licenced waste collection and disposal contractor, as required.



B12 HOURS OF OPERATION AND PROJECT LIFE

B12.1 Hours of Operation

The proposed hours of operation for the various activities are presented in **Table B11**.

B12.2 Project Life

At a maximum production rate of 1.5Mt ROM coal per annum, the proposed open cut coal mine would have a life of approximately 5 to 6 years (see **Table B6**). Should the annual production rate be less than the maximum, the life of the proposed open cut mine would be extended. Additionally, the coal mined through either highwall or auger mining campaigns may increase the mine life as it would contribute to the maximum annual production. It is anticipated, however, that the maximum operational mine life would be approximately 8 years. The completion of rehabilitation activities may extend the overall project life to 10 years.

Table B11
Proposed Hours of Operation

Activity	Proposed Days of Operation	Proposed Hours of Operation
Vegetation clearing and topsoil stripping	5 days a week, during each campaign	7:00am to 10:00pm
Open cut mining (including waste rock and coal mining)	7 days a week	7:00am to 10:00pm
Rehabilitation Works	7 days a week	7:00am to 10:00pm
Blasting	Up to 5 blasts per week, Monday to Friday ¹	9:00am to 5:00pm ¹
Highwall / auger mining	7 days a week	24 hours
Transportation of ROM coal (Haul Routes A to D)	7 days a week	7:00am to 10:00pm
Transportation of ROM coal (Haul Route E)	7 days a week	24 hours
Coal Processing at Camberwell CHPP	7 days a week	24 hours / day
Product Coal Despatch by rail via Camberwell rail loading facility	7 days a week	24 hours

Note 1: Unless required for misfire re-blast, emergency or safety reasons.

B13 SAFETY MANAGEMENT

B13.1 Public and Employee Safety

The Proponent recognises that the proximity of the Open Cut Area to Stony Creek Road, Middle Falbrook Road and adjacent rural properties would necessitate the implementation of procedures and controls to protect the safety of the public. While it is recognised that, due to the number of coal mining operations in the local area, most landowners and land users would be aware of safety and security issues associated with coal mines, this knowledge cannot be assumed.



Measures would also be required to ensure the safety of visitors to the mine, contractors and employees as well as ensuring the security of facilities and equipment from unauthorised access. It is the Proponent's policy that each person employed on, or visiting the Project Site is provided with a safe and healthy working environment. In order to achieve this, the Proponent would implement a recruitment, induction and training program to achieve the following objectives.

- To ensure compliance with statutory regulations and maintain constant awareness of new and changing regulations.
- To eliminate or control safety and health hazards in the working environment in order to achieve the highest possible standards for occupational safety in the mining industry.
- To ensure the suitability of prospective employees through a structured recruitment procedure.
- To provide relevant occupational health and safety information and training to all personnel.
- To develop and constantly review safe working practices and job training.
- To conduct regular safety meetings and provide an open forum for input from all employees.
- To provide effective emergency arrangements for all employees, visitors and general public protection.
- To maintain good morale and safety awareness through regular employee assessment and counseling.
- To ensure all contractors adopt and maintain the Proponent's policy objectives and safety standards at all times.
- To develop public awareness of the safety standards and objectives at the Glennies Creek Open Cut Coal Mine.

Central to all aspects of site security and safety at the proposed Glennies Creek Open Cut Coal Mine would be the following.

- The adoption of a pro-active approach to employee and public safety.
- Strict compliance at all times with the requirements of the following.
 - *Coal Industry Act 2001.*
 - *Coal Mine Health & Safety Act 2002.*
 - *Occupational Health and Safety Act 2002.*
 - *Occupational Health and Safety (Dangerous Goods) Act 2003.*
 - *Occupational Health and Safety Act 1983.*
 - *Occupational Health and Safety Regulations 2001.*
 - All other relevant legislation and Australian Standards.
- An Occupational Health and Safety Policy to cover all component activities at the mine.



The existing Integra Coal Operations Safety Management System and operating systems would be extended and/or amended to encompass or address all activities within the Project Site.

Specifically, the following safety and security measures would be implemented.

- (i) Internal fencing would be established to enable the continuation of agricultural activities, where appropriate.
- (ii) A lockable gate would be maintained at the junction of the mine access road and Middle Falbrook Road. This would be the only public access point to the Open Cut Area and would be locked whenever mining and associated activities are not being undertaken. The site access road would lead directly to the open cut facilities area, thereby minimising the potential for inadvertent entry to operational areas when mining activities are in progress.
- (iii) Security/warning signs would be positioned at strategic locations around or within the Project Site indicating the presence of earthmoving and mining equipment, deep excavations and steep slopes. The positioning of signs would depend on the location of the mining activities at any one time. Signs identifying blasting procedures and times, including road closure times (when appropriate), would also be installed at strategic locations, including along Stony Creek Road.
- (iv) Employee inductions would include safe working practices and regular follow-up safety meetings and reviews.
- (v) Where internal haul roads are adjacent to steep slopes, installation of bunds along the downslope margins of these haul roads to a minimum half the wheel height of the largest item of mobile equipment on-site.
- (vi) Implementation of appropriate controls with respect to the use of explosives to ensure compliance with Statutory requirements at all times.
- (vii) Ensuring that the blasting contractor utilises correct blasting procedures to contain the fragmented rock within the design blast envelope and to minimise the generation of excessive ground and air vibrations.
- (viii) Ensuring all earthmoving equipment complies with the Mine Mechanical Engineers Minimum Requirements for Mechanical Apparatus and is fitted with appropriate safety equipment.
- (ix) Strictly complying with all project approval, mining lease and licence conditions.

B13.2 Explosives Storage

There would be no permanent explosives storage magazine established for the proposed open cut mining operation. The explosives, boosters and detonators required for blasting would all be transported to the site or the blast by the blasting contractor.



B14 EMPLOYMENT AND ECONOMIC CONTRIBUTIONS

B14.1 Employment

B14.1.1 Site Establishment

Construction of the open cut facilities and site access road, as well as other site establishment-related activities, ie. clearing of vegetation and soil stripping, would be conducted by contractors and supervised by the Proponent.

It is anticipated that 20 people would be employed during the three month site establishment period.

B14.1.2 Operation

It is envisaged that the Project would require the equivalent of 45 full-time personnel during the operational phase of the proposed open cut, with existing management personnel supervising the operation. The Proponent is yet to determine whether mining-related activities would be undertaken by the Proponent or by a mining contractor.

Approximately 15 sub-contractors would also be routinely engaged at the mining operation for various tasks, including drilling and blasting operations.

B14.2 Economic Contributions

The economic contributions of the Glennies Creek Open Cut Coal Mine have been drawn from the socio-economic assessment compiled by the Allen Consulting Group. This report is summarised in Part D14 and presented in full as Part 9 (Volume 2) of the *Specialist Consultants Studies Compendium*. Relevant statistics arising from the socio-economic assessment include the following.

- (i) Coal produced from the proposed open cut would account for the following proportions of regional annual black coal production.
 - 8% of coal production within the Glennies Creek Area, as defined by Australian Bureau of Statistics Regions 1130803 and 1130805.
 - 2% of coal production within the Singleton Local Government Area.
 - 0.5% of Australian coal production.
- (ii) The project would make the following economic contributions within the Hunter Valley.
 - Net revenue \$58.1 million
 - Additional household expenditure \$253.9million
 - Increase in the Gross Regional Product 0.11% to 0.13%
 - Increase in full time employment 0.05% to 0.07%
- (iii) The Project would directly and indirectly create approximately 110 full time positions within the Hunter Valley, and an additional 68 positions throughout the remainder of NSW.



B15 SITE REHABILITATION

B15.1 Introduction

The Proponent would adopt a progressive approach to the rehabilitation of disturbed areas within the Open Cut Area to ensure that, where practicable, areas where mining or waste rock placement are completed are quickly shaped and vegetated to provide a stable landform. The progressive formation of the post-mining landform and the establishment of a vegetative cover would also minimise the potential mine-related visual amenity and air quality impacts at surrounding residences.

Rehabilitation activities would, however, be limited to those components of the Project Site not required for mining-related activities after completion of the Glennies Creek Open Cut. The Camberwell CHPP, Haul Route E, the RL100 Stockpile Area and, potentially the Haul Route D corridor between the Camberwell CHPP and Tailings Dam TD2, would continue to be used beyond the operational life of the Glennies Creek Open Cut. Consequently rehabilitation of these areas does not form part of this Project.

The following sub-sections describe the Proponent's rehabilitation objectives and the proposed final landform on completion of all proposed mining and associated disturbance. The procedures to be applied to each component of the mine, the water management structures and other areas of disturbance associated with the mining activities are also outlined.

The proposed rehabilitation procedures and the revegetation species nominated have been developed based on the recommendations of Geoff Cunningham Natural Resource Consultants and Countrywide Ecological Service. Refinements to these procedures, if required, would be undertaken on the basis of operational experience gained by the Proponent, or by others at nearby, similar operations. These refinements would be reported in the relevant Annual Environmental Management Report (AEMR) and/or any amended Mining Operations Plans (MOPs) produced by the Proponent over the life of the mine.

B15.2 Rehabilitation Objectives

The Proponent's rehabilitation objectives for all areas of mine-related disturbance within the Project Site can be defined in the short term and long term as follows.

Short Term Objectives

- Stabilise all disturbed areas no longer required for mine-related activities. This would help minimise erosion and dust generation, as well as reducing the visual impact of the proposed operation upon surrounding residents. This would be achieved through progressive reshaping, spreading of topsoil and seeding of the in-pit and out-of-pit waste rock emplacements.
- Reduce the visual impact upon surrounding residents by early establishment of vegetation in areas where mining-related operations have been completed, ie. on the external face of the amenity bund and progressive rehabilitation of the in-pit and out-of-pit waste rock emplacement as described above.
- Establish, enhance and maintain the biodiversity offset areas adjacent to the areas of proposed disturbance as described in Part B15.10.



Long Term Objectives

- Provide a low maintenance, geotechnically stable and safe landform which blends with surrounding landforms and provides land suitable for the final land use of nature conservation.
- Manage the biodiversity offset areas: to ensure the long term enhancement of their biodiversity value for native species; to increase the area of high quality, native vegetation; and provide biodiversity linkages with the other rehabilitated and protected areas in accordance with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* prepared by the Department of Mineral Resources (now Department of Primary Industries - Mineral Resources) in 1999 and the *Glennies Creek Catchment - Total Catchment Management Study – Management Strategy* prepared by the Hunter – Central Rivers Catchment Management Authority in 2004.

B15.3 Final Land Use

GCNRC (2007c) notes that the Agricultural Suitability Classification of the final landform following rehabilitation is likely to be Class 5, or unsuitable for agriculture or at best suited only to light grazing.

As the Proponent intends to use the final landform for nature conservation, this land use would enhance the long term biodiversity value of the Open Cut Area and surrounding area.

B15.4 Infrastructure and Services

Following the completion of mining, the infrastructure and services specifically established to service the mining operation, such as the ablutions building, workshop and site office, would be removed. All concrete footings and foundations would be removed and the area re-profiled to near pre-mining levels. The road materials used to form the site access road would be removed and the area ripped. Previously stockpiled topsoil would be re-spread over the disturbed areas and the areas would be seeded and/or planted as described in Part B15.6.

B15.5 Open Cut Void

Although the backfilling of the mined void would be maximised throughout the mining sequence and construction of the in-pit waste rock emplacement, there would be an open cut void of approximately 4 900 000m³ at the western end of the proposed open cut at the completion of coal extraction activities (see **Figure B8**).

It is the Proponent's current intention that the final void would ultimately be filled to the level of the existing surface or slightly above through the emplacement of reject material from the Camberwell CHPP, and/or breaker stone from the Glennies Creek Underground Coal Mine pre-treatment plant, with final rehabilitation involving reshaping, capping with inert materials (if required), spreading of topsoil and seeding/planting as described in Part B15.6.



Prior to the decision to commence backfilling the final void, the Proponent would evaluate the use of the void to gain access to the Barrett and/or Hebden seams within CL382, ie. through the development of entries in the open cut highwall. Should this use of the void be assessed to be appropriate at the time, the Proponent would seek approval for this alternative land use in a subsequent application for project approval. The rehabilitation methodology and the final landform in the area of the former Glennies Creek Open Cut void following the cessation of the underground mining would also be addressed in the same application.

B15.6 In-Pit and Out-of-Pit Waste Rock Emplacements

Progressive rehabilitation of the in-pit and out-of-pit waste rock emplacements would be undertaken in the following four stages.

Stage 1: Waste Rock Placement and Shaping

The proposed in-pit and out-of-pit waste rock emplacements would be progressively blended with the existing landforms (including the existing Camberwell emplacement) with undulating slopes of approximately 1:5 to 1:25 (V:H) (**Figure B13**).

The upper surface of the emplacement would vary between 21m and 27m above the current surface, or 5m to 11m below the existing Camberwell emplacement.

Preference would be given to placing weathered to partly weathered overburden on the surface of the shaped landform to avoid exposure of large rocks at the surface and improve the moisture holding capacity near the emplacement surface.

An assessment of overburden and interburden materials did not identify any risk of acid generation and as such no specific handling or storage requirements would be required.

Stage 2: Subsoil and Topsoil Replacement

Subsoil and topsoil would be placed on the shaped landform with the materials being preferentially sourced from active stripping areas or, if no such activity is being undertaken at the time, from previously established stockpiles. The thickness of the topsoil and subsoil layers to be replaced would be determined on the basis of the actual volumes of these materials stripped as part of the mining activities.

The surface of the shaped landform would be even but roughened, with contour lines ripped and compacted and/or smooth surfaces broken up. This would assist in maintaining soil stability and minimise erosion.

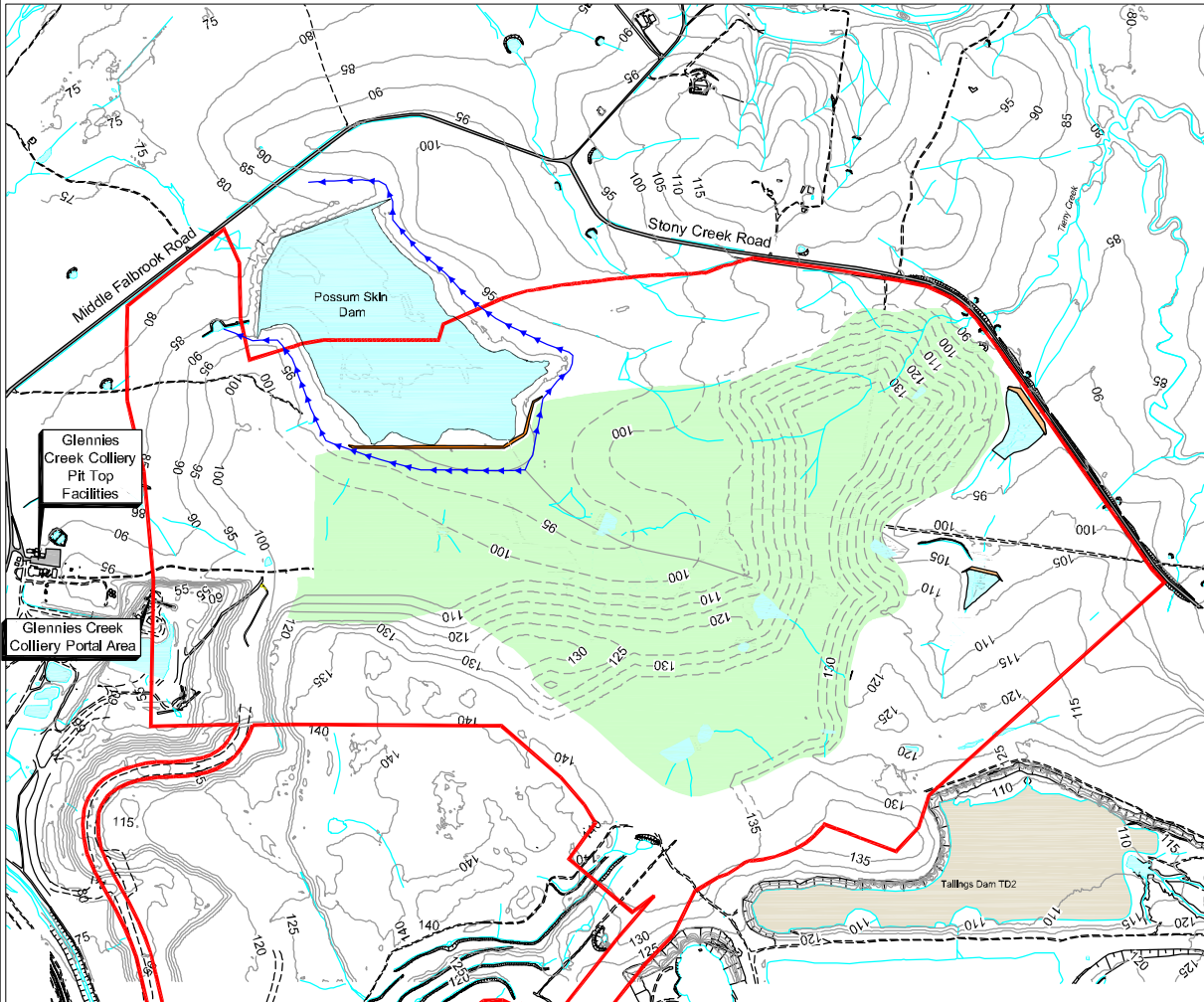
Tree trunks and branches set aside during vegetation clearing activities would be spread over the areas to be rehabilitated following soil placement.

Stage 3: Drainage Installation

Contour banks would be progressively installed on the rehabilitated landform as required.



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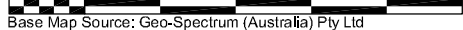


REFERENCE

- Project Site Boundary
- > Clean Water Diversion
- Existing Contour (m AHD)(Interval = 5m)
- - - Proposed Contour (m AHD)(Interval = 5m)
- Creek / Drainage Line
- Dam / Water Storage
- - - - - Unsealed Road / Track
- - - Fence
- Rehabilitation - Native Woodland
- Possum Skin Dam Southern Bund

SCALE 1:20 000

200 0 200 400 600 800 1000 m



Base Map Source: Geo-Spectrum (Australia) Pty Ltd

Figure B13
FINAL LANDFORM



Where required, flumes would be constructed on the slopes of the final landform to direct the flows collected by the contour banks to natural drainage lines or the dirty water management system.

Stage 4: Revegetation

The topsoiled surfaces would be initially stabilised with a non-persistent cover crop. A selection of locally occurring tree species including those identified in **Table B12** would then be planted. Where practicable, seedlings would be propagated from seed collected on or adjacent to the Project Site. The list presented in **Table B12**, however, is not exhaustive and a detailed list of species to be replanted would be included in the Mining Operations Plan to be prepared prior to the commencement of mining. The trees would encourage the re-establishment of the pre-agricultural vegetation communities and, in the medium to longer term, create habitat and corridors for native fauna.

Table B12
Indicative Tree and Shrub Species

Common Name	Scientific Name
Western Golden Wattle	<i>Acacia decora</i>
Narrow-leaved Ironbark	<i>Eucalyptus crebra</i>
Spotted Gum	<i>Corymbia maculata</i>
Forest Red Gum	<i>Eucalyptus tereticornis</i>
Bull Oak	<i>Allocasuarina luehmannii</i>
River Oak	<i>Casuarina cunninghamiana</i>
Swamp Oak	<i>Casuarina glauca</i>
Source: GCNRC (2007b) - Section 7	

Subject to the extent of natural regeneration from replaced topsoil, seed of locally occurring shrub species may also be broadcast to encourage the re-establishment of the shrub layer. All areas identified for native vegetation re-establishment would be protected from stock.

B15.7 Other Areas of Disturbance

On completion of all mining-related and associated activities, the Proponent would:

- remove and rip all remaining internal haul roads and other access tracks, spread subsoil and topsoil and seed in accordance with the procedure outlined in Part B15.6;
- rip or scrape the compacted floor of hardstand areas, spread subsoil and topsoil and seed in accordance with the procedure outlined in Part B15.6; and
- install appropriate drainage controls.

B15.8 Water Management Structures

Where practicable, water management structures such as contour banks and drains would be constructed with longitudinal gradients which permit the transfer of water at non-erosive velocities (eg. 1:200 (V:H)). Consequently, specialised rehabilitation treatments would generally not be required. Similarly, flumes constructed on the steeper slopes of the waste rock emplacements would be retained and allowed to revegetate naturally. However, in the event that unacceptable levels of erosion are observed, fast growing species identified as having a particular soil conservation application and / or specialised treatments such as bitumen/jute meshing or rock lining would be implemented.



The two dirty water containment dams discussed briefly in Part B1.3.2 and in detail in Part D10 may provide valuable habitat following completion of mining-related activities within the Project Site. As a result, a rehabilitation plan for these dams indicating whether they would be removed or retained would be developed in consultation with an ecological consultant and would be incorporated within the final Mining Operations Plan or Mine Closure Plan to be prepared towards the end of the life of the Project.

Trees and other vegetation would be planted around the various water containment structures and, together with the aquatic vegetation which would develop naturally, would enhance the filtration ability of these structures and surrounding areas and minimise the potential for erosion, as well as encouraging their use by native fauna.

B15.9 Rehabilitation Maintenance

The Proponent's commitment to effective rehabilitation would involve an ongoing monitoring and maintenance program during and after the operation of the proposed Glennies Creek Open Cut Coal Mine. Areas being rehabilitated would be regularly inspected and assessed against the short and long term rehabilitation objectives outlined in Part B15.2. During regular inspections, the following would be monitored.

- Evidence of any erosion or sedimentation from areas with establishing vegetation cover.
- Success of initial cover crop or grass cover establishment.
- Success of tree and shrub plantings.
- Natural regeneration of native species.
- Adequacy of drainage controls.
- General stability of the progressive or final rehabilitation areas.

It is noted that the Glennies Creek Colliery would continue to operate beyond the completion of the proposed open cut. This would ensure that personnel are available on-site to undertake and manage post mining rehabilitation and enhancement activities, including but not limited to the following.

- Where rehabilitation success appears limited, maintenance activities would be initiated. These may include re-seeding and where necessary, re-topsoiling and/or the application of specialised treatments such as composted mulch to areas with poor vegetation establishment. Tree guards would be placed around planted seedlings should grazing by native animals be excessive. If drainage controls are found to be inadequate for their intended purpose, or compromised by wildlife, these would be replaced. Temporary fences would be installed to exclude native fauna if grazing appears to be excessive.
- In the event areas of excessive erosion and sedimentation are identified, remedial works such as importation of additional fill, subsoil or topsoil material, or redesigning of water management structures would be undertaken.



- The Proponent is conscious of the potential for noxious weed infestation and would take the necessary precautions to prevent the excessive development of weeds within the rehabilitated areas. Where appropriate, this would include campaign weed spraying prior to the stripping of topsoil. Appropriate noxious weed control or eradication methods and programs would be undertaken in consultation with DPI(Agriculture) and / or the local Noxious Weeds Inspector.

No time limit has been placed on post-mining rehabilitation monitoring and maintenance. Rather, maintenance would continue until such time as the objectives outlined in Part B15.2 are met to the satisfaction of the relevant government agencies.

B15.10 Biodiversity Offset Strategy

B15.10.1 Introduction

The Biodiversity Offset Strategy developed for the Glennies Creek Open Cut Coal Mine incorporates two components, namely:

- the creation, preservation, management and enhancement of a number of biodiversity offset areas adjacent to the areas of disturbance; and
- a broader commitment to remediation of sections of the riparian zone of Glennies Creek, both on Project-related land and in co-operation with landowners whose properties incorporate sections of the riparian zone.

B15.10.2 Biodiversity Offset Areas

The Proponent intends to establish a series of biodiversity offset areas to compensate for disturbance of approximately:

- 68.3ha of Narrow-leaved Ironbark – Spotted Gum – Forest Red Gum Community;
- 6.1ha of Tussock Grassland Community; and
- 0.7ha of Regenerating Native Woodland / Shrubland Community.

The Biodiversity Offset Strategy would include protection and enhancement of :

- approximately 121ha of Project-related land to the north of Stony Creek Road (Northern Biodiversity Offset Area) (**Figure B14**).
- approximately 39ha of Project-related land to the south of Stony Creek Road and east of the out-of-pit waste rock emplacement (Southern Biodiversity Offset Area) (**Figure B14**).
- approximately 94ha of Project-related land to the south of Stony Creek and Middle Falbrook Roads and north and west of the areas of existing and proposed disturbance (Western Biodiversity Offset Area) (**Figure B14**).

This amounts to a total of approximately 254ha.



In addition, the Proponent would seek to incorporate two parcels of non-Project related land owned by Mr and Mrs BH and BL Evans and Mrs CI Payne into the Biodiversity Offset Strategy. This land, covering approximately 33ha, is located to the north of Stony Creek Road, east of Middle Falbrook Road, south of Glennies Creek and west of the Northern Biodiversity Offset Area and is referred to hereafter as the Supplementary Biodiversity Offset Area (**Figure B14**). Parts D2.7.1 and D3.7 of this *Environmental Assessment* indicate that air quality and noise impact assessment criteria are likely to be exceeded as a result of the Project at the residences located on these parcels of land. The Proponent has approached the owners of these parcels of land with a view to negotiating an appropriate arrangement. At the time when this document was lodged for public exhibition, no arrangement had been finalised.

Notwithstanding the significant biodiversity offsets incorporated within the Northern, Southern and Western Biodiversity Offset Areas, the Proponent would include the Supplementary Biodiversity Offset Area in the Biodiversity Offset Strategy for the Project should a suitable arrangement with the owners of this land be reached.

The Proponent would secure the biodiversity offset areas through an enduring covenant or restriction on the use of the land under Section 88B of the *Conveyancing Act 1919*, Part 4, Division 12 of the *National Parks and Wildlife Act 1974* or a similar arrangement, to the satisfaction of the DECC. The purpose of such a covenant would be to restrict the use of the biodiversity offset areas for the purposes of native vegetation conservation in perpetuity. In addition, the Proponent would undertake to manage the biodiversity offset areas for the purpose of native vegetation conservation during the life of the Project and while ever the Proponent continues to own the relevant land.

The following biodiversity management strategies would be employed during the life of the Project and while ever the Proponent continues to own the relevant land.

- Stock has already been removed and would continue to be excluded from the Northern, Southern and Western Biodiversity Offset Areas.
- In the event that a suitable arrangement is reached with the owners of the proposed Supplementary Biodiversity Offset Area, stock would be removed and would continue to be excluded from that area.
- Boundary fences would be maintained to prevent stock from surrounding properties entering the biodiversity offset areas.
- Appropriate fences would be erected to restrict wildlife from entering areas of active mining-related activities. These fences would be removed once mining and rehabilitation-related activities have ceased.
- Ongoing implementation of pest control programs, including for rabbits, European Red Foxes and feral cats.
- Ongoing implementation of weed control programs, including for noxious weeds such as Onion Grass, African Boxthorn, Green Cestrum, Mother-of-Millions and Prickly Pear.



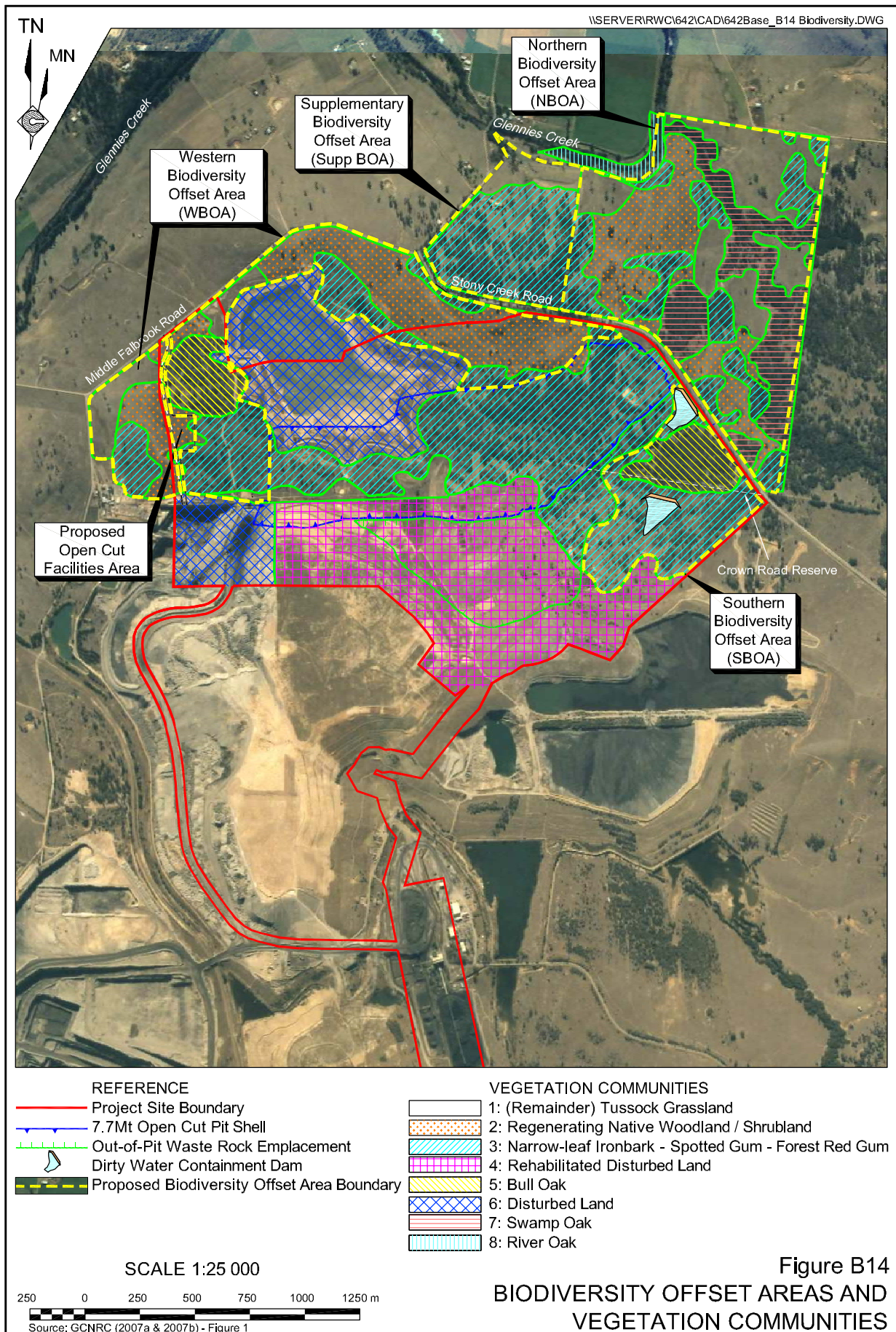


Figure B14
BIODIVERSITY OFFSET AREAS AND
VEGETATION COMMUNITIES



- Planting of approximately 10ha of seedlings in sections of the proposed Northern and Supplementary Biodiversity Offset Areas adjacent to Glennies Creek to establish linkages between the Project Site, the biodiversity offset areas and the riparian vegetation adjacent to Glennies Creek. The seedlings planted would comprise:
 - River Oak immediately adjacent to the banks of Glennies Creek;
 - Swamp Oak, Forest Red Gum and Grey Box at lower elevations adjacent to Glennies Creek; and
 - species representative of the Narrow-leaved Ironbark – Spotted Gum – Forest Red Gum Community at higher elevations further away from Glennies Creek.
- Erection of appropriately located nesting boxes for the Brush-tailed Phascogale in trees adjacent to Glennies Creek. The nesting boxes would be positioned at appropriate distances from the creek line.
- Erection of roosting tubes for microbats in trees within the biodiversity offset areas.

Should the Proponent donate the land covered by the Biodiversity Offset Areas to a public authority, an appropriate arrangement for the ongoing management of the land would be negotiated with the appropriate government agency prior to the land being transferred.

B15.10.3 Remediation of the Glennies Creek Riparian Zone

The Proponent would, subject to obtaining the relevant approvals, undertake remediation works within the Glennies Creek riparian zone on Project-related land. This remediation work would include:

- implementation of weed control programs within the riparian zone, including removal of willow and other non-native trees;
- replanting the riparian zone with appropriate species as described in Section 15.10.2;
- fencing of the riparian zone or the provision of individual tree guards to protect the planted vegetation from grazing by stock; and
- maintenance of remediated areas.

Subject to seasonal and climatic constraints, the Proponent would undertake to complete remediation-related activities on an approximately 1000m section of the Glennies Creek riparian zone on Project-related land during each year of the life of the Project.

In addition, the Proponent would view favourably any request by land owners in the vicinity of the Project Site for assistance in remediating sections of the Glennies Creek riparian zone. In particular, the Proponent would proactively seek to enter into arrangements with landowners to remediate and manage those sections of the Glennies Creek riparian zone, including land within the creek alignment, that forms critical ‘linkages’ between the biodiversity offset areas and other areas of high biodiversity value. This may take the form of in-kind or other support for community based groups such as LandCare or RiverCare who are undertaking remediation work in the vicinity of the Project Site.



B15.10.4 Flora, Fauna and Biodiversity Management Procedures

In addition, the Proponent would prepare Flora, Fauna and Biodiversity Management Procedures as supporting documents to the Mining Operations Plan for the proposed Glennies Creek Open Cut Coal Mine. These procedures would include, but not be limited to:

- a detailed description of the vegetation and flora found within the Open Cut Area and biodiversity offset areas prior to mining commencing;
- identification of all areas of vegetation disturbed as a consequence of mining-related activities;
- detailed management strategies and procedures, for:
 - areas within the Open Cut Area and biodiversity offset areas to be rehabilitated to improve biodiversity;
 - areas within the Open Cut Area and biodiversity offset areas to be protected to allow natural regeneration to occur;
- species to be planted, scheduling of planting programs, locations of nesting boxes to be constructed, etc; and
- detailed monitoring and reporting procedures, including adaptive measures.

B15.11 Consistency with the Synoptic Plan and Glennies Creek Management Strategy

It is an objective of the Project that the final landform and the biodiversity offset areas are consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* (the “Synoptic Plan”) and the *Glennies Creek Catchment - Total Catchment Management Study – Management Strategy* (the “Glennies Creek Management Strategy”).

Figure B15 presents an overview of the Synoptic Plan and Glennies Creek Management Strategy and illustrates how the rehabilitated final landform, as well as the biodiversity offset areas, would provide important linkages between the rehabilitated areas associated with the Mount Owen and Ravensworth Coal Mines in the north and the Camberwell and Rixs Creek Coal Mines in the south.

The Management Strategy lists the following as priority actions.

- Encourage the management of livestock to reduce grazing pressure on riverbanks and gullies by assisting landholders to complete riverbank revegetation and erosion rehabilitation projects where the creekbank or creekbed is degraded.
- Encourage landholders to establish biodiversity corridors as shown in Map 2 (reproduced in **Figure B15**).

The Biodiversity Offset Strategy would result in stock being excluded from the biodiversity offset areas and the revegetation of an area of approximately 10ha of Tussock Grassland Community adjacent to Glennies Creek within the Northern and Supplementary Biodiversity Offset Areas. In addition, **Figure B15** presents an overview of the biodiversity corridors proposed in the Glennies Creek Management Strategy. The proposed Biodiversity Offset Strategy and rehabilitation within the Project Site would complement the proposed biodiversity corridors between the area indicated on **Figure B15** as critical fauna habitat to the east of the Northern Biodiversity Offset Area, the Project Site, Biodiversity Offset Areas and Glennies Creek.



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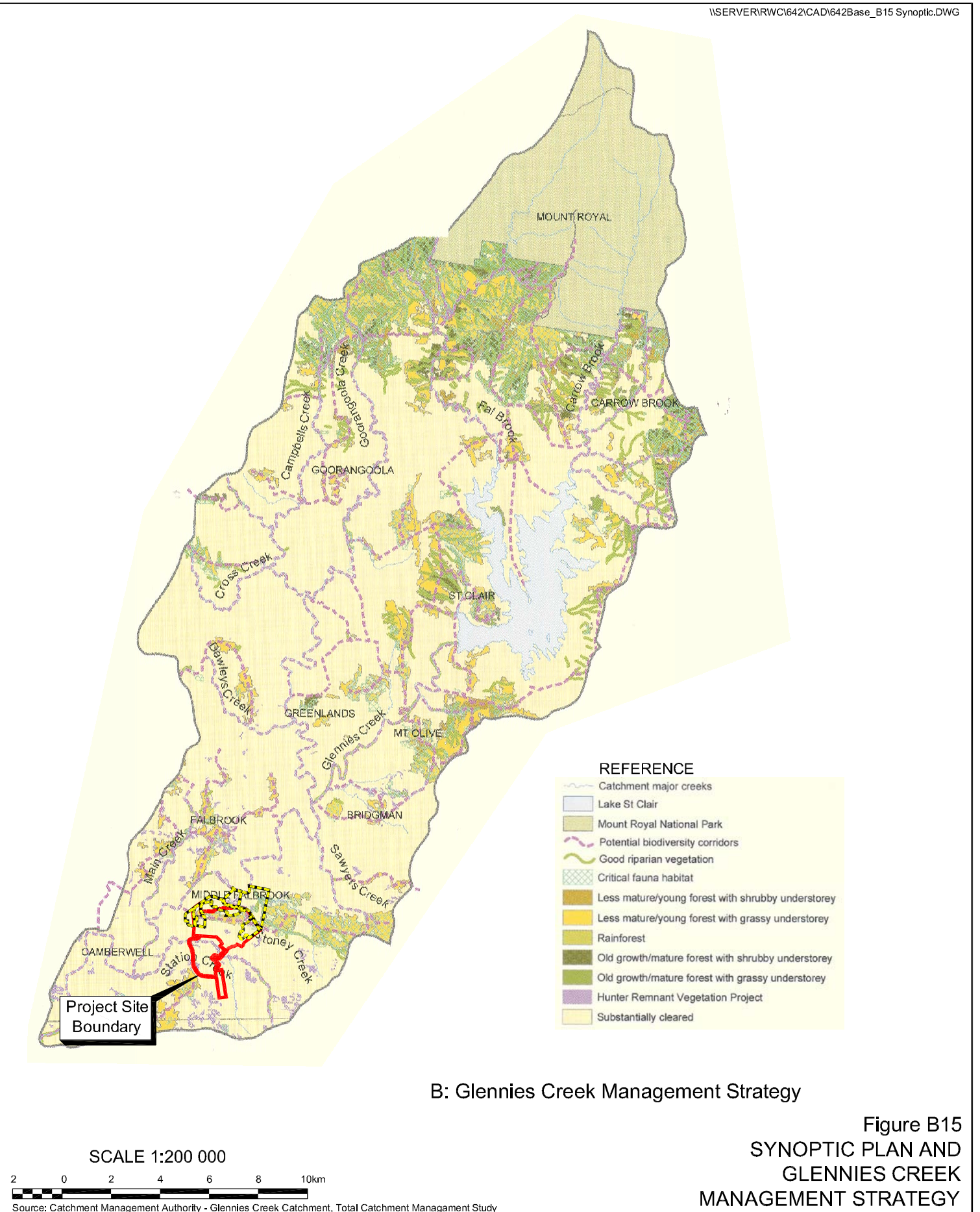
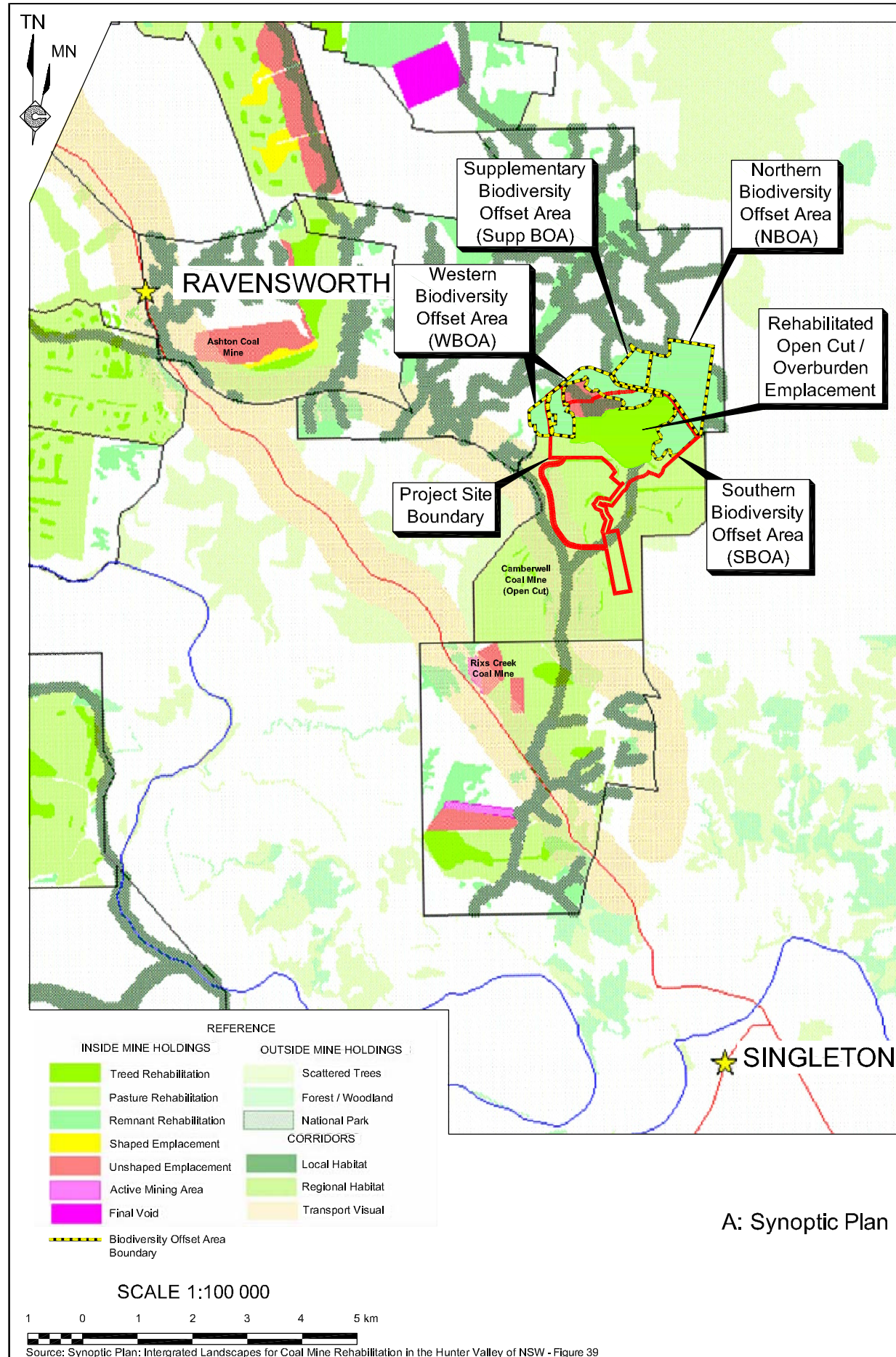


Figure B15
SYNOPTIC PLAN AND
GLENNIES CREEK
MANAGEMENT STRATEGY

Part C

Issue Identification, Consultation and Environmental Risk Analysis

Preamble

This section of the Environmental Assessment provides information outlining the steps undertaken to identify and prioritise the relevant environmental issues that should be addressed to allow the overall project to be assessed.

The steps undertaken to identify environmental issues include:

- consultation with the local community;*
- consultation with State and local government authorities; and*
- a review of relevant State legislation, policies and guidelines.*

An environmental risk analysis of the unmitigated risks associated with the Project is also provided.



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C1 INTRODUCTION

In order to undertake a comprehensive *Environmental Assessment* of the proposed Glennies Creek Open Cut Coal Mine, appropriate emphasis needs to be placed on those issues likely to be of greatest significance to the local environment, neighbouring landowners and the wider community. To ensure this has occurred, a program of community and government consultation, preliminary environmental studies and a review of the literature was undertaken to identify relevant environmental issues and potential impacts. This was followed by an analysis of the environmental risks arising from the potential impacts which was used to prioritise the assessment of the identified environmental issues within this *Environmental Assessment*.

C2 ISSUE IDENTIFICATION

Identification of environmental issues relevant to the development and operation of the Glennies Creek Open Cut Coal Mine involved a combination of consultation, background investigations and research, including:

- consultation with surrounding landowners and the wider community (see Part C2.1);
- consultation with State and local government agencies (see Part C2.2);
- reference to relevant NSW government guidelines and policies (see Part C2.3); and
- a review of a number of relevant environmental studies conducted by Specialist Consultants for the Proponent (see Part C2.4).

C2.1 Community Consultation

C2.1.1 Introduction

Community consultation is considered critical to the issue identification process for the following reasons.

- The proposed open cut would operate in comparatively close proximity to a number of neighbouring residences. In addition, more distant residents are likely to be able to see and/or hear one or more of the proposed activities.
- The intensity of coal mining activity in the Hunter Valley has led to increased community interest in the coal industry generally. It is important that issues arising from this increased level of interest are addressed.
- The Proponent is conscious of maintaining an open and honest relationship with the surrounding community.

The community consultation undertaken and the issues arising from this program are summarised in Parts C2.1.2 to C2.1.5.



C2.1.2 Initial Community Newsletter

The initial Community Newsletter was published in February 2005 and distributed by letterbox drop to surrounding landholders, together with an accompanying feedback form. The feedback form enabled interested parties to:

- provide their contact details;
- comment on the Project;
- request that the Proponent contact them personally to discuss the Project;
- request to be notified of the date of proposed community forums;
- request to be sent a digital copy of the *Environmental Assessment* and Specialist Consultant Studies Compendium; and
- request to be sent a hard copy of the Executive Summary of the *Environmental Assessment*.

The availability of the Newsletter and the feedback form was advertised in the *Singleton Argus* Public Notices on 11 February 2005 in which interested parties were invited to request a copy. Copies were mailed to each of the individuals or groups who made a request. Through a review of the Mt Owen Environmental Impact Statement, and discussions with the Glennies Creek Colliery Community Consultative Committee, a further list of interested stakeholders and interest groups was developed and the Community Newsletter was also mailed to those individuals and groups. Feedback forms were received from 25 residents living in the vicinity of the Project Site.

The issues that were identified from the feedback form are summarised in **Table C2** and presented in their entirety in **Appendix 3**.

C2.1.3 Community Forum and Information Sessions

The initial community forum was held on 22 March 2005 at the Mt Olive Community Hall. Although conditions were not ideal for the forum (there was considerable roof noise from a rain event during much of the meeting), attendance was high and each attendee was provided with a hard copy of the presentation for their reference. The forum was attended by around 40 people. Issues raised during this event are also summarised in **Table C2** and presented in their entirety in **Appendix 3**.

The information and feedback received during the community forum and from the feedback forms was used during the Project design phase and to help focus the approach to the environmental studies. For example, one of the issues raised by the neighbouring residents was noise. Subsequent noise modelling indicated that noise levels at night (between 10.00pm and 7.00am) would potentially exceed the appropriate noise criteria. The hours of operation were therefore modified to exclude mining operations between 10.00pm and 7.00am.



Following the finalisation of the mine design and return of the preliminary results from the Specialist Consultants, a further community information evening was held in the foyer of the Singleton Council Chambers on 2 May 2006. The information was presented on display boards with representatives of R.W. Corkery & Co. Pty. Ltd and the Proponent available to answer questions and explain the predicted and/or likely impacts. The evening was attended by approximately 30 to 35 people. The concerns raised at this information evening are also summarised in **Table C2**.

C2.1.4 Targeted Interviews

Targeted interviews with specific interest groups were conducted on 6 and 7 April 2005 by the Allen Consulting Group as part of the Socio-economic Assessment of the Project. Principal issues of concern that arose from these interviews included a potential reduction in the number of teaching or administrative assistant positions, or the loss of a portable classroom at the Mt Pleasant Public School should enrolments fall. Other community services such as childcare, playgroup, public transport and emergency, public and health services were not considered to be matters of concern. A more detailed précis of these interviews is presented in Part D14.

C2.1.5 Glennies Creek Colliery Community Consultative Committee

The Glennies Creek Colliery Community Consultative Committee continued to meet on a six monthly basis throughout the project development and environmental assessment phases. The status of the ongoing planning for the proposed open cut, as well as the environmental studies being conducted, were discussed at each committee meeting.

Due to the number of sources of information used during the community consultation process, it is acknowledged that issues raised by particular individuals may have been recorded more than once, ie. at the initial Community Forum and later at the Community Information Session. No attempt has been made to remove such double entries as the fact that they have been raised on more than one occasion reflects the importance of an issue to the individual.

C2.2 Consultation with Government Agencies

The Planning Focus Meeting for the Project was held at Glennies Creek Colliery on 5 December 2004 and was attended by representatives from the following Government agencies.

- The former Department of Infrastructure, Planning and Natural Resources (DIPNR) (now Department of Planning - DoP).
- Department of Primary Industries (DPI) (Agriculture).
- Department of Primary Industries - Mineral Resources (DPI - MR).
- Singleton Shire Council.
- Department of Environment and Conservation (Environment Protection Authority) (DEC (EPA)) (now Department of Environment and Climate Change).
- Hunter – Central Rivers Catchment Management Authority.



The meeting allowed the relevant government agencies the opportunity to visit the Project Site and obtain an understanding of the Project as it was then envisaged. Following the meeting, formal written requirements were received from all the relevant government agencies and compiled by the then DIPNR as the Director-General's requirements (DGRs). With the introduction of Part 3A of the *Environmental Planning and Assessment Act 1979* approval process, DGRs were re-requested under the new approval process and were re-issued, together with original or updated requirements from the relevant Government agencies. The DGRs were subsequently re-issued on 25 January 2007 incorporating an additional requirement to assess greenhouse gas-related impacts related to the Project. A summary of the most recent DGRs and requirements from the various Government agencies is provided in **Appendix 2**, together with a table which cross-references each requirement to the appropriate part(s) of the *Environmental Assessment*. The frequency that each issue was raised is presented in **Table C2**.

C2.3 State Planning and Environmental Guidelines and Policies

The Project is identified as a Major Project under Paragraph 5 of Schedule 1 of the State Environment Planning Policy (Major Projects) 2005. Under Section 75D of the *Environmental Planning and Assessment Act 1979* (EP&A Act), the Minister for Planning is the approval authority.

Section 75R(3) of the EP&A Act states that environmental planning instruments, other than State Environmental Planning Policies (SEPPs), do not apply to the carrying out of a Major Project. However, the zoning of the land is relevant in accordance with Section 75J(3)(b) of the EP&A Act, which states that the Minister cannot approve a project which is wholly prohibited.

Relevant SEPPs, the Singleton Shire Local Environment Plan 1996 and other relevant environmental policies are outlined below.

The NSW Government has released a number of State Policies that need to be taken into account during the planning and assessment of new projects such as the Glennies Creek Open Cut Coal Mine. All relevant policies are referred to throughout Part D of this document in the context of the discussion relating to the relevant environmental issue.

C2.3.1 State Planning Instruments

State Environmental Planning Policy (Major Projects) 2005

This SEPP was gazetted on 25 May 2005 and applies to applications for all projects satisfying nominated criteria made following that date. The aims of this Policy are:

- “(a) to identify development of economic, social or environmental significance to the State or regions of the State so as to provide a consistent and comprehensive assessment and decision making process for that development;*
- (b) to facilitate the development, redevelopment or protection of important urban, coastal and regional sites of economic, environmental or social significance to the State so as to facilitate the orderly use, development or conservation of those State significant sites for the benefit of the State;*



- (c) to facilitate service delivery outcomes for a range of public services and to provide for the development of major sites for a public purpose or redevelopment of major sites no longer appropriate or suitable for public purposes; and*
- (d) to rationalise and clarify the provisions making the Minister the consent authority for State significant development and State significant sites and to keep those provisions under review so that the consent powers are devolved to councils when the State planning objectives have been achieved.”*

Clause 6 of this SEPP states that development described in Schedule 1 of the SEPP is a Project to which Part 3A of the *Environmental Planning and Assessment Act 1979* applies. Schedule 1, paragraph 5(1)(a) identifies coal mining as an activity to which the SEPP applies. As a result, the application for project approval for the Project will be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries (Mining SEPP))

This SEPP was gazetted and commenced on 16 February 2007. Clause 19 of the SEPP states that the policy does not apply to an application for an approval under Part 3A of the EP&A Act that was made but not determined before the commencement of this policy. The present application was made on 21 February 2006 and amended on 3 January 2007. As a result, this SEPP does not apply to the present application for project approval.

State Environmental Planning Policy No. 11 (SEPP 11) – Traffic Generating Developments

Clause 7 of SEPP 11 requires that certain potentially traffic generating development applications be referred to the NSW Roads and Traffic Authority (RTA). Mining is listed under Schedule 1, paragraph (m) of this policy. Clause 5(2) of the Mining SEPP repeals this paragraph as it applies to proposals to which the Mining State Environmental Planning Policy applies. However, as the Mining SEPP does not apply to the present application and the application was made prior to gazettal of the Mining State Environmental Planning Policy, paragraph (m) does apply. As a result, this Project must be referred to the RTA.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

Hazardous and offensive industries, and potentially hazardous and offensive industries, relate to industries that, without the implementation of appropriate impact minimisation measures would, or potentially would, pose a significant risk to the locality, to human health, life or property, or to the biophysical environment.

Industries or projects determined to be hazardous or potentially hazardous would require the preparation of a Preliminary Hazard Analysis (PHA) in accordance with Clause 12 of SEPP 33. No further assessment under SEPP 33 is required for projects not considered potentially hazardous.



Hazardous materials are defined within DUAP (1997) as substances falling within the classification of the *Australian Code for Transportation of Dangerous Goods by Road and Rail* (Dangerous Goods Code). The quantities and locations of hazardous materials to be stored on the Project Site are summarised in **Table C1**.

Table C1
Hazardous Materials Storage Planned on the Project Site

Hazardous Material	Classification	Description	Storage Quantity	Storage Location
Diesel Fuel	Class 3 C1	Combustible liquids: flashpoint above 61°C but not exceeding 150°C	2 x 50 000L storage tanks (<100m ³)	Bunded fuel storage area within Open Cut Facilities Area (see Figure B11)
Lubricating oils and greases	Class 3 C2	Combustible liquids flashpoint above 150°C	Minor storage (<1 500L) (1.5m ³)	Fuel storage area and adjacent workshop area (see Figure B11)

As diesel fuel (Class C1) and lubricating oils and greases (Class C2) are not stored adjacent to any other hazardous materials, DUAP (1997) does not require these to be considered further. As a result, the storage of these hazardous materials would not result in the Project being considered potentially hazardous under SEPP 33. As such, there is no requirement to undertake a PHA for the Project.

State Environmental Planning Policy No. 44 (SEPP 44) - Koala Habitat Protection

The Singleton Local Government Area (LGA) is listed under Schedule 1 of this SEPP. This requires an investigation be carried out to determine if “core” or “potential” Koala habitat is present on the Project Site and is likely to be disturbed. “Core Koala habitat” comprises land with an identified resident population of Koalas. “Potential Koala habitat” comprises land with known Koala feed trees listed under Schedule 2 constituting at least 15% of the total number of trees present on a site.

The Flora Assessment (see Part D5 of this document and Part 4 (Volume 1 of the *Specialist Consultant Studies Compendium*)) concluded that one species, the Forest Red Gum (*Eucalyptus tereticornis*), listed under Schedule 2 occurs within the Project Site. The abundance of this species may approach 15% of the total number of trees in areas of Narrow-leaf Ironbark – Spotted Gum – Grey Box Community. This community is discussed further in Part D5.3.1. This community occupies 117ha of the Open Cut Area, of which 73ha would be disturbed. As a result, areas of “potential Koala habitat” may be disturbed by the proposed open cut.

The Fauna Assessment (see Part D4 of this document and Part 3 (Volume 1 of the *Specialist Consultant Studies Compendium*)) did not identify any Koalas nor signs of Koalas within the Project Site. In addition, there are no records of Koala sightings within the Project Site and only two within 10km of the Project Site. Considering the patchy distribution of “potential Koala habitat”, the fact that no Koalas or signs of Koalas have been observed within the Project Site, and the replanting and regeneration of the Forest Red Gum that the Proponent would carry out within the Project Site and Biodiversity Offset Areas, no significant impact on Koala habitat is likely to occur. As a result, SEPP 44 is not relevant to this application for project approval.



State Environmental Planning Policy No. 55 – Remediation of Land

No parts of the land within the Project Site are known to be contaminated, or have been identified as such. Hence this SEPP does not apply.

Draft State Environmental Planning Policy No. 66 – Integration of Land Use and Transport

Draft SEPP 66 aims to ensure that development is designed to achieve a number of planning objectives including providing for the efficient movement of freight and supporting the viable and efficient operation of public transport. As this Project would not considerably increase traffic on the roads to the Project Site and all coal product would be despatched from the Camberwell CHPP and transported to Port Newcastle by train, the Project is considered to be consistent with the objectives of this policy.

C2.3.2 Singleton Local Environment Plan 1996

The Project Site lies wholly within land zoned 1(a) under Singleton Local Environmental Plan 1996. Part 3 of the plan identifies that “coal mining” on land zoned 1(a) is a permissible land use with development consent (or project approval) under the *Environmental Planning and Assessment Act 1979*

C2.4 Environmental Studies

A series of specialist environmental studies was undertaken to assist in designing the Project and to ultimately assist in assessing the potential impact of the Proponent’s activities on each of the following aspects of the environment.

- Air quality.
- Noise and vibration.
- Fauna.
- Flora.
- Aboriginal heritage.
- Soils.
- Surface water.
- Groundwater.
- Socio-economic aspects.

A summary of the results of each of these studies is presented in Part D of this *Environmental Assessment* while the individual specialist consultant reports are included in the two volume *Specialist Consultant Studies Compendium* that accompanies this *Environmental Assessment*.

The above environmental studies highlighted that the Proponent’s activities could potentially impact upon the following aspects of the local environment.

- Air quality (particularly from dust).
- Noise.
- Vibration.
- Fauna.
- Aboriginal heritage.



C2.5 Summary of Identified Issues

Table C2
Identified Environmental Issues

Environmental Issue	Source and Frequency of Identification			
	Community Consultation ¹	Government Consultation ²	Planning Policies & Guidelines	Preliminary Environmental Studies ³
Air quality	10	21	1	1
Noise	19	10	1	1
Water (groundwater + surface water)	4	22	2	1
Flora and fauna	3	15	-	1
Rehabilitation, final landform	1	10	4	-
Traffic and transportation	5	5	1	-
Blasting and vibrations	8	1	-	1
Visual amenity	7	2	-	-
Socio-economic impacts	4	6	-	-
Aboriginal heritage	-	8	-	1
Waste management	-	10	-	-
Soils and land capability	-	1	-	-

Notes:
1 – summarised from Newsletter feedback sheets, minutes from the community forum, issues raised during the information evening and targeted interviews with community organisations and service providers
2 – summarised from Director-General's requirements and attached correspondence to DoP from Government Agencies (see **Appendix 2**). A number of the DGRs discussed the need to assess the cumulative impacts of the Project.
3 – based on the environmental issues identified prior to detailed investigations.

C3 ENVIRONMENTAL RISK ANALYSIS AND ISSUE PRIORITISATION

C3.1 Introduction and Methodology

Environmental risk is the possibility of an unwanted environmental impact occurring. The Director-General's requirements (**Appendix 2**) specify that an environmental risk analysis of the potential impacts of the Project must be carried out. This section outlines how this risk analysis was conducted and how the specific environmental risks and issues associated with the proposed Glennies Creek Open Cut Coal Mine were prioritised.

The risk analysis used in this *Environmental Assessment* was based generally upon the methodology outlined in *Environmental Risk Management – Principles and Process* issued by Standards Australia.

Levels of risk for a given event are calculated based on the likelihood of occurrence and the maximum reasonable consequences of an unwanted event occurring. To ensure consistency of assessment, the potential consequence categories listed in **Table C3** were used.



Table C3
Qualitative Consequence Rating

Level	Descriptor	Description
5	Catastrophic	<ul style="list-style-type: none"> Massive and permanent detrimental impacts on the environment. Very large area of impact. Massive remediation costs. Reportable to government agencies. Large fines and prosecution resulting in potential closure of the operation.
4	Major	<ul style="list-style-type: none"> Extensive and/or permanent detrimental impacts on the environment. Large area of impact. Very large remediation costs. Reportable to government agencies. Possible prosecution and fine.
3	Moderate	<ul style="list-style-type: none"> Substantial temporary or minor long term detrimental impact to the environment. Moderately large area of impact. Moderate remediation costs. Reportable to government agencies. Further action may be requested by government agency.
2	Minor	<ul style="list-style-type: none"> Minor detrimental impact on the environment. Affects a small area. Minimal remediation costs. Reportable to internal management only. No operational constraints posed.
1	Insignificant	<ul style="list-style-type: none"> Negligible and temporary detrimental impact on the environment. Affects an isolated area. No remediation costs. Reportable to internal management only. No operational constraints posed.

Source: Modified after Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(B)

The likelihood that a specific impact may occur was estimated according to the classification outlined in **Table C4**.

Table C4
Qualitative Likelihood Rating

Level	Descriptor	Description
A	Almost Certain	Is expected to occur in most circumstances.
B	Likely	Will probably occur in most circumstances.
C	Possible	Could occur.
D	Unlikely	Could occur but not expected.
E	Rare	Occurs only in exceptional circumstances.

Source: Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(A)



It should be noted that the initial environmental risk analysis was undertaken without consideration of mitigating measures that the Proponent intends to adopt. This strategy was adopted to give an indication of the unmitigated risks associated with the Project, and to then help focus the environmental studies conducted for the Project.

The resulting consequence and likelihood estimates for a given potential impact were then combined using **Table C5** to give a qualitative risk rating of Low, Moderate, High or Extreme. These ratings are defined by Standards Australia as follows.

- “Low (L): requiring a basic assessment of proposed controls and residual impacts. Any residual impacts are unlikely to have any major impact on the local environment or stakeholders.*
- Moderate (M): requiring a medium level assessment of proposed controls and residual impacts. It is unlikely to preclude the development of the Project but may result in impacts deemed unacceptable to some local or government stakeholders.*
- High (H): requiring in-depth assessment and high level documentation of the proposed controls and mitigation measures. Ultimately, this level of risk may preclude the development of the Project.*
- Extreme (E): requiring in-depth assessment and high level documentation of the proposed controls and mitigation measures and possible preparation of a specialised management plan. Unless considered to be adequately managed by the controls and/or management plan, this level of risk is likely to preclude the development of the Project.”*

**Table C5
Risk Matrix**

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (Almost Certain)	H	H	E	E	E
B (Likely)	M	H	H	E	E
C (Possible)	L	M	H	E	E
D (Unlikely)	L	L	M	H	E
E (Rare)	L	L	M	H	H

Note: Rating after Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(C)

C3.2 Assessment of Environmental Risks

The initial assessment of **unmitigated** environmental risks associated with the proposed Glennies Creek Open Cut Coal Mine is presented in **Table C6**. An assessment of the **mitigated** environmental risks after the proposed design and management mitigation measures are taken into account is presented in **Table F6** in Part F of this document.



Table C6
Risk Sources and Risks of Potential Unmitigated Environmental Impacts

Page 1 of 2

Environmental Issue	Risk Source/potential impact(s)	Potential Environmental Impact(s)	Potential Conseq.	Potential Likelihood	Unmitigated risk ¹
Water	• Discharge of dirty, saline or contaminated water to surface drainages or aquifers.	• Reduced water quality and impacts on downstream ecosystems, agriculture and groundwater quality.	3	D	M
	• Reduction in environmental flows through on-site capture of water.	• Reduced natural surface water flows and impacts on downstream ecosystems, agriculture and groundwater quality.	1	B	M
	• Pollution of groundwater by hydrocarbons, salinity and chemicals.	• Reduced groundwater quality and impacts on ecosystems and agriculture at and downstream from discharge point.	3	E	M
	• Reduction of groundwater levels due to mine in-flows.	• Reduction of groundwater levels and impacts on ecosystems and agriculture at and downstream from discharge point.	2	E	L
	• Altered flood regimes.	• Indirect impacts on native vegetation communities and ecosystems.	2	E	L
Air Quality	• Dust emissions from mine operations and vehicle movements.	• Nuisance / amenity impacts from dust deposition. Adverse health impacts if PM10 levels are excessive.	3	B	H
	• Greenhouse gas emissions from mining and transportation operations.	• Contribution to global greenhouse gas emissions.	1	B	M
	• Greenhouse gas emissions from burning of the product coal.	• Contribution to global greenhouse gas emissions.	1	B	M
	• Emission of odours, noxious gases (ie. NO ₂ , SO ₂).	• Nuisance/health impacts on residents.	2	E	L
Flora and Fauna	• Removal of native vegetation due to land clearing activities.	• Loss of, or alteration to, existing vegetation communities and habitats, as well as adverse impacts on fauna. Reduced biodiversity.	3	B	H
	• Disturbance to habitat as a result of project operations, eg. noise, dust, contaminated water etc.	• Direct adverse impact(s) on threatened species, populations or communities. Reduced biodiversity.	3	C	H
Noise and vibration	• Increased noise levels from mine and ancillary operations.	• Nuisance / amenity impacts, including sleep disturbance.	3	B	H
		• Reduced agricultural productivity from impacts on livestock	2	E	L
	• Increased levels of vibration from mine blasting.	• Structural damage to buildings and structures. Nuisance / amenity impacts on surrounding landowners / residents.	2	D	L
		• Reduced agricultural production.	1	E	L
Rehabilitation, Final Landform	• Modified / unstable landform on completion of the Project.	• Excessive erosion, modified water flows, safety issues, permanent scaring.	4	D	H
	• Reduced capability of final landform or failure of rehabilitation.	• Reduced biodiversity and/or agricultural production. Erosion, dust generation, permanent scaring.	3	C	H
Transportation	• Increased traffic levels due to movement of workforce and contractors.	• Increased traffic congestion. Elevated risk of accident/incident on local roads. Road pavement deterioration.	1	B	M
	• Temporary closure or other restriction on road network.	• Delayed journeys, unpredictable arrival times.	2	B	H



Table C6 (Cont'd)
Risk Sources and Risks of Potential Unmitigated Environmental Impacts

Page 2 of 2

Environmental Issue	Risk Source/potential impact(s)	Potential Environmental Impact(s)	Potential Conseq.	Potential Likelihood	Unmitigated risk ¹
Transportation (Cont'd)	• Simultaneous closure of Stony Creek and Glennies Creek Roads.	• Closure of both main access routes to the Glennies Creek area.	2	C	M
Aboriginal Heritage	• Removal or destruction of Aboriginal sites and/or objects.	• Impact on Aboriginal cultural heritage.	3 ²	B	H
Visual Amenity	• Changes in visual characteristics of the Project Site.	• Decreased visual amenity.	2	B	H
Socio-Economic Impacts ³	• Potential changes in employment and infrastructure.	• Improved economic activity and related social impacts attributable to reduced unemployment.	NA		
	• Perceived or actual Impacts on amenity of neighbouring properties.	• Reduced quality of life (actual or perceived) and / or property values.	2	C	M
	• Reduced property values due to presence of mining operation.	• Reduced individual wealth.	2	C	M
Soil and Land Capability	• Reduction in soil quality through stripping and stockpiling.	• Erosion, reduced soil capability, biodiversity and / or agricultural productivity.	3	B	H
	• Increased erosion and soil loss through poor rehabilitation and / or surface water control.	• Reduced soil capability, agricultural productivity or biodiversity, permanent scaring.	3	B	H
Notes					
1 – Note that these risks are unmitigated risks. Table F6 presents the risks of Mitigated Potential Environmental Impacts.					
2 – Potential consequence of destruction of Aboriginal objects can only be assessed by the local Aboriginal community. For the purpose of this environmental risk analysis, consequence is assumed to be Moderate.					
3 – Other potential socio-economic impacts such as noise and dust have been analysed under those specific issues					

C3.3 Issue Prioritisation

The unmitigated environmental risk analysis has been used to prioritise the order for the presentation of the environmental assessment issues in Part D of this *Environmental Assessment*. These issues are presented in the following order.

- | | |
|-----------------------------|---------------------------|
| 1 Air Quality | 7 Visibility |
| 2 Noise and Vibration | 8 Surface Water |
| 3 Fauna | 9 Groundwater |
| 4 Flora | 10 Transportation |
| 5 Aboriginal Heritage | 11 European Heritage |
| 6 Soils and Land Capability | 12 Socio-economic Setting |

It is noted that the inclusion of “Socio-economic Setting” at No. 12 is not a direct consequence of the risk analysis. Rather, it is included at No. 12 to enable all other issues to be considered prior to the consideration of the socio-economic setting as this issue invariably is inter-related with many of the preceding issues.



D4 FAUNA

D4.1 Introduction

The fauna survey and assessment was undertaken by Dr Leong Lim PhD, MSc, BSc, B Laws, Principal of Countrywide Ecological Service (CES). This part of the *Environmental Assessment* provides a summary of the fauna assessment report which is presented in full as Part 3 (Volume 1) of the *Specialist Consultants Studies Compendium* and referred to hereafter as “CES (2007)”. In addition, Part D6 of the *Environmental Assessment* provides an assessment of the proposed Biodiversity Offset Strategy.

Dr Lim has extensive experience with threatened fauna and is the author of a one of the earliest threatened species management plans. Dr Lim also has extensive fauna-related experience in coastal, tableland and arid habitats. Dr Lim was assisted during the searches for amphibians and reptiles by Mr Gerry Swan who is a research associate with the Australian Museum and author of a number of books on amphibians and reptiles. Ms Michaela Brown assisted with the identification of hair tube samples. Finally, Mr Keith Kendall, BA (Biology), Diploma in Park Management, of Kendall and Kendall Ecological Consultants undertook an independent peer review of the fauna assessment report. Mr Kendall has extensive nature conservation, land use and wildlife management experience in the Upper Hunter Valley.

D4.2 Assessment Methodology

D4.2.1 Fauna Survey Area

The fauna surveys were conducted within and surrounding an area of approximately 560ha referred to hereafter as the “Fauna Survey Area” (**Figure D16**) comprising:

- the Open Cut Area;
- an area to the north of the Open Cut Area and south of Stony Creek and Middle Fallbrook Roads (part Western Biodiversity Offset Area);
- an area to the west of the Open Cut Area and south and east of Middle Fallbrook Road (part Western Biodiversity Offset Area); and
- an area to the north of Stony Creek Road comprising the Northern and Supplementary Biodiversity Offset Areas.

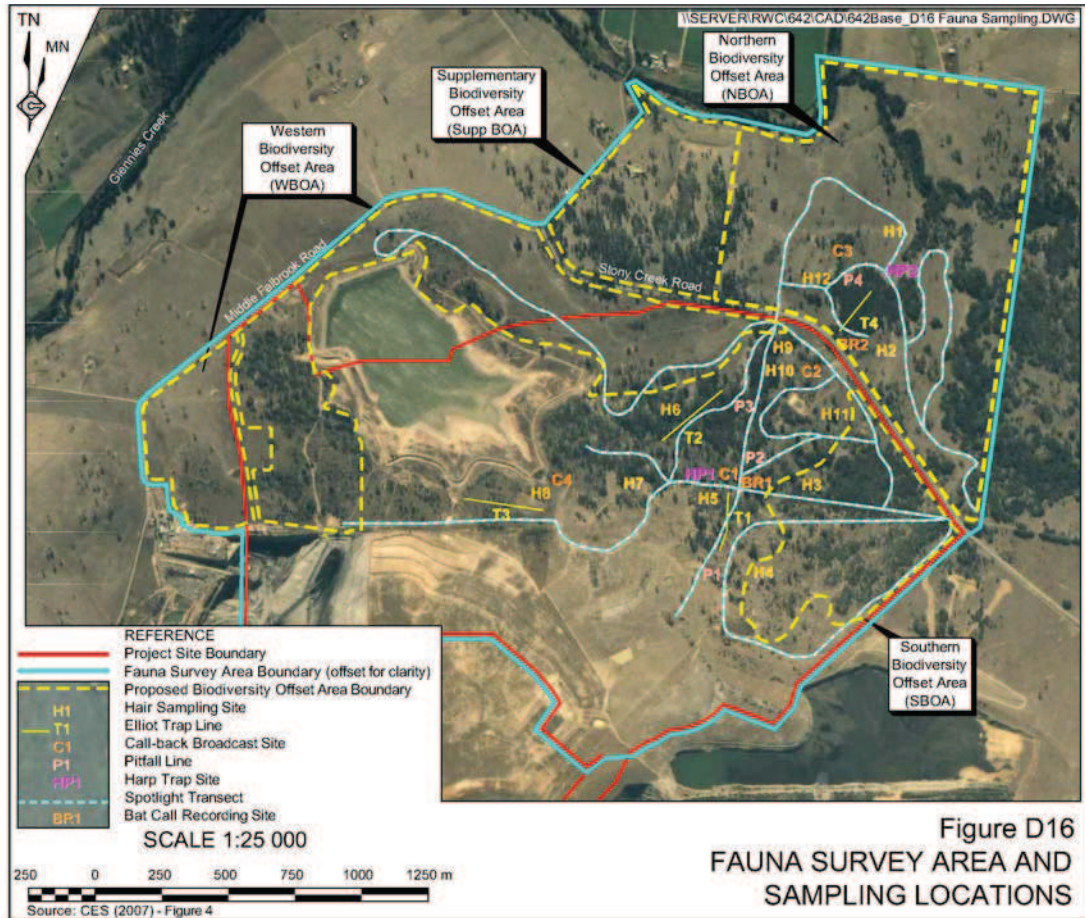
The Fauna Survey Area did not include other areas of the Project Site, namely Haul Route Corridors D and E and the Camberwell CHPP area, because these areas were considered to be heavily impacted by mining-related activities and the potential for further fauna-related impacts was considered to be negligible.

D4.2.2 Survey Timing

Fauna surveys were conducted during Winter, Spring and Autumn. The dates of the surveys were as follows.

- Winter 2004 – 23 and 24 August 2004 (2 days).
- Spring 2004 – 8 September 2004 (1 day).





- Spring 2004 – 9 to 13 October 2004 (5 days).
- Spring 2005 – 26 and 27 October 2005 (2 days).
- Autumn 2006 – 9 to 13 May 2006 (5 days).
- Winter 2006 – 15 to 17 June 2006 (3 days).

D4.2.3 Sampling Methods

Sampling methods used for the various fauna groups were as follows.

Amphibians

Systematic sampling for amphibians of all naturally occurring waterholes and drainage lines and all dams, including Possum Skin Dam, within and adjacent to the Fauna Survey Area was conducted during early evenings during the October 2004 survey to identify amphibians.

Calls of the Green and Golden Bell Frog were broadcast around all dams and waterholes containing water during the October 2004 survey, with approximately 20 minutes spent at each location.



In addition, pitfall trap lines were used to survey amphibians, reptiles and small mammals. The traps comprised four PVC pipes (150mm diameter x 600mm deep) with a 30.0 cm high 10.0m long drift fence extending 2.0m each side of the traps. The trap lines were located in the various habitat types at sites P1-P4 (**Figure D16**). Two tube traps were also installed against both sides of the drift fence, between the pitfall traps. The pitfall trap lines were located in positions that would maximise the capture of both reptiles and amphibians and were deployed for four nights during the October 2004 survey. This sampling effort was equivalent to 64 trap nights.

Birds

During all surveys, birds were identified opportunistically from calls and direct observation of birds, nests and other indicators of avian activity. In addition, a bird census was undertaken each morning during the October 2004 survey along the Elliott Type A Trap Lines (T1 to T4). These trap lines were approximately 300m in length and the census duration was between 30 minutes and 1 hour.

Supplementary surveys targeting Grey-crowned Babblers and their nests within the Fauna Survey Area and publicly accessible areas within 10km were conducted on 26 and 27 October 2005, 9 to 13 May 2006 and 15 to 17 June 2006.

Calls of the relevant threatened owl species and the Bush Stone-curlew were broadcast from positions C1 to C4 during the October 2004 survey (**Figure D16**), C5 to C8 during the May 2006 survey and C9 and C10 during the June 2006 survey (**Figure D17**). Following each broadcast, a listening watch was maintained for approximately 10 minutes, followed by a spotlight search for 10 minutes.

The call broadcast sampling effort amounted to 10 nights of sampling and the estimated probability of detection of the targeted species was more than 90%.

Mammals

Mammals were sampled using the following techniques.

- Opportunistic identification of body remains and other signs of mammal activity during all surveys.
- Targeted searches of habitat suitable for small mammals were undertaken during all surveys.
- Elliott live mammal traps (Type A) were deployed along four lines through areas of remnant vegetation and through open areas (T1 to T4, **Figure D16**). Along each line, 50 traps at 10m intervals were set for 4 nights during the October 2004 survey. Each trap was baited with a mix of rolled oats, peanut butter, dog food and sesame oil. A total of over 375 trap nights was achieved, with less than 2% trap return rate on trap lines T1 to T3. The trap return rate on trap line T4 was between 13% and 20%. This trap line was closed after 3 nights following repeated capture of the same lactating *Antechinus* individual.



- Twenty four hair sampling tubes were deployed at sites H1 to H12 (**Figure D16**) and baited with rolled oats, peanut butter, dog food and sesame oil between 24 August and 8 September 2004. Two traps were set up at each site, one on the ground and one in a nearby tree at about 6m above ground level. The tree trunks in the vicinity of the elevated trap were sprayed with a honey solution to attract arboreal mammals. These traps were left for 14 days. Each trap consists of two 100mm long sections, each with diameters of 70mm and 35mm. This sampling effort exceeds the requirements of NPWS (2004).
- Anabat-CF ultrasonic recorders deployed at locations BR1 and BR2 during the October 2004 survey (**Figure D16**).
- Harp traps were deployed at sites HP1 and HP2 for two nights during the October 2004 survey (**Figure D16**).
- Spotlight searches were undertaken during the August and October 2004 surveys using a spotlight from each side of a slow moving vehicle and pedestrian transects in the remnant woodlands (see **Figure D16**).
- Calls of Koala, Squirrel Glider and Yellow-bellied Glider were broadcast in conjunction with and using the same procedure as the bird call broadcast.
- Additionally, a program targeting the distribution of Phascogales was undertaken in May and June 2006, with 10 cage traps and 28 Elliott traps – Type A deployed in May 2006, and 30 Elliott traps – Type B deployed during June 2006 (**Figure D17**). This represents a sampling effort of approximately 140 trap nights for Elliott traps and 40 trap nights for cage traps.

Reptiles

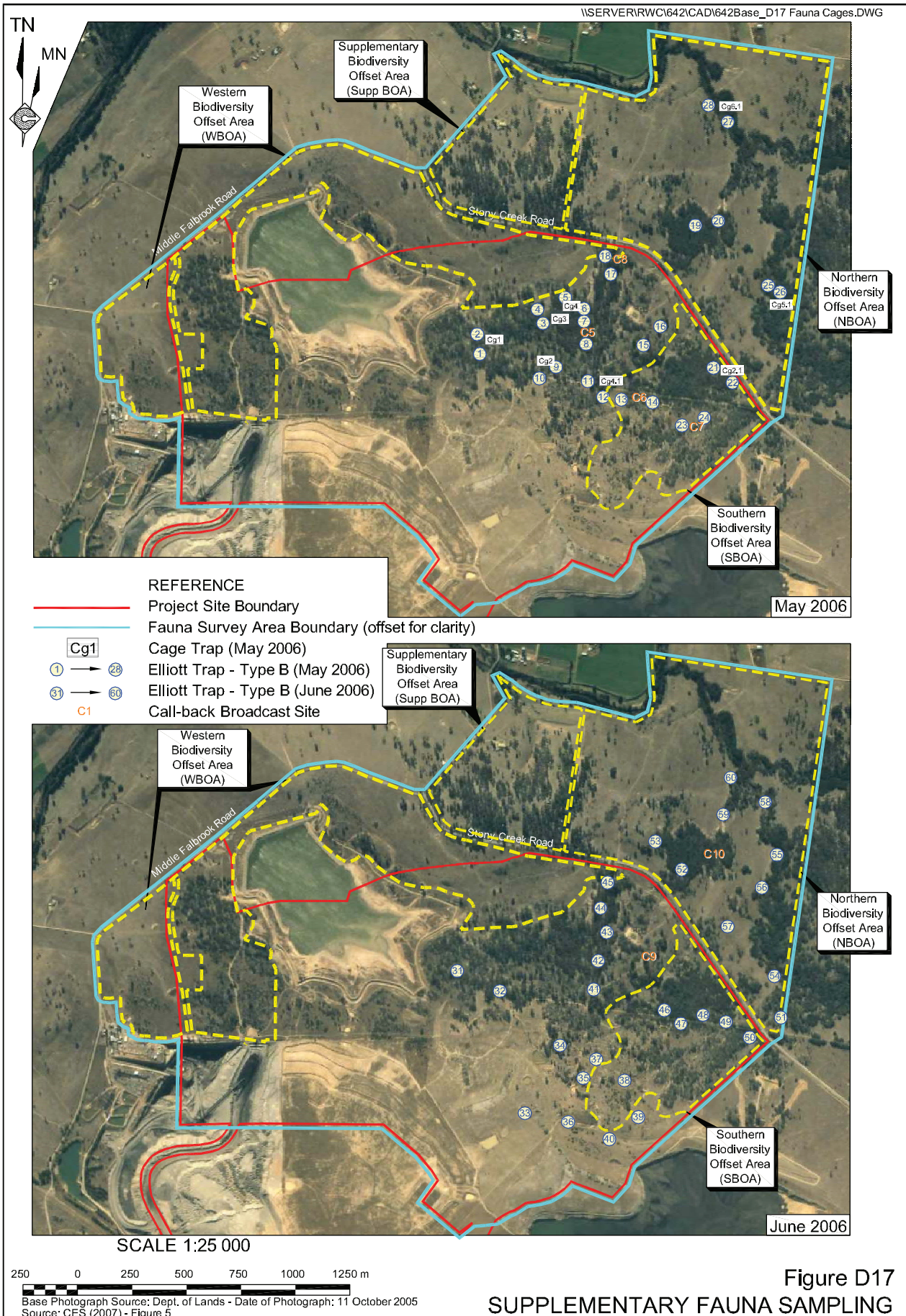
Reptiles were sampled using the pitfall traps. In addition, systematic searches during the October 2004 survey in the leaf litter and under logs and rocks were conducted by Dr Leong Lim and Mr Gerry Swan, an experienced herpetologist, within the Fauna Survey Area. Particular attention was made to record turtles that may occur along the drainage and creek lines as well as in the dams.

D4.3 Regional Fauna

An initial checklist of the regional fauna recorded within the Singleton Local Government Area (LGA) was compiled from the following sources.

- National Parks and Wildlife Service (NPWS) *Atlas of NSW Wildlife*.
- Strahan (1995).
- Swan *et al* (2004).
- Barrett *et al* (2003).
- Parnaby (1992).





- Cogger (2000).
- Churchill (1998).
- Ayers *et al* (1996-99).
- NPWS (1999).
- Other published and unpublished sources.

In addition, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listing of threatened, migratory and international agreement species for the Singleton LGA were also examined. A summary of the fauna recorded as occurring or likely to occur within the Singleton LGA is presented in **Table D30**. A complete list of the threatened species recorded for the Singleton LGA is presented in Section 4 and Appendix 1 of CES (2007).

Table D30
Threatened Species Recorded within the Singleton LGA

	NPWS Atlas of NSW Wildlife and other Sources			Number of EPBC Act Listed Threatened Species
	Number of Species Recorded	Number of Vulnerable Species	Number of Endangered Species	
Amphibians	36	5	3	3
Birds	240	17	4	3
• Migratory birds	-	-	-	9
• Marine birds	-	-	-	4
Mammals, incl bats	77	18	2	7
Reptiles	69	0	1	1

Source: Modified after CES (2007) – Section 4

D4.4 Survey Area Habitats

Five fauna habitats have been identified within the Fauna Survey Area as follows (**Figure D18**).

Habitat 1 – Open Pastures Habitat

This habitat comprises open grassland communities with occasional, scattered Narrow-leaf Ironbark, Grey Box, Bull Oak and Broad-leaf Ironbark trees.

Habitat 2 – Open Woodland Habitat

This habitat comprises areas of scattered Narrow-leaf Ironbark and Forest Red Gum trees in areas exhibiting evidence of previous disturbance and topsoil stockpiling.

Habitat 3 – Woodland Habitat

This habitat comprises variably spaced Narrow-leaf Ironbark, Spotted Gum, Grey Box and Forest Red Gum trees. The habitat also includes an area of old growth trees along a Council Road Reserve (**Figure D18**) which exhibits occasional hollow-bearing trees and scattered stags and logs. The remainder of this habitat comprises regrowth with a likely age of less than 60 years and an open understorey with little or no shrub layer. The shrub layer, however, has improved since domestic stock were removed from the Project Site since 2004.



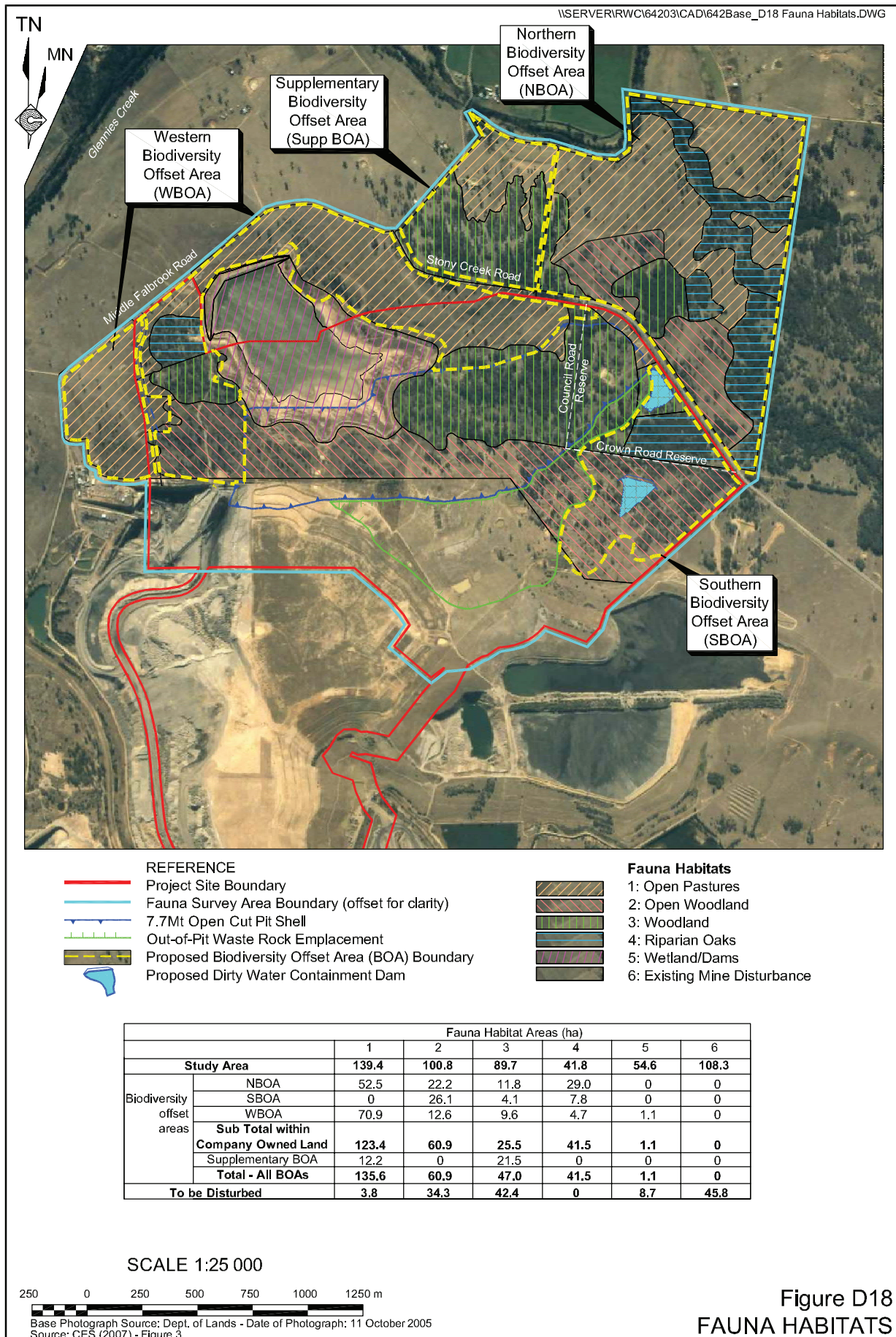


Figure D18
FAUNA HABITATS



Habitat 4 – Riparian Oaks Habitat

This habitat comprises closely spaced trees of Bull Oak and Swamp Oak trees, with areas dominated by Bull Oak located at higher elevations, further from drainage lines, and areas dominated by Swamp Oak located at lower elevations, closer to drainage lines. This habitat also includes areas of River Oak immediately adjacent to and within drainage lines.

Habitat 5 – Wetland / Dams

This habitat comprises a number dams and waterholes along drainage lines within the Fauna Survey Area, including Possum Skin Dam. Some of the dams have variable amounts of water weeds growing in them, including Cumbungi, Spike Rush, Red Azolla, Swamp Lilly and Water Primrose. The amount of vegetation present varied between the fauna survey periods, depending upon the amount of water that was present within the dams and waterholes.

In addition, a sixth habitat area was identified, namely areas of existing mine disturbance. These areas have no habitat value and were not surveyed.

D4.4.1 Survey Area Fauna

Table D31 identifies the number of fauna species recorded from the Survey Area, and lists all the threatened fauna species identified within the Fauna Survey Area. A complete list of species observed is presented in Section 5 of CES (2007).

Table D31
Fauna Species Recorded within the Fauna Survey Area

	Number of Species			Threatened Species
	Native	Exotic	Total	
Amphibians	9	0	9	Nil
Birds	60 ²	1	61	Grey-crowned Babbler (<i>Pomatostomus temporalis</i>)
Mammals, incl. bats	19	6 ¹	25	Eastern Freetail-bat (<i>Mormopterus norfolkensis</i>) Eastern Bentwing-bat (<i>Miniopterus schreibersii oceanesis</i>) Brush-tailed Phascogale (<i>Phascogale tapoatafa</i>) Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)
Reptiles	11	0	11	Nil
Note 1:	Three exotic species, the European Red Fox, the European Rabbit and Feral Cat, are also listed as Key Threatening Processes in the TSC Act.			
Note 2:	This figure includes the White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>), an EPBC Act listed migratory species.			
Source:	Modified after CES (2007) – Section 5.			



D4.5 Fauna Management and Mitigation Measures

D4.5.1 Design Safeguards

The following design safeguards have been implemented by the Proponent in the design of the Project to minimise the impact of the Project on fauna using and/or frequenting the Fauna Survey Area or its surrounds.

- The out-of-pit waste rock emplacement was initially designed to maximise the area located on previously disturbed land or cleared grazing land. Subsequently, the waste rock emplacement has been redesigned to avoid a large stand of Bull Oak Forest Community (see Part D5.3), in the eastern section of the Open Cut Area (see **Figures B1** and **D18**).
- Following identification of a single female Brush-tailed Phascogale in an area of hollow-bearing trees along the Crown Road Reserve in the eastern section of the Open Cut Area, the out-of-pit waste rock emplacement was re-designed to preserve as much of the stand of old trees with hollows along the Crown Road Reserve (see **Figure D18**).
- The locations and design of the Dirty Water Containment Dams and contour banks on the proposed waste rock emplacements were amended to minimise the size of the dams and limit impacts on the Bull Oak Forest Community (see Part D5.3) and remnant trees with hollows that may provide habitat for Brush-tailed Phascogale.
- The site access road and open cut facilities area have been located to avoid a stand of Bull Oak Forest Community and an area of Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community (see Part D5.3) to the west of the Possum Skin Dam (see **Figure D18**).

D4.5.2 Operational Safeguards

The following operational safeguards would be implemented by the Proponent throughout the life of the Project.

- Removal of native vegetation, including areas of regenerating vegetation, would be confined to those areas required for operational purposes during the subsequent 12 months.
- Removal of large, mature trees would be conducted in late spring and early autumn to avoid impacting on spring nesting birds and over-wintering bats.
- Mature trees with hollows would be inspected for threatened arboreal mammals, nesting birds and roosting bats prior to removal of the trees. When located, individual animals would be relocated to an appropriate location. Measures would be implemented to ensure that the hollows are not occupied by roosting or nesting fauna between the visual inspection and the commencement of tree clearing operations.
- Where practicable, vegetation, both standing and already fallen, would be relocated to areas that would not be disturbed, including the biodiversity offset areas, or placed on the revegetated native woodland areas on the final landform.



- Stock would be excluded from the biodiversity offset areas and areas undergoing rehabilitation and these areas would be fenced to allow natural regeneration to occur. It is noted that the Proponent has already excluded stock from the Project Site and Northern, Southern and Western Biodiversity Offset Areas. Stock would be excluded from the Supplementary Biodiversity Offset Area when a suitable arrangement with the owners of the land is achieved.
- Microbat roosting tubes and Phascogale nesting boxes, would be erected within the biodiversity offset areas to compensate for the removal of trees with hollows. The location and number of roosting tubes and nesting boxes would be determined during preparation of the Mining Operations Plan and Phascogale Species Management Plan respectively, should project approval be granted.
- In the event that any Phascogale nesting tree within the footprint of the Dirty Water Containment Dams become surrounded by water during the Brush-tailed Phascogale nesting season (July to August), an escape route for the female Phascogale would provide free access for the individual animal between an area outside the footprint of the dam and the nesting hollow. This may be achieved through the provision of piles of vegetation or rope ‘bridges’.
- Enhancement of the biodiversity offset areas and undisturbed areas of the Open Cut Area, including replanting and weed control would be commenced as soon as practicable after project approval is received. This would include revegetation of an area of approximately 10ha in the vicinity of the Glennies Creek riparian zone within the Northern and Supplementary Biodiversity Offset Areas to provide additional linkages between the Project Site, biodiversity offset areas and Glennies Creek.
- A 20m wide corridor adjacent to Stony Creek Road on the southern side would be planted with species representative of the Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Vegetation Community to enhance the roadside vegetation corridor and provide additional linkages between sections of the biodiversity offset areas and drainage lines.
- Ongoing pest and weed control programs across the Open Cut Area and biodiversity offset areas. Pest control programs would initially target those species listed as Key Threatening Processes under the *Threatened Species Conservation Act 1995* (TSC Act) and the EPBC Act (European Red Fox and Feral Cat) and would also target feral dogs and rabbits.

Should the Project receive project approval, Species Management Plans would be prepared and implemented for the Grey-crowned Babbler and Brush-tailed Phascogale prior to the commencement of mining activities. These plans would include:

- the extent, pattern and timing of deployment of nest boxes within the Open Cut Area and the biodiversity offset areas;
- appropriate and practicable operational practices to optimise survival chances and increase the generational viability of the local populations of these species; and



- ongoing monitoring programs, with a commitment that should monitoring indicate that the proposed management measures prove to be inadequate, that improved management measures would be implemented in agreement with the relevant government agency.

D4.5.3 Offset Strategies

The Proponent proposes to establish three biodiversity offset areas on its landholding, namely the Northern, Southern and Western Biodiversity Offset Areas (**Figure D18**). In addition, the Proponent would establish a fourth biodiversity offset area, the Supplementary Biodiversity Offset Area, on non-Project-related land to the west of the Northern Biodiversity Offset Area should a suitable arrangement with the landowners be achieved (**Figure D18**). Part B15.10 presents components of the Proponent's offset strategy and Part D6 assesses the Biodiversity Offset Strategy against the guidelines published by the Department of Environment and Climate Change.

D4.6 Assessment of Impacts

D4.6.1 Introduction

This Part provides an assessment of the likelihood of each of the species listed under the schedules of the TSC Act and the EPBC Act recorded within the Singleton LGA occurring within the Fauna Survey Area and whether the impacts upon each species are likely to be significant.

For those listed threatened or EPBC Act species that were observed or may occur within the Fauna Survey Area, or may be significantly impacted by the Project, a detailed impact assessment based upon the key thresholds listed in the *Draft Guidelines for Threatened Species Assessment* published by the Department of Environment and Conservation and Department of Primary Industries in 2005 is provided.

This Part concludes with an assessment of the likely impacts associated with the Project upon Koala habitat, an assessment of key threatening processes and an assessment of the cumulative impacts associated with the Project. A detailed assessment of the Biodiversity Offset Strategy is provided in Part D6.

D4.6.2 Preliminary Impact Assessment

Table D32 presents a summary of the likelihood of TSC Act and EPBC Act listed species occurring within the Fauna Survey Area and identifies those species that may be potentially impacted by the Project.



Table D32
Likelihood of Occurrence of Listed Species¹

Page 1 of 9

Species	Potential Impact		Comment
	None Likely	Possible	
Amphibians			
Green and Golden Bell Frog ²	✓		This species has been observed near Ravensworth to the northwest of the Fauna Survey Area. All wetlands within the Fauna Survey Area were checked for this species and no individuals were observed. Only two dams within the Survey Area have suitable habitat for this species. A viable population of this species is unlikely to occur within the Fauna Survey Area.
Booroolong Frog ²	✓		This species prefers high mountain streams. No such streams occur within the Fauna Survey Area. This species is unlikely to occur within the Fauna Survey Area.
Davies' Tree Frog ²	✓		This species prefers permanent flowing streams at elevations above 400m AHD. No such streams occur within the Fauna Survey Area. This species is unlikely to occur within the Fauna Survey Area.
Littlejohn's Tree Frog ²	✓		This species prefers permanent flowing streams at elevations above 280m AHD associated with sandstone. No such streams occur within the Fauna Survey Area. This species is unlikely to occur within the Fauna Survey Area.
Giant Burrowing Frog ²	✓		This species prefers undisturbed flowing streams. The Fauna Survey Area is moderately to highly disturbed. This species is unlikely to occur within the Fauna Survey Area.
Stuttering Frog ²	✓		This species prefers cool rainforest and moist sclerophyll forest. No such habitat occurs within the Fauna Survey Area. This species is unlikely to occur within the Fauna Survey Area.
Southern or Giant Barred Frog ²	✓		This species prefers coastal rainforests and wet sclerophyll forests. No such habitat occurs within the Fauna Survey Area. This species is unlikely to occur within the Fauna Survey Area.
Sphagnum Frog ²	✓		This species prefers high elevations and moist sclerophyll forest. No such habitat occurs within the Fauna Survey Area. This species is unlikely to occur within the Fauna Survey Area.
Red-crowned Toadlet ²	✓		This species prefers sandstone escarpments. No such habitat occurs within the Fauna Survey Area. This species is unlikely to occur within the Fauna Survey Area.
Black Bittern ²	✓		This species prefers to establish nesting sites near wetland areas. It is possible that this species may establish nesting sites near Possum Skin Dam or other farm dams within the Fauna Survey Area. However, there is an abundance of other farm dams and wetlands surrounding the Fauna Survey Area which may also be utilised by this species. As a result, the impacts on this species as a result of the Project are likely to be inconsequential.
Note 1: Likely to occur within the Singleton Local Government Area.			
Note 2: Listed under the <i>Threatened Species Conservation Act 1995</i>			
Note 3: Listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .			
Source: Modified after CES (2007) – Section 6.1			



Table D32 (Cont'd)
Likelihood of Occurrence of Listed Threatened Species¹

Species	Potential Impact		Comment
	None Likely	Possible	
Birds			
Black-necked Stork ²	✓		This species prefers wetland areas, While there is one record of this species within the Singleton LGA; the Fauna Survey Area is outside its normal breeding range. As a result, the impact on this species as a result of the Project likely to be inconsequential.
Bush Stone-curlew ²	✓		This species prefers to nest on the ground. The presence of foxes and the degraded understorey within the Fauna Survey Area suggests that this species is unlikely to occur within the Fauna Survey Area.
Red Goshawk ²	✓		This species usually occurs as sedentary individuals or breeding pairs and would have been observed had it been present within the Fauna Survey Area. It was not recorded and is unlikely to occur within the Fauna Survey Area.
Black-breasted Buzzard ²	✓		This species has a large home range and requires habitats with large trees. As a result it is unlikely to occur within the Fauna Survey Area. If the species was present, it would be unlikely to be impacted by the removal of approximately 42ha of Woodland habitat.
Barking Owl ²	✓		This species usually responds to broadcast calls. It was not recorded within the Fauna Survey Area following broadcast of its calls and is therefore unlikely to occur within the Fauna Survey Area. In addition, this species has a home range of more than 1 000ha and, as a result, if it did occur within the Fauna Survey Area, it would be unlikely to be impacted by the removal of approximately 42ha of Woodland habitat.
Powerful Owl ²	✓		This species has a home range of more than 1 000ha and requires habitats with large trees. The absence of large trees means that the species would be unlikely to occur within the Fauna Survey Area. If the species is present, it would be unlikely to be impacted by the removal of approximately 42ha of Woodland habitat.
Masked Owl ²	✓		This species has a home range of more than 1 000ha and requires habitats with large trees. The absence of large trees means that the species would be unlikely to occur within the Fauna Survey Area. If the species is present, it would be unlikely to be impacted by the removal of approximately 42ha of Woodland habitat.
Sooty Owl ²	✓		This species has a home range of more than 1 000ha and requires habitats with large trees. The absence of large trees means that the species would be unlikely to occur within the Fauna Survey Area. If species is present, it would be unlikely to be impacted by the removal of approximately 42ha of Woodland habitat.
<p>Note 1: Likely to occur within the Singleton Local Government Area. Note 2: Listed under the <i>Threatened Species Conservation Act 1995</i> Note 3: Listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p>			
Source: Modified after CES (2007) – Section 6.1			



Table D32 (Cont'd)
Likelihood of Occurrence of Listed Threatened Species¹

Species	Potential Impact		Comment
	None Likely	Possible	
Birds (Cont'd)			
Glossy Black-Cockatoo ²	✓		This species appears to prefer hill slopes along river valleys in the vicinity of stands of <i>Allocasuarina</i> and <i>Casuarina</i> . This species was targeted during the Fauna Survey and was not observed. However, if it did occur within the Fauna Survey Area, it would be unlikely to be affected by the Project as the stands of <i>Allocasuarina</i> and <i>Casuarina</i> within the Riverine Oaks Habitat areas would not be impacted by the Project. The proposed Biodiversity Offset Strategy would be likely to benefit this species through protection of the Riparian Oaks Habitat within the biodiversity offset areas.
Gang-gang Cockatoo ²	✓		This species prefers to forage in stands of large Eucalypts on hill slopes and valleys, nests in hollows near permanent water in sheltered gullies and has a distinctive, noisy call. The species was not observed within the Fauna Survey Area and, as its preferred habitat is not present within the Fauna Survey Area, it would be unlikely to occur within the Fauna Survey Area.
Turquoise Parrot ²	✓		This species prefers to forage in grassed areas near stands of mixed Eucalypts and requires a reliable source of drinking water near by. Notwithstanding the presence of Possum Skin Dam with its slightly saline water, a reliable, suitable water supply is not always present and there are few potential nesting sites within the Fauna Survey Area. The species is therefore unlikely to occur within the Fauna Survey Area. The proposed Biodiversity Offset Strategy may benefit this species by allowing grasses to seed, providing additional foraging resources.
Swift Parrot ²	✓		This species is nomadic and prefers feeds on winter flowering Eucalypts and other species. While winter flowering vegetation is present within the Fauna Survey Area, including Forest Red Gum and Spotted Gum, this species has not been recorded in the Upper Hunter Valley. As a result, it is unlikely to occur within the Fauna Survey Area.
Regent Honeyeater ²	✓		This species is a very conspicuous species and was not observed during the Fauna Survey. It roams widely within its breeding area; however, no breeding areas have been identified within the Hunter Valley. This species is also an opportunistic feeder and would be expected to occur within Fauna Survey Area as a transient only. As a result, the removal of approximately 42ha of Woodland would be unlikely to significantly impact upon this species.
Black-chinned Honeyeater ²	✓		This species is rarely recorded east of the Great Dividing Range. It prefers forest remnants greater than 200ha and is principally associated with Yellow and White Box – Ironbark Woodland on the Western Slopes. The Fauna Survey Area does not include the preferred habitat of this species and it is therefore unlikely to occur within the Fauna Survey Area.

Note 1: Likely to occur within the Singleton Local Government Area.

Note 2: Listed under the *Threatened Species Conservation Act 1995*

Note 3: Listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

Source: Modified after CES (2007) – Section 6.1



Table D32 (Cont'd)
Likelihood of Occurrence of Listed Threatened Species¹

Species	Potential Impact		Comment
	None Likely	Possible	
Birds (Cont'd)			
Painted Honeyeater ²	✓		This species is heavily dependant on mistletoe which is uncommon within the Fauna Survey Area. As a result, the species is unlikely to occur within the Fauna Survey Area.
Hooded Robin ²	✓		This species prefers <i>Acacia</i> shrubs and mallee with abundant dead timber and appears to require relatively large vegetation remnants. It is unlikely that the isolated, relatively small and fragmented habitat within the Fauna Survey Area would support viable population of this species. The proposed Biodiversity Offset Strategy may benefit this species through an increase in the patch size of the habitat and a reduction in fragmentation.
Brown Treecreeper ²	✓		This species nests in tree hollows and forages on the ground amongst leaf litter and fallen timber. This species was targeted during the Fauna Survey and was not observed. The low abundance of trees with hollows, leaf litter and fallen timber within the Fauna Survey Area means that this species is unlikely to occur within the Fauna Survey Area.
Olive Whistler ²	✓		This species prefers areas of relatively thick understorey and has been recorded mainly in rainforest and Eucalypt forest at elevations above 500m AHD. The absence of a thick understorey with the Fauna Survey Area and elevation below 500m suggests that this species is unlikely to occur within the Fauna Survey Area. The proposed Biodiversity Offset Strategy may benefit this species through the regeneration of the understorey.
Diamond Firetail ²	✓		This species prefers woodlands with a grassy understorey and good shrub cover near a water source. The species occurs predominantly west of the Great Dividing Range and appears to be unable to persist in habitat remnants less than 200ha. The poorly developed shrub layer within the Fauna Survey Area and the small habitat patch size imply that this species is unlikely to occur within the Fauna Survey Area. The proposed Biodiversity Offset Strategy may benefit this species through the regeneration of the shrub layer.
Speckled Warbler ²	✓		This species nests on the ground and forages in open, grassy, leaf litter and shrub cover and appears to require vegetation remnants of more than 100ha. The presence of foxes, poorly developed ground cover, low abundance of leaf litter and shrub cover and the small habit patch size within the Fauna Survey Area suggests that this species is unlikely to occur within the Fauna Survey Area.
<p>Note 1: Likely to occur within the Singleton Local Government Area. Note 2: Listed under the <i>Threatened Species Conservation Act 1995</i> Note 3: Listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p>			
Source: Modified after CES (2007) – Section 6.1			



Table D32 (Cont'd)
Likelihood of Occurrence of Listed Threatened Species¹

Species	Potential Impact		Comment
	None Likely	Possible	
Birds (Cont'd)			
Blue-billed Duck ²	✓		This species has not been recorded within the Singleton LGA, although it may occur within the Hunter Valley. The species prefers deepwater swamps, which do not occur within the Fauna Survey Area. However, the species is very mobile and it is possible that it may intermittently utilise dams within the Fauna Survey Area. As there is no shortage of farm dams and other similar water bodies in the vicinity of the Fauna Survey Area, the impact of the Project on this species is likely to be insignificant.
Freckled Duck ²	✓		This species has not been recorded within the Singleton Local Government Area, although it may occur within the Hunter Valley. The species breeds in inland lakes west of the Great Dividing Range. However, the species is very mobile and it is possible that it may intermittently utilise dams within the Fauna Survey Area. As there is no shortage of farm dams and other similar water bodies in the vicinity of the Fauna Survey Area, the impact of the Project on this species is likely to be insignificant.
Grey-crowned Babbler ²		✓	This species was observed within and surrounding the Fauna Survey Area and may be impacted by the Project. See discussion in Part D4.6.3.
White-bellied Sea-Eagle ³	✓		This species is predominantly a coastal and estuarine species but also occurs on inland waterways where there are sufficient fish. This species was recorded on one occasion during this study. As the Fauna Survey Area does not incorporate suitable habitat for this species, it would be unlikely to use the Fauna Survey Area only rarely (if at all).
White-throated Needletail ³	✓		This species is a migratory species that spends much of its time airborne. It opportunistically roosts in tall trees from time to time. The proposed removal of approximately 77ha of Woodland and Open Woodland would be unlikely to have a significant impact on this species.
Satin Flycatcher ³	✓		This species inhabits Eucalypt Woodland, migrates north in winter, breeds in wet areas with dense vegetation and moves to drier habitats once the young are out of the nest. It is nomadic in the vicinity of the Fauna Survey Area and the removal of approximately 77ha of Woodland and Open Woodland would be unlikely have a significant impact on this species.
Painted Snipe ³	✓		This species forages in mudflats and nests among the vegetation in shallow water. As this type of habitat is not available within the Fauna Survey Area this species would be likely to use the Fauna Survey Area rarely (if at all).
Australian Painted Snipe ³	✓		This species forages in mudflats and nests among the vegetation in shallow water. As this type of habitat is not available within the Fauna Survey Area this species would be likely to use the Fauna Survey Area rarely (if at all).

Note 1: Likely to occur within the Singleton Local Government Area.

Note 2: Listed under the *Threatened Species Conservation Act 1995*

Note 3: Listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

Source: Modified after CES (2007) – Section 6.1



Table D32 (Cont'd)
Likelihood of Occurrence of Listed Threatened Species¹

Species	Potential Impact		Comment
	None Likely	Possible	
Birds (Cont'd)			
Latham's Snipe ³	✓		This species usually forages in muddy edges of natural freshwater swamps and pools and occupies the surrounding wet grass and heath. The Wetland / Dams Habitat within the Fauna Survey Area is unlikely to provide high quality habitat for this species and, as a result, this species would be likely to use the Fauna Survey Area rarely (if at all).
Rufous Fantail ³	✓		This species prefers structurally diverse Eucalypt forests in the Central Tablelands and Central Coast of NSW during its summer migrations. The Fauna Survey Area does not have the structural diversity preferred by this species and is unlikely to occur within the Fauna Survey Area.
Black-faced Monarch ³	✓		This species breeds on the east coast of Australia to the south of latitude 26°S along the eastern slopes and plains and migrates to northern Queensland during winter. It prefers rainforest and Eucalypt forest where it forages in tangled understorey for insects and their larvae along branches and in crevices. As there is no suitable habitat for this species within the Fauna Survey Area, it is unlikely to occur within the Fauna Survey Area.
Spectacled Monarch ³	✓		This species prefers rainforest habitat, although it has also been noted in mangrove areas and Eucalypt forests close to rainforests and usually feeds among the understorey for insects and other invertebrates. As there is no suitable habitat for this species within the Fauna Survey Area, it is unlikely to occur within the Fauna Survey Area.
Fork-tailed Swift ³	✓		This species is a migratory species that breeds in Asia and is nomadic in this part of its distribution. It generally spends most of its time in the air, but may roost occasionally in reeds, on cliffs or in large trees. As there are few large trees within the Fauna Survey Area and the habitat within the area is relatively small, this species would be likely to use the Fauna Survey Area rarely (if at all).
Great or White Egret ³	✓		This species is widespread in coastal areas and in inland Australia and forages in shallow swamps, flooded fields and along the edges of ditches and streams. As the Project would not disturb any habitat suitable for this species, it would be likely to use the Fauna Survey Area rarely (if at all).
Cattle Egret ³	✓		This species feeds on insects and other invertebrates disturbed by cattle. It also feeds in shallow water around wetlands and drains. As the Project would not disturb any habitat suitable for this species, it would be likely to use the Fauna Survey Area rarely (if at all).
Rainbow Bee-eater ³	✓		This species requires a high density of insect prey. As the Fauna Survey Area does not include an area with such a high density of insects, it would be likely that this species would use the Fauna Survey Area rarely (if at all).
<p>Note 1: Likely to occur within the Singleton Local Government Area. Note 2: Listed under the <i>Threatened Species Conservation Act 1995</i> Note 3: Listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p>			
Source: Modified after CES (2007) – Section 6.1			



Table D32 (Cont'd)
Likelihood of Occurrence of Listed Threatened Species¹

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Species	Potential Impact		Comment
	None Likely	Possible	
Mammals			
Brush-tailed Rock-wallaby ²	✓		This species prefers rocky outcrops or steep hill slopes. As this habitat type does not occur within the Fauna Survey Area the species is unlikely to occur within the Fauna Survey Area.
Koala ²	✓		One species of tree suitable for Koala foraging is present within the Fauna Survey Area, namely Forest Red Gum. Koala usually frequent feed trees in areas of soils richer than those that occur within the Fauna Survey Area. No Koala or signs of Koala were observed during the Fauna Survey. It is noted, however, that Koala may traverse considerable distances between habitat remnants. However, CES (2007) notes that the proposed area of disturbance is isolated by agricultural land, mining activities and roads. As a result, the likely impact of the Project on this species is not significant. As a result, Koala would be likely to frequent the Fauna Survey Area only infrequently and would be unlikely to be adversely impacted by the Project.
Squirrel Glider ²	✓		This species prefers substantial patches of intact woodland. It was not observed during the Fauna Survey and the isolated, relatively immature, fragmented habitat available within the Fauna Survey Area would be unlikely to support a viable population of this species. As a result, this species is unlikely to occur within the Fauna Survey Area.
Yellow-bellied Glider ²	✓		This species prefers extensive areas of tall forest or woodland with large mature Eucalypt trees with overlapping flowering seasons. As this habitat is not present within the Fauna Survey Area, the species is unlikely to occur within the Fauna Survey Area.
Eastern Pygmy-possum ²	✓		This species prefers areas with a thick understorey of <i>Banksia</i> and <i>Leptospermum</i> for cover and food. As this habitat is not present within the Fauna Survey Area, the species is unlikely to occur within the Fauna Survey Area.
Brush-tailed Phascogale ²		✓	This species was observed within the Fauna Survey Area and may be impacted by the Project. See discussion in Part D4.6.7.
Parma Wallaby ²	✓		This species prefers large areas of remnant vegetation and a viable population of this species is unlikely to persist in the relatively isolated, fragmented habitat within the Fauna Survey Area.
Red-legged Pademelon ²	✓		This species prefers large areas of remnant vegetation and a viable population of this species is unlikely to persist in the relatively isolated, fragmented habitat within the Fauna Survey Area.
Note 1: Likely to occur within the Singleton Local Government Area.			
Note 2: Listed under the <i>Threatened Species Conservation Act 1995</i>			
Note 3: Listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .			
Source: Modified after CES (2007) – Section 6.1			



Table D32 (Cont'd)
Likelihood of Occurrence of Listed Threatened Species¹

Species	Potential Impact		Comment
	None Likely	Possible	
Mammals (Cont'd)			
Long-nosed Potoroo ^{2,3}	✓		This species prefers large areas of remnant vegetation and a viable population of this species is unlikely to persist in the relatively isolated, fragmented habitat within the Fauna Survey Area. The Fauna Survey Area is not a habitat occupied by a local population of this marsupial and the proposed activity is unlikely to cause any impact on this species by an introduction or encouragement of an invasive species or interfere with any recovery action for this species.
Rufous Bettong ²	✓		This species prefers large areas of remnant vegetation and a viable population of this species is unlikely to persist in the relatively isolated, fragmented habitat within the Fauna Survey Area.
Hastings River Mouse ^{2,3}	✓		This species prefers thick ground cover, including ferns and grasses and is usually observed at elevations greater than 500m AHD. As this habitat is not available within the Fauna Survey Area, this species is unlikely to occur within the Fauna Survey Area. The Fauna Survey Area is not a habitat occupied by a local population of this marsupial and the proposed activity is unlikely to cause any impact on this species by an introduction or encouragement of an invasive species or interfere with any recovery action for this species.
Large-footed Myotis ²	✓		This species prefers riparian corridors associated with Second Order streams where it forages for prey on the surface of the water. As no second order streams occur within the Fauna Survey Area, and no riparian corridors would be impacted by the Project, it is unlikely that this species would be impacted by the Project.
Eastern False Pipistrelle ²	✓		This species roosts in tree hollows and prefers moist, tall forest habitat. Tree hollows are present only in limited numbers and this habitat type is not present within the Fauna Survey Area, In addition, this species was not observed during the Fauna Survey despite the high intensity call sampling program undertaken. The absence of recordings of this species suggests it does not occur within or surrounding the Fauna Survey Area or that it occurs in very low densities.
Greater Broad-nosed Bat ²	✓		This species roosts in tree hollows and prefers moist, tall forest habitat. Tree hollows are present only in limited numbers and this habitat type is not present within the Fauna Survey Area, In addition, this species was not observed during the Fauna Survey despite the high intensity call sampling program undertaken. The absence of recordings of this species suggests it does not occur within or surrounding the Fauna Survey Area or that it occurs in very low densities.
<p>Note 1: Likely to occur within the Singleton Local Government Area. Note 2: Listed under the <i>Threatened Species Conservation Act 1995</i> Note 3: Listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p>			
Source: Modified after CES (2007) – Section 6.1			



Table D32 (Cont'd)
Likelihood of Occurrence of Listed Threatened Species¹

Species	Potential Impact		Comment
	None Likely	Possible	
Mammals (Cont'd)			
Eastern Bentwing-bat ²		✓	This species is a cave dwelling species. It was observed within the Fauna Survey Area through ultrasonic recordings and may therefore be impacted by the Project. See discussion in Part D4.6.4.
Little Bentwing-bat ²	✓		This species is a cave dwelling species. It was not recorded during the Fauna Survey despite the high intensity of call sampling program undertaken. This implies that the species would be likely to use the Fauna Survey Area only rarely (if at all).
Large-eared Pied Bat ²	✓		This species is a cave dwelling species. It was not recorded during the Fauna Survey despite the high intensity of call sampling program undertaken. This implies that the species would be likely to use the Fauna Survey Area only rarely (if at all).
Eastern Freetail-bat ²		✓	This species was observed within the Fauna Survey Area through ultrasonic recordings and may be impacted by the Project. See discussion in Part D4.6.5.
Spotted-tailed Quoll ^{2,3}	✓		This species prefers dense ground level cover. As this habitat type is not present within the Fauna Survey Area, it is unlikely to occur within the Fauna Survey Area. In addition, the Fauna Survey Area is not area associated with a local population of this species and the proposed activity is unlikely to cause any impact on the species by an introduction or encouragement of an invasive species or interfere with any recovery action for this species.
Grey-headed Flying-fox ^{2,3}		✓	A camp of this species exists in a park in Singleton and the Fauna Survey Area may be within foraging distance of this camp. As a result, this species may be impacted and further assessment is required under the TSC Act (See discussion in Part D4.6.5). However, Singleton is not a major roosting site for this species and the proposed activity is unlikely to result in any invasive species becoming established in this species' habitat or interfere with the recovery of this fruit bat. As a result, further assessment under the EPBC Act is not required.
Eastern Long-eared Bat ³	✓		CES (2007) notes that the Eastern Long-eared Bat (<i>Nyctophilus timoriensis</i>) is unlikely to be found east of the Great Dividing Range and the record of this species within the Singleton LGA is likely to be the result of misidentification of an individual from a montane population of <i>N. gouldi</i> .
Reptiles			
Broad-headed Snake ²	✓		This species prefers sandstone escarpments. As this habitat is not present within the Fauna Survey Area, the species is unlikely to occur within the Fauna Survey Area.
<p>Note 1: Likely to occur within the Singleton Local Government Area. Note 2: Listed under the <i>Threatened Species Conservation Act 1995</i> Note 3: Listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p>			
Source: Modified after CES (2007) – Section 6.1			



D4.6.3 Detailed Impact Assessment

D4.6.3.1 Introduction

This Part provides an assessment of the likely impact of the Project on the listed species identified in Part D4.6.2 as likely to occur within the Project Site or likely to be impacted by the Project. The likely impact of the Project upon each species is assessed against the four key thresholds presented in the Draft Guidelines for Threatened Species Assessment published by the Department of Conservation and Climate Change and Department of Primary Industries in July 2005.

D4.6.3.2 Grey-crowned Babbler

A family of Grey-crowned Babblers (*Pomatostomus temporalis*) was recorded during each of the field surveys (see **Figure D19**). Primary aspects of the life cycle of this species are as follows.

- Breeding – co-operative breeding once or twice per year.
- Food/foraging – an insectivorous species which forages in leaf litter and through the bark of trees.
- Nesting – conspicuous nests in the shape of a rounded bottle on its side. Nest heights vary from a few metres to 15m above ground.
- Movements – family groups permanently occupy an area.
- Threats – habitat degeneration and fragmentation.

Impact Assessment

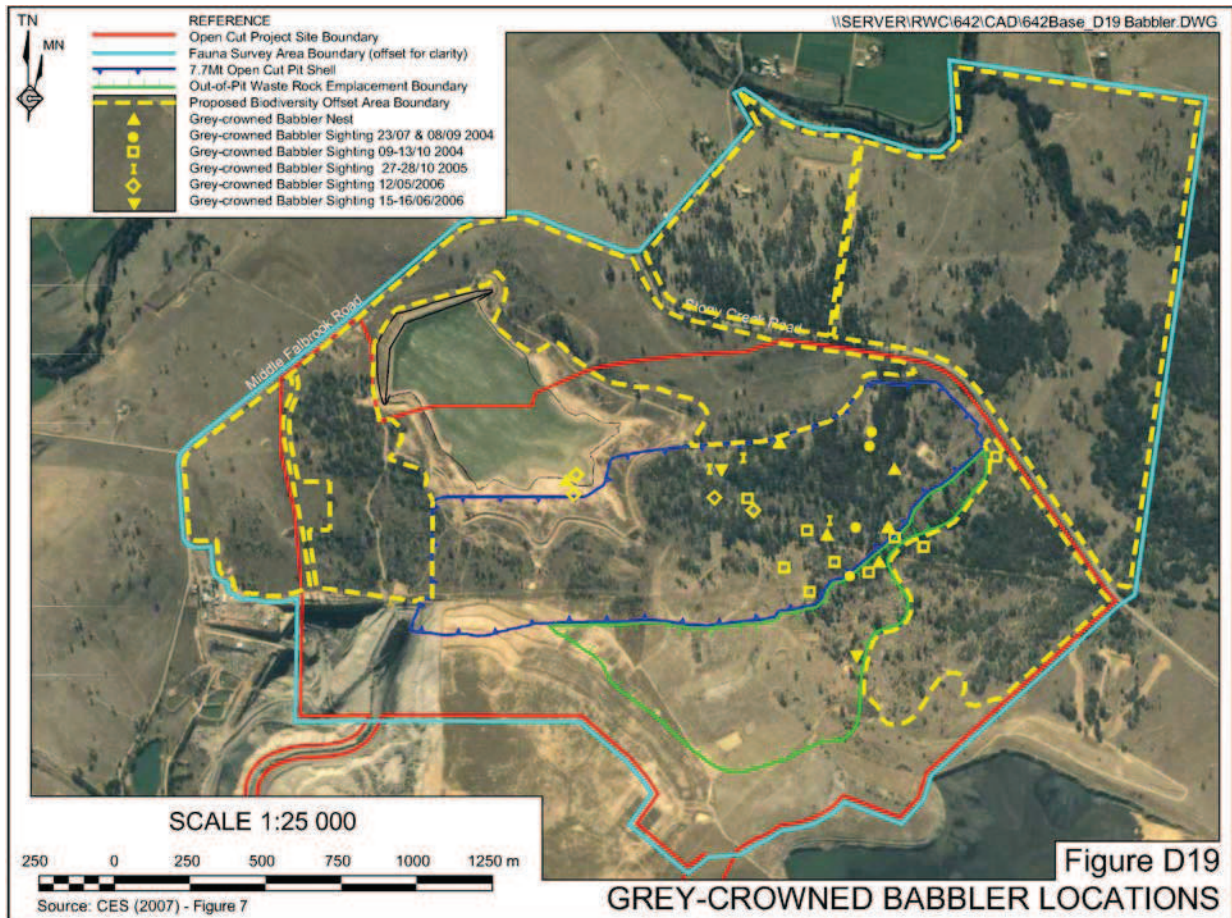
- *Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.*

CES (2007) notes that this species has been recorded persisting in the vicinity of the Mount Owen Coal Mine in areas of rehabilitation that are more than five years old. The proposed revegetation of sections of the biodiversity offset areas and continued regeneration of vegetation within the Tussock Grassland and Regenerating Native Woodland / Shrubland Vegetation Community (see Part D5.3.1), together with the re-establishment of native vegetation within the areas of disturbance would have the effect of improving the biodiversity value of the Fauna Survey Area for this species.

- *Whether or not the proposal is likely to reduce the long-term viability of a local population of the species, population or community.*

The removal of approximately 77ha of Woodland and Open Woodland Habitat may affect the observed family of Grey-crowned Babblers. The impact would be ameliorated by improvements in the habitat patch quality within the biodiversity offset areas achieved through de-stocking, ameliorative planting and regeneration of the grassy understorey. As a result, the Project is unlikely to adversely affect the long-term viability of this species.





- *Whether or not the proposal is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.*

The Project is unlikely to isolate any local population of this babbler from any currently interconnecting or proximate areas of habitat because of the mobility of the species and ability to fly between patches of undisturbed habitat. Field observations in January 2006 suggest that this family consists of three to five birds which may no longer be resident within the Fauna Survey Area. The family, however, may still be foraging through the Open Woodland areas within the Fauna Survey Area. The Fauna Survey Area is not at the distributional limit of this listed vulnerable babbler species which is known to occur in suitable habitat over most of the eastern half of NSW. As a result, the Project is unlikely accelerate or place the species at risk of the extinction.

- *Whether or not the proposal will adversely affect critical habitat.*

There is no declared critical habitat within the Fauna Survey Area.

In summary, the babbler family observed within the Fauna Survey Area may be affected by the Project, and there may be an impact on the generational viability of this local population of *P. temporalis*. However, given that the local population of this species may no longer be resident within the Fauna Survey Area, and the early commencement of amelioration and rehabilitation activities within the biodiversity offset areas and the Open Cut Area, it is unlikely that the Project would adversely impact on the biodiversity values of the Fauna Survey Area, reduce the long-term viability or accelerate the extinction of the local population of this species or adversely affect critical habitat.

D4.6.3.3 Eastern Bentwing-bat

- The Eastern Bentwing-bat (*Miniopterus schreibersii oceanesis*) is normally a cave dweller that forages over several kilometres from its roosting site in areas of open woodland such as those present within and surrounding the Fauna Survey Area. The species congregates to breed and is vulnerable to disturbance in and around its maternal caves. This species is known to occur in Victoria, Queensland and South Australia as well as NSW.

Impact Assessment

- *Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.*

The proposed Biodiversity Offset Strategy would allow the habitat patch quality within the Fauna Survey Area to improve with time. Notwithstanding the initial impact associated with clearing areas of the Open Cut and Out-of-Pit Waste Rock Emplacement, the biodiversity offset areas would be likely to have an increased insect diversity and density due to improved ground and shrub cover as a result of the continued cessation of grazing of domestic stock. This would provide better foraging opportunity for this species. In the short term, the installation of roosting tubes for microbats would provide immediate roosting opportunities for this species. In the longer term, the mature trees will develop hollows which will provide longer term roosting opportunities. As a result, it is likely that the Project would maintain or improve biodiversity values within the Fauna Survey Area.

- *Whether or not the proposal is likely to reduce the long-term viability of a local population of the species, population or community.*

As no maternal cave is known to exist within 20km of the Fauna Survey Area and this species forages over a large area, the proposed activity is unlikely to significantly affect any maternal care or affect the availability of foraging habitat. As a result, the Project would not be likely to reduce the long-term viability of this species in the area around the Open Cut Area.

- *Whether or not the proposal is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.*

The proposed activities do not impact upon any cave directly or indirectly. The Project is thus unlikely to impact upon any viable local population of this species.

- *Whether or not the proposal will adversely affect critical habitat.*

There is no declared critical habitat within the Fauna Survey Area.

In summary, it is unlikely that the Project would adversely impact on the biodiversity values of the Fauna Survey Area, reduce the long-term viability or accelerate the extinction of the local population of this species or adversely affect critical habitat.



D4.6.3.4 Eastern Freetail-bat

The Eastern Freetail-bat (*Mormopterus norfolkensis*) was recorded foraging over the Open Cut Area from a few isolated calls. Primary aspects of the life cycle of this species are as follows.

- Breeding – very little is known of the breeding biology of this bat. There are, however, some suggestions of male exclusive maternal groups forming during breeding.
 - Food / Foraging – this species is insectivorous. Most records of the Eastern Freetail-bat are in dry Eucalypt forest and woodland.
 - Roosting – *M. norfolkensis* normally roosts in tree-hollows but has also been found to roost under bark, metal caps of telegraph posts and in the roofs of buildings.
 - Movements – no seasonal movement or any other movement pattern has been recorded.
- *Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.*

The proposed Biodiversity Offset Strategy would allow the habitat patch quality within the Fauna Survey Area to improve with time. Notwithstanding the initial impact associated with clearing areas of the Open Cut and Out-of-Pit Waste Rock Emplacement, the biodiversity offset areas would be likely to have an increased insect diversity and density due to improved ground and shrub cover as a result of the continued cessation of grazing by domestic stock. This will provide better foraging opportunity for this species. In the short term, the installation of roosting tubes for microbats would provide immediate roosting opportunities for this species. In the longer term, the mature trees will develop hollows which will provide longer term roosting opportunities. As a result, it is likely that the Project would maintain or improve biodiversity values for this species within the Fauna Survey Area.

- *Whether or not the proposal is likely to reduce the long-term viability of a local population of the species, population or community.*

The Project would involve the removal of approximately 77ha of Open Woodland and Woodland Habitat. Considering its mobility and ability to access foraging habitats to the north of Stony Creek Road, it is unlikely that the Project would significantly adversely affect the long-term viability of this local population of *M. norfolkensis*.

- *Whether or not the proposal is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.*

M. norfolkensis, can be found along the greater part of the east coast of the Australian mainland. The Open Cut Area is not at the limit of this species' known distribution.

It is, unlikely that this local population of *M. norfolkensis* would be put at risk of extinction by this Project.



- *Whether or not the proposal will adversely affect critical habitat.*

There is no declared critical habitat within the Fauna Survey Area.

In summary, it is unlikely that the Project would adversely impact on the biodiversity values of the Fauna Survey Area, reduce the long-term viability or accelerate the extinction of the local population of this species or adversely affect critical habitat.

D4.6.3.5 Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) was not recorded on the Open Cut Area. However, it was observed roosting in a park in Singleton 12km south of the Open Cut Area. This fruit bat can be expected to frequent the Open Cut Area when *Eucalypt* species are flowering.

- *Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.*

CES (2007) notes that while the initial clearing of approximately 77ha of the Woodland and Open Woodland Habitat area will produce an initial ‘pulse’ impact, the ameliorative measures proposed within the Biodiversity Offset Strategy would ensure that in the short-term the biodiversity values of the remaining areas of habitat within the Flora Survey Area would be preserved and improved through the regeneration of saplings and smaller trees which will mature to provide blossoms for this flying fox. In the longer term, the Open Pastures and Open Woodland Habitat within the biodiversity offset areas would be likely to regenerate into Woodland Habitat, providing additional foraging and roosting opportunities for this species.

- *Whether or not the proposal is likely to reduce the long-term viability of a local population of the species, population or community.*

Considering the mobility of this flying-fox along the east coast of Victoria, NSW and southern Queensland, and its semi-nomadic habits, it is unlikely that the removal of approximately 77ha of Open Woodland and Woodland foraging habitat would significantly impact upon this species life cycle or the viability of the Singleton *P. poliocephalus* population.

- *Whether or not the proposal is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.*

The Open Cut Area is not at the limit of the known distribution of *P. poliocephalus* which extends throughout the eastern half of NSW and into Eastern Victoria and SE Queensland. As a result, it is unlikely that the Project would accelerate the extinction of this flying fox or place it at risk of extinction.

- *Whether or not the proposal will adversely affect critical habitat.*

There is no declared critical habitat within the Fauna Survey Area.

In summary, it is unlikely that the Project would adversely impact on the biodiversity values of the Fauna Survey Area, reduce the long-term viability or accelerate the extinction of the local population of this species or adversely affect critical habitat.



D4.6.3.6 Brush-tailed Phascogale

At least two individual Brush-tailed Phascogales (*Phascogale tapoatafa*) were observed within the Survey Area. An adult female was trapped in the same area within the Open Cut Area on three occasions and was most likely the same individual, considering the proximity of the trap locations. A non-sexually active adult male was also trapped within the Northern Biodiversity Offset Area.

Primary aspects of the life cycle of this species are as follows.

- Breeding – once a year. Mating in hollows occurs around June is followed by male die-off. Females can live up to three years. The gestation period is approximately 30 days after which up to eight young attach to teats in the rudimentary pouch of an enlarged lateral ventral abdominal skin folds on the mother. Young are independent of their mother after approximately 20 weeks, ie. at the beginning of Spring, and start to disperse during mid-summer.
 - Foraging – nocturnal. Forages in leaf litter, tree hollows, hollow logs and under bark for small vertebrates, insects and other invertebrates.
 - Nesting – the Brush-tailed Phascogale nests in tree hollows, stags, stumps and hollow logs. Females have exclusive home ranges of between 20ha and 70ha and occasionally these areas may overlap with their mother's. Males have home range sizes about twice those of females and these overlap with those of the females. Females prefer large tree cavities with small secure entrances in which they build large nests. Individuals use up to 20 sites nests over the year and often make large nests of bark strips, fur and feathers.
 - Movements – Phascogales are solitary for most of their life cycle. Young remain with their mothers near their maternal nests until dispersal. Independent females remain close to their maternal home range after dispersal while males move long distances between habitat remnants during the mating period.
- *Whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.*

Suitable foraging habitat within the Fauna Survey Area is limited in areas where grazing by domestic stock has been conducted. However, since the cessation of grazing on land controlled by the Proponent, the amount of ground and shrub cover has increased. The regeneration of woodland and shrubland within the biodiversity offset areas would be likely to result in an increased insect diversity and density which would provide improved foraging opportunity for this species. In the short term, the installation of nesting boxes would provide immediate nesting opportunities for this species and would compensate for the removal of a gallery of mature trees, some of which exhibit hollows, within the Council Road Reserve (**Figure D18**). In the longer term, trees within the Biodiversity Offset Area will develop hollows which will provide nesting opportunities. As a result, it is likely that the Project would maintain or improve biodiversity values for this species within the Fauna Survey Area.



- *Whether or not the proposal is likely to reduce the long-term viability of a local population of the species, population or community.*

As the Proponent would erect a suitable number of nesting boxes for this species and the areas to be disturbed would appear to affect only a portion of the home range of what is most likely a single adult female, it is likely that the Project would not reduce the long-term viability of a local population of this species.

- *Whether or not the proposal is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.*

The Project would remove some of the exclusive home range of, what is most likely, a single adult female. In addition, the proposed Biodiversity Offset Strategy would compensate for the removal of a gallery of mature trees, some of which exhibit hollows, and the loss of foraging habitat through the erection of nesting boxes and the regeneration of woodland and shrubland within the biodiversity offset areas. As a result, the Project would be unlikely to accelerate the extinction of this species or place it at risk of extinction.

- *Whether or not the proposal will adversely affect critical habitat.*

There is no declared critical habitat within the Fauna Survey Area.

In summary, the likely single female Brush-tailed Phascogale observed within the Open Cut Area may be impacted by the Project. However, the extent of the impact would be reduced through commencement of rehabilitation activities within the biodiversity offset areas and the Open Cut Area as early as practicable. In addition, a Species Management Plan would be developed for this species and would be referred to within the Mining Operations Plan that would be prepared prior to the commencement of operations.

D4.6.4 EPBC Act Considerations

CES (2007) concludes that no species listed under the EPBC Act would be significantly impacted by the Project and that the Project would be unlikely to be construed to be a controlled action under the EPBC Act.

D4.6.5 Koala Habitat Protection

The Singleton Local Government Area is listed in Schedule 1 of *SEPP 44 – Koala Habitat Protection*. This listing requires an investigation of the areas to be disturbed to determine the presence of “core” or “potential Koala habitat” that may be impacted by the proposed development.

SEPP 44 defines potential Koala habitat as an area containing “native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees.” One species listed in Schedule 2 occurs within Open Cut Area, namely Forest Red Gum (*Eucalyptus tereticornis*). This species occurs as scattered individuals or in clumps and may approach 15% of the total number of trees in some areas (GCNRC, 2007b).



CES (2007) considers that the Project considers unlikely that to impact on “core” or “potential Koala habitat” for the following reasons.

- No Koala, nor any signs of Koalas, were identified during the fauna surveys. All scratch marks evident on Eucalypts were attributable to the Brush-tailed Possums common in the vicinity of the Fauna Survey Area.
- The area of proposed Woodland and Open Woodland to be disturbed represents a small habitat patch isolated by cleared agricultural land, active mining areas and roads.
- While Koalas may traverse the Fauna Survey Area, this species usually frequents feed trees in areas of richer soil than those that occur on within the Fauna Survey Area.
- The proposed replanting and regeneration of Forest Red Gum within the Open Cut Area and biodiversity offset areas would provide additional potential habitat for Koalas in the long term

D4.6.6 Key Threatening Processes

Schedule 3 of the TSC Act lists the following as key threatening processes.

- Predation by the European Red Fox.
- Predation by the Feral Cat.
- Competition and grazing by the feral European Rabbit.
- Clearing of native vegetation.
- Bushrock removal.
- Removal of dead wood and dead trees.
- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands.

The Proponent would continue to undertake feral pest management programs to control populations of European Red Fox, Feral Cat and the European Rabbit, as well as populations of feral dogs.

The Project would involve the clearing of native vegetation. However, the area to be cleared has been minimised and the Proponent would provide biodiversity offsets to compensate for the clearing of this vegetation (see Parts D5 and D6).

The Project would not involve the removal of bush rock and any dead trees or timber within the areas to be disturbed would be relocated to areas undergoing rehabilitation or to the biodiversity offset areas, or stockpiled for use in rehabilitation-related activities.

The Project would not impact on the natural flow regimes of any river or stream or their floodplains or any area of wetland.

The Proponent would also undertake routine weed management programs.



D4.6.7 Cumulative Impact

Assessment of the cumulative impact of the Project on the fauna in the vicinity of the Open Cut Area is difficult because of the absence of detailed information on the distribution of fauna species surrounding the Open Cut Area. However, the following observations are made.

- Approximately 77ha of Woodland and Open Woodland Habitat would be disturbed by the Project. However, these Woodland and Open Woodland remnants are not connected to any other substantial native vegetation remnants. As a result, removal of this vegetation would not isolate any other remnant habitat patches.
- Revegetation, the exclusion of stock and weed and feral pest control programs in sections of the Open Cut Area that would not be disturbed, the biodiversity offset areas and areas that would be rehabilitated would improve the fauna habitat patch quality, including along wildlife corridors along Glennies and Reedy Creeks.

D4.7 Fauna Monitoring

The following monitoring programs would be implemented within the Open Cut Area and the biodiversity offset areas.

- Regular monitoring of the biodiversity offset areas and areas undergoing rehabilitation and regeneration to determine the success or otherwise of the management, mitigation and ameliorative measures and the rehabilitation programs would be undertaken. Where the monitoring programs determine that these measures could be improved, remedial action would be undertaken.
- Detailed Species Management Plans, including procedures for monitoring, would be developed and referred to in the Mining Operations Plan for the Project.

D5 FLORA

The flora assessment was undertaken by Mr Geoff Cunningham BSc(Hons), Principal of Geoff Cunningham Natural Resource Consultants Pty Ltd.

Mr Cunningham prepared two flora assessment reports. The first is presented in full as Part 4a (Volume 1) of the *Specialist Consultants Studies Compendium* and is referred to hereafter as "GCNRC (2007a)". That report describes the regional flora surrounding the Project Site, the vegetation communities within the Project Site and within two areas adjacent to the Project Site, describes the threatened flora species and Endangered Ecological Communities (EECs) observed within the Project Site and documents the significance of the anticipated impacts upon such species and EECs.

The second report is presented in full as Part 4b (Volume 1) of the *Specialist Consultants Studies Compendium* and is referred to hereafter as "GCNRC (2007b)". That report describes two additional vegetation communities that occur only within the Northern Biodiversity Offset Area, compares the relative biodiversity values of the biodiversity offset areas and the areas to be disturbed and concludes with an assessment of the proposed Biodiversity Offset Strategy against biodiversity offset guidelines established by the Department of Environment and Climate Change. Mr Cunningham makes a number of references in GCNRC (2007b) to fauna species that may utilise particular species of vegetation as food sources. This information has been sourced from ongoing research being undertaken by Mr Cunningham.



This part of the *Environmental Assessment* provides a summary of the assessment reports described above. Part D6 of the *Environmental Assessment* provides an assessment of the proposed Biodiversity Offset Strategy.

The location of the Flora Survey Area is indicated on **Figure D20**. The Flora Survey Area does not include those sections of the Project Site considered to be heavily impacted by mining-related activities, namely Haul Route Corridors D and E and the Camberwell CHPP area, because the potential for further flora-related impacts was considered to be negligible.

D5.1 Regional Flora

Story *et al* (1963) describe the area around the Survey Area as being typical of the Killarney Land System and noted the remnant vegetation to be a Savannah Woodland of box, gum and ironbark that had mostly been thinned or cleared.

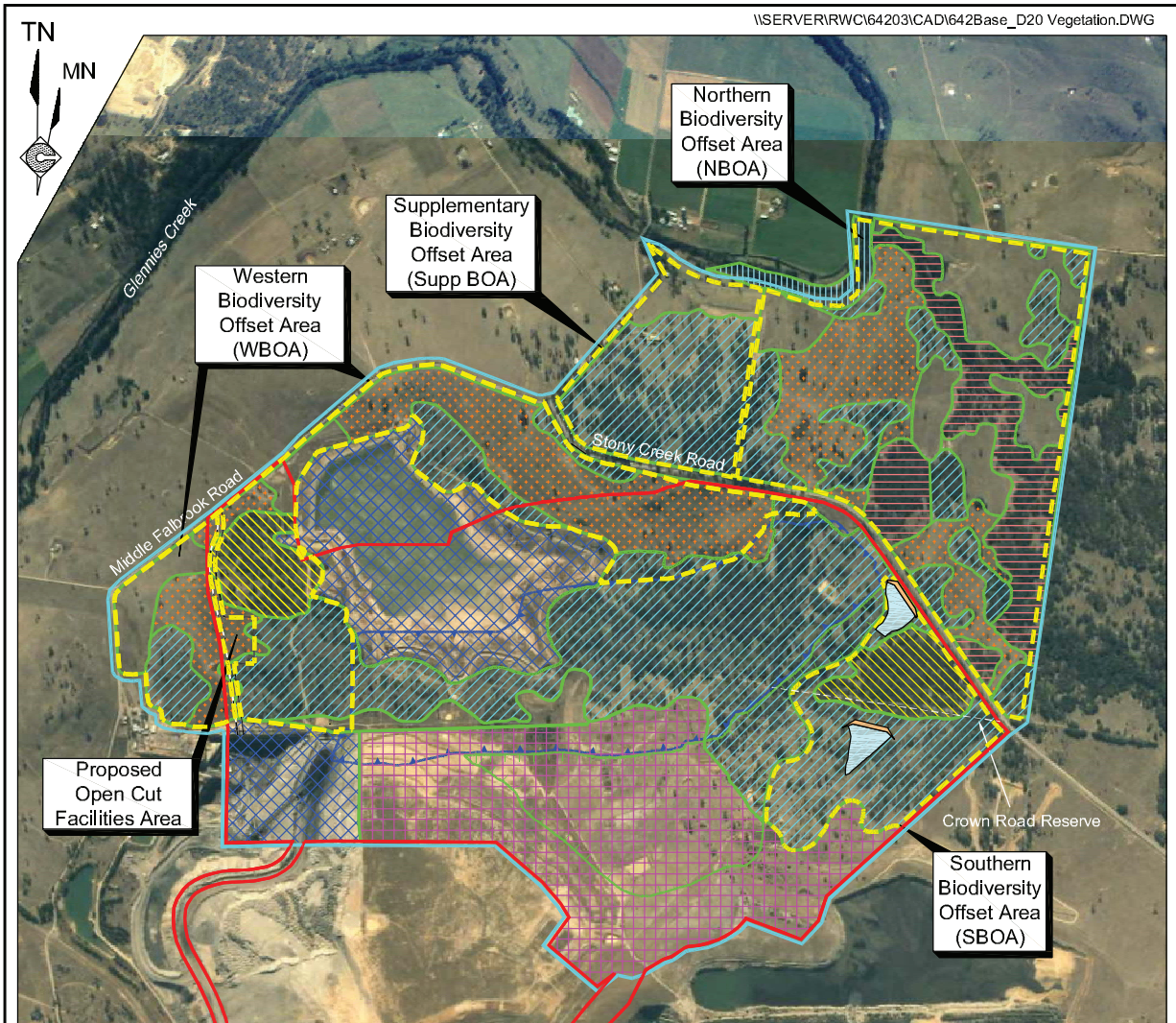
More recently, surveys over more limited areas have been conducted in relation to applications for development consent or project approval for a number of mining operations, including the Glennies Creek Colliery, Camberwell, Mt Owen, Ravensworth East, Rixs Creek, Ashton and Glendell Coal Mines. These studies indicate the vegetation surrounding the Survey Area to comprise a mixture of cleared areas and Eucalypt woodlands, with the woodlands dominated by a mixture of Narrow-leaf Ironbark, Broad-leaf Ironbark, Spotted Gum, Grey Box, Blakely's Red Gum and Forest Red Gum. The cleared areas are either grass dominated and predominantly treeless pastures, or pastures with a scattering of regenerating Eucalypts and, at times Bull Oak saplings. The cleared areas also contain large numbers of weeds. The studies also noted that the vegetation surrounding the Survey Area had been heavily modified by past land use, including agricultural and mining activities, but that the vegetation communities encountered in those surveys are relatively widespread in the Hunter Valley.

D5.2 Assessment Methodology

Preliminary boundaries of vegetation communities were established through stereoscopic interpretation of aerial photographs of the Survey Area. These boundaries were verified and/or adjusted as a result of the field surveys. A total of 91 sample sites were then selected to determine the variation in species density and composition within the identified communities. At each site, a 40m x 40m quadrat was examined and all species of tree, shrub and ground cover present were recorded. However, during the July 2007 field survey, it became apparent that exclusion of domestic stock, primarily cattle, from sections of the Flora Survey Area had resulted in significant regeneration of native trees and shrubs in areas that had been previously identified as Tussock Grassland Community (see Part D5.3). As a result, at the sites examined during the July 2007 survey, only those species of trees and shrubs present were recorded, as the ground cover species had been recorded during previous surveys.

Sampling sites and identified vegetation communities are shown in **Figure D20**.





- | | |
|---|---|
| <p>REFERENCE</p> <ul style="list-style-type: none"> — Project Site Boundary — Flora Survey Area (offset for clarity) — 7.7Mt Open Cut Pit Shell — Out-of-Pit Waste Rock Emplacement Dirty Water Containment Dam Proposed Biodiversity Offset Area Boundary | <p>VEGETATION COMMUNITIES</p> <ul style="list-style-type: none"> 1: (Remainder) Tussock Grassland 2: Regenerating Native Woodland / Shrubland 3: Narrow-leaf Ironbark - Spotted Gum - Forest Red Gum 4: Rehabilitated Disturbed Land 5: Bull Oak 6: Disturbed Land 7: Swamp Oak 8: River Oak |
|---|---|

		Vegetation Community Areas (ha)							
		1	2	3	4	5	6	7	8
Part 4b Flora Study Area		51.6	77.5	180.1	93.8	21.1	76.3	33.4	1.5
Biodiversity Offset Areas	NBOA	28.4	30.9	26.9	0	0	0	33.4	1.5
	SBOA	0	0	27.8	0	11.1	0	0	0
	WBOA	10.2	43.1	30.8	0	9.8	0.4	0	0
	Sub Total within Project Related Land	38.6	74.0	85.5	0	20.9	0	33.4	1.5
	Supplementary BOA	5.8	0	27.6	0	0	0	0	0
Total - (BOAs)		44.4	74.0	113.1	0	20.9	0.4	33.4	1.5
Area To be Disturbed		6.1	0.7	68.3	47.6	0	12.3	0	0

SCALE 1:25 000

250 0 250 500 750 1000 1250 m

Source: GCNRC (2007a & 2007b) - Figure 1

Figure D20
VEGETATION COMMUNITIES



Flora sampling and mapping was undertaken on:

- 9 and 10 February, 2003 (2 days);
- 24 September, 2003 (1 day);
- 18 and 22 April, 2004 (2 days);
- 6 January 2006 (1 day);
- 2 and 3 May 2006; and
- 2 and 17 July 2007 (2 days).

D5.3 Existing Flora

D5.3.1 Vegetation Communities

The flora survey identified the following eight communities within the Flora Survey Area.

- Tussock Grassland Community.
- Regenerating Native Woodland / Shrubland Community.
- Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community.
- Rehabilitated Disturbed Land Community.
- Bull Oak Community.
- Disturbed Land.
- Swamp Oak Community.
- River Oak Community.

Tussock Grassland Community

This community occupies approximately 51.6ha within the Flora Survey Area and is generally dominated by (or generally comprises) open grassland with scattered areas of Narrow-leaf Ironbark, Grey Box, Bull Oak and Broad-leaf Ironbark regeneration. Shrub species are dominated by Eastern Cottonbush. Native groundcover species include Wiregrass, Red Grass, Rock Fern, Barbed Wire Grass, Spreading Flax-lily, Cotton Panic and Native Flax. Exotic ground cover species include Scarlet Pimpernel, Onion Grass and Fireweed.

Regenerating Native Woodland / Shrubland Community

This community occupies approximately 77.5ha within the Flora Survey Area. Since removal of domestic stock from sections of the Flora Survey Area by the Proponent, areas previously classified as Tussock Grassland Community have experienced significant regeneration of native tree and shrub species. As a result, during the July 2007 field surveys, the area previously classified as Tussock Grassland Community were re-evaluated and re-classified as Regenerating Native Woodland / Shrubland.



Tree species within this community principally comprise Narrow-leaf Ironbark, Grey Box, Bull Oak and Forest Red Gum. The density of regeneration is generally greatest in the vicinity of existing, larger trees.

Shrub species within this community include Broom Bitter-pea, Gorse Bitter-pea, Fan Wattle, *Acacia falcata*, *Hakea decurrens*, *Acacia falcata*, Western Boobialla, *Pultenaea* sp. and Eastern Cottonbush. The spacing between shrubs varies from between 5m to 10m to less than 1m in places, and in some section of the Flora Survey Area shrubs make the area impenetrable. The heights of shrubs within this community vary from approximately 80cm to 4m.

Native ground cover species within this community include Wiregrass, Red Grass, Rock Fern, Barbed Wire Grass, Panic Grass, Spreading Flax-lily, Cotton Panic, Matrush and Native Flax. Exotic ground cover species include Scarlet Pimpernel, Onion Grass and Fireweed.

Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community

This community occupies approximately 180.1ha within the Flora Survey Area and is dominated by Narrow-leaf Ironbark, Spotted Gum, Grey Box and Forest Red Gum trees, with lesser numbers of Blakely's Red Gum, Bull Oak and Rough-barked Apple. Tree spacing generally varies from less than 1m to around 20m.

Shrub species within this community include Butterbush, Broom Bitter-pea, False Sarsaparilla, Peach Heath, Silver-stemmed Wattle, Amulla, Coil-pod Wattle, African Boxthorn, Native Olive, Western Boobialla, Chinese Shrub, Western Golden Wattle and Thyme Spurge.

Common native ground cover species within this community include Wiregrass, Rock Fern, Tall Chloris, Yellow Buttons, Barbed Wire Grass, Slender Tick-trefoil, Spreading Flax-lily, Kidney Weed, Fringe Rush, Native Flax, Matrush, Pomax, Kangaroo Grass and Golden Everlastings. Exotic ground cover species within this community include Spear Thistle, Flax-leaf Fleabane, Red-flowered Mallow, Fireweed, Prickly Pear and Paddy's Lucerne,

This community is considered a representative of the Central Hunter Ironbark – Spotted Gum – Grey Box Forest as defined by Peake (2006).

Rehabilitated Disturbed Land Community

This community occupies approximately 93.8ha of the Flora Survey Area and comprises land that has been rehabilitated following disturbance and land used for topsoil storage. With the exception of seedlings and saplings that have been planted, and occasional Narrow-leaf Ironbark and Forest Red Gum trees and saplings, there are very few trees within this community. Shrub species include Amulla, Broom Bitter-pea and Eastern Cottonbush.

Bull Oak Community

This community occupies approximately 21.1ha of the Flora Survey Area and is dominated by close-spaced Bull Oak trees, as well as Narrow-leaf Ironbark, Rough-barked Apple and Grey Box in places.

Shrub species within this community include Silver-stemmed Wattle, Kangaroo Thorn, Cough Bush, Chinese Shrub, Coil-pod Wattle and Western Boobialla.



Native ground cover species include Wiregrass, Rock Fern, Yellow Buttons, Barbed Wire Grass, Spreading Flax-lily and Brown's Lovegrass.

Disturbed Land

This community includes all areas of currently disturbed land and occupies approximately 76.3ha of the Flora Survey Area. Areas of current disturbance were not sampled.

Swamp Oak Community

This community occupies approximately 33.4ha of the Flora Survey Area and is generally restricted to lower-lying locations along drainage lines and creeks. The closely spaced Swamp Oak dominates this community, with occasional Rough-barked Apple and Grey Box trees present.

Shrubs of Eastern Cottonbush are present where the tree cover is less dense than elsewhere.

Native ground cover species include Slender Bamboo Grass, Climbing Saltbush, Kidney Weed, *Solanum* sp., Red Grass, Purple Wiregrass, Barbed-wire Grass, *Oxalis* sp., Rock Fern, Ratstail Grass, Curly Windmill Grass, Yellow Buttons, Common Reed and Saw-sedge.

River Oak Community

This community occupies approximately 1.5ha of the Flora Survey Area and is dominated by a gallery of River Oak adjacent to and within Glennies Creek.

Occasional *Acacia* shrubs have been observed within the community and native ground cover species include Umbrella Grass, Curly Windmill Grass, Rock Fern and Cobbler's Peps.

The community is heavily invaded by exotic species including Willows, Olive, Green Cestrum Madeira Vine, African Boxthorn, Prickly Pear, Ribwort, Fennel, Paspalum, Kikuyu Grass, Fireweed, Chicory, Wild Stattice, Spear Thistle and Flaxleaf Fleabane,

D5.3.2 Noxious Weeds

Five species of noxious weeds occur within the Open Cut Area , namely:

1. African Boxthorn (*Lycium ferocissimum*);
2. Green Cestrum (*Cestrum parqui*);
3. Mother-of-Millions (*Bryophyllum delagoense*);
4. Onion Grass (*Romulea rosea*); and
5. Prickly Pear (*Opuntia stricta*).



D5.3.3 Threatened Flora Species

The National Parks and Wildlife Service's *Atlas of NSW Wildlife (Atlas of Wildlife)* database was searched on 26 May 2005, 10 March 2006 and 7 November 2006 to identify threatened species within the Camberwell 1:100 000 map sheet. Seven threatened species were identified as occurring within the map sheet. In addition, the Department of Environment and Climate Change website indicates that a further 14 threatened species have been recorded within the Singleton LGA. None of these species were recorded within the Flora Survey Area or Biodiversity Offset Areas during the flora survey.

D5.3.4 Endangered Ecological Communities

The search of the *Atlas of Wildlife* database on 26 May 2005, 10 March 2006 and 7 November 2006 revealed 30 Endangered Ecological Communities that may occur within the Camberwell 1:100 000 map sheet, with the schedules to the *Environment Protection and Biodiversity Conservation Act 1999* also listing the Grassy White Box Woodlands as an endangered community that may occur in the vicinity of the Flora Survey Area. None of these communities occur within the Flora Survey Area. However, one community identified by the NPWS *Atlas of NSW Wildlife* database as endangered, namely the Lower Hunter Spotted Gum - Ironbark Forest, is closely related to the Central Hunter Ironbark – Spotted Gum – Grey Box Forest Community. The Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community is considered to be equivalent to the Central Hunter Ironbark – Spotted Gum – Grey Box Forest Community. Common species within the endangered Lower Hunter Spotted Gum - Ironbark Forest include Spotted Gum, Broad-leaf Ironbark and the shrub *Melaleuca nodosa*. Narrow-leaf Ironbark trees are only a minor component of this community. By contrast, in the Central Hunter Ironbark – Spotted Gum – Grey Box Forest Community, Narrow-leaf Ironbark is very common, Broad-leaf Ironbark is less common and *Melaleuca nodosa* is absent. As a result, the Narrow-leaf Iron Bark – Spotted Gum – Forest Red Gum Community found within the Flora Survey Area is not regarded as being representative of the endangered Lower Hunter Spotted Gum – Grey Box Forest ecological community.

D5.3.5 Endangered Flora Populations

The *Atlas of Wildlife* database was searched on 26 May 2005, 13 March 2006 and 7 November 2006 for endangered flora populations within the Camberwell 1:100 000 map sheet. Two populations were identified, namely *Eucalyptus camaldulensis* and *Acacia pendula*, neither of which were observed or are predicted to occur in the vicinity of the Flora Survey Area.

D5.3.6 Conservation Value of Recorded Species

The *Hunter Bushland Resource Kit* (HCMT, 2003) identifies 18 flora species as being of conservation significance. One shrub species, *Acacia decora* (Western Golden Wattle), occurs within the Flora Survey Area and is designated within the Kit as being threatened.



D5.4 Flora Management

D5.4.1 Design and Operational Safeguards

The following design safeguards were adopted by the Proponent in the design of the Project to minimise the impact of its activities.

- The out-of-pit waste rock emplacement footprint has been designed to ensure as much as possible lies on previously disturbed land or on Tussock Grassland rather than impacting the Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community, or the Bull Oak Forest Community. In addition, the design of the out-of-pit waste rock emplacement was amended to preserve a stand of old trees with hollows along the east-west orientated road reserve in the eastern section of the Open Cut Area (see **Figure D20**).
- The design of the Dirty Water Containment Dams and contour banks on the proposed waste rock emplacements was amended to minimise the size of the dams and limit impacts on the Bull Oak Forest Community and remnant vegetation within the Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community.
- The site access road has been located to avoid a stand of the Bull Oak Forest Community to the west of the Possum Skin Dam (see **Figure D20**).
- The open cut facilities area has been positioned to avoid impacting upon areas of Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum and Bull Oak Communities.

In addition, the following operational safeguards would be implemented by the Proponent.

- The extent of clearing undertaken would be the minimum required to undertake the planned mining operations.
- All areas to be cleared would be clearly defined and marked prior to clearing.
- Areas where topsoil is to be stripped would be sprayed to remove weeds prior to stripping where infestation levels warrant and seasonal or growth conditions permit.
- Any vegetation suitable for commercial timber, if present, would be felled and removed prior to the commencement of mining operations. Clearing of the remainder of the larger vegetation would be undertaken by bulldozer with the blade positioned just above the ground to minimise soil disturbance and retain the groundcover.
- The remaining vegetation would be removed with the topsoil to enhance the viability of the stripped topsoil, maximise the amount of seed available for natural regeneration and assist to minimise erosion of the directly placed or stockpiled topsoil.
- Where practicable, vegetation material to be relocated would be directly transferred to an active rehabilitation area.
- Progressive rehabilitation of all disturbed surfaces would be undertaken in accordance with the procedures described in Part B15.



- Topsoil would not be removed from the Open Cut Area. This would ensure "Onion Grass", a Class 5 noxious weed, is not removed from site ie. as required in accordance with Division 2 of the *Noxious Weeds Act 1993 (NSW)*.
- Noxious weed control programs would be instigated and maintained within the Open Cut Area and the biodiversity offset areas.

D5.4.2 Offset Management Measures

The flora management measures to be adopted within the biodiversity offset areas include the following.

- Domestic stock have already been removed from the Northern, Southern and Western the Northern Biodiversity Offset Areas and would continue to be excluded from those areas.
- In the event that a suitable arrangement is reached with the owners of the proposed Supplementary Biodiversity Offset Area, stock would be removed from that area.
- Appropriate fences would be erected to prevent wildlife from entering areas of active mining-related activities. These fences would be removed once mining and rehabilitation-related activities have ceased.
- Ongoing implementation of pest control programs, including for European Rabbits.
- Ongoing implementation of weed control programs, including for noxious weeds such as Onion Grass, African Boxthorn, Green Cestrum, Mother-of-Millions and Prickly Pear.
- Allowing native vegetation regeneration to continue to occur within the areas of the Open Cut Area that would not be disturbed and the biodiversity offset areas.
- Planting of approximately 10ha of seedlings of species representative of the Narrow-leaf Ironbark - Spotted Gum - Forest Red Gum Community in sections of the proposed Northern and Supplementary Biodiversity Offset Areas adjacent to Glennies Creek to establish linkages between the Project Site, the Biodiversity Offset Areas and the riparian vegetation adjacent to Glennies Creek the seedlings planted would comprise:
 - River Oak along the immediate banks within and immediately adjacent to the banks of Glennies Creek;
 - Swamp Oak, Forest Red Gum and Grey Box at lower elevations adjacent to Glennies Creek; and
 - species representative of the Narrow-Leaved Ironbark – Spotted Gum – Forest Red Gum Community at higher elevations further away from Glennies Creek.



D5.4.3 Rehabilitation Procedures

The following flora-related rehabilitation procedures would be employed.

- Disturbed areas would be progressively rehabilitated as soon as practicable after the area is no longer required for mining-related activities.
- Following spreading of subsoil and topsoil as outlined in Part D8.4, the following species would be replanted or seed spread as appropriate.
 - *Acacia decora* (Western Golden Wattle).
 - *Eucalyptus crebra* (Narrow-leaf Iron Bark).
 - *Corymbia maculata* (Spotted Gum).
 - *Eucalyptus tereticornis* (Forest Red Gum).
 - *Allocasuarina luehmannii* (Bull Oak).
 - *Casuarina glauca* (River Oak).
 - *Casuarina cunninghamiana* (Swamp Oak).
- The precise species mix, together with location and timing of plantings would be recorded within the Mining Operations Plan.
- Whenever possible, seed from the Open Cut Area and surrounding areas would be collected and propagated for use in rehabilitation activities.
- Current weed management and control procedures would be extended to the areas requiring rehabilitation.

D5.5 Assessment of Impacts

The DEC's draft *Guidelines for Threatened Species Assessment* (DEC, 2005) require that the magnitude and extent of impacts, and the significance of the impacts as they relate to the conservation importance of the habitat, individuals and populations likely to be affected, are assessed. In the absence of specific assessment methodologies, the '7-part test' as described in the DEC's *Threatened Species Assessment Guidelines* for assessment under Section 5A of the EP&A Act has been used to evaluate the potential impacts of the Project.

D5.5.1 Seven Part Test

- *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction:*

No listed threatened flora species were recorded within the Flora Survey Area during the current or previous surveys.

- *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction:*

No endangered flora populations were recorded within or in the vicinity of the Flora Survey Area during the current or previous surveys.



- *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*
 - i. *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
 - ii. *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

No endangered ecological communities were recorded within the Flora Survey Area during the current or previous surveys.

- *In relation to the habitat of a threatened species, population or ecological community:*
 - i. *the extent to which the habitat is likely to be removed or modified as a result of the action proposed, and*
 - ii. *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
 - iii. *the importance of the habitat to be removed, modified fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.*

No threatened flora species, endangered flora populations or endangered ecological communities were recorded within or in the vicinity of the Flora Survey Area during the current or previous surveys.

- *Whether the action proposed is likely to have an effect on critical habitat (either directly or indirectly).*

No critical habitat was recorded within or in the vicinity of the Flora Survey Area during the current or previous surveys.

- *Whether the action proposed is consistent with the objectives or actions of a species recovery plan or threat abatement plan.*

No threatened flora species, endangered flora populations or endangered ecological communities were recorded within or in the vicinity of the Flora Survey Area during the current or previous surveys. Consequently, no actions contained in threatened species recovery plans or threat abatement plans are specifically relevant to the Project.

- *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

‘Clearing of Native Vegetation’ is listed as a key threatening process in the schedules of the *Threatened Species Conservation Act 1995*. Similarly ‘Land Clearance’ is listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* as a key threatening process.



Approximately 68.3ha of the Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community within the pit shell and out-of-pit waste rock emplacement footprint would be disturbed. This may be considered ‘Clearing of Native Vegetation’ or ‘Land Clearance’ and may therefore be a key threatening process. However, the impact of the proposed clearing would be limited by the following factors.

- The Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum and Bull Oak Forest Communities are dominated by young Eucalypts and other trees, suggesting these areas have been previously cleared or thinned and are presently regenerating.
- The biodiversity offsets outlined in Part D5.4.2 would compensate for the loss of approximately 68.3ha of Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community, 0.7ha of Regenerating Native Woodland / Shrubland and 6.1ha of Tussock Grassland Community.
- The Proponent would progressively rehabilitate the cleared areas following the completion of mining activities. A mix of species similar to that occurring in the existing communities would be used (see Part D5.4.3).

These management and offset strategies would, in the opinion of GCNRC, result in an overall reduction in the impact of the listed key threatening processes of ‘Clearing of Native Vegetation’ and ‘Land Clearance’. Over time, these strategies would result in an enhancement of biodiversity values and habitat availability within the Flora Survey Area.

D5.5.2 Threatened Species, Communities, Populations and Habitats

No threatened flora species, threatened flora populations or endangered ecological communities as defined under the *Threatened Species Conservation Act 1995* or the *Environment Protection and Biodiversity Conservation Act 1999* were observed within, or in the vicinity of, the Open Cut Area during the present or previous surveys. Additionally, there is no suitable habitat present for many of the threatened flora species that could potentially occur around the Open Cut Area. Much of the Open Cut Area has been cleared or thinned of native trees and shrubs in the past, and the site has been heavily invaded by introduced weed species. As a result, the Project would not significantly impact on threatened flora species, Endangered Ecological Communities, Endangered Flora Populations or Critical Habitats.

One species found within the Open Cut Area, *Acacia decora* (Western Golden Wattle), is listed as threatened in the *Hunter Bushland Resource Kit* (HCMT, 2003). This species would be included in the species mix to be replanted / reseeded during post-mining rehabilitation activities. The impact of the Project on this species is therefore considered to minor.

No approvals would be required under the *Environment Protection and Biodiversity Conservation Act 1999* as the Project would not be a controlled action (GCNRC, 2007a).



D5.5.3 Cumulative Impact

An assessment of the cumulative impact of the Project on the flora in the vicinity of the Open Cut Area is difficult because of the absence of published information on the extent of native vegetation community clearing in the Hunter Valley region. However, the following observations are made.

- The biodiversity offset areas would form an important link between the remnant native vegetation and rehabilitated areas of the Rixs Creek, Camberwell, Mt Owen, Glendell and Ravensworth Mine Sites in accordance with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of NSW* (Figure B15).
- Rehabilitated disturbed areas within the Open Cut Area would be preserved for native conservation and would enhance the long-term biodiversity value of the area.

As a result, the cumulative impact of the Project is considered to be minimal.

D5.6 Flora Monitoring

The Proponent would commission regular surveys of selected monitoring sites at appropriate intervals during rehabilitation and following the completion of mining. The results of the monitoring programs and the development of the vegetation assemblage over time would be reported in each Annual Environmental Management Report. The Proponent intends to continue the monitoring program until it can establish to the satisfaction of the DECC that rehabilitation has been completed successfully.

D6 BIODIVERSITY OFFSET STRATEGY

D6.1 Introduction

This part of the *Environmental Assessment* assesses the Biodiversity Offset Strategy in general terms and in light of the requirements of the *Principles for the use of Biodiversity Offsets in NSW* presented as Appendix II in *Guidelines for Biodiversity Certification of Environmental Planning Instruments - Working Draft*, published by the Department of Environment and Climate Change in April 2007.

The technical information presented in this Part has been sourced from the flora and fauna assessments prepared by Dr Leong Lim and Mr Geoff Cunningham (CES, 2007, GCNRC, 2007a and GCNRC, 2007b). The fauna and flora assessment reports are presented in full as Parts 3, 4a and 4b respectively in Volume 1 of the *Specialist Consultants Studies Compendium*.

D6.2 Fauna-specific Assessment of the Biodiversity Offset Strategy

Table D33 presents the fauna habitat areas identified during the fauna assessment.



Table D33
Fauna Habitat Areas within the Areas to be Disturbed and the Biodiversity Offset Areas

		Fauna Habitat Areas* (ha)					
		1	2	3	4	5	6
Fauna Survey Area		143.4	100.8	89.7	41.8	54.6	108.3
Biodiversity Offset Areas	NBOA	52.5	22.2	11.8	29.0	0	0
	SBOA	0	26.1	4.0	7.8	0	0
	WBOA	67.4	12.6	9.6	4.7	1.1	0
	Sub Total within Project-related Land	119.9	60.9	25.5	41.5	1.1	0
	Supplementary BOA	12.2	0	21.5	0	0	0
Total – All BOAs		132.1	60.9	47.0	41.5	1.1	0
To be Disturbed		1.3	34.3	42.4	0	8.7	45.8
Note 1: NBOA = Northern Biodiversity Offset Area		* Habitat 1 = Open Pastures					
Note 2: SBOA = Southern Biodiversity Offset Area		Habitat 2 = Open Woodland					
Note 3: WBOA = Western Biodiversity Offset Area		Habitat 3 = Woodland					
Note 4: Supplementary BOA = Supplementary Biodiversity Offset Area		Habitat 4 = Riparian Oaks					
		Habitat 5 = Wetlands / Dams					
		Habitat 6 = Existing Mine Disturbance					

Appendix 5 of CES (2007) presents a detailed fauna-specific assessment of the Biodiversity Offset Strategy.

As a result of the close proximity and similarity of habitat within the areas proposed to be disturbed and the Southern and Western Biodiversity Offset Areas, it is certain that fauna species observed or likely to occur within the areas proposed to be disturbed would also be present within the Southern and Western Biodiversity Offset Areas. As a result, the following comparative assessment compares the likelihood of fauna species occurring within the Open Cut Area, including the areas proposed to be disturbed and the Southern and Western Biodiversity Offset Areas, with the Northern and Supplementary Biodiversity Offset Areas. The results of that assessment are summarised as follows.

General

- The fauna habitat areas and the vegetation communities within the areas to be disturbed and the biodiversity offset areas are not structurally or floristically identical due to differences in topography, elevation, landform and proximity to drainage lines.
- The fauna survey was intentionally concentrated in the areas to be disturbed. As a result, the intensity of fauna sampling is not uniform across the Fauna Survey Area.
- The proximity of the areas to be disturbed and the biodiversity offset areas means, that with limited exceptions, all fauna species observed within the areas to be disturbed are likely to also occur within the biodiversity offset areas and vice versa.
- As a result of the above, a statistical analysis of the biodiversity values and fauna present within the areas to be disturbed and the biodiversity offset areas would not be valid.



Amphibians

- All the amphibian species observed or likely to be found within the Open Cut Area were also observed or would be likely to occur within the biodiversity offset areas.
- The observed species are opportunistic and their population sizes depend on the availability of standing water.

Birds

- A greater abundance of small insectivorous birds were observed within the Northern Biodiversity Offset Area than within the Open Cut Area.
- The Open Cut Area appears to have a greater abundance of aggressive grassland species, blossom-feeding species and waterbirds than the Northern Biodiversity Offset Area.
- The Grey-crowned Babbler was only observed within the Open Cut Area, however, CES (2007) notes that it is likely to utilise the resources within the biodiversity offset areas and would be expected to transit these areas regularly.
- The White Throated Treecreeper was the only bird observed within the Northern Biodiversity Offset Area that did not appear within the Open Cut Area. CES (2007) notes that this probably reflects the greater diversity of habitat structure within the Northern Biodiversity Offset Area than occurs within the Open Cut Area.

Mammals

- All the mammal species recorded or expected to occur in the Open Cut Area were also recorded or expected to occur within the Northern Biodiversity Offset Area.
- There was a higher abundance of Yellow-footed Antechinus within the Northern Biodiversity Offset Area compared with the Open Cut Area due to the higher level of understorey cover along the riparian corridors within the Northern Biodiversity Offset Area.

Reptiles

- Reptile species such as small skinks, geckoes, snakes and dragons are more likely to occur in areas of higher moisture along riparian corridors within the Northern and Supplementary Biodiversity Offset Area than within the Open Cut Area.

In addition, Section A5.4 of Appendix 5 of CES (2007) provides an overview of those listed threatened species and other listed species which would be likely to benefit as a result of the Biodiversity Offset Strategy in both the short term (during the life of the Project) and the long term (in the period following completion of the Project). **Table D34** presents a summary of the information presented in Section A5.4 of Appendix 5 of CES (2007).



Finally, CES (2007) notes that the proposed Biodiversity Offset Strategy presents an opportunity to secure elements of habitat that would otherwise remain unprotected and that the proposed strategy, together with the proposed remediation of sections of the Glennies Creek riparian area (see Part B15.10.3), would be consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* (DPI – MR, 1999) and the *Glennies Creek Catchment - Total Catchment Management Study – Management Strategy* (HCRCA, 2004).

Table D34
Listed Threatened Species Likely to Benefit from the Biodiversity Offset Strategy

Species	Likely Benefit		Species	Likely Benefit	
	Short Term	Long Term		Short Term	Long Term
Threatened Birds			Threatened Mammals		
Regent Honeyeater		✓	Koala		✓
Swift Parrot		✓	Eastern Pygmy-possum	✓	✓
Speckled Warbler	✓	✓	Spotted-tail Quoll		✓
Brown Treecreeper	✓	✓	Brush-tailed Phascogale		✓
Diamond Firetail	✓	?	Parma Wallaby		✓?
Painted Honeyeater	✓	✓	Red-legged Pademelon		✓
Black-chinned Honeyeater*	✓	✓	Yellow-bellied Glider		✓
Olive Whistler	✓	✓	Squirrel Glider		✓
Hooded Robin	✓	✓	Rufous Bettong		✓
Grey-crowned Babbler	✓	✓	Long-nosed Potoroo		✓
Turquoise Parrot	✓	✓	Eastern Freetail-bat	✓	✓
Barking Owl		✓	Eastern False Pipistrelle	✓	✓
Powerful Owl		✓	Little Bentwing-bat	✓	✓
Masked Owl		✓	Large-footed Myotis		✓
Sooty Owl		✓	Large-eared Pied Bat	✓	✓
Gang-gang Cockatoo	✓	✓	Greater Broad-nosed Bat	✓	✓
Glossy Black-Cockatoo	✓	✓	Grey-headed Flying-fox		✓
Bush Thick-knee (Curlew)	✓	✓	Amphibians		
Black-faced Monarch		✓	Green and Golden Bell Frog		✓?
Spectacled Monarch		✓			
Satin Flycatcher		✓			
Rufous Flycatcher		✓			
Great Egret		✓			
Note: ✓ = species likely to benefit ✓? = Species may benefit					



D6.3 Flora-specific Assessment of the Biodiversity Offset Strategy

Table D35 presents for each vegetation community within the Flora Survey Area, the area to be disturbed, and the area to be preserved within the Northern, Southern and Western Biodiversity Offset Areas and the Supplementary Biodiversity Offset Area, and the total area of the community within the Flora Survey Area.

Table D35
Flora Communities within the Areas to be Disturbed and the Biodiversity Offset Areas

		Vegetation Community Areas (ha)							
		1	2	3	4	5	6	7	8
Flora Survey Area		51.6	77.5	180.1	93.8	21.1	76.3	33.4	1.5
Biodiversity Offset Areas	NBOA ¹	28.4	30.9	26.9	0	0	0	33.4	1.5
	SBOA ²	0	0	27.8	0	11.1	0	0	0
	WBOA ³	10.2	43.1	30.8	0	9.8	0.4	0	0
	Sub Total within Project-related Land	38.6	74.4	85.5	0	20.9	0	33.4	1.5
	Supplementary BOA ⁴	5.8	0	27.6	0	0	0	0	0
Total – All BOAs		44.4	74.0	113.1	0	20.9	0.4	33.4	1.5
Area To be Disturbed		6.1	0.7	68.3	47.6	0	12.3	0	0
Note 1: NBOA = Northern Biodiversity Offset Area Note 2: SBOA = Southern Biodiversity Offset Area Note 3: WBOA = Western Biodiversity Offset Area Note 4: Supplementary BOA = Supplementary Biodiversity Offset Area									

Section 5 of GCNRC (2007b) presents a detailed comparison of each of the communities within the area to be disturbed and the biodiversity offset areas. These comparisons are summarised as follows.

Tussock Grassland Community

This community exhibits similar biodiversity values in the area to be disturbed and the biodiversity offset areas. GCNRC (2007b) notes that both areas have:

- similar structure;
- a low abundance of trees and shrubs;
- a similar diversity and abundance of groundcover, with the exception of the Supplementary Biodiversity Offset Area where grazing of domestic stock is ongoing; and
- a low abundance of weeds.

It is noted that there has been significant regeneration of native shrubs since the exclusion of domestic stock from the Open Cut Area. It is therefore anticipated sections of this community within the biodiversity offset areas would develop into Regenerating Native Woodland / Shrubland Community with the continued exclusion of domestic stock.



It is also noted that the Proponent has committed to establish approximately 10ha of seedlings of River Oak, Swamp Oak, Narrow-leaf Ironbark, Spotted Gum and Forest Red Gum within this community adjacent to Glennies Creek to provide additional linkages between the Project Site, the biodiversity offset areas and the riparian vegetation adjacent to Glennies Creek.

Regenerating Native Woodland / Shrubland

This community has similar biodiversity values in the areas to be disturbed and the biodiversity offset areas. GCNRC (2007b) notes that both areas have:

- similar structure;
- similar diversity and abundance trees, shrubs and groundcover; and
- a low abundance of weeds.

GCNRC (2007b) notes that this Community is being rapidly invaded by tree and shrub seedlings and provides a wide diversity of native plant species for use as food sources and habitat.

Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community

This community has similar good to high biodiversity values in the areas to be disturbed and the biodiversity offset areas. GCNRC (2007b) notes that both areas have:

- a similar structure with most of the community classified as “Tall Woodland” with some areas of “Closed Woodland” and “Open Forest” (classifications after McDonald *et al* , 1990);
- a similar diversity of tree species;
- a similar spacing of trees, however, sections of the areas to be disturbed have more widely spaced trees;
- a greater diversity of shrub species within the Project Site than within the Northern and Supplementary Biodiversity Offset Areas;
- a similar spacing of shrubs;
- a similar diversity of groundcover; and
- a low abundance of weeds, however, the range and abundance of weeds within the Northern Biodiversity Offset Area is higher than others areas.

Bull Oak Community

None of this community would be disturbed by the Project. GCNRC (2007b) notes that the Bull Oak Community has:

- closely spaced trees, largely comprising Bull Oak, with limited Narrow-leaf Ironbark, Grey Box and Rough-barked Apple;
- sparsely distributed shrubs;



- high levels of groundcover, comprising mostly Bull Oak ‘leaf drop’; and
- a low abundance of weeds.

GCNRC (2007b) notes that this community provides an important feed source for a number of species of cockatoo and other seed-eating species, and that the preservation of this community would be an important conservation outcome.

Swamp Oak Community

None of this community would be disturbed by the Project. GCNRC (2007b) notes that:

- trees are primarily Swamp Oak, with occasional Grey Box and Rough-barked Apple;
- shrubs are generally absent;
- groundcover levels are good, particularly in areas of elevated soil moisture levels; and
- some weed species are present.

GCNRC (2007b) notes that this community has a high biodiversity value and provides a good food source for species that utilise *Casuarina* seeds and also provides variation in habitat within the biodiversity offset areas.

River Oak Riparian Community

None of this community would be disturbed by the Project. GCNRC (2007b) notes that:

- trees species include River Oak, Willow, Poplar, Pepper Tree, Olive and one or more unidentified deciduous species, possibly fruit trees;
- shrubs are generally absent; and
- groundcover levels are good, albeit, dominated by weeds which are prevalent throughout the community.

GCNRC (2007b) notes that this community currently has a low biodiversity value, although the biodiversity value would be increased by the proposed remediation and revegetation activities.

D6.4 Principles for the use of Biodiversity Offsets in NSW

The relevant guidelines for the assessment of biodiversity offset proposals in NSW are the *Principles for the use of Biodiversity Offsets in NSW* presented as Appendix II of the *Guidelines for Biodiversity Certification of Environmental Planning Instruments – Working Draft* published by the Department of Environment and Climate Change in April 2007. This Part provides an assessment of the proposed Biodiversity Offset Strategy against each of the 13 principles within the Guidelines.



Information used to assess the Biodiversity Offset Strategy against Principles 5, 6, 7, 9, 10 and 11 has been sourced from CES (2007) and GCNRC (2007b). Information used to assess the Biodiversity Offset Strategy against the remainder of the Principles has been provided by the Proponent.

Principle 1 - Impacts must be avoided first by using prevention and mitigation measures.

Offsets are then used to address remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.

The Proponent proposes to disturb approximately 75.1ha of native vegetation and 59.9ha of previously disturbed land (**Figure D20**). The areas to be disturbed include:

- an open pit shell (approximately 90ha);
- an out-of-pit waste rock emplacement (approximately 43ha);
- an open cut facilities area (approximately 1.5ha); and
- a site and Open Cut access road (approximately 0.5ha).

The Proponent has sought to minimise the impacts associated with the Project as follows.

- Locating the out-of-pit waste rock emplacement so as to avoid as much native vegetation as possible by:
 - maximising the overlap of the out-of-pit waste rock emplacement with the existing Camberwell waste rock emplacement;
 - minimising the footprint of the out-of-pit waste rock emplacement through maximising the use of the in-pit emplacement, both within and above the pit void; and
 - designing the footprint of the out-of-pit waste rock emplacement to avoid a gallery of old growth trees along a Crown Road Reserve to the east of the out-of-pit waste rock emplacement (**Figure D18**).
- Locating the Open Cut Facilities Area in an area of Regenerating Native Woodland / Shrubland Community rather than an area of Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community.
- Locating the Site Access Road Corridor to avoid an area of Bull Oak Community to the west of Possum Skin Dam.
- Placing the coal haul routes as much as possible within the proposed open cut and out-of-pit waste rock emplacement disturbance footprints.
- Locating the Dirty Water Containment Dams so as to avoid impacts upon the Bull Oak Community.

Detailed environmental management and mitigation measures for the environmental issues identified in Part C2.5 are presented in the relevant sections of Part D and are included in the Draft Statement of Commitments presented in Part E.



In summary, the Proponent contends that it has taken all reasonable steps in the design of the Project to avoid, prevent and mitigate impacts upon the biodiversity of the area within and surrounding the Project Site.

Principle 2 - All regulatory requirements must be met.

Offsets cannot be used to satisfy approvals or assessments under other legislation, e.g. assessment requirements for Aboriginal heritage sites, pollution or other environmental impacts (unless specifically provided for by legislation or additional approvals).

The Proponent would meet all regulatory requirements related to the construction, operation and rehabilitation of the Project.

Principle 3 - Offsets must never reward ongoing poor performance.

Offset schemes should not encourage landholders to deliberately degrade or mismanage offset areas in order to increase the value from the offset.

The Proponent has not deliberately degraded or mismanaged any land under its control. Indeed, domestic stock was removed from the Open Cut and Northern Biodiversity Offset Areas between 2004 and 2006. Since that date, areas of Tussock Grassland Community have undergone significant regeneration and are now classified as Regenerating Native Woodland / Shrubland Community.

In addition, the Proponent employs a Manager-Safety and Environment and a Safety and Environment Advisor. These individuals are responsible to the appropriate environmental management of the lands controlled by the Proponent.

Principle 4 - Offsets will complement other government programs.

A range of tools is required to achieve the NSW Government's conservation objectives, including the establishment and management of new national parks, nature reserves, state conservation areas and regional parks and incentives for private landholders.

One of the long-term rehabilitation objectives of the Project is to provide biodiversity linkages with the other rehabilitated and protected areas in accordance with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* (the "Synoptic Plan") published by the Department of Mineral Resources (now Department of Primary Industries - Mineral Resources) in 1999 and the *Glennies Creek Catchment - Total Catchment Management Study – Management Strategy* (the "Management Strategy") prepared by the Hunter – Central Rivers Catchment Management Authority in 2004.

Figure B15 presents an overview of the Synoptic Plan and illustrates how the rehabilitated final landform, as well as the biodiversity offset areas, would provide important linkages between the rehabilitated areas associated with the Mount Owen and Ravensworth Coal Mines in the north and the Camberwell and Rixs Creek Coal Mines in the south, as well as areas of existing native vegetation.



The Management Strategy lists the following as priority actions.

- Encourage the management of livestock to reduce grazing pressure on riverbanks and gullies by assisting landholders to complete riverbank revegetation and erosion rehabilitation projects where the creek bank or creek bed is degraded.
- Encourage landholders to establish biodiversity corridors as shown in Map 2 (reproduced in **Figure B15**).

The Biodiversity Offset Strategy would result in stock being excluded from the biodiversity offset areas and the establishment of an area of approximately 10ha of seedlings of River Oak, Swamp Oak, Narrow-leaf Ironbark, Spotted Gum and Forest Red Gum adjacent to Glennies Creek within the Northern and Supplementary Biodiversity Offset Areas. The proposed Biodiversity Offset Strategy and rehabilitation within the Project Site would complement the proposed biodiversity corridors between the area indicated as critical fauna habitat to the east of the Northern Biodiversity Offset Area, the Project Site, the biodiversity offset areas and Glennies Creek (**Figure B15**).

Principle 5 - Offsets must be underpinned by sound ecological principles.

They must:

- *include the consideration of structure, function and compositional elements of biodiversity, including threatened species;*
- *enhance biodiversity at a range of scales;*
- *consider the conservation status of ecological communities; and*
- *ensure the long-term viability and functionality of biodiversity.*

Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.

GCNRC (2007b) and CES (2007) note that the following factors are relevant when considering the whether the proposed Biodiversity Offset Strategy complies with the requirements of this principle.

- The structure, composition and function of the vegetation communities within the areas to be disturbed and the biodiversity offset areas are similar.
- With the exception of scattered older trees, the majority of trees within the areas to be disturbed and the biodiversity offset areas are less than 60 years old. The distribution of older, hollow-bearing trees within the areas to be disturbed and the biodiversity offset areas is similar.
- No threatened flora species would be impacted by the Project.



- The proposed Biodiversity Offset Strategy would enhance biodiversity at a local and regional level by increasing the area of remnant native vegetation conserved in perpetuity. The proposed management of the biodiversity offset areas would allow regeneration of woodland and shrub species to provide a long-term increase in woodland area in the vicinity of the Project Site.
- In addition, the re-establishment on the post-mining landscape of woodland communities and the establishment of vegetated linkages between scattered habitat and vegetation remnants would further enhance the biodiversity value of the Glennies Creek area.
- The most significant vegetation-specific biodiversity impact associated with the Project would be the removal of 68.3ha of Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community. GCNRC (2007b) equates this community with the Central Hunter Ironbark – Spotted Gum – Grey Box Forest community of Peake (2006). The Biodiversity Offset Strategy would include the preservation, management and enhancement of 113.1ha of this community, together with 74.0ha of Regenerating Native Woodland / Shrubland, sections of which will develop into Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community. As a result, the proposed Biodiversity Offset Strategy would considerably enhance the conservation status of this community. In addition, the proposed rehabilitation of the post-mining landform would involve the establishment of up to approximately 135ha of this community, further enhancing the long-term conservation status of this community.
- Other vegetation communities either have little biodiversity value (ie. Community 4 – Rehabilitated Disturbed Land and Community 6 – Disturbed Land) or only a small area would be disturbed (ie. Community 1 – Tussock Grassland (6.1ha) and Community 2 – Regenerating Native Woodland / Shrubland (0.7ha)).
- The proposed Biodiversity Offset Strategy would ensure the long-term viability and functionality of the flora communities and would, over time, enhance the diversity of flora and fauna species within and surrounding the biodiversity offset areas. In addition, the linkages between existing areas of native vegetation would assist in reducing the genetic isolation of populations and would facilitate the transfer of genetic diversity between otherwise isolated flora and fauna populations.

Principle 6 - Offsets should aim to result in a net improvement in biodiversity over time.

Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site.

Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity (removal of threats), time-lag effects, and the uncertainties and risks associated with actions such as revegetation.



Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value and removal of threats by conservation agreements or reservation.

Table D35 presents the areas of vegetation communities that would be preserved within the biodiversity offset areas and the areas that would be disturbed. With the exception of Community 4 (Rehabilitated Disturbed Land) and Community 6 (Disturbed Land), the areas to be preserved within the biodiversity offset areas are greater or significantly greater than the areas to be disturbed. GCNRC (2007b) states that Communities 4 and 6, have limited biodiversity value as a result of the existing high level of mining-related disturbance.

Table D33 presents the areas of fauna habitat that would be preserved within the biodiversity offset areas and the areas that would be disturbed. With the exception of the Wetland / Dams Habitat, the area of all fauna habitats to be preserved is greater than the area to be disturbed. However, **Table D33** indicates that 8.7ha of Wetland / Dams Habitat would be disturbed, while 1.1ha would be preserved. The area of this habitat to be disturbed is a section of Possum Skin Dam. This dam which forms part of the integrated Integra Coal Operations surface water management system, is primarily used as an interim water storage and evaporation facility. The water level within the dam is variable and, as the dam is managed such that water is not discharged, the water quality within the dam may not meet the relevant water quality guidelines. As a result, the biodiversity value of the Wetland / Dam Habitat is considered to be small. It should be noted that the long-term future of Possum Skin Dam is uncertain as the dam life was initially established by the NSW Dam Safety Committee (DSC) at 8 years, albeit with the potential extension beyond that period based on the results of surveillance monitoring. In view of the above, and the uncertainties as to the DSC's longer term requirements with respect to rehabilitation of the dam's embankment, the Proponent has identified the removal of the structure as part of its long-term planning.

GCNRC (2007b) notes that the Biodiversity Offset Strategy would provide a diversity of habitat for flora and fauna and, as vegetation communities within the biodiversity offset areas mature, the more mature trees will age and develop a wider range of hollows and other habitat features, providing further variety of habitat niches available for use by fauna species, as well as a wide range of food sources. In addition, the Regenerating Native Woodland / Shrubland Community will provide a different set of habitat features more suited to smaller birds that nest close to the ground as well as cover for small mammals. As a result, GCNRC (2007b) concludes that there would be a net improvement in biodiversity in the vicinity of the proposed Glennies Creek Open Cut Coal Mine.

Principle 7 - Offsets must be enduring – they must offset the impact of the development for the period that the impact occurs.

As impacts on biodiversity are likely to be permanent, the offset should also be permanent and secured by a conservation agreement or reservation and management for biodiversity. Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. Offsetting should only proceed if an appropriate legal mechanism or instrument is used to secure the required actions.



As indicated in Part B15.10.2, the Proponent would secure the biodiversity offset areas through an enduring covenant or restriction on the use of the land under Section 88B of the *Conveyancing Act 1919*, Part 4, Division 12 of the *National Parks and Wildlife Act 1974* or similar arrangement, to the satisfaction of the Department of Environment and Climate Change. The purpose of such an arrangement would be to restrict the use of the biodiversity offset areas for the purposes of native vegetation conservation in perpetuity. In addition, the Proponent would undertake to manage the biodiversity offset areas for the purpose of native vegetation and fauna conservation during the life of the Project and while ever the Proponent continues to own the relevant land. In the event that the land is donated to a public authority, the Proponent would negotiate an appropriate arrangement with the relevant government agency for the ongoing management of the land prior to the transfer of control of the land.

GCNRC (2007b) notes that in light of the above commitments to ensure the ongoing maintenance and restriction of the use of the biodiversity offset areas, the proposed Biodiversity Offset Strategy would result in the offsets continuing longer than the period of impact associated with the Project.

Principle 8 - Offsets should be agreed prior to the impact occurring.

Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal commitments to the offset actions should be entered into prior to the commencement of works under approval.

The Biodiversity Offset Strategy and a timeframe for putting the appropriate legal arrangements and management strategies put in place would be agreed with the relevant government agencies prior to Project-related disturbance occurring.

Principle 9 - Offsets must be quantifiable – the impacts and benefits must be reliably estimated.

Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset. The methodology should include:

- *the area of impact;*
- *the types of ecological communities and habitat/species affected;*
- *connectivity with other areas of habitat/corridors;*
- *the condition of habitat;*
- *the conservation status and/or scarcity/rarity of ecological communities;*
- *management actions; and*
- *level of security afforded to the offset site.*



The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where:

- *they protect land with high conservation significance;*
- *management actions have greater benefits for biodiversity;*
- *the offset areas are not isolated or fragmented; and*
- *the management for biodiversity is in perpetuity (e.g. secured through a conservation agreement).*

Management actions must be deliverable and enforceable.

The following factors are relevant when considering whether the proposed Biodiversity Offset Strategy complies with the requirements of this principle.

- The area of each vegetation community that would be preserved within the biodiversity offset areas is greater than the areas that would be disturbed, with the exception of Community 4 (Rehabilitated Disturbed Land) and Community 6 (Disturbed Land). Communities 4 and 6 are considered to have limited or no biodiversity value at present as a result of the existing level of disturbance within these areas.
- The area of each fauna habitat area, to be preserved within the biodiversity offset areas is greater than the area of fauna habitat to be disturbed, with the exception of the Wetland / Dams Habitat. The majority of the Wetland / Dams Habitat is considered to have limited or no biodiversity value as a result of the existing use of Possum Skin Dam as part of the integrated Integra Coal Operations surface water management system and its likely removal.
- Each of the vegetation communities and fauna habitats to be disturbed are represented within the biodiversity offset areas. In addition, a number of vegetation communities which would not be disturbed by the Project, namely the Bull Oak, Swamp Oak and River Oak Communities, and associated fauna habitats, namely the Riparian Oaks Habitat, are present within the biodiversity offset areas. These vegetation communities and fauna habitats increase the biodiversity value of the biodiversity offset areas by increasing the variety of habitat available for threatened fauna species such as the Brush-tailed Phascogale and Grey-crowned Babbler.
- The proposed Biodiversity Offset Strategy, in particular the commitment to establish an area of approximately 10ha seedlings of River Oak, Swamp Oak, Narrow-leaf Ironbark, Spotted Gum and Forest Red Gum adjacent to Glennies Creek within the Northern and Supplementary Biodiversity Offset Areas, would result in increased connectivity between areas of existing habitat and vegetation within and surrounding the biodiversity offset areas, as well as increasing the connectivity between these areas and Glennies Creek.



- The proposed Biodiversity Offset Strategy is consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley (DPI – MR, 1999)* and the *Glennies Creek Catchment - Total Catchment Management Study – Management Strategy (HCRCMA, 2004)* and would provide important linkages between areas of proposed and existing vegetation and habitat identified in those documents.
- GCNRC (2007b) notes that both the proposed areas to be disturbed (with the exception of areas of existing mining-related disturbance) and the biodiversity offset areas are in generally good condition and that this condition has improved with time since domestic livestock were excluded. The development of a layer of young shrubs and trees in the areas that were grasslands indicates a progression towards an open woodland situation that would provide an enhanced habitat for a wide range of fauna species including smaller birds, mammals and reptiles.
- GCNRC (2007b) notes that the Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community equates with the Central Hunter Ironbark – Spotted Gum – Grey Box Forest Community of Peake (2006). Peake notes that this community has a high regional significance and that its reservation status is very poor. However, he also notes that community is 'widespread across the main [Hunter Valley] floor.' GCNRC (2007b) notes that the proposed preservation of approximately 113.1ha of this community within the biodiversity offset areas, together with approximately 74.0ha of Regenerating Native Woodland / Shrubland, sections of which will develop into Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community, would considerably enhance the conservation status of this community. In addition, the establishment of up to 135ha of this community on the post-mining landform would, in the long term, further enhance the conservation status of this community.
- The proposed biodiversity offset-related management actions are described in detail in Part B15.10. These actions are included in the Draft Statement of Commitments provided in Part E. The Proponent anticipates that these commitments would form part of the conditions of project approval, should it be granted.
- The biodiversity offset areas would be fenced, domestic stock would be excluded and access by unauthorised personnel would be prevented.
- The Proponent would secure the biodiversity offset areas through an enduring covenant or restriction on the use of the land under an appropriate, legally enforceable arrangement. In addition, the Proponent would undertake to manage the biodiversity offset areas for the purpose of native vegetation conservation while ever the Proponent continues to own the relevant land.
- Taking into consideration the good condition of the biodiversity offset areas, the proximity of the biodiversity offset areas to Glennies Creek and the proposed revegetation of approximately 10ha adjacent to the Glennies Creek, the Proponent contends that the areas to be protected have a high conservation significance.
- CES (2007) notes that the exclusion of domestic stock and the resulting regeneration of the shrub layer within the biodiversity offset areas would be beneficial for the listed threatened Grey-crowned Babbler.



- CES (2007) also notes that the increased insect diversity and density likely to result from the regeneration of ground cover and shrub species within the biodiversity offset areas would result in improved foraging opportunities for insectivorous bats such as the listed threatened Eastern Bentwing-bat and Eastern Freetail-bat.
- CES (2007) further notes that the proposed protection and enhancement of the biodiversity offset areas would result in a greater abundance and diversity of blossoms suitable for the listed threatened Grey-headed Flying Fox.
- CES (2007) lastly notes that the provision of nesting boxes within the biodiversity offset areas would assist the Brush-tailed Phascogale in the vicinity of the Project Site.
- The proposed biodiversity management actions include revegetation of approximately 10ha adjacent to Glennies Creek, exclusion of domestic stock from the biodiversity offset areas, the erection of nesting boxes and roosting tubes and ongoing weed and feral pest management programs. The Proponent contends that these actions would have benefits for biodiversity.
- The offset areas are not isolated from the proposed areas to be disturbed, the other biodiversity offset areas or areas of native vegetation surrounding the proposed Glennies Creek Open Cut Coal Mine.

In light of the above, the Proponent contends that the requirements of this principle are met.

Principle 10 - Offsets must be targeted.

They must offset impacts on the basis of like-for-like or better conservation outcome. Offsets should be targeted according to biodiversity priorities in the area, based on the conservation status of the ecological community, the presence of threatened species or their habitat, connectivity and the potential to enhance condition by management actions and the removal of threats. Only ecological communities that are equal or greater in conservation status to the type of ecological community lost can be used for offsets. One type of environmental benefit cannot be traded for another: for example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements.

Tables D33 and D35 identify the areas of each fauna habitat and vegetation community to be preserved within the biodiversity offset areas and the areas to be disturbed. As highlighted in the previous discussion of Principle 6, the area of each native vegetation community and fauna habitat that would be preserved is greater than the area of that community that would be disturbed.

GCNRC (2007b) provides a detailed description of the biodiversity value of each of the vegetation communities that would be preserved, a summary of which is provided below.

- **Tussock Grassland** – This community has considerable value as a food and shelter source for small mammals and reptiles and as a foraging area for many birds including parrots and other seed eating species as well insectivorous / invertebrate eating species.



- **Regenerating Native Woodland / Shrubland** – This community would, in the long term, form a mix of Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community and Bull Oak Community. In the intervening period, it will provide habitat suitable for a wide range of fauna species, including smaller birds, smaller mammals and reptiles.
- **Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community** – This community equates with the Central Hunter Ironbark – Spotted Gum – Forest Red Gum Forest community of Peake (2006). The conservation of 113.1ha of this community would be a significant achievement for biodiversity conservation.
- **Bull Oak Community** – The *Allocasuarina* and *Casuarina* species associated with this community provide a significant feed source for cockatoos, and other seed-eating species including the rare and threatened species.
- **Swamp Oak Community** – This community equates with the Central Hunter Swamp Oak Forest community of Peake (2006). Peake describes this community as having a high significance because it is restricted in distribution, very highly cleared, highly threatened and extremely poorly reserved. The preservation and protection of 33.4ha of this community within the biodiversity offset areas provides a significant enhancement to the biodiversity value of biodiversity offset areas.
- **River Oak Community** – This community equates with the Hunter Valley River Oak Forest of Peake (2006). Peake describes this community as having a high significance because it is restricted in distribution, highly cleared, threatened and extremely poorly reserved. The preservation and protection of 1.5ha of this community, even though it is small in size, provides a significant enhancement to the overall biodiversity value of the biodiversity offset areas.

The Proponent contends that the Biodiversity Offset Strategy complies with the requirements of this principle as follows.

- The Biodiversity Offset Strategy seeks to protect and enhance areas of vegetation and fauna habitat of the same type and condition as the areas of vegetation and fauna habitat that would be disturbed by the Project.
- The Biodiversity Offset Strategy targets the biodiversity priorities in the vicinity of the Project Site through:
 - preservation and enhancement of vegetation communities and habitat suitable for threatened species such as the Grey-crowned Babbler and Brush-tailed Phascogale;
 - enhancement of the connectivity of areas of native vegetation and habitat within the biodiversity offset areas with areas of native vegetation and habitat and Glennies Creek; and
 - enhancement of the condition of the biodiversity offset areas through revegetation of approximately 10ha adjacent to Glennies Creek, the erection of nesting boxes and roosting tubes within the biodiversity offset areas and ongoing weed and feral pest management programs.



- Finally, GCNRC (2007b) states the native vegetation communities proposed to be conserved within the biodiversity offset areas include areas of equivalent or greater biodiversity value than those proposed to be disturbed. In addition, a wider range of communities exist within the biodiversity offset areas than exist within the areas to be disturbed, further enhancing the biodiversity value of the biodiversity offset areas.

Principle 11 - Offsets must be located appropriately.

Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development.

The biodiversity offset areas are located adjacent to the area of proposed disturbance and subsequent rehabilitation. As noted by CES (2007), the threatened fauna species observed within the areas to be disturbed would be expected to be able to move between the areas of proposed disturbance and the biodiversity offset areas. As a result, the Proponent contends that the requirements of this principle have been met.

Principle 12 - Offsets must be supplementary.

They must be beyond existing requirements and not already funded under another scheme. Areas that have received incentive funds cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, such as national parks, flora reserves and public open space cannot be used as offsets.

The proposed Biodiversity Offset Strategy is supplementary to existing biodiversity management programs currently implemented or planned to be implemented by the Proponent, another landholder or government agency. Funding for remediation works within the biodiversity offset area has not been received under any previous or existing funding scheme. There are no existing protected areas within the biodiversity offset areas and the proposed offset areas are not already managed by any government agency.

Principle 13 - Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.

Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.

It is envisaged that the proposed Biodiversity Offset Strategy and related commitments made in this document would be incorporated into the conditions associated with project approval, should it be granted. In addition, it is anticipated that the conditions to any project approval would include a requirement for the Proponent to undertake an independent compliance audit of the Project against the conditions of the project approval.



D6.5 Conclusion

In conclusion, the Proponent contends that the proposed Biodiversity Offset Strategy provides adequate offsets for the disturbance of approximately 75.1ha of native vegetation and 59.9ha of previously disturbed land for the following reasons.

- The areas of each vegetation community and each fauna habitat within the areas to be disturbed and the biodiversity offset areas have similar biodiversity values.
- Each of the vegetation communities to be disturbed, namely the Tussock Grassland, Regenerating Native Woodland / Shrubland and Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Communities, are also found within the biodiversity offset areas, and the areas of each community that would be disturbed is less than the area that would be preserved within the biodiversity offset areas.
- Each of the fauna habitat areas to be disturbed, namely the Open Pastures, Open Woodland, Woodland and Wetland / Dam Habitat areas, are also found within the biodiversity offset areas. In addition, with the exception of the Wetland / Dams Habitat, the area of each habitat that would be disturbed is less than the area that would be preserved within the biodiversity offset areas. As described in Part D6.4 under Principle 4, the Wetland / Dams Habitat is considered to have limited biodiversity value.
- The biodiversity offset areas include areas of vegetation communities that would not be disturbed by the Project, namely the Bull Oak, Swamp Oak and River Oak Communities. These vegetation communities provide additional habitat variety within the biodiversity offset areas and would increase the biodiversity value of these areas.
- The Biodiversity Offset Strategy would result in biodiversity benefits to each of the listed threatened species discussed in Part D4.6.3.
- The Biodiversity Offset Strategy complies with the requirements of *Principles for the use of Biodiversity Offsets in NSW*.

D7 ABORIGINAL HERITAGE

The Aboriginal heritage assessment for the Project was undertaken by HLA Envirosciences Pty Ltd, with the survey work undertaken by Mr Alan Williams (BSc, MSc), Archaeologist and Mr Jakub Czastka (BA), Senior Archaeologist. Technical and peer reviews were conducted by Mr Jakub Czastka and Mr Michael England respectively of HLA.

This part of the *Environmental Assessment* provides a summary of the assessment report, which is presented in full as Part 5 (Volume 2) of the *Specialist Consultants Studies Compendium* and referred to hereafter as "HLA (2007)".

The Survey Area was restricted to those areas of the Open Cut Area that would be disturbed because the other areas of the Project Site, namely Haul Route Corridors D and E and the Camberwell CHPP area, were considered by HLA Envirosciences Pty Ltd and the Proponent to be heavily impacted by mining-related activities and the potential for further Aboriginal heritage-related impacts was considered to be negligible.



D7.1 Existing Environment

D7.1.1 Background Research

A search of the National Parks and Wildlife Service (NPWS) *Aboriginal Heritage Information Management System* (AHIMS) heritage register was conducted on 2 March 2005 to identify any previously identified sites of Aboriginal heritage significance within, or in the vicinity of, the Open Cut Area. The search revealed 154 recorded sites within a 10km by 10km area centred on the Open Cut Area. Approximately 96% of these sites are described as “open camp sites”.

As well as gathering the data from the heritage register, seven previous Aboriginal heritage assessments relating to development applications in the vicinity of the Open Cut Area were also reviewed. These assessments indicate that regionally, most artefacts are located within approximately 100m of creeks or watercourses. This distribution is likely to have been influenced by archaeological sampling bias, as well as downslope transport of artefacts and primary artefact distribution patterns reflecting the concentration of Aboriginal activities along watercourses and floodplains. Downslope artefact movement also indicates the potential for artefacts to be covered or buried by colluvium and / or alluvium. Surface visibility is also a major factor that can influence the distribution of artefact finds. Where ground cover is less dense, as typically occurs on hill slopes and ridgelines, the likelihood of observing an artefact on the surface is higher than where the vegetation is thicker. As a result, alluvial flats, hill slopes and ridgelines were all considered likely to yield artefacts.

The search of the AHIMS heritage register, as well as the review of previous studies, indicate that the majority of archaeological objects discovered in the vicinity of the Open Cut Area are stone artefacts comprising small amorphous flakes, flaked pieces and broken flakes of mudstone or silcrete. However, grinding grooves have been noted by Witter (2002) around Ashton Coal Mine and scarred trees by Brayshaw (1986) around the Glennies Creek Colliery.

D7.1.2 Community Consultation

In accordance with the then Department of Environment and Conservation (DEC) *Interim Community Consultation Requirements for Applicants* 2005, the following steps were undertaken to identify Aboriginal groups interested in participating in the Aboriginal heritage consultation and assessment process.

- An advertisement was published in each edition of the “Singleton Argus” and “Muswellbrook Chronicle” newspapers between Friday 11 February and Monday 21 February 2005, allowing 10 days for registrations of interest.
- The DEC Executive Director Operations, Cultural Heritage Division and Aboriginal Heritage Conservation Officer at Scone were both contacted for assistance in identifying relevant Aboriginal groups.
- The DEC Northeast Environment Protection and Regulations Division, as well as Singleton Shire Council, were also contacted for assistance identifying relevant Aboriginal groups.



- The Native Title Tribunal database was searched to identify potential Native Title claimants.
- The database of the Office of Registrar of Aboriginal Corporations was searched.

Representatives of HLA-Envirosciences also directly contacted a number of Aboriginal groups known to have an interest in Aboriginal cultural heritage in the Hunter Valley.

An initial consultation meeting was held on the 11 February 2005 in Singleton, with a second meeting held on 7 March 2005 to discuss the Project and survey methodology. The initial meeting was attended by representatives of the following groups.

- Combined Council of Hunter Valley Aboriginal Corporation.
- Lower Wonnarua Tribal Consultancy Pty Ltd.
- Ungooroo Aboriginal Corporation.
- Upper Hunter Aboriginal Corporation.
- Upper Hunter Wanaruah Council.
- Wanaruah Custodians.
- Wanaruah Local Aboriginal Land Council.
- Wanaruah Nations Aboriginal Corporation.
- Wattaka Wonnarua Cultural Consultancy Service.
- Yarrawalk Enterprises.

Hunter Valley Cultural Consultants, Valley Culture and Wonnarua Cultural Heritage sent their apologies and were consulted following the initial meeting.

The meeting on 7 March 2005 was attended by the representatives (or groups) present at the previous meeting, as well as representatives of Valley Culture and Giwirr Consultants who contacted HLA after the initial meeting.

The initial fieldwork was undertaken on 14 and 15 March 2005, with the following groups in attendance.

- Combined Council of Hunter Valley Aboriginal Corporation.
- Giwirr Consultants.
- Hunter Valley Cultural Consultants.
- Lower Wonnarua Tribal Consultancy Pty Ltd.
- Valley Culture.
- Wanaruah Local Aboriginal Land Council.
- Wanaruah Nations Aboriginal Corporation.
- Wattaka Wonnarua Cultural Consultancy Service.
- Ungooroo Aboriginal Corporation.



- Upper Hunter Aboriginal Corporation.
- Upper Hunter Wanaruah Council.
- Yarrawalk Enterprises.

A second field survey was undertaken on 7 March 2006. This survey was required following alterations to the Open Cut Area boundary to the west of Possum Skin Dam. Although the above groups were invited to participate in the survey, only the groups listed below assisted with the fieldwork.

- Yarrawalk Enterprises.
- Wanaruah Nations Aboriginal Corporation.

A log of all community consultation is presented in Appendix A of HLA (2007).

D7.2 Assessment Methodology

A total of 24 transects were completed covering most of the area to be disturbed and a small area beyond the planned area of disturbance (**Figure D20**). Areas already substantially disturbed, such as the Camberwell waste rock emplacement, Haul Route Corridors D and E and the Camberwell CHPP, were excluded from the Survey Area. Start and end points of each transect, and the location of any other relevant feature were recorded with a GPS. The following information was recorded for each transect.

- Landform unit, ie. ridge; upper, mid or lower slope; flat; stream.
- Environmental setting within the landform unit.
- Fall or rise of slope along the transect.
- Type of vegetation cover.
- Visibility levels measured as a percentage of the soil surface visible per transect.
- Type of ground exposure, i.e. erosion or disturbance from mining or other activities.
- Frequency of exposures, i.e. number in each transect.
- Size of exposures.
- Depth and type of soil erosion.
- Soil type and profile level exposed (if exposed).
- Evidence of downslope movement of soil and rock particles.
- Presence of naturally occurring rock suitable for artefact production.
- Presence of archaeological material.



D7.3 Survey Results

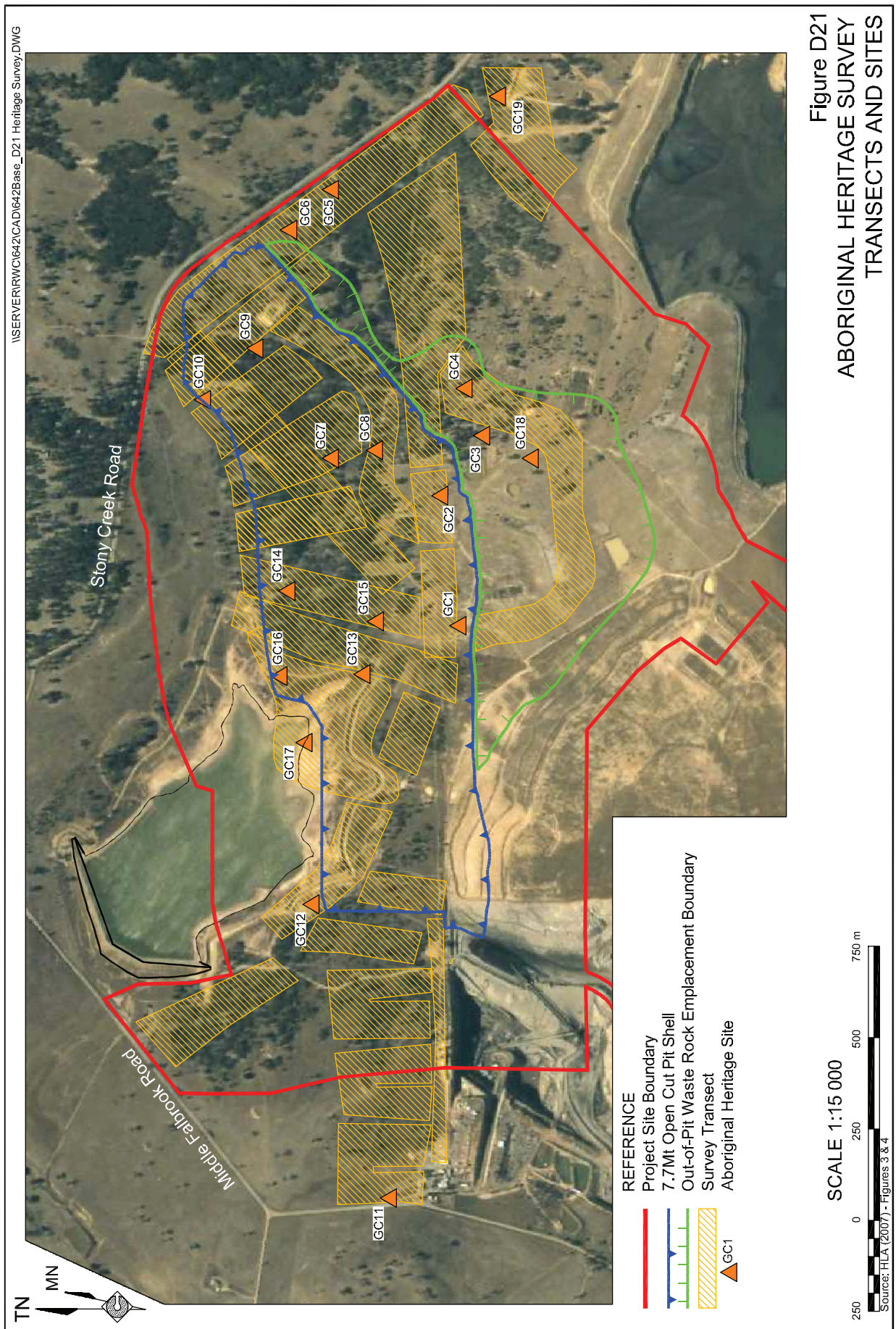
D7.3.1 Sites Identified

A total of 19 sites were identified as containing, or having the potential to contain, archaeological deposits. The locations of these sites are shown in **Figure D21** and a summary of each site is presented in **Table D36**.

Table D36
Summary of Sites Containing Archaeological Deposits

Site Number*	Site Type	Site Content	Site Size (m)	Site Condition
GC1	Artefact Scatter	2 red silcrete flakes and 2 red silcrete flakes	50x50	Highly disturbed
GC2	Artefact Scatter	1 red brown tuff core and 1 grey mudstone flake	40x40	NR
GC3	Isolated Artefact	Orange brown FGS broken flake	-	Highly Disturbed
GC4	Artefact Scatter	6 tuff flakes of various colours, 1 brown mudstone flake and 1 red silcrete flake	15x15	Highly Disturbed
GC5	Artefact Scatter	1 red/pink silcrete flake and 1 pink grey tuff flake	NR	Highly Disturbed
GC6	Artefact Scatter	1 red brown FGS core and 1 red brown tuff pebble core tool	NR	Disturbed
GC7	Artefact Scatter	1 red FGS flake and 1 chalcedony microlith.	NR	Highly Disturbed
GC8	Artefact Scatter	2 yellow mudstone flakes, 1 brown mudstone flake and 1 red tuff broken flake.	100x100	Highly Disturbed
GC9	Isolated Artefact	1 yellow/grey silcrete flake.	-	Highly Disturbed
GC10	Isolated Artefact	1 flake.	-	Disturbed
GC11	Isolated Artefact	1 red flake.	-	NR
GC12	Artefact Scatter	7 mudstone flakes of various colours, 1 brown mudstone core, 1 yellow mudstone blade, 2 tuff flakes and 1 yellow silcrete flake.	150 elongate	Highly Disturbed
GC13	Artefact Scatter	1 brown mudstone microlith, 1 red/brown flake and 1 red silcrete flake.	NR	Highly Disturbed
GC14	Artefact Scatter	3 mudstone flakes of various colours.	20x20	Highly Disturbed
GC15	Isolated Artefact	1 grey FGS flake.	-	NR
GC16	Isolated Artefact	1 red brown mudstone flake.	-	Highly Disturbed
GC17	Artefact Scatter	17 mudstone flakes of various colours, 2 flakes of unknown composition, 1 pink FGS core, 1 pink FGS flake and 1 red brown tuff flake.	200 elongate	Highly Disturbed
GC18	Isolated Artefact	1 grey tuff flake	-	Highly Disturbed
GC19	Isolated Artefact	1 yellow mudstone flake	-	Highly Disturbed
Note NR = Not recorded			* See Figure D21	
Source: HLA Envirosiences (2007) – modified from Section 4.4			FGS = Fine Grained Siliceous	





In summary, the archaeological sites are predominantly isolated or low density artefact scatters, consisting mostly of flakes which are interpreted to have primarily been debitage and unlikely to have been used. Most artefacts were located in disturbed or highly disturbed areas. The assemblage is typical of the Hunter Valley and is not unique.

D7.3.2 Sensitivity Assessment

The archaeological sensitivity of the Survey Area was assessed using the following criteria.

- The presence of known surface archaeological materials.
- The probability of undetected surface archaeological materials.

The probability of sub-surface archaeological materials.

The effective coverage of the Survey Area was calculated to be 52%, which is a comparatively high level of visibility for this type of assessment. As a result, the likelihood of undetected surface deposits is considered to be low.

The widespread distribution of disturbed soil profiles, as well as the absence of depositional environments within the Project Site, suggests the potential for sub-surface archaeological deposits is very low. Consequently, with the exception of the known archaeological sites, the Project Site is considered to have a low archaeological sensitivity. Archaeological material is not likely to occur in areas outside the identified sites GC1 to GC19. However, these sites are considered to have a high archaeological sensitivity.

D7.4 Management Procedures

The following management procedures would be implemented throughout the life of the Project to ensure that the risk of Aboriginal heritage items being impacted by the proposed open cut is minimised.

- Ground disturbing work would not be undertaken in areas where an Aboriginal heritage assessment has not been completed.
- An Aboriginal Heritage Management Protocol for sites GC1 to GC19 would be developed in consultation with the Aboriginal groups listed in Part D7.1.2. This would include salvage of the identified Aboriginal objects and identification of an appropriate 'keeping place' for the salvaged artefacts.
 - In the event that any further Aboriginal objects, including skeletal remains, are uncovered during the course of the Project, work in the subject area would cease immediately and the Proponent would advise the DECC. An appropriate response would then be developed in consultation with the DECC and Aboriginal groups listed in Part D7.1.2.



- All staff and contractors would be made aware of their responsibilities through an induction program regarding the protection of Aboriginal archaeological items under the *National Parks and Wildlife Act 1974*.
- Should the Aboriginal communities decide that salvage of cultural material other than those identified during the Aboriginal heritage survey, ie. salvage of materials from areas other than sites GC1 to GC19, not be required, a cultural ‘offset’ could be negotiated with the Aboriginal communities to benefit the communities in general, and promote Aboriginal heritage and culture in the wider community.

D7.5 Assessment of Impacts

As a result of the high level of ground visibility and the high percentage of the Project Site that was covered by the surveys, HLA (2007) concluded that, with the exception of sites GC1 to GC19, the Survey Area has a low archaeological sensitivity. Considering that archaeological items from sites GC1 to GC19 would be salvaged in accordance with a Management Protocol agreed with the Aboriginal groups listed in Part D7.1.2, the residual impact of the Project is considered to be minor.

All Aboriginal groups listed in Part D7.1.2 were provided with a draft copy of the Aboriginal heritage survey report (HLA, 2007) and only those groups listed below provided a response to the draft report. The responses agreed with the recommendations included in the draft report.

- Giwiirr Consultants Pty. Limited.
- Wattaka Wonnarua Cultural Consultation Service.
- Wonnarua Nation Aboriginal Corporation.

D8 SOILS AND LAND CAPABILITY

The soils assessment was undertaken by Mr Geoff Cunningham (BSc.(Hons)), Principal of Geoff Cunningham Natural Resource Consultants Pty Ltd (GCNRC). This part of the *Environmental Assessment* provides a summary of the assessment report which is presented in full as Part 6 (Volume 2) of the *Specialist Consultants Studies Compendium*, and referred to hereafter as "GCNRC (2007c)".

The Survey Area was restricted to the Open Cut Area because the soil resources within other areas of the Project Site, namely Haul Route Corridors D and E and the Camberwell CHPP area, were considered to be heavily impacted by mining-related activities or removed. The potential for further soil resource-related impacts was therefore considered to be negligible.



Part E

Draft Statement of Commitments

Preamble

This section tabulates and summarises all the environmental design and operational safeguards, management, mitigation and monitoring commitments made by the Proponent with respect to the proposed Glennies Creek Open Cut Coal Mine.

Table E1 lists the commitments that the Proponent intends to adopt to manage the environmental issues related to the Glennies Creek Open Cut Coal Mine.

*The commitments are presented in **Table E1** in terms of their desired outcome(s), action(s) and timing. The commitments relate to:*

- Operational Matters;*
- Environmental Issues; and*
- Environmental Monitoring.*

***Table E1** concludes the Proponent's commitments with a summary of the proposed environmental monitoring and various documents the Proponent would prepare prior to and during the life of the Project.*

*In order to assist readers when reviewing the commitments throughout this section, **Figure E1** presents an aerial photograph of the Project Site and surrounds, together with the boundaries of the main Project components. **Figure E2** presents all monitoring locations.*



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Table E1
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
1 Environmental Management		
Compliance with all conditional requirements in all approvals, licences and leases.	1.1 Comply with all commitments recorded in Table E1 .	Continuous and as required.
	1.2 Comply with all conditional requirements included in the: <ul style="list-style-type: none"> • Project Approval; • Environment Protection Licence; • Mining Lease(s); and • any other approvals. 	
All operations conducted in accordance with all relevant documentation.	1.3 Undertake all activities in accordance with the accepted Mining Operations Plan, environmental procedures, safety management plan and/or site-specific documentation.	Continuous and as required.
2 Area of Activities		
All approved activities are undertaken generally in the location(s) nominated on the figures shown in Parts B & D.	2.1 Mark, and where appropriate, survey the boundaries of the areas of proposed disturbance.	Prior to the commencement of the relevant activity.
3 Operating Hours		
All operations are undertaken within the approved operating hours.	3.1 Vegetation clearing, soil stripping and rehabilitation activities: <ul style="list-style-type: none"> • 7.00am to 10.00pm / 5 days a week 	On campaign basis
	3.2 Open cut mining (including waste rock and coal mining), ROM coal transportation (Haul Routes A to D) and rehabilitation activities: <ul style="list-style-type: none"> • 7.00am to 10.00pm / 7 days a week 	Continuous.
	3.3 ROM coal transportation (Haul Route E): <ul style="list-style-type: none"> • 24 hours / 7 days a week 	Continuous.
	3.4 Coal processing and despatch: <ul style="list-style-type: none"> • 24 hours / 7 days a week 	Continuous.
	3.5 Blasting: 9.00am to 5.00pm / Monday to Friday	Up to 5 blasts per week (typically 2 to 3 per week)
	3.6 Highwall / auger mining: <ul style="list-style-type: none"> • 24 hours / 7 days a week 	Continuous.
4 Air Quality Management		
Site activities are undertaken without exceeding DECC air quality criteria or goals.	4.1 Disturb only the minimum area required for the operation of the open cut.	Continuous during operations.
	4.2 Re-vegetate soil stockpiles not required for more than 3 months.	
	4.3 Use water sprays and water truck to keep coal stockpiles and coal handling areas in a moist condition.	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing	
4 Air Quality Management (Cont'd)			
Site activities are undertaken without exceeding DECC air quality criteria or goals.	4.4	Use water truck within the open cut, along haul routes and in other areas to minimise the generation of dust.	Continuous during operations.
	4.5	Minimise the creation of minor roads and access tracks during soil stripping, mining operations and rehabilitation.	
	4.6	Use dust aprons, dust extraction systems, water injection or sprays during drilling operations.	
	4.7	Use adequate stemming during blasting.	
	4.8	Commence rehabilitation as soon as practicable once an area is no longer required for mining operations.	
Appropriate arrangement with impacted residents negotiated.	4.9	Continue negotiations to reach an appropriate arrangement with the owners of Residences 32 and 36 (see Figure E2).	Ongoing.
5 Noise and Vibration			
Project-related noise impacts on surrounding residences minimised.	5.1	Restrict hours of open cut mining and ancillary activities (except highwall / auger mining) to 7.00am to 10.00pm.	Continuous during operations.
	5.2	Use noise mitigated mobile equipment which complies with the sound power levels presented in Table 2 of Heggies (2007) in Part 2 of the <i>Specialist Consultant Studies Compendium</i> .	
	5.3	Restrict evening mining operations, where practicable, to the deeper sections of the open cut.	
	5.4	Sequence construction of the out-of-pit waste rock emplacement, and those portions of the in-pit waste rock emplacement that are above the existing ground surface such that during day time operations material would be preferentially placed at the margins of the emplacement to create an acoustic bund, while during evening operations preferentially place material immediately behind the acoustic bund.	
	5.5	Preferentially place waste rock within those portions of the in-pit waste rock emplacement that are deepest within the open cut during evening operations.	
	5.6	Construct acoustic bunds adjacent to haul roads where appropriate and practicable.	
	5.7	Undertake development activities such as tree clearing and soil stripping during day time operations only, where practicable.	
	5.8	Refine on-site noise mitigation measures and operating procedures, ie. based upon monitoring results.	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
5 Noise and Vibration (Cont'd)		
Project-related noise impacts on surrounding residences minimised.	5.9 Inform residents that the existing complaints line for Glennies Creek Colliery (1800 505 361) would apply to the open cut mine.	Continuous during operations.
	5.10 Encourage all residents to contact site management with issues of concern.	
	5.11 Initiate regular discussions with potentially affected residents to proactively identify noise-related issues of concern.	
	5.12 Promptly respond to any issues of concern.	
	5.13 Consider acoustic mitigation at residences where exceedances of the Project specific criteria are substantiated by monitoring.	
	5.14 Consider negotiated agreements with landowners where exceedances of the Project specific criteria are substantiated by monitoring.	
Project-related blasting impacts within ANZECC Guidelines.	5.15 Develop a Blast Management Protocol to ensure the safety of employees and the public and adherence with the ANZECC guidelines.	Continuous during operations.
	5.16 Restrict blasting between the hours of 9.00am and 5.00pm on weekdays, unless blasts outside this time are required for misfire re-blast, emergency or safety reasons.	
	5.17 Undertake blast design and implementation by a suitably qualified blasting engineer and experienced shot-firer to ensure ANZECC Guidelines met at all non-project related residences surrounding the Project Site. Monitor each blast at representative surrounding residences.	
	5.18 Refine blast mitigation measures and operating procedures ie. based upon monitoring results.	
	5.19 Review site specific blasting procedures to manage airblast and ground vibration impacts through modification of the blast design, as required.	
	5.20 Use appropriate signage, advertisements, phone calls, automated SMS-text messages and letter drops, to notify residents surrounding the Project Site of days and times of blasts and closure of Stony Creek Road.	
Minimise impacts on the users of Stony Creek Road	5.21 Minimise the duration of the road closure	Continuous during operations.
	5.22 Schedule initiation of blasts to avoid peak traffic periods and interference to school bus timetables.	
	5.23 Provide advance notification of planned closure times in local media outlets and via signs on Stony Creek Road and Middle Falbrook Road.	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
5 Noise and Vibration (Cont'd)		
Minimise impacts on the users of Stony Creek Road	5.24 Provide notification 30 to 60 minutes prior to a blast of updated closure times via automated SMS text messages to residents and others who request to be included on the notification list.	Continuous during operations.
	5.25 Co-ordinate blasting times as far as practicable with Ashton Coal Operations Pty Ltd to ensure that both Glennies Creek and Stony Creek Roads are not closed during at the same period.	
	5.26 Enable traffic controllers stationed on Stony Creek Road to request the short-term suspension of a blast to allow emergency vehicles to pass.	
6 Fauna		
Minimise Project-related impacts on fauna within and surrounding the Project Site.	6.1 Develop Species Management Plans for the Brush-tailed Phascogale and the Grey-crowned Babbler.	Prior to the commencement of operations
	6.2 Erect nesting boxes suitable for the Brush-tailed Phascogale in trees adjacent to Glennies Creek.	
	6.3 Erect roosting tubes suitable for microbats in trees within the biodiversity offset areas.	
	6.4 Restrict the removal of native vegetation to those areas required for operational purposes in the during the next twelve month period.	Continuous during operations.
	6.5 Preferentially clear vegetation during late Spring and early Autumn to avoid impacts on nesting fauna and over wintering bats.	
	6.6 Inspect hollow-bearing trees for arboreal mammals, nesting birds and roosting bats prior to their removal. When located, individuals would be relocated to an appropriate location within the most appropriate biodiversity offset areas. Measures would be implemented to ensure that the hollows are not occupied by roosting or nesting fauna between the visual inspection and the commencement of tree clearing operations.	
	6.7 Relocate suitable vegetation, where practicable, to undisturbed areas or areas undergoing rehabilitation.	
	6.8 Exclude stock from the biodiversity offset areas and areas undergoing rehabilitation.	
	6.9 Provide a means whereby Phascogale nesting in trees within the footprint of the Dirty Water Containment Dams have free access to the area surrounding the dam should the trees become surrounded by water (see Figure E1).	
	6.10 Undertake enhancement of the biodiversity offset areas, including establishment of vegetation in an approximately 10ha area adjacent to Glennies Creek within the Northern and Supplementary Biodiversity Offset Areas (see Figure E1).	
	6.11 Undertake revegetation of a 20m wide corridor on the southern side of and adjacent to Stony Creek Road (see Figure E1).	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
6 Fauna (Cont'd)		
	6.12 Continue pest and weed control programs across the Project Site and biodiversity offset areas targeting in particular European Red Fox, European Rabbit, feral cat and feral dog.	Continuous during operations.
	6.13 Revegetate with species consistent with the existing communities.	
7 Flora		
Project-related impacts on flora within and surrounding the Project Site are minimised.	7.1 Limit native vegetation removal to the minimum area required for operational purposes during the next 12 month period.	Continuous during operations.
	7.2 Clearly define and mark areas to be cleared.	
	7.3 Undertake vegetation clearing and topsoil stripping in campaigns only as required.	
	7.4 Progressively rehabilitate all disturbed areas	
	7.5 Harvest any vegetation suitable for commercial timber, if present.	Prior to each clearing campaign.
	7.6 Clear the remaining larger vegetation by bulldozer with the blade positioned just above the ground.	During clearing campaigns.
	7.7 Remove remaining vegetation with the topsoil.	During each topsoil campaign.
	7.8 Relocate vegetation material directly to an active rehabilitation area where practicable.	
	7.9 Exclude stock from all biodiversity offset areas.	As soon as practicable following the grant of project approval.
7.10 Erect appropriate fences to exclude domestic stock from the biodiversity offset areas and prevent access by fauna to active mining areas and areas undergoing rehabilitation.		
7.11 Establish 10ha of native vegetation adjacent to Glennies Creek within the Northern and Supplementary Biodiversity Offset Areas as described in Part B15.10.2.		
Project-related impacts on flora within and surrounding the Project Site minimised.	7.12 Rehabilitate disturbed areas with seedlings or seed of the species listed in Part D5.4.3.	During rehabilitation and revegetation programs.
	7.13 Preferentially propagate locally collected seed for use during rehabilitation where practicable.	
Introduction of weeds avoided and existing weed species controlled.	7.14 Spray all areas where topsoil is to be stripped to reduce weeds prior to being stripped, when feasible.	Continuous during operations.
	7.15 Retain all topsoil within the Project Site ie. in accordance with Division 2 of the Noxious Weeds Act 1993 (NSW).	
	7.16 Control noxious weeds and other weeds within the Project Site and the biodiversity offset areas.	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
8 Biodiversity Offset Strategy		
Compensate for disturbing approximately 75.1ha of native vegetation	<p>8.1 Agree with the relevant government agencies on a procedure to establish three biodiversity offset areas on Project-related land, namely the Northern, Southern and Western Biodiversity Offset Areas.</p> <p>8.2 Agree with the relevant government agencies on a procedure to establish an additional biodiversity offset area on non-Project-related land, namely the Supplementary Biodiversity Offset Area, should a suitable arrangement be negotiated with the owners of this land.</p>	As soon as practicable following the grant of project approval.
Perpetual restriction on the use of the land covered by the biodiversity offset areas for native vegetation conservation.	8.3 Secure the land covered by the biodiversity offset areas through an enduring covenant or restriction on the use of the land under Section 88B of the <i>Conveyancing Act 1919</i> , Part 4, Division 12 of the <i>National Parks and Wildlife Act 1974</i> or a similar arrangement, to the satisfaction of the relevant government agency.	
Prepare detailed management procedures for management of the biodiversity offset areas.	<p>8.4 Prepare Flora, Fauna and Biodiversity Management Procedures as a supporting document(s) to the Mining Operations Plan including the following.</p> <ul style="list-style-type: none"> • A detailed description of the vegetation found within the Open Cut Area and biodiversity offset areas prior to mining commencing. • Identification of all areas of vegetation disturbed as a consequence of mining-related activities. • Detailed management strategies and procedures, for: <ul style="list-style-type: none"> – areas within the Open Cut Area and biodiversity offset areas to be rehabilitated to improve biodiversity; and – areas within the Open Cut Area and biodiversity offset areas to be protected to allow natural regeneration to occur. • Identification of species to be planted, scheduling of planting programs, locations of nesting boxes and roosting tubes to be constructed, etc. • Monitoring and reporting procedures, including adaptive measures. 	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
8 Biodiversity Offset Strategy (Cont'd)		
Resources available for the ongoing management of the land covered by the biodiversity offset areas.	8.5 The Proponent would manage the land in accordance with the requirements of the Biodiversity Offset Strategy, the conditions of the project approval and any other relevant requirements.	While ever the Proponent retains ownership of the land covered by the biodiversity offset areas.
	8.6 Negotiate an appropriate arrangement for the ongoing management of the land with the appropriate government agency should the Proponent donate the land to a public authority	Prior to transfer of the land.
Improvement in the habitat value of Glennies Creek riparian zone within Project-related land	8.7 Implementation of weed control programs within the riparian zone of the Glennies Creek, including removal of willow and other non-native trees.	Complete remediation of the riparian zone at a rate of 1 000m per year.
	8.8 Replant the riparian zone with appropriate species as described in Section B15.10.2.	
	8.9 Fence riparian zone or provide individual tree guards to protect the planted vegetation from grazing by stock.	
	8.10 Undertake maintenance of remediated areas.	
Improvement in the habitat value of Glennies Creek riparian zone within non-Project-related land	8.11 Proactively seek to enter into arrangements with surrounding landowners to remediate and manage those sections of the Glennies Creek riparian zone, including land within the creek alignment, that forms critical 'linkages' between the biodiversity offset areas and other areas of high biodiversity value.	Ongoing while ever the Proponent retains ownership of the land covered by the biodiversity offset areas.
	8.12 View favourably any request by land owners the Project Site for assistance in remediation of sections of the Glennies Creek riparian zone.	Upon request.
9 Aboriginal Heritage		
Identified Aboriginal sites are appropriately managed.	9.1 Develop a Management Protocol for Aboriginal Sites GC1 to GC19 in consultation with the Aboriginal groups listed in Section D7.1.2 (see Figure E1).	Prior to commencement of operations.
Unidentified Aboriginal sites are not disturbed by the Proponent's activities.	9.2 Confine ground disturbing work to areas where an Aboriginal heritage assessment has been completed.	Continuous during operations.
	9.3 Advise all staff and contractors regarding their responsibilities with regards to Aboriginal archaeological items under the <i>National Parks and Wildlife Act 1974</i> .	As required.
	9.4 Cease work immediately and contact the NSW DECC for advice, in the event that any further Aboriginal objects, including skeletal remains, are discovered.	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
10 Soil Management		
The Proponent's activities do not result in soil degradation or loss.	10.1 Strip soils in accordance with Table D38 .	Continuous during operations.
	10.2 Minimise handling of soils through direct replacement where practicable and selection of soil stockpile locations to avoid subsequent relocation.	
	10.3 Limit handling of soils during periods of high soil moisture.	
	10.4 Exclude mobile equipment from soil stockpiles once created.	
	10.5 Create topsoil stockpiles between 0.6m and 2m in height, and subsoil stockpiles less than 3m in height.	
	10.6 Position stockpiles away from direct surface water runoff or install upslope water diversion banks or similar controls.	
	10.7 Install downslope sedimentation controls until the soil stockpiles are appropriately stabilised.	
	10.8 Construct stockpiles such that the surfaces are rough.	
	10.9 Sow appropriate non-regenerating pasture species to stabilise stockpiles.	
	10.10 Exclude stock from the final rehabilitated landform and stockpiles.	
	10.11 Establish and use a soil inventory to identify all areas where soil has been stripped, re-spread or stockpiled, and the volumes of material involved.	
11 Visibility		
Day-time visibility of site activities limited.	11.1 Construct a visual amenity bund along Stony Creek Road to screen the open cut from motorists and others (see Figure E1).	During the initial operational phase
	11.2 Progressively reshape and rehabilitate the waste rock emplacements.	Continuous during operations.
	11.3 Consider any request by a potentially affected resident for assistance to create a visual screen on private land.	As required
Night-time visibility of site activities limited.	11.4 Construct haul routes as far as practicable such that headlights from haul trucks are not directed towards residences (see Figure E1).	Continuous during operations.



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
12 Surface Water		
All surface water managed such that dirty water is retained on-site and clean water is directed into natural drainage lines.	12.1 Construct the Northern Dirty Water Containment Dam and equip with a pump with a pumping capacity of 21L/s, as well as associated dirty water catch drains (see Figure E1).	Prior to commencement of operations
	12.2 Construct clean water diversions to divert clean water away from areas of disturbance to a standard suitable to contain an ARI 50 rainfall event (see Figure E1).	
	12.3 Construct the Southern Dirty Water Containment Dam and equip with a pump with a pumping capacity of 50L/s, as well as associated dirty water catch drains (see Figure E1).	Prior to the catchment for the Northern Dirty Water Containment Dam reaching 11ha.
	12.4 Maintain the Dirty Water Containment Dams in an empty state and pump water out of these dams promptly following a rainfall event.	Continuous during operations.
	12.5 Maintain the maximum operation level of Possum Skin Dam at 87.5m AHD.	
	12.6 Progressively rehabilitate waste rock emplacements to maximise the volume of clean water runoff to natural drainage and losses by evapotranspiration.	
	12.7 Continue current Water Management System.	
	12.8 Pump water from the Camberwell North Pit sump to Possum Skin Dam, the open cut and/or Camberwell South Pit in the event that water levels in the sump approach the level of the Glennies Creek Underground Coal Mine portal.	As required.
13 Groundwater		
All saline groundwater retained on site.	13.1 Pump groundwater from in-pit drainage sumps in accordance with the Glennies Creek / Camberwell site water management system.	Continuous during and following operations.
No build up of highly saline water within final void.	13.2 Backfill the final void with breaker stone or reject material from the Camberwell CHPP.	Following completion of mining related activities.
14 Transportation		
Project-related impacts on transportation and the road network surrounding the Project Site are limited.	14.1 Adopt an appropriate design for the intersection of the site access road and Middle Falbrook Road.	Prior to commencement of operations.
	14.2 Development of a Traffic Management Plan to minimise safety risks and impacts associated with construction of the intersection between the site access road and Middle Falbrook Road.	
	14.3 Adhere to RTA and Council restrictions on transport hours and safety/warning requirements for transportation of "oversize" loads.	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing	
14 Transportation (Cont'd)			
Project-related impacts on transportation and the road network surrounding the Project Site are limited.	14.4	Include a requirement for all employees, contractors, suppliers and service providers to drive responsibly on local roads, as well as a mechanism to report alleged incidents of irresponsible driving to the Proponent.	Prior to commencement of operations.
	14.5	Minimise the duration of the road closures on Stony Creek Road as a result of blasting.	During all blasts.
	14.6	Schedule blasts to avoid peak traffic periods and school bus timetables.	Prior to all blasts.
	14.7	Notify the community of approximate road closure times via local media outlets and signs on Stony Creek Road.	Prior to all blasts.
	14.8	Notify the community of updated closure times 30 to 60 minutes prior to a blast via automated SMS text messages to those who request to be included on the notification list.	Continuous during operations.
	14.9	Co-ordinate blasting times with Ashton Coal Operations to avoid the potential for coincident closure of both Glennies Creek and Stony Creek Roads.	
	14.10	Control blasts such that the traffic controllers stationed on Stony Creek Road may suspend the blast to allow Emergency vehicles to pass.	
14.11	Develop a Blast Management Plan consistent with the above to ensure the safety of employees and the public.	Prior to commencement of operations.	
15 Socio-Economic Environment			
Any negative impacts on the social fabric or facilities available to the Glennies Creek community are minimised.	15.1	Give preference to prospective tenants of Project-related residences based on those with primary aged children who would attend the Mt Pleasant Public School.	As required.
	15.2	Consider funding support to maintain the current levels of staff and facilities at the Mt Pleasant Public School should enrolments fall below the relevant funding thresholds as a result of the Project.	
16 Environmental Monitoring			
Ongoing monitoring of air quality.	16.1	Continue operation of and recording of data from the following monitoring locations. a. Camberwell Coal meteorological station. b. PM ₁₀ monitors HV1 and HV3. c. High volume dust monitors, HV1, HV2 and HV3. d. The current network of dust deposition gauges (see Figure E2).	Ongoing.
Ongoing monitoring of noise and blast impacts.	16.2	Establish a network of monitoring locations and report the results of regular noise and blast monitoring in each Annual Environmental Management Report (AEMR) (see Figure E2).	Continuous during operations.
	16.3	Monitor each blast at a selection of local residences, subject to landholder agreement.	



Table E1 (Cont'd)
Draft Statement of Commitments for the Proposed Glennies Creek Open Cut Coal Mine

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Desired Outcome	Action	Timing
16 Environmental Monitoring (Cont'd)		
Ongoing monitoring of fauna-related impacts.	16.4 Monitor the fauna within the Project Site and biodiversity offset areas in accordance with the objectives recorded in the Mining Operations and Species Management Plans.	Continuous during operations.
Ongoing monitoring of flora-related impacts	16.5 Undertake annual surveys of selected monitoring sites 16.6 Report the results of the monitoring program in each Annual Environmental Management Report	Annually during and following operations until rehabilitation has been completed successfully.
Ongoing monitoring of surface water impacts.	16.7 Continue monitoring of the water level within the Camberwell North Pit sump. 16.8 Monitor and regularly report the volumes of water pumped between storages on site. 16.9 Monitor and regularly report volumes of water used in the Camberwell CHPP and exported to other mining operations.	Continuous during and following operations.
	16.10 Measure the salinity of water in the proposed open cut and final void.	Monthly during and following operations.
Groundwater impacts monitored.	16.11 Monitor bores GC01 to GC16, GCTB, GW067291, GW049285 and GW011543 for the water level, pH, EH and salinity (see Figure E2), until such time as any bore is removed by mining activities or mining has ceased within the open cut and groundwater impacts have stabilised.	Monthly during and following operations.
	16.12 Monitor the above bores biannually for Na, Mg, Ca, Cl, HCO ₃ , SO ₄ and total Fe, until such time as any bore is removed by mining activities or mining has ceased within the open cut and groundwater impacts have stabilised.	Biannually during and following operations.
17 Documentation		
Ensure appropriate documentation of the proposed mining-related activities	17.1 The Proponent would prepare the following documentation. <ul style="list-style-type: none"> • Mining Operations Plan. • Safety Management Plan. • Species Management Plans. • Traffic Management Plan. • Aboriginal Heritage Management Protocol. • Rehabilitation Procedures. • Blast Management Plan. • Water Management. • Waste Management Plan. 	Prior to commencement of operations with annual review and revision.
	<ul style="list-style-type: none"> • Mine Closure Plan. 	Two years prior to cessation of mining operations.



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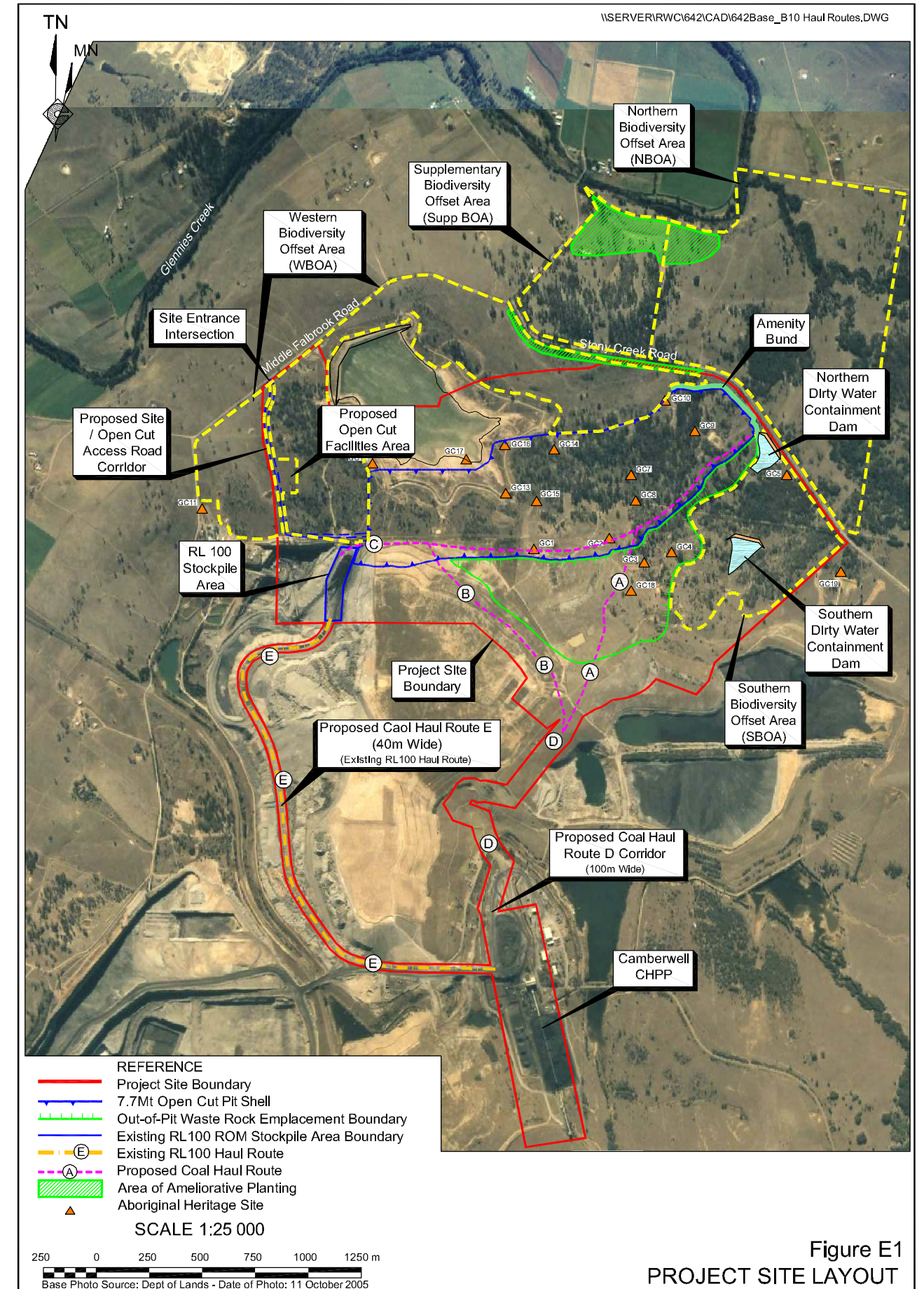
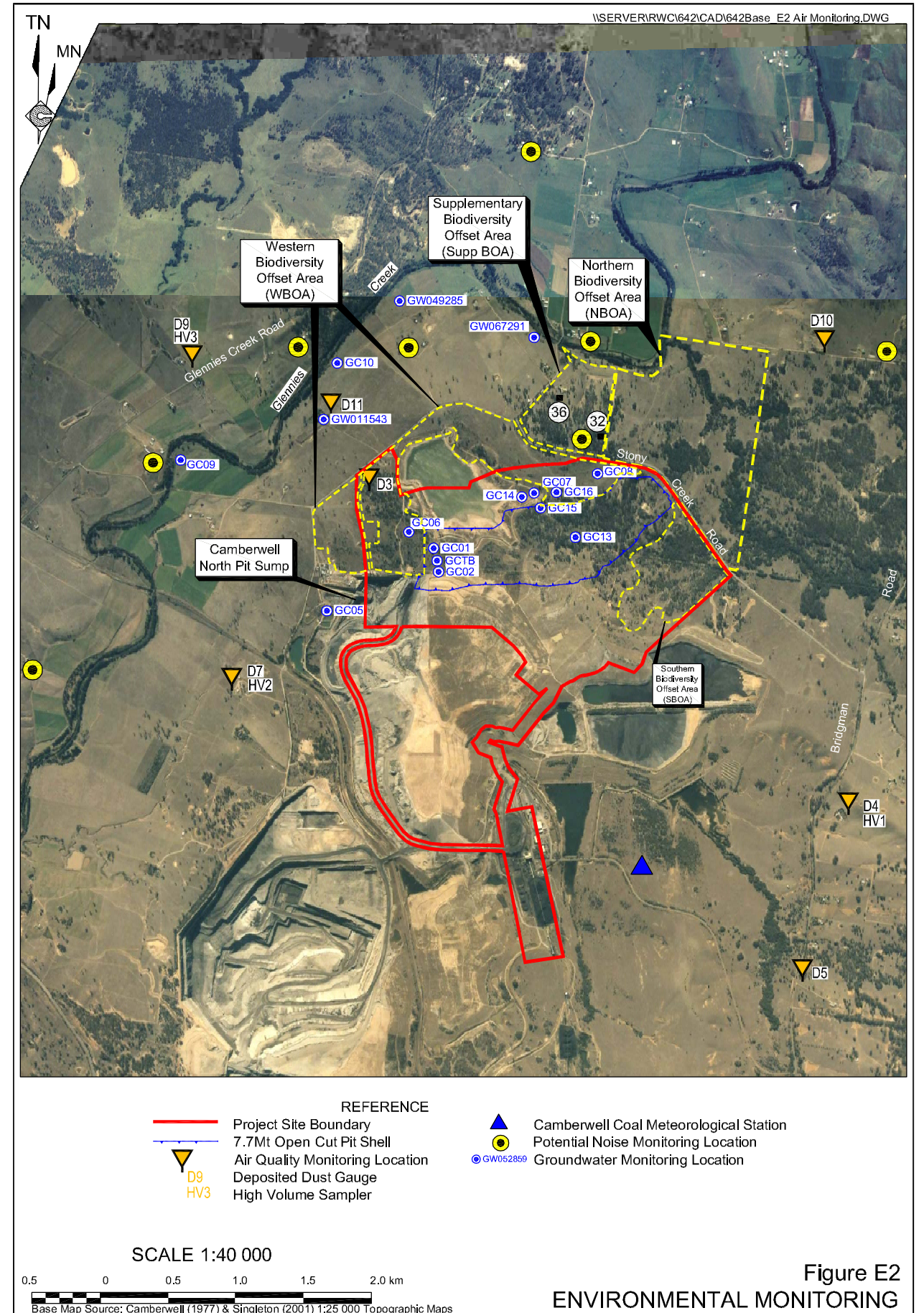


Figure E1
PROJECT SITE LAYOUT



Part F

Evaluation and Justification of the Project

Preamble

This part of the Environmental Assessment concludes the document with an evaluation of the Glennies Creek Open Cut Coal Mine Project. Alternative development options are considered and the residual environmental risks assessed. This Part also includes an assessment of the Project against the principles of Ecologically Sustainable Development, and concludes with a justification of the Project.



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F1 DEVELOPMENT ALTERNATIVES

F1.1 Introduction

The Director-General's requirements issued on 25 January 2007 required that the *Environmental Assessment* include a detailed description of the development alternatives considered.

The considerations of feasible alternatives to the proposed activities are discussed in this Part and relate principally to:

- alternative open cut pit sizes;
- alternative mining methods;
- alternative mining sequences;
- alternative waste rock emplacement designs;
- alternative waste rock emplacement locations; and
- alternative dirty water containment design.

The alternative of not developing the proposed open cut is considered in Part F3.

F1.2 Alternative Open Cut Pit Sizes

The Project as proposed would recover an estimated 7.7Mt of coal from the area of the proposed open cut shown in **Figure B3**. Extension of the proposed open cut to the south and east is constrained by the sub-cropping of the mineable coal seams, as well as current and former mining activities. Extension of the proposed open cut northwards was considered during the planning phase of the Project but ultimately rejected due to the factors listed below.

- Extension to the northeast would require the relocation of Stony Creek Road for comparatively low yields.
- Extension to the north would encounter prohibitive stripping ratios, rendering such an extension uneconomic under current market conditions.
- As discussed in detail in Part B1.3.1, there is the potential to extract a further 1.3Mt of coal from an area to the northwest of the proposed open cut (**Figure B2**). This, however, would encroach upon Possum Skin Dam and impact on the integrated site water management system by reducing the on-site water storage and evaporation capacity. The Proponent is unwilling at present to reduce this capacity. As a result, extraction of this coal does not form a part of this application. However, should the Proponent elect to exploit the remaining coal reserve beneath Possum Skin Dam in the future, a subsequent modification application and related environmental assessment would be submitted to the Department of Planning.
- Extension of the proposed open cut to the west would encounter high stripping ratios, require relocation of the Glennies Creek Colliery surface facilities and, possibly, Middle Falbrook Road.



F1.3 Alternative Mining Methods

Underground longwall mining methods were considered but as the coal seams within the proposed pit shell are relatively close to the surface, open cut mining is more economically viable than underground mining. In addition, the coal to be mined consists of multiple seams with only limited thicknesses of intervening interburden which would preclude a multi seam underground mining operation.

F1.4 Alternative Mining Sequences

The option of mining the proposed open cut from west to east rather than east to west was considered. This alternative would have allowed for the enhancement of the biodiversity offset areas over a longer timeframe prior to disturbance of areas of native vegetation with high biodiversity value in the eastern section of the open cut. However, this option was rejected for the following reasons.

- It would prevent the future recovery of the 1.3Mt coal resource beneath the southern part of Possum Skin Dam (see Part B1.3.1).
- It would result in the final void being located in the northeast of the proposed open cut which would prevent access to any potential underground coal resource to the north and west of the proposed open cut from the Glennies Creek final void.
- Commencement of open cut mining in the west would initially result in a longer haul distance for waste rock during the early stages of the proposed mining sequence, significantly impacting on the viability of the Project.

F1.5 Alternative Waste Rock Emplacement Designs

A number of alternative final landforms for the waste rock emplacements were considered during the environmental assessment process. The alternatives, together with their advantages and disadvantages are provided in **Table F1**.

Table F1
Alternative Waste Rock Emplacement Designs

Design	Advantages	Disadvantages
Higher emplacement with smaller disturbance footprint.	<ul style="list-style-type: none"> • Smaller footprint hence less area of vegetation cleared. 	<ul style="list-style-type: none"> • Increased visual impact from a more imposing landform and less aesthetic blending with the existing Camberwell waste rock emplacement.
Lower emplacement with steeper slopes.	<ul style="list-style-type: none"> • Less visually intrusive. 	<ul style="list-style-type: none"> • Steeper slopes would result in less successful or unsuccessful rehabilitation, and a higher potential for erosion.
Lower emplacement with larger disturbance footprint.	<ul style="list-style-type: none"> • Less visually intrusive. 	<ul style="list-style-type: none"> • Clearing of additional vegetation and habitat would be required.

The design presented in Part B7.3 was considered the best compromise between potential visual impacts, impacts on native vegetation and fauna, and providing a stable final landform.



F1.6 Alternative Waste Rock Emplacement Locations

A number of alternative out-of-pit waste rock emplacement locations were considered. The two feasible alternative locations and their advantages and disadvantages are presented in **Table F2**. It is further noted that footprint of the selected out-of-pit waste rock emplacement was refined/adjusted to minimise impacts upon known Brush-tailed Phascogale habitat.

Table F2
Alternative Waste Rock Emplacement Locations

Alternative Emplacement Location	Advantages	Disadvantages
North of the proposed open cut.	<ul style="list-style-type: none"> Minimise the area of disturbance of native vegetation. 	<ul style="list-style-type: none"> Emplacement closer to surrounding residences with resulting increased air quality, noise and visual amenity impacts. Increased haul distances and costs.
Infilling of the Camberwell North Pit.	<ul style="list-style-type: none"> No or reduced out-of-pit waste rock emplacement. 	<ul style="list-style-type: none"> Block access to the Glennies Creek Underground Coal Mine.

The footprint of the proposed waste rock emplacement is considered to be the best location because impacts on residents would be minimised and continued access to the Glennies Creek Underground Coal Mine operations would not be compromised.

F1.7 Dirty Water Containment Design

The Proponent considered using a single, larger Dirty Water Containment Dam in the same location as the Northern Dirty Water Containment Dam. However, the footprint of the single Dirty Water Containment Dam would have impinged upon the area of the Bull Oak Forest Community to the east of the out-of-pit waste rock emplacement and would have resulted in a greater loss of habitat suitable for the threatened Brush-tailed Phascogale than the proposed Dirty Water Containment Dam design. As a result, the construction of a single Dirty Water Containment Dam was rejected in favour of a small dam and a supplementary Southern Dirty Water Containment Dam.

F2 PROJECT EVALUATION

F2.1 Introduction

In order to evaluate the environmental impact of the Project, the residual impacts of the Project, ie. those predicted following the adoption of the proposed design and operational safeguards and management measures, were examined through the completion of a further environmental risk analysis for the Project (Part F2.2). The residual environmental impacts are then evaluated in the context of ecologically sustainable development, to further consider their acceptability (Part F2.3).

Part F2.4 presents an overall summary of the Project evaluation. This forms the basis for the Project justification presented in Part F3.



F2.2 Residual Environmental Risks

An assessment of the unmitigated environmental risks associated with the Project has previously been presented in **Table C2**. Taking into account the design and operational safeguards and management measures described in Part D, together with the commitments provided in Part E, an assessment of the mitigated risks associated with the Project was completed for each potential environmental impact based on the likelihood of occurrence and potential environmental consequence. **Tables C2, C3 and C4** which outline the basis for determining the risk posed (without mitigation) are reproduced as **Tables F3, F4 and F5**. **Table F6** reproduces the results of the analysis of, (unmitigated) risk together with the residual (mitigated) risks associated with the Project.

Table F3
Qualitative Consequence Rating

Level	Descriptor	Description
5	Catastrophic	<ul style="list-style-type: none"> • Massive and permanent detrimental impacts on the environment. • Very large area of impact. • Massive remediation costs. • Reportable to government agencies. • Large fines and prosecution resulting in potential closure of the operation.
4	Major	<ul style="list-style-type: none"> • Extensive and/or permanent detrimental impacts on the environment. • Large area of impact. • Very large remediation costs. • Reportable to government agencies. • Possible prosecution and fine.
3	Moderate	<ul style="list-style-type: none"> • Substantial temporary or minor long term detrimental impact to the environment. • Moderately large area of impact. • Moderate remediation costs. • Reportable to government agencies. • Further action may be requested by government agency.
2	Minor	<ul style="list-style-type: none"> • Minor detrimental impact on the environment. • Affects a small area. • Minimal remediation costs. • Reportable to internal management only. • No operational constraints posed.
1	Insignificant	<ul style="list-style-type: none"> • Negligible and temporary detrimental impact on the environment. • Affects an isolated area. • No remediation costs. • Reportable to internal management only. • No operational constraints posed.

Source: Modified after Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(B)

Table F4
Qualitative Likelihood Rating

Level	Descriptor	Description
A	Almost Certain	Is expected to occur in most circumstances.
B	Likely	Will probably occur in most circumstances.
C	Possible	Could occur.
D	Unlikely	Could occur but not expected.
E	Rare	Occurs only in exceptional circumstances.

Source: Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(A)



Table F5
Risk Matrix

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (Almost Certain)	H	H	E	E	E
B (Likely)	M	H	H	E	E
C (Possible)	L	M	H	E	E
D (Unlikely)	L	L	M	H	E
E (Rare)	L	L	M	H	H

Note: Rating after Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(C)

Table F6
Mitigated Risks Associated with the Project

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Environmental Issue	Risk Source/Potential Impact(s)	Potential Environmental Impacts	Unmitigated Risk	Mitigated Consequence	Mitigated Likelihood	Mitigated Risk
Water	• Discharge of dirty, saline or contaminated water to surface drainages or aquifers.	• Reduced water quality and impacts on downstream ecosystems, agriculture and groundwater quality.	M	3	E	M
	• Reduction in environmental flows through on-site capture of water.	• Reduced natural surface water flows and impacts on downstream ecosystems, agriculture and groundwater quality.	M	1	C	L
	• Pollution of groundwater by hydrocarbons, salinity and chemicals.	• Reduced groundwater quality and impacts on ecosystems and agriculture at and downstream from discharge point.	L	3	E	L
	• Reduction of groundwater levels due to mine in-flows.	• Reduction of groundwater levels and impacts on ecosystems and agriculture at and downstream from discharge point.	M	2	E	L
	• Altered flood regimes.	• Indirect impacts on native vegetation communities and ecosystems.	L	2	E	L
Air Quality	• Dust emissions from mine operations and vehicle movements.	• Nuisance / amenity impacts from dust deposited on window sills, cars, surfaces etc. Adverse health impacts if PM ₁₀ levels are excessive.	H	3	D	L
	• Greenhouse gas emissions from mining and transportation operations.	• Contribution to global greenhouse gas emissions.	L	1	B	M
	• Greenhouse gas emissions from burning product coal.	• Contribution to global greenhouse gas emissions.	M	1	B	M
	• Emission of odours, noxious gases (ie. NO, SO ₂).	• Nuisance/health impacts on residents.	L	2	E	L
Flora and Fauna	• Removal of native vegetation due to land clearing activities.	• Loss of, or alteration to, existing vegetation communities and habitats, as well as adverse impacts on fauna. Reduced biodiversity.	H	2	C	M
	• Disturbance to habitat as a result of project operations, ie. noise, dust, contaminated water etc.	• Direct adverse impact(s) on threatened species, populations or communities. Reduced biodiversity.	H	2	E	L

Notes

- 1 – Potential consequence of destruction of Aboriginal objects can only be assessed by the local Aboriginal community. For the purpose of this risk analysis consequence is assumed to be Moderate.
2 – Other potential socio-economic impacts such as noise and dust have been analysed under those specific issues



Table F6 (Cont'd)
Mitigated Risks Associated with the Project

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Environmental Issue	Risk Source/Potential Impact(s)	Potential Environmental Impacts	Unmitigated Risk	Mitigated Consequence	Mitigated Likelihood	Mitigated Risk
Noise and vibration	• Increased noise levels from mine and ancillary operations.	• Nuisance / amenity impacts, including sleep disturbance.	H	2	D	L
	• Increased levels of vibration from mine blasting.	• Structural damage to buildings and structures. Nuisance / amenity impacts on surrounding landowners / residents. Reduced agricultural production.	L	2	E	L
Rehabilitation, Final Landform	• Modified / unstable landform on completion of the Project.	• Excessive erosion, modified water flows, safety issues, permanent scaring.	H	2	D	L
	• Reduced capability of final landform or failure of rehabilitation.	• Reduced biodiversity and/or agricultural production. Erosion, dust generation, permanent scaring.	H	2	D	L
Transportation	• Increased traffic levels due to movement of workforce and contractors.	• Increased traffic congestion. Elevated risk of accident/incident on local roads. Road pavement deterioration.	M	1	D	L
	• Temporary closure or other restriction on road network.	• Delayed journeys, unpredictable arrival times.	M	2	D	L
	• Simultaneous closure of Stony Creek and Glennies Creek Roads.	• Closure of the most convenient access routes to the Glennies Creek area.	M	2	D	L
Aboriginal Heritage ¹	• Removal or destruction of Aboriginal sites and/or objects.	• Impact on Aboriginal cultural heritage.	H	3	E	M
Visual Amenity	• Changes in visual characteristics of the Project Site.	• Decreased visual amenity.	M	1	D	L
Socio-Economic Impacts ²	• Potential changes in employment and infrastructure.	• Improved economic activity and related social impacts attributable to reduced unemployment.	NA			
	• Perceived or actual Impacts on amenity of neighbouring properties.	• Reduced quality of life (actual or perceived) and / or property values.	M	1	D	L
	• Reduced property values due to presence of mining operation.	• Reduced individual wealth.	M	1	C	L
Soil and Land Capability	• Reduction in soil quality through stripping and stockpiling.	• Erosion, reduced soil capability, biodiversity and / or agricultural productivity.	H	3	D	M
	• Increased erosion and soil loss through poor rehabilitation and / or surface water control.	• Reduced soil capability, agricultural productivity or biodiversity, permanent scaring.	H	2	D	L

Notes

1 – Potential cultural consequence of destruction of Aboriginal objects can only be assessed by the local Aboriginal community. For the purpose of this risk analysis consequence is assumed to be Moderate. (TABLE AMENDED TO REFLECT THIS NOTE)

2 – Other potential socio-economic impacts such as noise and dust have been analysed under those specific issues



As can be seen from **Table F6**, the proposed design and operational safeguards, together with the proposed management measures, are anticipated to reduce the likelihood of an environmental incident occurring as a result of the Proponent's activities. In a number of instances, the measures are also expected to result in a reduction in the consequence of a potential impact or risk. As a result, the proposed safeguards and management measures are anticipated to reduce the risk of unwanted environmental impact or incidents to low to moderate.

It is acknowledged, however, that this analysis of environmental risk is based on a community wide assessment. Individuals within the community may be impacted to greater or lesser extent and have different perceptions of environmental values. The degree of impact upon a particular resident would be dependent on the distance and direction of their residence from the Project Site, the topographic position of the residence in relation to the Project Site and the sensitivity of each resident to the particular class of impact.

F2.3 Ecologically Sustainable Development

F2.3.1 Introduction

Ecologically sustainable development (ESD) is defined in Section 6(2) of the *Protection of the Environment Administration Act 1991* as follows.

Ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

- (a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
 - (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
 - (ii) an assessment of the risk-weighted consequences of various options,**
- (b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*
- (c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*
- (d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as:
 - (i) polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,**



- (ii) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
- (iii) *environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (The World Commission for the Environment and Development, 1988, p.43). The principle aims to allow the needs of the present generation to be met, while conserving the long-term viability of ecosystems for future generations. The 1992 *Inter-governmental Agreement on the Environment* identified four key guiding principles for ESD. These are:

- the precautionary principle;
- social equity through intra- and inter-generational equity;
- the conservation of biodiversity and ecological integrity; and
- the promotion of improved valuation and pricing of environmental resources.

During the design and planning phase, the Proponent endeavoured to address each of the principles outlined above, namely:

- the precautionary principle;
- social equity through intra- and inter-generational equity;
- the conservation of biodiversity and ecological integrity; and
- the promotion of improved valuation and pricing of environmental resources.

In addition, the Proponent modified the proposed Project design and/or operational aspects of the Project where impacts inconsistent with the above principles were highlighted during the environmental assessment.

Each of the above principles are discussed below in light of the Project objectives and the proposed design and management safeguards.

F2.3.2 Precautionary Principle

The precautionary principle holds that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental impacts. In the application of this principle, decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and an assessment of the risk-weighted consequences of various options should be made. Emphasis must be placed on anticipation and prevention of environmental damage, rather than remediation after the damage has occurred.



For the proposed Glennies Creek Open Cut Coal Mine, the Proponent has engaged eight specialist consultancies to conduct detailed assessments of a number of areas identified during the consultation and risk assessment phase outlined in Part C. These assessments ensure that there is a sufficient scientific understanding of the Project and the surrounding environment to enable the Minister to make a decision consistent with this principle.

Project Objectives

The principal objectives of the Project are the design and operation of an open cut mine in a manner that minimises surface disturbance and impact on the environment and surrounding residents, as well as ensuring compliance with environmental criteria, reasonable community expectations and all relevant statutory requirements through appropriate design, management and mitigation measures.

Design Safeguards

A number of design features were incorporated during the initial design stage in recognition of the Precautionary Principle. In addition, subsequent modifications were made in response to issues identified during the specialist consultant investigations undertaken as part of the environmental assessment phase. These design features and modifications included the following.

- The out-of-pit waste rock emplacement was designed to avoid an area of native vegetation to the east of the proposed open cut. The design was subsequently altered to also avoid an area with a number of trees with hollows that form habitat for the Brush-tailed Phascogale.
- The site access road was realigned to avoid an area of native vegetation to the west of Possum Skin Dam.
- The original design included a final void at the western end of the open cut. However, when groundwater modelling indicated that unacceptably high salinity levels would develop in the void, the proposed design was altered such that the final void would be filled eg. with breaker stone from the Glennies Creek Underground Coal Mine's pre-treatment plant or reject material from the Camberwell CHPP.
- Haul routes have been placed, as far as practicable, within the open cut and out-of-pit waste rock emplacement footprints to avoid disturbing additional areas of native vegetation.
- The slopes of the final landform would vary from approximately 1:5 (V:H) to 1:25 (V:H) to mimic the slopes of the natural landform within and adjacent to the Project Site. This would also minimise the potential for erosion and topsoil loss requiring further rehabilitation.
- The initial project design included a single dirty water containment dam. However following identification of habitat suitable for the threatened Brush-tailed Phascogale and likely impacts on the Bull Oak Forest Community, a two dam design was introduced.



Management and Operational Safeguards

The framework for ongoing environmental management, operational performance and rehabilitation of the Project Site would be provided through the project approval and would be managed in accordance with the DPI - MR Mining, Rehabilitation and Environmental Management Process, and would involve the input from relevant State and local government agencies. The Mining Operations Plan would contain a range of site specific environmental procedures to achieve consistency with planned outcomes and to control identified risks. The Annual Environmental Management Report would report on the progress of the operation and provide an opportunity to review the effectiveness of the environmental management strategies adopted. In addition, the following management and operational safeguards would be implemented.

- All on-site procedures would be regularly reviewed, particularly in light of monitoring results.
- Air quality, noise and ground vibration, would be monitored at selected locations to ensure the routine compliance with the goals outlined in those Parts.
- Regular monitoring of the status of rehabilitation, regeneration and enhancement programs within the Project Site and the biodiversity offset areas would be undertaken, with particular attention paid to threatened and vulnerable species. Remediation actions would be undertaken when identified as necessary following monitoring.
- Topsoil and subsoil would be stripped, stockpiled and re-spread in accordance with the procedures outlined in Part D8. An inventory of all stripped, stockpiled and re-spread soils would be maintained to ensure potential rehabilitation issues are identified and rectified.
- The surface and groundwater structures and management procedures outlined in Parts D10 and D11 would be implemented to prevent contaminated surface runoff leaving site, or significant erosion occurring and be monitored.

Rehabilitation and Subsequent Land Use

Long term adverse impacts on the environment would be avoided through:

- creation of a stable, free-draining final landform which blends with the surrounding landforms;
- progressive rehabilitation, including shaping of the final landform, spreading of subsoil and topsoil and reseeding or replanting with endemic, locally sourced species as described in Parts B15, D4 and D5; and
- a final land use of native conservation for the rehabilitated mine area and biodiversity offset areas which would, in the longer term, provide significant habitat with enhanced biodiversity values.



Conclusion

The precautionary principle has been considered during all stages of the design and assessment of the Project. The approach adopted, including initial design, risk analysis, consultation, specialist environmental assessment, design modification and safeguard design, provides a high degree of certainty that the Project would not result in any major unforeseen impacts.

F2.3.3 Social Equity

Social equity includes both intra- and inter-generational equity. Intra-generational equity requires that the economic and social benefits of the Project be shared equitably among all members of the community, ie. both groups and individuals. Inter-generational equity requires that the present generation pass onto the next generation an environment that does not limit the ability of future generations to attain a quality of life at least equal to that of current generation.

Both elements of social equity are addressed through the design of the Project, the implementation of operational safeguards to mitigate any short-term or long-term environmental impacts, and the proposed rehabilitation of the areas directly disturbed. Examples of matters relating to social equity that are relevant to the various stages of the Project are listed below.

Project Objectives

The objectives of the Project are to design and operate the open cut in a cost-effective manner to ensure security of employment, both within and outside the Hunter Valley. In addition, the Proponent intends to maintain an open and honest relationship with the members of the surrounding community through ongoing consultation, and address issues of concern as they arise.

The Proponent intends to ensure inter-generational equity by incorporating long-term offset strategies and preserving the disturbed areas following completion of mining for nature conservation. Furthermore, the Project would continue, and increase, the opportunities for economic activity in the local area both directly and indirectly.

Design Safeguards

The Project has been designed to maintain inter-generational equity by ensuring components of the existing biological, social and economic environment available to the present generation would also be available to future generations. Examples include the following.

- Enhancement and perpetual protection of the biodiversity offset areas and rehabilitated Project Site. This, in particular, would provide habitat and protection for the threatened Brush-tailed Phascogale and Grey-crowned Babbler.
- The location and orientation of the out-of-pit waste rock emplacement, open cut facilities area site access road and dirty water containment dams have been designed to ensure the least possible area of disturbance to native vegetation and sensitive fauna habitats.



- The waste rock emplacement has been designed to blend into the existing topography, reducing the visual impact of the final landform.
- The final void would be filled to the present surface. This would prevent excessively saline water accumulating within the final void.

Management and Operational Safeguards

The Proponent has, and would continue to ensure inter- and intra-generational equity through the following management and operational safeguards.

- Consultation with local community stakeholders to ensure the Project does not have a significant negative impact on the facilities, services and amenity of the area surrounding the Project Site.
- The Proponent recognises the importance of ensuring the preservation of the Aboriginal sites identified during the Aboriginal heritage assessment. Accordingly, the Proponent would develop an appropriate management protocol as outlined in Part D7.5 to salvage and store any Aboriginal artefacts that would otherwise be disturbed by the Proponent's activities in an appropriate manner. This would ensure that these artefacts are available for future generations.

Rehabilitation and Subsequent Land Use

The final landform would be constructed and rehabilitated in a manner that would blend with the existing landscape. Specifically, the slopes of the rehabilitated landform would be similar to the surrounding natural and man-made landforms, and the upper surface would be gently undulating. The planned nature conservation land use would be consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* and the *Glennies Creek Catchment – Total Catchment Management Study – Management Strategy* and would preserve and enhance the biodiversity values in the vicinity of the Project Site for future generations.

Conclusion

The principle of social equity has been addressed throughout the design of the Project. It would contribute to the economic activity of the Singleton Local Government Area and the Hunter Valley as a whole by stimulating demand for local goods and services. As such, the benefits of the Project would be distributed throughout the local community. The Proponent would adopt a pro-active approach to identifying and addressing any concerns identified by the local community or its members.

The Project was also designed such that elements of the existing environment available to this generation, including land for nature conservation purposes, would be enhanced and would continue to be available to future generations.



F2.3.4 Conservation of Biodiversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological integrity are central goals of sustainability. Biodiversity is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term. Details of how the Project has been designed to achieve compliance with these principles are set out below.

Project Objectives

The Proponent is committed to undertake all activities in an environmentally responsible manner, and recognises the need to ensure that changes to natural components of the environment do not adversely affect biological diversity or ecological integrity. As such, the Project has been designed with an objective of minimising impacts on the flora and fauna within and in the vicinity of the Project Site, whilst allowing the extraction of an economically viable resource.

Design Safeguards

The following design features were incorporated into the Project to ensure that the impact of the Proponent's activities on the biodiversity and ecological integrity of the Project Site and surrounding areas are minimised.

- The biodiversity offset areas have been selected:
 - to be as close as possible to the Project Site;
 - to incorporate as much existing native vegetation as possible;
 - to be consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* and the *Glennies Creek Catchment – Total Catchment Management Study – Management Strategy*; and
 - to incorporate the greatest variety of habitat as possible, including riparian, river flat, and hill slope areas.
- Design of the out-of-pit waste rock emplacement and dirty water containment dams to avoid as much native vegetation as possible, including refining the footprints in light of the identification of habitat for the threatened Brush-tailed Phascogale along a road reserve to the east of the proposed open cut.
- Nesting boxes suitable for Brush-tailed Phascogale would be erected within the Northern Biodiversity Offset Area to compensate for clearing of native vegetation within the Project Site.



Management and Operational Safeguards

The following management and operational safeguards would be incorporated by the Proponent to ensure that the impact of its activities on the biodiversity and ecological integrity of the Project Site and surrounding areas is minimised.

- Clearing of native vegetation would preferentially occur in late Spring and early Autumn to avoid nesting or roosting fauna. In addition, trees with hollows would be inspected prior to any clearing commencing, and any threatened nesting or roosting animals would be relocated appropriately.
- Enhancement of the biodiversity offset areas and areas of the Project Site that would not be disturbed would commence as soon as possible. This would include planting or spreading seed of endemic flora species, and installing nesting boxes and roosting tubes in trees within the biodiversity offset areas.
- Suitable cleared vegetation would be retained and used during rehabilitation of disturbed areas or relocated to the biodiversity offset areas.
- Weed eradication programs would be implemented, as required.

Biodiversity Offset Strategy

The Biodiversity Offset Strategy would enhance and protect in perpetuity approximately 254ha of Project-related land, namely the Northern, Southern and Western Biodiversity Offset Areas. In addition, the Biodiversity Offset Strategy would enhance and protect a further 33ha of non-Project-related land, namely the Supplementary Biodiversity Offset Area.

The areas of each vegetation community and fauna habitat area that would be preserved within the biodiversity offset areas and the areas that would be disturbed by the Project are presented in **Tables F7** and **F8** respectively.

Table F7
Vegetation Community Areas

	Area to be Disturbed ¹	Area within the Biodiversity Offset Areas ¹
Tussock Grassland Community	6.1	44.4
Regenerating Native Woodland / Shrubland	0.7	74.0
Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community	68.3	113.1
Bull Oak Community	-	20.9
Swamp Oak Community	-	33.4
River Oak Community	-	1.5
Note 1: Areas in ha and approximately only		



Table F8
Fauna Habitat Areas

	Area to be Disturbed¹	Area within the Biodiversity Offset Areas¹
Open Pastures	3.8	135.6
Open Woodland	34.3	60.9
Woodland	42.4	47.0
Riparian Oaks	-	41.5
Wetland / Dams	8.7	1.1
Note 1: Areas in ha and approximately only		

For each vegetation community and fauna habitat, the proposed Biodiversity Offset Strategy would, with one exception, preserve an area within the biodiversity offset areas that is greater than the area to be disturbed. The exception is the Wetland / Dams Fauna habitat. Approximately 8.7ha of this habitat type comprising a section of Possum Skin Dam, would be disturbed. This dam was constructed and is used as an evaporation pond for the surface water management system for the Glennies Creek Colliery and the Camberwell Coal Mine. In addition, the proposed Biodiversity Offset Strategy would preserve areas of three vegetation communities and one fauna habitat that would not be disturbed by Project-related activities. As a result, the proposed Biodiversity Offset Strategy would result in protection of a greater range and area of vegetation communities and habitat areas than would be disturbed by the proposed activities and, as a result, the Project would preserve or enhance ecosystem diversity in the vicinity of the Project Site and would not threaten the integrity of the ecological systems in the short or long-term.

Rehabilitation and Subsequent Land Use

Post-mining rehabilitation of the final landform would include the reseeded or planting of native vegetation, including the threatened Western Golden Wattle (*Acacia decora*). The final landform would be used for nature conservation, which would, in the medium- to long-term, increase the area and value of available habitat.

Conclusion

It is anticipated that the Project would have little impact on local or regional biodiversity. Notwithstanding, disturbance to areas of native vegetation would be minimised wherever possible. Enhancement of the biodiversity offset areas through placement of hollow logs and erection of nesting boxes would increase the habitat available in the short-term for the Brush-tailed Phascogale in particular. The post-mining use of the final landform for nature conservation purposes would increase the biodiversity value of the Project Site and surrounds in the medium- to long-term.



F2.3.5 Promotion of Improved Valuation and Pricing of Environmental Resources

This principle is premised on the assumption that all resources are appropriately valued and priced based upon the full life cycle of those resources, with appropriate and cost-effective environmental stewardship encouraged. A reflection on these issues with regards to the Project is set out below.

Project Objectives

The principal objectives of the Project are to operate the proposed open cut in a safe, environmentally responsible and cost-effective manner. This places environmental considerations at the forefront of the Proponent's decision-making process and demonstrates that an appropriate value has been placed on elements of the existing environment.

Design, Management and Operational Safeguards

The extent of research, planning and design of environmental safeguards and mitigation measures, as well as the Proponent's willingness to ensure the biodiversity offset areas and Project Site are used for nature conservation following the completion of mining activities, is evidence of the value placed by the Proponent on the ecological resources within and in the vicinity of the Project Site.

Rehabilitation and Subsequent Land Use

The extent and anticipated cost of the proposed rehabilitation, enhancement and weed control programs the Proponent intends to implement illustrates the value placed by the Proponent on the ecological resources within the Project Site and biodiversity offset areas.

Conclusion

The value placed by the Proponent on ecological resources is evident from the extent of site-specific investigations, planning and environmental safeguards and measures that have been undertaken and which would be implemented to prevent irreversible damage to the environment within, and in the vicinity of, the Project Site and biodiversity offset areas. It is anticipated that the income received from the sale of the coal would be sufficient to enable the Proponent to achieve an acceptable profit level whilst completing all environment-related tasks, commitments and conditions attached to all consents, leases, licences and approvals.

F2.3.6 Compatibility with the Principles of ESD

The approach taken in planning the Project has been multi-disciplinary, involving consultation with stakeholders and various government agencies, with emphasis placed on the application of design and operational management and mitigation measures to minimise potential environmental, social and economic impacts. The design of the Project has addressed each of the ESD principles and, on balance, it is concluded that the Project achieves a sustainable outcome for the local and wider environment.



F3 PROJECT JUSTIFICATION

F3.1 Introduction

This part justifies the proposed Glennies Creek Open Cut Coal Mine by drawing together and reviewing the full range of positive and negative predicted residual impacts, including cumulative impacts previously discussed in Part D of this document. The residual impacts are those that remain after the proposed design and operational management, mitigation and offset measures have been taken considered. This part also presents and reviews the design and operational management, mitigation and offset measures proposed by the Proponent.

F3.2 Biophysical Considerations

Parts D2 to D14 discuss the range of anticipated residual impacts on the biophysical and socio-economic environment attributable to the Project, including cumulative impacts. Those impacts considered to be of greatest significance, and the proposed management of these, are summarised below.

F3.2.1 Air Quality

Suspended and deposited dust levels attributable to the Project alone and cumulatively are predicted to be at or below the assessment criteria for deposited dust, total suspended particulate matter (TSP) and PM₁₀ at all private residences, with the exception of those listed below.

- Residence 32 is expected to receive dust impacts in excess of the 24-hour and annual PM₁₀ impact and deposited dust assessment criteria during Year 1 when Haul Routes B and D and C and E are in use, ie. Scenarios 1 and 2.
- Residence 33 is predicted to experience dust impacts in excess of the 24-hour and annual PM₁₀ impact assessment criteria during Years 1 when Haul Routes C and E are in use, ie. Scenario 2, and during Year 3 when Haul Routes B and D and C and E are in use, ie. Scenarios 3 and 4. However, the annual average PM₁₀ concentration for the Project alone when Haul Routes C and E are in use is predicted to be 8µg/m³, indicating that elevated Project-related PM₁₀ concentrations are likely to be a relatively uncommon occurrence.
- Residence 36 is predicted to receive dust impacts in excess of the deposited dust impact assessment criteria during Year 1 when Haul Routes A and D are in use, ie. Scenario 1.
- Residence 42 is predicted to experience marginal exceedance of the 24-hour PM₁₀ impact assessment criteria in Year 1 when Haul Routes C and E are in use, ie. Scenario 2. However, the predicted annual average PM₁₀ concentration from the Project alone would be 5µg/m³, indicating that elevated PM₁₀ concentrations are likely to be a relatively uncommon occurrence.



Greenhouse gas emissions from activities related to the extraction, transportation, processing and shipping of the coal have been estimated to be 2 163 341t of carbon dioxide equivalent per year during Years 1 to 5. These emissions are estimated to contribute to 0.00001°C of global warming. This is not considered to be significant.

CO, SO₂ and NO₂ emissions would have no more than a negligible impact on the area surrounding the Project Site due to the wide spacing of mining equipment and resulting exhaust emissions onsite.

The existing monitoring program would be continued around the Project Site to validate the predicted dust levels. Operating/management measures would be modified on the basis of this monitoring, where appropriate.

F3.2.2 Noise

The Project has been designed with the aim of minimising noise impacts on surrounding residences. The Proponent would limit the noise impacts through the use of noise mitigated mining equipment, as well as limiting the hours of operation to between 7.00am and 10.00pm. The noise modelling suggests two residences, Residences 32 and 36, would experience noise impacts in excess of 5dB(A) above the Project-specific noise assessment criteria during the life of the Project. A further seven residences, Residences 4, 5, 6, 7, 8, 9 and 11, would experience noise impacts of between 1 and 5dB(A) above the Project-specific noise assessment criteria during the night under adverse weather conditions, ie. temperature inversions.

The Proponent has made contact with the owners of Residences 32 and 36 with a view to negotiating an appropriate arrangement. These negotiations are currently on hold at the request of the residents pending completion of the *Environmental Assessment*.

The predicted noise impacts expected to be experienced at Residences 4, 5, 6, 7, 8, 9 and 11 during night-time under adverse weather conditions are a consequence of concurrent CHPP and train loader operation and would be the same as impacts experienced at present. As there have been no complaints from the owners of these residences with regard the existing noise impacts, the Proponent does not consider that the residual noise-related impacts are significant.

The noise modelling also suggests that seven parcels of vacant land to the northeast of the proposed open cut in Year 1 and one parcel of land to the southeast of the Project Site during the life of the Project would receive noise levels in excess of the assessment criteria. As this land is not occupied at present, and the impact would only occur during mining of the north-eastern portion of the open cut, the Proponent does not consider these impacts to be significant.

No exceedances of the cumulative noise assessment criteria are expected.

Noise monitoring would be undertaken to validate the predicted noise levels around the Project Site and management and mitigation measures would be modified, where appropriate, in light of the outcomes from this monitoring.



F3.2.3 Blasting

All blasts would be designed to ensure that blasting-related impacts at all non-project-related residences would be within the ANZECC guidelines specified in **Table D18**. In addition, the proponent would develop blast management procedures to ensure that impacts related to the closure of Stony Creek Road are minimised. As a result blasting-related impacts are not considered to be significant.

Blast monitoring would be undertaken to measure the impacts of blasts around the Project Site, and, on the basis of these results, blast designs and procedures would be modified, if required.

F3.2.4 Fauna

The fauna survey identified five threatened fauna species within, and in the vicinity of, the Fauna Survey Area and biodiversity offset areas. These species are:

- the Grey-crowned Babbler;
- the Eastern Bentwing-bat;
- the Eastern Freetail-bat;
- the Grey-headed Flying-fox; and
- the Brush-tailed Phascogale.

The assessment concluded that the Project was unlikely to impact on the three species of bats because the Fauna Survey Area represents only a portion of the foraging area for these species, and none would appear to roost within or in the vicinity of the Project Site or biodiversity offset areas. The Grey-crowned Babbler and the Brush-tailed Phascogale may, in the absence of mitigating measures, be expected to be impacted by the Project.

The Proponent intends to undertake the following mitigation measures to ameliorate the impact of its activities on these species.

- Continued management of the proposed biodiversity offset areas and undisturbed sections of the Project Site for native vegetation conservation.
- Early commencement of rehabilitation and enhancement activities within the Project Site and biodiversity offset areas.
- Erection of nesting boxes along Glennies Creek as soon as possible after project approval is granted.

Considering the proposed mitigation measures, CES (2007) considers that the impact of the Project on the Grey-crowned Babbler and the Brush-tailed Phascogale, as well as the cumulative impact of the Project, would not be significant.



F3.2.5 Flora

The flora survey identified six flora communities and two disturbed communities within the Flora Survey Area. None of these communities is classified as an endangered ecological community. One threatened shrub species, Western Golden Wattle (*Acacia decora*) was, however, identified within the Project Site. This species would be included in the species mix to be spread or replanted during rehabilitation and vegetation enhancement programs.

In addition, the Proponent would establish approximately 10ha of native vegetation adjacent to Glennies Creek within the Northern and Supplementary Biodiversity Offset Areas as described in Part B15.10.2.

F3.2.6 Aboriginal Heritage

The Aboriginal heritage assessment concluded that, with the exception of 19 sites with known Aboriginal objects, the Project Site has a low archaeological sensitivity. The observed Aboriginal objects consisted mostly of broken flakes and occasional cores. The Proponent intends to develop an appropriate Aboriginal Heritage Management Protocol to preserve these objects. This protocol would include salvage and relocation of the known objects, in consultation with the relevant representative Aboriginal groups.

As a result of the planned mitigation measures, the residual impacts of the Project on Aboriginal heritage issues are not considered to be significant

F3.2.7 Soils, Land Capability and Agricultural Suitability

Impacts on the soils of the Project Site would be temporary and manageable given the proposed stripping, stockpiling and re-spreading procedures. As a result, the residual impacts on the soils of the Project Site are considered to be temporary and not significant.

The land capability of the final landform would be Class VII or land best protected by green timber. The Agricultural Suitability Classification of the final landform would be Class 5, or not suitable for agriculture. Neither the land capability nor the Agricultural Suitability Classification of the undisturbed areas would be changed as a result of the Project.

F3.2.8 Visibility

The Project Site is topographically shielded from a significant proportion of the land surrounding the Project Site. However, some areas, notably to the northwest of the Project Site, have elevated, frontal views of the Project Site. The Proponent intends to undertake a number of design and management measures to mitigate the impact of its activities on the visual amenity of the surrounding residences and road users. These include construction of an amenity bund along Stony Creek Road and progressive reshaping and rehabilitation of the waste rock emplacement. In addition, the Proponent would consider any reasonable request from a landowner for assistance in creating a visual screen on private land.



As a result, the residual impact on the visual amenity of the surrounding residents is not considered to be significant. However, the Proponent recognises that individuals may be impacted by its activity to a greater or lesser extent depending on the location of their property and their sensitivity to changes in the visual landscape.

F3.2.9 Water Resources

The Proponent intends to contain surface water contaminated by excessive levels of sediment or salt and use that water for processing of coal and other mining-related activities. In addition, the Proponent has formal agreements with other local coal mining companies to supply excess dirty water for mining-related purposes, thereby reducing their demands on clean water sources such as the Hunter River. An assessment of the integrated Glennies Creek/Camberwell site water balance indicates that a balance can be readily maintained between water inputs from direct rainfall, percolation through the waste rock emplacements and groundwater inflows and outputs, with the agreements with Ashton and Newpac providing an opportunity to export substantial additional volumes of water if available.

Modelling of the quality of water in the final void indicated unacceptably high levels of salinity would develop if the void were to remain open. As a result the Proponent intends to backfill the final void following completion of mining operations.

Modelling of the drawdown of the Permian-aged aquifers indicates that the Project would generate a cone of depression that would extend approximately 1km from the Project Site, but that the impacts of the existing coal mining operations would be significantly greater than that from the Project (**Figure D34**). In addition, the water quality of the affected aquifers is such that the water is unsuitable for agricultural or other purposes.

No impact to Glennies Creek or the associated shallow, fresh water, alluvial aquifers is predicted.

As a result, the residual impact on the water resources of the area around the Project Site is not considered to be significant.

F3.2.10 Traffic and Transportation

The traffic and transportation assessment estimated that the Project would:

- generate on average, an additional approximately 84 vehicle movements per day on Stony Creek and Middle Falbrook Roads;
- require construction of an intersection between the site access road and Middle Falbrook Road; and
- require the closure of Stony Creek Road when blasting occurs within 500m of the road.

Considering the proposed mitigation measures, the residual impacts are considered to be short term and not significant.



F3.2.11 European Heritage

The impact of the Proponent's activities on the Middle Falbrook Road Bridge over Glennies Creek was assessed as being minimal or non-existent.

F3.2.12 Conclusions

On the basis of the above, the residual impacts attributable to the Project, after the proposed design and operational management and mitigation measures have been taken into account, are not considered to be significant.

F3.3 Socio-economic Considerations

The socio-economic impacts of the Project within the Hunter Valley were assessed as being largely positive and include:

- net revenue generation of approximately \$58 million;
- an additional \$253.9 million in household expenditure; and
- an additional 110 full time equivalent (FTE) positions.

The quantifiable environmental costs included the following.

- Mining-related greenhouse gas emissions – negative approximately \$1.2 million.
- Reduced surface water flows – negative approximately \$0.2 million.

All other impacts were assessed as being not significant or not able to be quantified.

As a result, the quantifiable net socio-economic benefit of the Project within the Hunter Valley is \$252.5 million. In addition, the Project would have significant economic benefits for the remainder of NSW and Australia through the payments of coal royalties, taxes, expanded export markets for coal and increased economic activity.

F3.4 Consequences of not Proceeding with the Project

The consequences of not proceeding with the Project include the following.

- The recoverable coal would not be mined by the Proponent. Such an outcome would be contrary to the objective of the Department of Primary Industries - Mineral Resources and the Proponent's obligations under the terms of its leases to maximise resource utilisation.
- The opportunity to create up to 110 full-time employment positions within the Hunter Valley would be forgone.
- The disposable wages associated with the above positions would be forgone, a substantial portion of which would be spent within the Singleton and Muswellbrook areas.



- The training opportunities that would be provided by the Proponent would be forgone.
- The benefits flowing to the NSW and Commonwealth Governments through coal royalties, taxes and increased exports would be forgone.
- The opportunity to permanently preserve and protect the native vegetation within the biodiversity offset areas and Project Site may be forgone. This vegetation represents significant habitat for at least two threatened fauna species, the Grey-crowned Babbler and the Brush-tailed Phascogale.
- A number of relatively minor impacts on the biophysical environment would not eventuate.

It is considered therefore that the public interest of proceeding with the Project exceed the residual negative impacts associated with it.

F4 CONCLUSION

The proposed Glennies Creek Open Cut Coal Mine has, to the extent feasible, been designed to address the issues of concern to the community and all levels of government. This document, together with the range of specialist consultant studies undertaken, has identified that the Project should proceed because it would:

- (i) produce significant employment and economic benefits for the Hunter Valley and NSW;
- (ii) satisfy sustainable development principles;
- (iii) result in long-term protection of areas of native habitat within biodiversity offset areas and maintain or improve biodiversity values in the vicinity of the Project Site;
- (iv) have a minimal and manageable impact on the biophysical environment;
- (v) address impacts on the surrounding residents;
- (vi) reduce risk levels associated with possible incidents and impacts on the environment to an acceptable level; and
- (vii) contribute towards satisfying the international demand for high quality coal.



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Part F

Evaluation and Justification of the Project

Preamble

This part of the Environmental Assessment concludes the document with an evaluation of the Glennies Creek Open Cut Coal Mine Project. Alternative development options are considered and the residual environmental risks assessed. This Part also includes an assessment of the Project against the principles of Ecologically Sustainable Development, and concludes with a justification of the Project.



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F1 DEVELOPMENT ALTERNATIVES

F1.1 Introduction

The Director-General's requirements issued on 25 January 2007 required that the *Environmental Assessment* include a detailed description of the development alternatives considered.

The considerations of feasible alternatives to the proposed activities are discussed in this Part and relate principally to:

- alternative open cut pit sizes;
- alternative mining methods;
- alternative mining sequences;
- alternative waste rock emplacement designs;
- alternative waste rock emplacement locations; and
- alternative dirty water containment design.

The alternative of not developing the proposed open cut is considered in Part F3.

F1.2 Alternative Open Cut Pit Sizes

The Project as proposed would recover an estimated 7.7Mt of coal from the area of the proposed open cut shown in **Figure B3**. Extension of the proposed open cut to the south and east is constrained by the sub-cropping of the mineable coal seams, as well as current and former mining activities. Extension of the proposed open cut northwards was considered during the planning phase of the Project but ultimately rejected due to the factors listed below.

- Extension to the northeast would require the relocation of Stony Creek Road for comparatively low yields.
- Extension to the north would encounter prohibitive stripping ratios, rendering such an extension uneconomic under current market conditions.
- As discussed in detail in Part B1.3.1, there is the potential to extract a further 1.3Mt of coal from an area to the northwest of the proposed open cut (**Figure B2**). This, however, would encroach upon Possum Skin Dam and impact on the integrated site water management system by reducing the on-site water storage and evaporation capacity. The Proponent is unwilling at present to reduce this capacity. As a result, extraction of this coal does not form a part of this application. However, should the Proponent elect to exploit the remaining coal reserve beneath Possum Skin Dam in the future, a subsequent modification application and related environmental assessment would be submitted to the Department of Planning.
- Extension of the proposed open cut to the west would encounter high stripping ratios, require relocation of the Glennies Creek Colliery surface facilities and, possibly, Middle Falbrook Road.



F1.3 Alternative Mining Methods

Underground longwall mining methods were considered but as the coal seams within the proposed pit shell are relatively close to the surface, open cut mining is more economically viable than underground mining. In addition, the coal to be mined consists of multiple seams with only limited thicknesses of intervening interburden which would preclude a multi seam underground mining operation.

F1.4 Alternative Mining Sequences

The option of mining the proposed open cut from west to east rather than east to west was considered. This alternative would have allowed for the enhancement of the biodiversity offset areas over a longer timeframe prior to disturbance of areas of native vegetation with high biodiversity value in the eastern section of the open cut. However, this option was rejected for the following reasons.

- It would prevent the future recovery of the 1.3Mt coal resource beneath the southern part of Possum Skin Dam (see Part B1.3.1).
- It would result in the final void being located in the northeast of the proposed open cut which would prevent access to any potential underground coal resource to the north and west of the proposed open cut from the Glennies Creek final void.
- Commencement of open cut mining in the west would initially result in a longer haul distance for waste rock during the early stages of the proposed mining sequence, significantly impacting on the viability of the Project.

F1.5 Alternative Waste Rock Emplacement Designs

A number of alternative final landforms for the waste rock emplacements were considered during the environmental assessment process. The alternatives, together with their advantages and disadvantages are provided in **Table F1**.

Table F1
Alternative Waste Rock Emplacement Designs

Design	Advantages	Disadvantages
Higher emplacement with smaller disturbance footprint.	<ul style="list-style-type: none"> • Smaller footprint hence less area of vegetation cleared. 	<ul style="list-style-type: none"> • Increased visual impact from a more imposing landform and less aesthetic blending with the existing Camberwell waste rock emplacement.
Lower emplacement with steeper slopes.	<ul style="list-style-type: none"> • Less visually intrusive. 	<ul style="list-style-type: none"> • Steeper slopes would result in less successful or unsuccessful rehabilitation, and a higher potential for erosion.
Lower emplacement with larger disturbance footprint.	<ul style="list-style-type: none"> • Less visually intrusive. 	<ul style="list-style-type: none"> • Clearing of additional vegetation and habitat would be required.

The design presented in Part B7.3 was considered the best compromise between potential visual impacts, impacts on native vegetation and fauna, and providing a stable final landform.



F1.6 Alternative Waste Rock Emplacement Locations

A number of alternative out-of-pit waste rock emplacement locations were considered. The two feasible alternative locations and their advantages and disadvantages are presented in **Table F2**. It is further noted that footprint of the selected out-of-pit waste rock emplacement was refined/adjusted to minimise impacts upon known Brush-tailed Phascogale habitat.

Table F2
Alternative Waste Rock Emplacement Locations

Alternative Emplacement Location	Advantages	Disadvantages
North of the proposed open cut.	<ul style="list-style-type: none"> Minimise the area of disturbance of native vegetation. 	<ul style="list-style-type: none"> Emplacement closer to surrounding residences with resulting increased air quality, noise and visual amenity impacts. Increased haul distances and costs.
Infilling of the Camberwell North Pit.	<ul style="list-style-type: none"> No or reduced out-of-pit waste rock emplacement. 	<ul style="list-style-type: none"> Block access to the Glennies Creek Underground Coal Mine.

The footprint of the proposed waste rock emplacement is considered to be the best location because impacts on residents would be minimised and continued access to the Glennies Creek Underground Coal Mine operations would not be compromised.

F1.7 Dirty Water Containment Design

The Proponent considered using a single, larger Dirty Water Containment Dam in the same location as the Northern Dirty Water Containment Dam. However, the footprint of the single Dirty Water Containment Dam would have impinged upon the area of the Bull Oak Forest Community to the east of the out-of-pit waste rock emplacement and would have resulted in a greater loss of habitat suitable for the threatened Brush-tailed Phascogale than the proposed Dirty Water Containment Dam design. As a result, the construction of a single Dirty Water Containment Dam was rejected in favour of a small dam and a supplementary Southern Dirty Water Containment Dam.

F2 PROJECT EVALUATION

F2.1 Introduction

In order to evaluate the environmental impact of the Project, the residual impacts of the Project, ie. those predicted following the adoption of the proposed design and operational safeguards and management measures, were examined through the completion of a further environmental risk analysis for the Project (Part F2.2). The residual environmental impacts are then evaluated in the context of ecologically sustainable development, to further consider their acceptability (Part F2.3).

Part F2.4 presents an overall summary of the Project evaluation. This forms the basis for the Project justification presented in Part F3.



F2.2 Residual Environmental Risks

An assessment of the unmitigated environmental risks associated with the Project has previously been presented in **Table C2**. Taking into account the design and operational safeguards and management measures described in Part D, together with the commitments provided in Part E, an assessment of the mitigated risks associated with the Project was completed for each potential environmental impact based on the likelihood of occurrence and potential environmental consequence. **Tables C2, C3 and C4** which outline the basis for determining the risk posed (without mitigation) are reproduced as **Tables F3, F4 and F5**. **Table F6** reproduces the results of the analysis of, (unmitigated) risk together with the residual (mitigated) risks associated with the Project.

Table F3
Qualitative Consequence Rating

Level	Descriptor	Description
5	Catastrophic	<ul style="list-style-type: none"> • Massive and permanent detrimental impacts on the environment. • Very large area of impact. • Massive remediation costs. • Reportable to government agencies. • Large fines and prosecution resulting in potential closure of the operation.
4	Major	<ul style="list-style-type: none"> • Extensive and/or permanent detrimental impacts on the environment. • Large area of impact. • Very large remediation costs. • Reportable to government agencies. • Possible prosecution and fine.
3	Moderate	<ul style="list-style-type: none"> • Substantial temporary or minor long term detrimental impact to the environment. • Moderately large area of impact. • Moderate remediation costs. • Reportable to government agencies. • Further action may be requested by government agency.
2	Minor	<ul style="list-style-type: none"> • Minor detrimental impact on the environment. • Affects a small area. • Minimal remediation costs. • Reportable to internal management only. • No operational constraints posed.
1	Insignificant	<ul style="list-style-type: none"> • Negligible and temporary detrimental impact on the environment. • Affects an isolated area. • No remediation costs. • Reportable to internal management only. • No operational constraints posed.

Source: Modified after Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(B)

Table F4
Qualitative Likelihood Rating

Level	Descriptor	Description
A	Almost Certain	Is expected to occur in most circumstances.
B	Likely	Will probably occur in most circumstances.
C	Possible	Could occur.
D	Unlikely	Could occur but not expected.
E	Rare	Occurs only in exceptional circumstances.

Source: Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(A)



Table F5
Risk Matrix

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (Almost Certain)	H	H	E	E	E
B (Likely)	M	H	H	E	E
C (Possible)	L	M	H	E	E
D (Unlikely)	L	L	M	H	E
E (Rare)	L	L	M	H	H

Note: Rating after Standards Australia - *Environmental Risk Management – Principles and Process* - Table 4(C)

Table F6
Mitigated Risks Associated with the Project

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Environmental Issue	Risk Source/Potential Impact(s)	Potential Environmental Impacts	Unmitigated Risk	Mitigated Consequence	Mitigated Likelihood	Mitigated Risk
Water	• Discharge of dirty, saline or contaminated water to surface drainages or aquifers.	• Reduced water quality and impacts on downstream ecosystems, agriculture and groundwater quality.	M	3	E	M
	• Reduction in environmental flows through on-site capture of water.	• Reduced natural surface water flows and impacts on downstream ecosystems, agriculture and groundwater quality.	M	1	C	L
	• Pollution of groundwater by hydrocarbons, salinity and chemicals.	• Reduced groundwater quality and impacts on ecosystems and agriculture at and downstream from discharge point.	L	3	E	L
	• Reduction of groundwater levels due to mine in-flows.	• Reduction of groundwater levels and impacts on ecosystems and agriculture at and downstream from discharge point.	M	2	E	L
	• Altered flood regimes.	• Indirect impacts on native vegetation communities and ecosystems.	L	2	E	L
Air Quality	• Dust emissions from mine operations and vehicle movements.	• Nuisance / amenity impacts from dust deposited on window sills, cars, surfaces etc. Adverse health impacts if PM ₁₀ levels are excessive.	H	3	D	L
	• Greenhouse gas emissions from mining and transportation operations.	• Contribution to global greenhouse gas emissions.	L	1	B	M
	• Greenhouse gas emissions from burning product coal.	• Contribution to global greenhouse gas emissions.	M	1	B	M
	• Emission of odours, noxious gases (ie. NO, SO ₂).	• Nuisance/health impacts on residents.	L	2	E	L
Flora and Fauna	• Removal of native vegetation due to land clearing activities.	• Loss of, or alteration to, existing vegetation communities and habitats, as well as adverse impacts on fauna. Reduced biodiversity.	H	2	C	M
	• Disturbance to habitat as a result of project operations, ie. noise, dust, contaminated water etc.	• Direct adverse impact(s) on threatened species, populations or communities. Reduced biodiversity.	H	2	E	L

Notes

- 1 – Potential consequence of destruction of Aboriginal objects can only be assessed by the local Aboriginal community. For the purpose of this risk analysis consequence is assumed to be Moderate.
2 – Other potential socio-economic impacts such as noise and dust have been analysed under those specific issues



Table F6 (Cont'd)
Mitigated Risks Associated with the Project

Page 2 of 2

Environmental Issue	Risk Source/Potential Impact(s)	Potential Environmental Impacts	Unmitigated Risk	Mitigated Consequence	Mitigated Likelihood	Mitigated Risk
Noise and vibration	• Increased noise levels from mine and ancillary operations.	• Nuisance / amenity impacts, including sleep disturbance.	H	2	D	L
	• Increased levels of vibration from mine blasting.	• Structural damage to buildings and structures. Nuisance / amenity impacts on surrounding landowners / residents. Reduced agricultural production.	L	2	E	L
Rehabilitation, Final Landform	• Modified / unstable landform on completion of the Project.	• Excessive erosion, modified water flows, safety issues, permanent scaring.	H	2	D	L
	• Reduced capability of final landform or failure of rehabilitation.	• Reduced biodiversity and/or agricultural production. Erosion, dust generation, permanent scaring.	H	2	D	L
Transportation	• Increased traffic levels due to movement of workforce and contractors.	• Increased traffic congestion. Elevated risk of accident/incident on local roads. Road pavement deterioration.	M	1	D	L
	• Temporary closure or other restriction on road network.	• Delayed journeys, unpredictable arrival times.	M	2	D	L
	• Simultaneous closure of Stony Creek and Glennies Creek Roads.	• Closure of the most convenient access routes to the Glennies Creek area.	M	2	D	L
Aboriginal Heritage ¹	• Removal or destruction of Aboriginal sites and/or objects.	• Impact on Aboriginal cultural heritage.	H	3	E	M
Visual Amenity	• Changes in visual characteristics of the Project Site.	• Decreased visual amenity.	M	1	D	L
Socio-Economic Impacts ²	• Potential changes in employment and infrastructure.	• Improved economic activity and related social impacts attributable to reduced unemployment.	NA			
	• Perceived or actual Impacts on amenity of neighbouring properties.	• Reduced quality of life (actual or perceived) and / or property values.	M	1	D	L
	• Reduced property values due to presence of mining operation.	• Reduced individual wealth.	M	1	C	L
Soil and Land Capability	• Reduction in soil quality through stripping and stockpiling.	• Erosion, reduced soil capability, biodiversity and / or agricultural productivity.	H	3	D	M
	• Increased erosion and soil loss through poor rehabilitation and / or surface water control.	• Reduced soil capability, agricultural productivity or biodiversity, permanent scaring.	H	2	D	L

Notes

1 – Potential cultural consequence of destruction of Aboriginal objects can only be assessed by the local Aboriginal community. For the purpose of this risk analysis consequence is assumed to be Moderate. (TABLE AMENDED TO REFLECT THIS NOTE)

2 – Other potential socio-economic impacts such as noise and dust have been analysed under those specific issues



As can be seen from **Table F6**, the proposed design and operational safeguards, together with the proposed management measures, are anticipated to reduce the likelihood of an environmental incident occurring as a result of the Proponent's activities. In a number of instances, the measures are also expected to result in a reduction in the consequence of a potential impact or risk. As a result, the proposed safeguards and management measures are anticipated to reduce the risk of unwanted environmental impact or incidents to low to moderate.

It is acknowledged, however, that this analysis of environmental risk is based on a community wide assessment. Individuals within the community may be impacted to greater or lesser extent and have different perceptions of environmental values. The degree of impact upon a particular resident would be dependent on the distance and direction of their residence from the Project Site, the topographic position of the residence in relation to the Project Site and the sensitivity of each resident to the particular class of impact.

F2.3 Ecologically Sustainable Development

F2.3.1 Introduction

Ecologically sustainable development (ESD) is defined in Section 6(2) of the *Protection of the Environment Administration Act 1991* as follows.

Ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

- (a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
 - (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
 - (ii) an assessment of the risk-weighted consequences of various options,**
- (b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*
- (c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*
- (d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as:
 - (i) polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,**



- (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
- (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (The World Commission for the Environment and Development, 1988, p.43). The principle aims to allow the needs of the present generation to be met, while conserving the long-term viability of ecosystems for future generations. The 1992 *Inter-governmental Agreement on the Environment* identified four key guiding principles for ESD. These are:

- the precautionary principle;
- social equity through intra- and inter-generational equity;
- the conservation of biodiversity and ecological integrity; and
- the promotion of improved valuation and pricing of environmental resources.

During the design and planning phase, the Proponent endeavoured to address each of the principles outlined above, namely:

- the precautionary principle;
- social equity through intra- and inter-generational equity;
- the conservation of biodiversity and ecological integrity; and
- the promotion of improved valuation and pricing of environmental resources.

In addition, the Proponent modified the proposed Project design and/or operational aspects of the Project where impacts inconsistent with the above principles were highlighted during the environmental assessment.

Each of the above principles are discussed below in light of the Project objectives and the proposed design and management safeguards.

F2.3.2 Precautionary Principle

The precautionary principle holds that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental impacts. In the application of this principle, decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and an assessment of the risk-weighted consequences of various options should be made. Emphasis must be placed on anticipation and prevention of environmental damage, rather than remediation after the damage has occurred.



For the proposed Glennies Creek Open Cut Coal Mine, the Proponent has engaged eight specialist consultancies to conduct detailed assessments of a number of areas identified during the consultation and risk assessment phase outlined in Part C. These assessments ensure that there is a sufficient scientific understanding of the Project and the surrounding environment to enable the Minister to make a decision consistent with this principle.

Project Objectives

The principal objectives of the Project are the design and operation of an open cut mine in a manner that minimises surface disturbance and impact on the environment and surrounding residents, as well as ensuring compliance with environmental criteria, reasonable community expectations and all relevant statutory requirements through appropriate design, management and mitigation measures.

Design Safeguards

A number of design features were incorporated during the initial design stage in recognition of the Precautionary Principle. In addition, subsequent modifications were made in response to issues identified during the specialist consultant investigations undertaken as part of the environmental assessment phase. These design features and modifications included the following.

- The out-of-pit waste rock emplacement was designed to avoid an area of native vegetation to the east of the proposed open cut. The design was subsequently altered to also avoid an area with a number of trees with hollows that form habitat for the Brush-tailed Phascogale.
- The site access road was realigned to avoid an area of native vegetation to the west of Possum Skin Dam.
- The original design included a final void at the western end of the open cut. However, when groundwater modelling indicated that unacceptably high salinity levels would develop in the void, the proposed design was altered such that the final void would be filled eg. with breaker stone from the Glennies Creek Underground Coal Mine's pre-treatment plant or reject material from the Camberwell CHPP.
- Haul routes have been placed, as far as practicable, within the open cut and out-of-pit waste rock emplacement footprints to avoid disturbing additional areas of native vegetation.
- The slopes of the final landform would vary from approximately 1:5 (V:H) to 1:25 (V:H) to mimic the slopes of the natural landform within and adjacent to the Project Site. This would also minimise the potential for erosion and topsoil loss requiring further rehabilitation.
- The initial project design included a single dirty water containment dam. However following identification of habitat suitable for the threatened Brush-tailed Phascogale and likely impacts on the Bull Oak Forest Community, a two dam design was introduced.



Management and Operational Safeguards

The framework for ongoing environmental management, operational performance and rehabilitation of the Project Site would be provided through the project approval and would be managed in accordance with the DPI - MR Mining, Rehabilitation and Environmental Management Process, and would involve the input from relevant State and local government agencies. The Mining Operations Plan would contain a range of site specific environmental procedures to achieve consistency with planned outcomes and to control identified risks. The Annual Environmental Management Report would report on the progress of the operation and provide an opportunity to review the effectiveness of the environmental management strategies adopted. In addition, the following management and operational safeguards would be implemented.

- All on-site procedures would be regularly reviewed, particularly in light of monitoring results.
- Air quality, noise and ground vibration, would be monitored at selected locations to ensure the routine compliance with the goals outlined in those Parts.
- Regular monitoring of the status of rehabilitation, regeneration and enhancement programs within the Project Site and the biodiversity offset areas would be undertaken, with particular attention paid to threatened and vulnerable species. Remediation actions would be undertaken when identified as necessary following monitoring.
- Topsoil and subsoil would be stripped, stockpiled and re-spread in accordance with the procedures outlined in Part D8. An inventory of all stripped, stockpiled and re-spread soils would be maintained to ensure potential rehabilitation issues are identified and rectified.
- The surface and groundwater structures and management procedures outlined in Parts D10 and D11 would be implemented to prevent contaminated surface runoff leaving site, or significant erosion occurring and be monitored.

Rehabilitation and Subsequent Land Use

Long term adverse impacts on the environment would be avoided through:

- creation of a stable, free-draining final landform which blends with the surrounding landforms;
- progressive rehabilitation, including shaping of the final landform, spreading of subsoil and topsoil and reseeding or replanting with endemic, locally sourced species as described in Parts B15, D4 and D5; and
- a final land use of native conservation for the rehabilitated mine area and biodiversity offset areas which would, in the longer term, provide significant habitat with enhanced biodiversity values.



Conclusion

The precautionary principle has been considered during all stages of the design and assessment of the Project. The approach adopted, including initial design, risk analysis, consultation, specialist environmental assessment, design modification and safeguard design, provides a high degree of certainty that the Project would not result in any major unforeseen impacts.

F2.3.3 Social Equity

Social equity includes both intra- and inter-generational equity. Intra-generational equity requires that the economic and social benefits of the Project be shared equitably among all members of the community, ie. both groups and individuals. Inter-generational equity requires that the present generation pass onto the next generation an environment that does not limit the ability of future generations to attain a quality of life at least equal to that of current generation.

Both elements of social equity are addressed through the design of the Project, the implementation of operational safeguards to mitigate any short-term or long-term environmental impacts, and the proposed rehabilitation of the areas directly disturbed. Examples of matters relating to social equity that are relevant to the various stages of the Project are listed below.

Project Objectives

The objectives of the Project are to design and operate the open cut in a cost-effective manner to ensure security of employment, both within and outside the Hunter Valley. In addition, the Proponent intends to maintain an open and honest relationship with the members of the surrounding community through ongoing consultation, and address issues of concern as they arise.

The Proponent intends to ensure inter-generational equity by incorporating long-term offset strategies and preserving the disturbed areas following completion of mining for nature conservation. Furthermore, the Project would continue, and increase, the opportunities for economic activity in the local area both directly and indirectly.

Design Safeguards

The Project has been designed to maintain inter-generational equity by ensuring components of the existing biological, social and economic environment available to the present generation would also be available to future generations. Examples include the following.

- Enhancement and perpetual protection of the biodiversity offset areas and rehabilitated Project Site. This, in particular, would provide habitat and protection for the threatened Brush-tailed Phascogale and Grey-crowned Babbler.
- The location and orientation of the out-of-pit waste rock emplacement, open cut facilities area site access road and dirty water containment dams have been designed to ensure the least possible area of disturbance to native vegetation and sensitive fauna habitats.



- The waste rock emplacement has been designed to blend into the existing topography, reducing the visual impact of the final landform.
- The final void would be filled to the present surface. This would prevent excessively saline water accumulating within the final void.

Management and Operational Safeguards

The Proponent has, and would continue to ensure inter- and intra-generational equity through the following management and operational safeguards.

- Consultation with local community stakeholders to ensure the Project does not have a significant negative impact on the facilities, services and amenity of the area surrounding the Project Site.
- The Proponent recognises the importance of ensuring the preservation of the Aboriginal sites identified during the Aboriginal heritage assessment. Accordingly, the Proponent would develop an appropriate management protocol as outlined in Part D7.5 to salvage and store any Aboriginal artefacts that would otherwise be disturbed by the Proponent's activities in an appropriate manner. This would ensure that these artefacts are available for future generations.

Rehabilitation and Subsequent Land Use

The final landform would be constructed and rehabilitated in a manner that would blend with the existing landscape. Specifically, the slopes of the rehabilitated landform would be similar to the surrounding natural and man-made landforms, and the upper surface would be gently undulating. The planned nature conservation land use would be consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* and the *Glennies Creek Catchment – Total Catchment Management Study – Management Strategy* and would preserve and enhance the biodiversity values in the vicinity of the Project Site for future generations.

Conclusion

The principle of social equity has been addressed throughout the design of the Project. It would contribute to the economic activity of the Singleton Local Government Area and the Hunter Valley as a whole by stimulating demand for local goods and services. As such, the benefits of the Project would be distributed throughout the local community. The Proponent would adopt a pro-active approach to identifying and addressing any concerns identified by the local community or its members.

The Project was also designed such that elements of the existing environment available to this generation, including land for nature conservation purposes, would be enhanced and would continue to be available to future generations.



F2.3.4 Conservation of Biodiversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological integrity are central goals of sustainability. Biodiversity is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term. Details of how the Project has been designed to achieve compliance with these principles are set out below.

Project Objectives

The Proponent is committed to undertake all activities in an environmentally responsible manner, and recognises the need to ensure that changes to natural components of the environment do not adversely affect biological diversity or ecological integrity. As such, the Project has been designed with an objective of minimising impacts on the flora and fauna within and in the vicinity of the Project Site, whilst allowing the extraction of an economically viable resource.

Design Safeguards

The following design features were incorporated into the Project to ensure that the impact of the Proponent's activities on the biodiversity and ecological integrity of the Project Site and surrounding areas are minimised.

- The biodiversity offset areas have been selected:
 - to be as close as possible to the Project Site;
 - to incorporate as much existing native vegetation as possible;
 - to be consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley* and the *Glennies Creek Catchment – Total Catchment Management Study – Management Strategy*; and
 - to incorporate the greatest variety of habitat as possible, including riparian, river flat, and hill slope areas.
- Design of the out-of-pit waste rock emplacement and dirty water containment dams to avoid as much native vegetation as possible, including refining the footprints in light of the identification of habitat for the threatened Brush-tailed Phascogale along a road reserve to the east of the proposed open cut.
- Nesting boxes suitable for Brush-tailed Phascogale would be erected within the Northern Biodiversity Offset Area to compensate for clearing of native vegetation within the Project Site.



Management and Operational Safeguards

The following management and operational safeguards would be incorporated by the Proponent to ensure that the impact of its activities on the biodiversity and ecological integrity of the Project Site and surrounding areas is minimised.

- Clearing of native vegetation would preferentially occur in late Spring and early Autumn to avoid nesting or roosting fauna. In addition, trees with hollows would be inspected prior to any clearing commencing, and any threatened nesting or roosting animals would be relocated appropriately.
- Enhancement of the biodiversity offset areas and areas of the Project Site that would not be disturbed would commence as soon as possible. This would include planting or spreading seed of endemic flora species, and installing nesting boxes and roosting tubes in trees within the biodiversity offset areas.
- Suitable cleared vegetation would be retained and used during rehabilitation of disturbed areas or relocated to the biodiversity offset areas.
- Weed eradication programs would be implemented, as required.

Biodiversity Offset Strategy

The Biodiversity Offset Strategy would enhance and protect in perpetuity approximately 254ha of Project-related land, namely the Northern, Southern and Western Biodiversity Offset Areas. In addition, the Biodiversity Offset Strategy would enhance and protect a further 33ha of non-Project-related land, namely the Supplementary Biodiversity Offset Area.

The areas of each vegetation community and fauna habitat area that would be preserved within the biodiversity offset areas and the areas that would be disturbed by the Project are presented in **Tables F7** and **F8** respectively.

Table F7
Vegetation Community Areas

	Area to be Disturbed ¹	Area within the Biodiversity Offset Areas ¹
Tussock Grassland Community	6.1	44.4
Regenerating Native Woodland / Shrubland	0.7	74.0
Narrow-leaf Ironbark – Spotted Gum – Forest Red Gum Community	68.3	113.1
Bull Oak Community	-	20.9
Swamp Oak Community	-	33.4
River Oak Community	-	1.5
Note 1: Areas in ha and approximately only		



Table F8
Fauna Habitat Areas

	Area to be Disturbed¹	Area within the Biodiversity Offset Areas¹
Open Pastures	3.8	135.6
Open Woodland	34.3	60.9
Woodland	42.4	47.0
Riparian Oaks	-	41.5
Wetland / Dams	8.7	1.1
Note 1: Areas in ha and approximately only		

For each vegetation community and fauna habitat, the proposed Biodiversity Offset Strategy would, with one exception, preserve an area within the biodiversity offset areas that is greater than the area to be disturbed. The exception is the Wetland / Dams Fauna habitat. Approximately 8.7ha of this habitat type comprising a section of Possum Skin Dam, would be disturbed. This dam was constructed and is used as an evaporation pond for the surface water management system for the Glennies Creek Colliery and the Camberwell Coal Mine. In addition, the proposed Biodiversity Offset Strategy would preserve areas of three vegetation communities and one fauna habitat that would not be disturbed by Project-related activities. As a result, the proposed Biodiversity Offset Strategy would result in protection of a greater range and area of vegetation communities and habitat areas than would be disturbed by the proposed activities and, as a result, the Project would preserve or enhance ecosystem diversity in the vicinity of the Project Site and would not threaten the integrity of the ecological systems in the short or long-term.

Rehabilitation and Subsequent Land Use

Post-mining rehabilitation of the final landform would include the reseeded or planting of native vegetation, including the threatened Western Golden Wattle (*Acacia decora*). The final landform would be used for nature conservation, which would, in the medium- to long-term, increase the area and value of available habitat.

Conclusion

It is anticipated that the Project would have little impact on local or regional biodiversity. Notwithstanding, disturbance to areas of native vegetation would be minimised wherever possible. Enhancement of the biodiversity offset areas through placement of hollow logs and erection of nesting boxes would increase the habitat available in the short-term for the Brush-tailed Phascogale in particular. The post-mining use of the final landform for nature conservation purposes would increase the biodiversity value of the Project Site and surrounds in the medium- to long-term.



F2.3.5 Promotion of Improved Valuation and Pricing of Environmental Resources

This principle is premised on the assumption that all resources are appropriately valued and priced based upon the full life cycle of those resources, with appropriate and cost-effective environmental stewardship encouraged. A reflection on these issues with regards to the Project is set out below.

Project Objectives

The principal objectives of the Project are to operate the proposed open cut in a safe, environmentally responsible and cost-effective manner. This places environmental considerations at the forefront of the Proponent's decision-making process and demonstrates that an appropriate value has been placed on elements of the existing environment.

Design, Management and Operational Safeguards

The extent of research, planning and design of environmental safeguards and mitigation measures, as well as the Proponent's willingness to ensure the biodiversity offset areas and Project Site are used for nature conservation following the completion of mining activities, is evidence of the value placed by the Proponent on the ecological resources within and in the vicinity of the Project Site.

Rehabilitation and Subsequent Land Use

The extent and anticipated cost of the proposed rehabilitation, enhancement and weed control programs the Proponent intends to implement illustrates the value placed by the Proponent on the ecological resources within the Project Site and biodiversity offset areas.

Conclusion

The value placed by the Proponent on ecological resources is evident from the extent of site-specific investigations, planning and environmental safeguards and measures that have been undertaken and which would be implemented to prevent irreversible damage to the environment within, and in the vicinity of, the Project Site and biodiversity offset areas. It is anticipated that the income received from the sale of the coal would be sufficient to enable the Proponent to achieve an acceptable profit level whilst completing all environment-related tasks, commitments and conditions attached to all consents, leases, licences and approvals.

F2.3.6 Compatibility with the Principles of ESD

The approach taken in planning the Project has been multi-disciplinary, involving consultation with stakeholders and various government agencies, with emphasis placed on the application of design and operational management and mitigation measures to minimise potential environmental, social and economic impacts. The design of the Project has addressed each of the ESD principles and, on balance, it is concluded that the Project achieves a sustainable outcome for the local and wider environment.



F3 PROJECT JUSTIFICATION

F3.1 Introduction

This part justifies the proposed Glennies Creek Open Cut Coal Mine by drawing together and reviewing the full range of positive and negative predicted residual impacts, including cumulative impacts previously discussed in Part D of this document. The residual impacts are those that remain after the proposed design and operational management, mitigation and offset measures have been taken considered. This part also presents and reviews the design and operational management, mitigation and offset measures proposed by the Proponent.

F3.2 Biophysical Considerations

Parts D2 to D14 discuss the range of anticipated residual impacts on the biophysical and socio-economic environment attributable to the Project, including cumulative impacts. Those impacts considered to be of greatest significance, and the proposed management of these, are summarised below.

F3.2.1 Air Quality

Suspended and deposited dust levels attributable to the Project alone and cumulatively are predicted to be at or below the assessment criteria for deposited dust, total suspended particulate matter (TSP) and PM₁₀ at all private residences, with the exception of those listed below.

- Residence 32 is expected to receive dust impacts in excess of the 24-hour and annual PM₁₀ impact and deposited dust assessment criteria during Year 1 when Haul Routes B and D and C and E are in use, ie. Scenarios 1 and 2.
- Residence 33 is predicted to experience dust impacts in excess of the 24-hour and annual PM₁₀ impact assessment criteria during Years 1 when Haul Routes C and E are in use, ie. Scenario 2, and during Year 3 when Haul Routes B and D and C and E are in use, ie. Scenarios 3 and 4. However, the annual average PM₁₀ concentration for the Project alone when Haul Routes C and E are in use is predicted to be 8µg/m³, indicating that elevated Project-related PM₁₀ concentrations are likely to be a relatively uncommon occurrence.
- Residence 36 is predicted to receive dust impacts in excess of the deposited dust impact assessment criteria during Year 1 when Haul Routes A and D are in use, ie. Scenario 1.
- Residence 42 is predicted to experience marginal exceedance of the 24-hour PM₁₀ impact assessment criteria in Year 1 when Haul Routes C and E are in use, ie. Scenario 2. However, the predicted annual average PM₁₀ concentration from the Project alone would be 5µg/m³, indicating that elevated PM₁₀ concentrations are likely to be a relatively uncommon occurrence.



Greenhouse gas emissions from activities related to the extraction, transportation, processing and shipping of the coal have been estimated to be 2 163 341t of carbon dioxide equivalent per year during Years 1 to 5. These emissions are estimated to contribute to 0.00001°C of global warming. This is not considered to be significant.

CO, SO₂ and NO₂ emissions would have no more than a negligible impact on the area surrounding the Project Site due to the wide spacing of mining equipment and resulting exhaust emissions onsite.

The existing monitoring program would be continued around the Project Site to validate the predicted dust levels. Operating/management measures would be modified on the basis of this monitoring, where appropriate.

F3.2.2 Noise

The Project has been designed with the aim of minimising noise impacts on surrounding residences. The Proponent would limit the noise impacts through the use of noise mitigated mining equipment, as well as limiting the hours of operation to between 7.00am and 10.00pm. The noise modelling suggests two residences, Residences 32 and 36, would experience noise impacts in excess of 5dB(A) above the Project-specific noise assessment criteria during the life of the Project. A further seven residences, Residences 4, 5, 6, 7, 8, 9 and 11, would experience noise impacts of between 1 and 5dB(A) above the Project-specific noise assessment criteria during the night under adverse weather conditions, ie. temperature inversions.

The Proponent has made contact with the owners of Residences 32 and 36 with a view to negotiating an appropriate arrangement. These negotiations are currently on hold at the request of the residents pending completion of the *Environmental Assessment*.

The predicted noise impacts expected to be experienced at Residences 4, 5, 6, 7, 8, 9 and 11 during night-time under adverse weather conditions are a consequence of concurrent CHPP and train loader operation and would be the same as impacts experienced at present. As there have been no complaints from the owners of these residences with regard the existing noise impacts, the Proponent does not consider that the residual noise-related impacts are significant.

The noise modelling also suggests that seven parcels of vacant land to the northeast of the proposed open cut in Year 1 and one parcel of land to the southeast of the Project Site during the life of the Project would receive noise levels in excess of the assessment criteria. As this land is not occupied at present, and the impact would only occur during mining of the north-eastern portion of the open cut, the Proponent does not consider these impacts to be significant.

No exceedances of the cumulative noise assessment criteria are expected.

Noise monitoring would be undertaken to validate the predicted noise levels around the Project Site and management and mitigation measures would be modified, where appropriate, in light of the outcomes from this monitoring.



F3.2.3 Blasting

All blasts would be designed to ensure that blasting-related impacts at all non-project-related residences would be within the ANZECC guidelines specified in **Table D18**. In addition, the proponent would develop blast management procedures to ensure that impacts related to the closure of Stony Creek Road are minimised. As a result blasting-related impacts are not considered to be significant.

Blast monitoring would be undertaken to measure the impacts of blasts around the Project Site, and, on the basis of these results, blast designs and procedures would be modified, if required.

F3.2.4 Fauna

The fauna survey identified five threatened fauna species within, and in the vicinity of, the Fauna Survey Area and biodiversity offset areas. These species are:

- the Grey-crowned Babbler;
- the Eastern Bentwing-bat;
- the Eastern Freetail-bat;
- the Grey-headed Flying-fox; and
- the Brush-tailed Phascogale.

The assessment concluded that the Project was unlikely to impact on the three species of bats because the Fauna Survey Area represents only a portion of the foraging area for these species, and none would appear to roost within or in the vicinity of the Project Site or biodiversity offset areas. The Grey-crowned Babbler and the Brush-tailed Phascogale may, in the absence of mitigating measures, be expected to be impacted by the Project.

The Proponent intends to undertake the following mitigation measures to ameliorate the impact of its activities on these species.

- Continued management of the proposed biodiversity offset areas and undisturbed sections of the Project Site for native vegetation conservation.
- Early commencement of rehabilitation and enhancement activities within the Project Site and biodiversity offset areas.
- Erection of nesting boxes along Glennies Creek as soon as possible after project approval is granted.

Considering the proposed mitigation measures, CES (2007) considers that the impact of the Project on the Grey-crowned Babbler and the Brush-tailed Phascogale, as well as the cumulative impact of the Project, would not be significant.



F3.2.5 Flora

The flora survey identified six flora communities and two disturbed communities within the Flora Survey Area. None of these communities is classified as an endangered ecological community. One threatened shrub species, Western Golden Wattle (*Acacia decora*) was, however, identified within the Project Site. This species would be included in the species mix to be spread or replanted during rehabilitation and vegetation enhancement programs.

In addition, the Proponent would establish approximately 10ha of native vegetation adjacent to Glennies Creek within the Northern and Supplementary Biodiversity Offset Areas as described in Part B15.10.2.

F3.2.6 Aboriginal Heritage

The Aboriginal heritage assessment concluded that, with the exception of 19 sites with known Aboriginal objects, the Project Site has a low archaeological sensitivity. The observed Aboriginal objects consisted mostly of broken flakes and occasional cores. The Proponent intends to develop an appropriate Aboriginal Heritage Management Protocol to preserve these objects. This protocol would include salvage and relocation of the known objects, in consultation with the relevant representative Aboriginal groups.

As a result of the planned mitigation measures, the residual impacts of the Project on Aboriginal heritage issues are not considered to be significant

F3.2.7 Soils, Land Capability and Agricultural Suitability

Impacts on the soils of the Project Site would be temporary and manageable given the proposed stripping, stockpiling and re-spreading procedures. As a result, the residual impacts on the soils of the Project Site are considered to be temporary and not significant.

The land capability of the final landform would be Class VII or land best protected by green timber. The Agricultural Suitability Classification of the final landform would be Class 5, or not suitable for agriculture. Neither the land capability nor the Agricultural Suitability Classification of the undisturbed areas would be changed as a result of the Project.

F3.2.8 Visibility

The Project Site is topographically shielded from a significant proportion of the land surrounding the Project Site. However, some areas, notably to the northwest of the Project Site, have elevated, frontal views of the Project Site. The Proponent intends to undertake a number of design and management measures to mitigate the impact of its activities on the visual amenity of the surrounding residences and road users. These include construction of an amenity bund along Stony Creek Road and progressive reshaping and rehabilitation of the waste rock emplacement. In addition, the Proponent would consider any reasonable request from a landowner for assistance in creating a visual screen on private land.



As a result, the residual impact on the visual amenity of the surrounding residents is not considered to be significant. However, the Proponent recognises that individuals may be impacted by its activity to a greater or lesser extent depending on the location of their property and their sensitivity to changes in the visual landscape.

F3.2.9 Water Resources

The Proponent intends to contain surface water contaminated by excessive levels of sediment or salt and use that water for processing of coal and other mining-related activities. In addition, the Proponent has formal agreements with other local coal mining companies to supply excess dirty water for mining-related purposes, thereby reducing their demands on clean water sources such as the Hunter River. An assessment of the integrated Glennies Creek/Camberwell site water balance indicates that a balance can be readily maintained between water inputs from direct rainfall, percolation through the waste rock emplacements and groundwater inflows and outputs, with the agreements with Ashton and Newpac providing an opportunity to export substantial additional volumes of water if available.

Modelling of the quality of water in the final void indicated unacceptably high levels of salinity would develop if the void were to remain open. As a result the Proponent intends to backfill the final void following completion of mining operations.

Modelling of the drawdown of the Permian-aged aquifers indicates that the Project would generate a cone of depression that would extend approximately 1km from the Project Site, but that the impacts of the existing coal mining operations would be significantly greater than that from the Project (**Figure D34**). In addition, the water quality of the affected aquifers is such that the water is unsuitable for agricultural or other purposes.

No impact to Glennies Creek or the associated shallow, fresh water, alluvial aquifers is predicted.

As a result, the residual impact on the water resources of the area around the Project Site is not considered to be significant.

F3.2.10 Traffic and Transportation

The traffic and transportation assessment estimated that the Project would:

- generate on average, an additional approximately 84 vehicle movements per day on Stony Creek and Middle Falbrook Roads;
- require construction of an intersection between the site access road and Middle Falbrook Road; and
- require the closure of Stony Creek Road when blasting occurs within 500m of the road.

Considering the proposed mitigation measures, the residual impacts are considered to be short term and not significant.



F3.2.11 European Heritage

The impact of the Proponent's activities on the Middle Falbrook Road Bridge over Glennies Creek was assessed as being minimal or non-existent.

F3.2.12 Conclusions

On the basis of the above, the residual impacts attributable to the Project, after the proposed design and operational management and mitigation measures have been taken into account, are not considered to be significant.

F3.3 Socio-economic Considerations

The socio-economic impacts of the Project within the Hunter Valley were assessed as being largely positive and include:

- net revenue generation of approximately \$58 million;
- an additional \$253.9 million in household expenditure; and
- an additional 110 full time equivalent (FTE) positions.

The quantifiable environmental costs included the following.

- Mining-related greenhouse gas emissions – negative approximately \$1.2 million.
- Reduced surface water flows – negative approximately \$0.2 million.

All other impacts were assessed as being not significant or not able to be quantified.

As a result, the quantifiable net socio-economic benefit of the Project within the Hunter Valley is \$252.5 million. In addition, the Project would have significant economic benefits for the remainder of NSW and Australia through the payments of coal royalties, taxes, expanded export markets for coal and increased economic activity.

F3.4 Consequences of not Proceeding with the Project

The consequences of not proceeding with the Project include the following.

- The recoverable coal would not be mined by the Proponent. Such an outcome would be contrary to the objective of the Department of Primary Industries - Mineral Resources and the Proponent's obligations under the terms of its leases to maximise resource utilisation.
- The opportunity to create up to 110 full-time employment positions within the Hunter Valley would be forgone.
- The disposable wages associated with the above positions would be forgone, a substantial portion of which would be spent within the Singleton and Muswellbrook areas.



- The training opportunities that would be provided by the Proponent would be forgone.
- The benefits flowing to the NSW and Commonwealth Governments through coal royalties, taxes and increased exports would be forgone.
- The opportunity to permanently preserve and protect the native vegetation within the biodiversity offset areas and Project Site may be forgone. This vegetation represents significant habitat for at least two threatened fauna species, the Grey-crowned Babbler and the Brush-tailed Phascogale.
- A number of relatively minor impacts on the biophysical environment would not eventuate.

It is considered therefore that the public interest of proceeding with the Project exceed the residual negative impacts associated with it.

F4 CONCLUSION

The proposed Glennies Creek Open Cut Coal Mine has, to the extent feasible, been designed to address the issues of concern to the community and all levels of government. This document, together with the range of specialist consultant studies undertaken, has identified that the Project should proceed because it would:

- (i) produce significant employment and economic benefits for the Hunter Valley and NSW;
- (ii) satisfy sustainable development principles;
- (iii) result in long-term protection of areas of native habitat within biodiversity offset areas and maintain or improve biodiversity values in the vicinity of the Project Site;
- (iv) have a minimal and manageable impact on the biophysical environment;
- (v) address impacts on the surrounding residents;
- (vi) reduce risk levels associated with possible incidents and impacts on the environment to an acceptable level; and
- (vii) contribute towards satisfying the international demand for high quality coal.



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Part G

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Part H

Glossary of Acronyms, Symbols, Units and Technical Terms

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GLOSSARY OF ACRONYMS

AADT Annual Average Daily Traffic.

Adb Air dried basis.

AEMR Annual Environmental Management Review.

AHD Australian height datum (in metres).

AHIMS Australian Heritage Information Management System.

AMCI AMCI Holdings Australia Pty Ltd

AMD Acid Mine Drainage.

ANC Acid Neutralising Capacity.

ANFO Ammonium Nitrate and Fuel Oil.

ANZEC Australian and New Zealand Environment Council

ANZECC Australian and New Zealand Environment and Conservation Council

ARI Average Recurrence Intervals

AS Australian Standard.

CEC Cation Exchange Capacity.

CL Coal Lease.

CHPP Coal Handling and Preparation Plant.

DA Development Application.

dB(A) decibels, A-weighted scale.

DEC Department of Environment and Conservation (NSW).

DECC Department of Environment and Climate Change (NSW).

DEH Department of Environment and Heritage (Commonwealth).

DGRs Director-General's Requirements

DIPNR Department of Infrastructure, Planning and Natural Resources (NSW).

DNR Department of Natural Resources (NSW) – now Department of Water and Energy.

DoP Department of Planning (NSW).

DP Deposited Plan.

DPI Department of Primary Industries (NSW).

DPI (MR) Department of Primary Industries (Mineral Resources) (NSW).

DUAP Department of Urban Affairs and Planning (NSW) (now Department of Planning)

DWE Department of Water and Energy.

EA Environmental Assessment.

EAT Emersons Aggregate Test.

EC electrical conductivity.

ECRTN Environmental Criteria for Road Traffic Noise.

EIS Environmental Impact Statement.

EL Exploration Licence.

EPBC Act Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).

EP&A Act Environmental Planning and Assessment Act 1979 (NSW).

EPL Environment Protection Licence



ESD	Ecologically Sustainable Development.	NPW Act	National Parks and Wildlife Act 1974 (NSW).
FTE	Full time equivalent	NPWS	National Parks and Wildlife Service (NSW).
GCCM	Glennies Creek Coal Management Pty Ltd	NVC Act	Native Vegetation Conservation Act 1997 (NSW).
GHG	Greenhouse Gas.	PHA	Preliminary Hazard Analysis.
GWP	Global Warming Potential.	PSA	Particle Size Analysis.
HVAS	High Volume Air Sampling.	PVS	Peak Vector Sum.
ICO	Integra Coal Operations Pty Ltd	POEO Act	Protection of the Environment Operations Act 1997 (NSW).
INP	Industrial Noise Policy.	REP	Regional Environmental Plan.
LALC	Local Aboriginal Land Council.	RFI Act	Rivers and Foreshores Improvement Act 1948 (NSW).
LEP	Local Environmental Plan.	ROM	Run-of-Mine.
LGA	Local Government Area.	RTA	Roads and Traffic Authority (NSW).
LW	Long Wall.	RBL	Rating Background Level.
MIC	Maximum Instantaneous Charge.	SCC	Singleton Shire Council.
MLA	Mining lease application.	SEPP	State Environmental Planning Policy.
MMC	Maitland Main Collieries	SMP	Subsidence Management Plan.
MOP	Mining Operations Plan.	SMU	Soil Mapping Unit.
MR	Main Road.	SR	Shire Road.
MREMP	Mining, Rehabilitation and Environmental Management Process.	SWMP	Surface Water Management Plan.
NAG	Net Acid Generation.	TAPM	The Air Pollution Model.
NAPP	Net Acid Producing Potential.	TSC Act	Threatened Species Conservation Act 1995 (NSW).
NATA	National Association of Testing Authorities.	TSP	Total Suspended Particulate.
NEPC	National Environment Protection Council.	USBM	United States Bureau of Meteorology
NEPM	National Environment Protection Measure.	VBMP	Vegetation and Biodiversity Management Plan.
NHMRC	National Health and Medical Research Council.	WHO	World Health Organisation.



GLOSSARY OF SYMBOLS AND UNITS

°	degrees.	lcm	loose cubic metre – a volume of 1m ³ after excavation.
°C	degrees Celsius.	L/s	litres per second.
%	percentage.	L/t	litres per tonne.
\$M	million dollars.	L/hr	litres per hour.
<	less than.	L _{A10}	sound level exceeded 10% of the sampling time.
≤	less than or equal to.	L _{A90}	sound level exceeded 90% of the sampling time.
>	greater than.	L _{Aeq}	the L _{Aeq} is the “equal energy” average noise levels, and is used in some instances for the assessment of traffic noise effects or the risk of hearing impairment due to noise exposures.
≥	greater than or equal to.	L _{Aeq 1 hour}	the “equal energy” average noise level over 60 minutes – used for assessing impacts of noise from motor vehicles.
bcm	bank cubic metre – a volume of 1m ³ in the ground prior to disturbance.	L _{Aeq T}	sound level of continuous noise which emits the same energy as the fluctuation sound over a given time period (T).
cm	centimetre (= 10mm).	L _{Amax}	the absolute maximum noise level measured in a given time interval.
D%	dispersion percentage.	L _{AN}	the A-weighted sound pressure level exceeded by N% of a given measured period.
dB	decibel, unit used to express sound intensity.	m	metre (= 100cm).
dB(A)	the unit of measurement of sound pressure level heard by the human ear, expressed in “A” scale.	m AHD	metres above Australian Height Datum.
deg	degrees.	M	million.
g	gram (= 0.001 kilogram).	m ²	square metre.
g/m ² /month	grams per square metre per month – unit for deposited dust.	m ³	cubic metre.
Gt	Gigatonnes (=1 billion tonnes).	m/s	metres per second.
ha	hectare (100m x 100m).	Mbcm	million bank cubic metres.
kg	kilogram (= 1 000 grams).	mg	milligram (weight unit = 0.001 gram).
kL	kilolitre (= 1 000 litres).	mg/L	milligrams per litre (parts per million).
km	kilometre (= 1 000 metres).	ML	megalitre.
km ²	square kilometre (= 1 million m ²).		
km/hr	kilometres per hour.		
kVA	kilovolt – amperes.		
L	litre.		



MLpa	megalitres per annum.
mm	millimetre (= 0.001 metres).
mm/s	millimetres per second
Mt	million tonnes (metric tonne = 1 000kg).
Mtpa	million tonnes per annum.
MW	megawatt
PM₁₀	particulate matter <10µm in diameter.
RL	reduced level
SWL	standing water level.
t	tonne (= 1 000kg).
tpa	tonnes per annum.
V:H	vertical to horizontal ratio.
µS/cm	microsiemens per centimetre.
µm	micrometres (= 0.001mm).
µg/m³	micrograms (1 x 10 ⁻⁶ grams) per cubic metre.



GLOSSARY OF TECHNICAL TERMS

A horizon – part of soil profile immediately below the topsoil.

acid – substance with a pH less than 7.0; the lower the pH, the higher the corrosive ability of the substance.

acid formation – the process whereby acid is formed by the oxidation of minerals (particularly sulfides) exposed to air and water.

acid mine drainage (AMD) – runoff of acidic water, typically from mine waste rock, following acid formation within the rock.

acoustic bund – a natural or artificial structure (e.g. a hill or a bund) that inhibits the transmission of sound.

adverse weather conditions (in respect of noise and dust) – conditions, such as temperature inversions or gentle winds (<3m/s) from the mine towards receptors.

aerial photographs – photographs of landscape taken from a plane (typically areas several kilometres across) used for the surveying and interpretation of vegetation type, geology, land use, etc.

aerial survey – survey of a landscape from an aeroplane, typically involving aerial photography, to determine specific characteristics (e.g. mineral potential or land use).

airblast overpressure – a shock wave from the blast transmitted through the air, normally measured in dB(Linear).

air pollutant – a substance in ambient atmosphere, resulting from the activity of man or from natural processes, causing adverse effects to man and the environment (also called "air contaminant").

air pollution emissions inventory – all information, collection and processing system containing data on emissions of, and sources of, air pollution from both man-made and natural causes.

air quality criteria – quantitative relationship between a pollutant's dose, concentration, deposition rate or any other air quality-related factors, and the related effects on receptors, e.g. humans, animals, plants, or materials. Air quality criteria serve as the scientific basis for formulating ambient air quality standards or objectives.

alkaline – having a pH greater than 7.0.

alkalinity – in water analysis a measure of the carbonates, bicarbonates, hydroxides and occasionally the borates, silicates and phosphates in the water.

alluvial – pertaining to material, such as sand or silt, deposited by running water (e.g. a creek or river).

ambient level – existing level of a phenomenon without the influence of the project.

amenity – the desirability of an area.

amphibians – animals (such as frogs) adapted to live both on land and in water.

anecdotal evidence – informal, oral or written evidence of an event.

ANFO – mixture of ammonium nitrate and fuel oil (diesel) used as an explosive.

aquifer – rock or sediment capable of holding and transmitting groundwater.

arboreal – pertaining to tree habitats.

archaeology – the scientific study of human history, particularly the relics and cultural remains of the distant past.

artefact – anything made by human workmanship, particularly by previous cultures (such as chipped and modified stones used as tools).

atmospheric stability – a measure of turbulence which determines the rate at which the effluent is dispersed as it is transported by the wind.

auger – a remote controlled mining machine used to extract coal during highwall mining of thin coal seams.



average annual rainfall – the average amount of rain to fall at a specific location over the period of 1 year (measured in millimetres).

B horizon – subsoil material located below the A horizon material and above the parent rock.

backfill – material used to fill created void.

background dust level – dust level in the absence of mining and processing activities.

background noise levels – the level of the ambient sound indicated on a sound level meter in the absence of the sound under investigation (eg sound from a particular noise source; or sound generated for test purposes).

bank cubic metre – a volume of 1m³ in the ground prior to disturbance.

baseline monitoring – monitoring performed prior to site development.

basin – the drainage area of a river and its tributaries or of a groundwater system.

batter – An engineered slope of soil or rock fill on either side upslope or downslope of a road, embankment or mine waste storage.

bench – a step in the face of a quarry or mine which could be 1m to 5m wide (if terminal).

blasthole – hole drilled into rock to position explosive for blasting.

blasting – the operation of breaking rock by means of explosives.

blast rock – rock that is propelled into the air by the force of an explosion. Usually comes from pre-broken material on the surface or upper open face.

bore – a well, usually of less than 20cm diameter, sunk into the ground and from which water is pumped.

box cut – an area excavated from ground level to provide the entry to an underground mine (via an adit or portal).

bulldozer – an item of tracked mobile earth moving equipment fitted with a front blade and with rear rippers used for pushing and ripping soil and rock.

bund – embankment of clay or weathered rock emplaced for visual or acoustic screening.

Carboniferous – geological time interval for the period from 345 to 280 million years before present and has a duration of 65 million years.

catch drains – drains used to intercept and redirect runoff.

catchment area – the area determined by topographic features within which rainfall will contribute to runoff at a particular point.

cation – an ion having a positive charge and characteristically moving toward a negative electrode.

channel – river or irrigation channel, includes bed and bank.

clay – a size term denoting particles, regardless of mineral composition, with diameter less than 0.004 mm.

coal seam – a layer of coal within the geological strata.

colliery – coal mine.

community – a combination of plants that are dependant on their environment and influence one another and modify their own environment. They form together, with their common habitat and other associated organisms, an ecosystem, which is also related to neighbouring ecosystems and to the macroclimate of the region.

concentration – the amount of a substance, expressed as mass or volume, in a unit volume of air.

conductivity – the measurement of the ability of a substance (either a measure of solid, liquid or gas) to transmit electricity; a measure of the salt content.

conglomerate – sedimentary rock consisting of poorly sorted grains (typically pebbles surrounded by finer material, such as sand or silt).



conservation – the management of resources in a way that will benefit both present and future generations.

continuous miner – An electric machine used in underground mines that cuts and loads coal at the same time.

contour bank – an earth bank constructed across a slope parallel to contours.

contractor – specialist brought in to perform a specific task, such as the construction of mine infrastructure or the excavation (mining) of the open pit.

core – (archaeology) a piece of stone from which flakes have been removed; cores often show distinctive flake scars indicative of certain production techniques, such as blade or adze production.

cross-section – a two-dimensional diagram of an object presented as if the object had been cut along its length.

crusher – that part of an ore-processing plant where the ore is mechanically crushed into smaller pieces.

crushing – the mechanical process of reducing rock size usually by pressure or impact.

culvert – large pipe or channel carrying water underneath a structure (e.g. a road or railway track) or underneath the ground.

cumulative – increasing by successive additions.

deceleration lane – a lane used for decreasing speed before leaving the road.

decibel – unit expressing difference in power between acoustic signals.

density – 1. The mass of a substance (e.g. sediment) divided by its volume; water has a density of exactly 1 kilogram per litre; gold has a density of 19.3 kilograms per cubic metre. 2. The coverage of vegetation (e.g. trees) per unit of distance (along a linear transect) or unit of area (in an area transect).

deposition – laying down of particulate material (e.g. sediment in a lake or tailings solids in a tailings storage).

detonator – a device that triggers an explosive.

diamond core – cylindrical-shaped drilling samples obtained by use of a diamond surfaced drilling bit.

diamond drill hole – drill hole constructed by equipment using rotary fluid flushing and a diamond faced bit to obtain core from the rock being drilled.

dip – the angle that rock strata make with a horizontal surface measured at right angles to the strike.

dispersibility – a characteristic of soils relating to their structural breakdown in water into individual particles.

diversion bank – an earth bank constructed to divert water away from disturbed areas.

drainage line – a passage along which water concentrates and flows towards a stream, drainage plain or swamp intermittently during or following rain.

drawdown – the difference between the water level observed during pumping and the non-pumping water level (static water level or static head).

drill core – the cylindrical sample of rock recovered by means of diamond drilling.

drilling – the action of boring holes (usually less than 30 centimetres in diameter and up to several kilometres deep) into the ground, typically to establish a water bore or to investigate the geology found at depth.

dust suppressant – any substance used to prevent dust disturbance.

dust concentration – the amount of a substance, expressed as mass or volume, in a unit volume of air.

dust – particles of mostly mineral origin generated by erosion of surfaces and the mining and handling of materials

electrical conductivity (EC) – the ability of a substance (either solid, liquid or gas) to transmit electricity.

ecology – the relationship between living things and their environment.



ecologically sustainable development (ESD) – using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and the total quality of life, now and in the future can be increased.

ecosystem – the totality of biological processes and interactions within a specified physical environment.

Emerson Class No. – ranking given to a soil or clay according to the Emerson crumb test.

emission – a discharge of a substance (e.g. dust) into the environment.

emission factor – an expression for the rate at which a pollutant is generated as a result of some activity, divided by the level of that activity.

environment – a general term for all the conditions (physical, chemical, biological and social) in which an organism or group of organisms (including human beings) exists.

Environmental Assessment (EA) – a report required to accompany a planning application for a major project – covering the project description, assessment of impacts and proposed safeguards and commitments.

environmental constraints – limitations on a project by components of the environment.

ephemeral – not permanent, e.g. a stream that flows only seasonally or after rainfall or a lake that periodically dries out.

erodibility – the tendency of soil, earth or rock to erode.

erosion – the wearing away of the land surface (whether natural or artificial) by the action of water, wind and ice.

erosion potential – the susceptibility of a parcel of land to the prevailing agents of erosion. It is dependent on a combination of climate, landform, soil, land use and land management factors.

evaporation – the loss of water as vapour from the surface of a liquid that has a temperature lower than its boiling point.

excavate – to dig into natural material or fill using an excavator or other machinery.

excavator – item of earth moving equipment fitted with a bucket on an articulated boom and used for digging material from a face in front of, or below the machine.

existing air quality – the quality of the ambient air near ground level, expressed as concentrations or deposition rates or air pollutants – also expressed as ambient air quality.

exotic – introduced or foreign, not native.

exploration licence (EL) – a licence issued by the Department of Mineral Resources for exploration in a defined area.

fault – a fracture in rock along which there has been observable displacement.

fauna – a general term for animals (birds, reptiles, marsupials, fish etc.) particularly in a defined area or over a defined time period.

feasibility study – a preliminary technical and economic study to assess the viability of a project.

fill – material imported and emplaced to raise the general surface level of a site.

front-end loader – machine used to lift and place soil, earth, rocks, etc. on a construction site.

fugitive emissions – emissions not entering the atmosphere from a stationary vent (stack). Examples of fugitive dust sources include vehicular traffic on unpaved roads, handling of raw materials, wind erosion of dusty surfaces, etc.

geotechnical – technical or engineering aspects relating to soil, rock and other materials.

grader – an item of earthmoving equipment, rubber tyred and fitted with a centrally mounted blade and rippers used to shape and trim the ground surface.

gradient – rate of change of a given variable (such as temperature or elevation) with distance.

grassland – an extensive area of largely treeless land covered mainly by natural grasses.



ground vibration – oscillatory motion of the ground caused by the passage of seismic waves originating from a blast.

groundcover – vegetation that grows close to the ground (such as grasses and herbs) providing protection from erosion.

groundwater – all waters occurring below the land surface; the upper surface of the soils saturated by groundwater in any particular area is called the water table.

groundwater depression – localised lowering of the regional water table.

groundwater surface – the upper surface of the water table.

habitat – the place where an organism normally lives; habitats can be described by their floristic and physical characteristics.

haul road – road used in a mine for haulage of rock from the active face to the processing or stockpile area and for general site access.

haultruck – a truck specifically designed for hauling and tipping soil or rock within the mine or similar situation.

head (hydraulic head) – energy contained in a water mass, produced by elevation, pressure or velocity.

heavy metals – normally trace metals of high density which occur in ore deposits and may be environmentally hazardous.

heritage – the things of value which are inherited.

heritage significance – of aesthetic, historic, scientific, cultural, social, archaeological, natural or aesthetic value for past, present or future generations.

highwall – exposed wall of excavation designed to stand open for mine life.

hydraulic conductivity (k) – the rate of flow of water in an aquifer through a cross section of unit area under a unit hydraulic gradient, at the prevailing temperature. Usually expressed in units of metres per second or metres per day.

hydraulic gradient – the direction of flow of groundwaters.

hydrogeology (geohydrology) – the study of groundwater and the related geologic aspects of surface waters.

in-situ – a term used to distinguish material (e.g. rocks, minerals, fossils, etc.) found in its original position of formation, deposition, or growth, as opposed to transported material.

indigenous – belonging to, or found naturally in, a particular environment (see also exotic).

infiltration – the process of surface water soaking into the soil.

inflow – flow directed into a particular feature, such as a lake or a mine pit.

infrastructure – the supporting installations and services that supply the needs of a project.

interburden – (waste rock) – in the mining context refers to non-economic material that occurs between two coal seams.

inter-generational equity – the principle that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

intermittent – flows periodically, irregularly.

inversion - generally used in meteorology with respect to an increase of temperature with height in contrast with the usual decrease of temperature with height in the troposphere. An inversion layer is distinguished by its large stability, which limits the turbulence and therefore the dispersion of pollutants.

invertebrates – commonly, animals without a backbone (jellyfish, worms, molluscs, etc.).

ion – an atom or compound that has gained or lost an electron, so that it is no longer electrically neutral but carries a positive or negative charge.

jointing - planes of discontinuity in rockmass which exhibit no evidence of relative movement.

landform – a specific feature of a landscape (such as a hill) or the general shape of the land.



lapse weather conditions – weather conditions that neither particularly exacerbate nor mitigate the dispersal of pollutant emissions (dust, noise etc.) from the project area.

loam – loose soil composed of clay and sand, especially a kind containing organic matter and of great fertility.

Local Environmental Plan (LEP) – a plan developed by a council to control development in part or all of their shire or municipality.

long-term – a period of time associated with annual air quality standards. Long-term models usually address pollutant concentrations over several seasons to one year.

low loader – is a trailer which has a relatively low carrying deck and used to transport large items of equipment such as bulldozers or scrapers.

low-yielding – an aquifer which yields water at a low rate.

major project – an activity as defined under the State Environment Planning Policy (Major Projects).

mammal – animal of the class mammalia, distinguished by the presence of hair and mammary glands.

management strategy – a policy or direction that assists in actions required to address issues.

migratory – passing, usually predictably (based on aquatic species), from one region or climate to another, for purposes of feeding, breeding, or other biological purposes

Mining, Rehabilitation and Environmental Management Process (MREMP) – process prepared under the auspices of the NSW Department of Mineral Resources as a vehicle for government agency control of the environmental management of a mining project from construction through operations to decommissioning, final rehabilitation and relinquishment of the mining lease.

mitigation measures – measures employed to reduce (mitigate) an impact (such as the construction of a perimeter bund to reduce sound emissions).

mobile equipment – wheeled or tracked self propelled equipment such as trucks and front-end loaders.

monitoring – systematic sampling and, if appropriate, sample analysis to record changes over time caused by impacts such as mining.

mudstone – sedimentary rock formed from the consolidation of silt and clay.

National Park – an area set aside for the protection of flora and fauna and for public recreation.

natural – existing in, or formed by, nature (generally excludes anything obviously modified by human beings).

neutral – neither acidic nor basic (e.g. a pH equal to 7.0).

noxious – introduced species considered to be harmful to native species or to the habitat of native species.

nutrients – generally refers to nitrogen and phosphorus, which are essential for biological growth.

offset strategy – a method of providing for disturbance attributable to the project through additional or compensatory measures.

open pit – large hole excavated in an open-cut mining operation to remove the ore.

operations phase – that period of the mining project, after construction and prior to decommissioning, during which pit excavation and metal extraction takes place.

overburden (waste rock) – in the mining context refers to non-economic material to be removed to allow access to the resource.

particle size distribution – the relative proportions of particles (e.g. in a sediment) that fall within specific size categories.

particulate matter – small solid or liquid particles suspended in or falling through the atmosphere - sometimes expressed by the term particulates.



peak particle velocity (ppv) – a measure of ground vibration reported in millimetres per second (mm/sec).

particle size distribution – the relative proportions of particles (e.g. in a sediment) that fall within specific size categories.

particulate matter – small solid or liquid particles suspended in or falling through the atmosphere – sometimes expressed by the term particulates.

peak particle velocity (ppv) – a measure of ground vibration reported in millimetres per second (mm/sec).

perennial – refers to stream which has flow throughout the year.

permeability – a material property relating to the ability of the material to transmit water.

Permian – the geological period of time from 280 to 225 million years.

pH – a measure of the degree of acidity or alkalinity of a solution; expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acid, 7 is neutral acid, and 14 is most basic (alkaline).

piezometer – a core drilled specifically for the monitoring of groundwater levels and water quality.

Planning Application – an application to the Department of Planning for approval of a major project.

pollution – the alteration of air, soil, or water as a result of human activities such that it is less suitable for any purpose for which it could be used in its natural state.

population – a group of organisms all of the same species occupying a particular area.

potable – water suitable for human consumption.

precautionary principle – a principle of ESD which states that decisions about any proposed development should be guided by careful management to avoid serious and irreversible damage to the environment.

progressive rehabilitation – rehabilitation of mine or disturbed areas as soon as practicable after they are released during the life of the mine, or after the final landform is achieved.

Project Site – the total area covered by the Planning Approval and correspondent with the open cut mining, out-of-pit waste rock emplacement, open cut facilities area, internal Haul Routes A, B and C and the site access road. The Project Site covers an area of 321ha.

Proponent – Integra Coal Management Pty Ltd

pump test – the systematic pumping of water from a bore to test the response of an aquifer.

quadrat – a square survey area.

quantify – to determine the quantity or amount of a component in a substance.

Quaternary – geological period of time from 2 million years before present to present.

recharge – the addition of water to an aquifer, directly from the surface, indirectly from the unsaturated zone, or by discharge from overlying or underlying aquifer systems.

Regional Environmental Plan (REP) – a plan prepared by the State Government Department responsible for planning where controls on development are considered on a regional and/or statewide basis.

rehabilitation – the preparation of a final landform after quarrying and its stabilisation with grasses, trees and shrubs.

reject material – comprises a mixture of high ash coal and non-coal materials such as sedimentary rock and clay.

relative humidity – the ratio of actual moisture in the air to the amount the air could hold if saturated, at a given temperature.

relief – the variation in landscape elevation over a region.

remnant woodland – native woodland remaining after widespread clearing has taken place.

reptiles – cold-blooded vertebrates, including lizards, snakes, turtles, and crocodiles.



reserves – in the mining context refers to those parts of a resource where sufficient information is available to undertake mine planning.

resource – an estimate of potentially usable coal in a defined area based on preliminary information.

revegetation – replacement of vegetation, principally grasses and legumes on areas disturbed by mining activities.

rider seam – thin coal seam associated with a thicker layer of coal.

runoff – that portion of the rainfall falling on a catchment area that flows from the catchment past a specified point.

run-of-mine (ROM) – ore or overburden in condition as loaded from open cut.

saline – water with high salt concentration.

salinity – the dissolved content of water expressed in terms of milligrams per litre.

scarred tree – tree with cuts in its bark or wood made by Aborigines.

scraper – irregularly shaped artefact that has been modified in a manner that suggests use in scraping activities, notably woodworking.

screening – a process which separates crushed rock into various size fractions – this usually involves a mechanical vibration of the rock over a series of decks fitted with steel mesh, steel plate or polyurethane or rubber mats with fixed sized apertures.

sediment basin – a small excavation designed to trap the coarse material washed from disturbed areas.

sequence (geological) – layers of (predominantly) sedimentary rocks sourced from a common geological environment or period.

short-term – a period of time associated with air quality standards for pollutant exposures ranging between one hour and twenty four hours.

silt – a classic sediment, most of the particles of which are between 0.063mm and 0.004mm in diameter.

silt-stop fencing – fine mesh fencing normally installed downslope of a sediment source, designed to trap silt and sediment and allow the water to pass through.

soil erosion hazard – the susceptibility of an area of land to erosion and includes rainfall erosivity, slope, soil erodibility and cover.

solubility – the ability of a substance (such as copper) to dissolve in a solvent (such as water); solubility depends on such factors as temperature and pH.

source – the place where pollutants are emitted into the atmosphere. Sources may be point, area or line sources. Often the term “source” is used for a whole plant or an installation. In air pollution modelling, the terms “continuous source” and “instantaneous source” are used:

- continuous source: source which emits pollution continuously over a time period much larger than the travel time to a point where the concentration is considered. Usually it is assumed that during this time period the emission is constant.
- instantaneous source: source which emits pollution over a time period much short than the travel time of the emission to a point where its concentration is considered.

species – a taxonomic grouping of organisms that are able to interbreed with each other but not with members of other species.

species diversity – a measure of the number of different species in a given area.

specific energy – heat liberated by combustion of a fuel, ie. energy available per unit of mass.

stable – used with respect to the atmospheric boundary layer, when the vertical temperature gradient is greater than the adiabatic lapse rate. Vertical air motions are suppressed. The turbulence intensity is low resulting in poor dispersion conditions.

stemming – the fine material placed in a blast drill hole after the explosive to ensure blast force is directed laterally.



stockpile – a pile used to store material (such as coal) for future use.

storage capacity – the maximum volume of liquid able to be retained in a container (e.g. a reservoir or lake).

stripping – removal of vegetation and topsoil.

structure (soil) – the physical texture of the soil arising from the interrelationship between the grain size, composition, and organic nature of a soil.

subsoil – the layer of soil lying below the topsoil; usually contains less organic matter and is less fertile.

surface waters – all water flowing over, or contained on, a landscape (e.g. runoff, streams, lakes etc).

Surface Water Management Plan (SWMP) – a plan to manage the capture, storage and use of Project Site surface water.

suspended solids – analytical term applicable to water samples referring to material recoverable from the sample by filtration.

syncline – a fold in the form of an basin.

temperature inversion – an increase in air temperature with height.

terrestrial – of or relating to the land, as distinct from air or water.

texture (of soil) – variations in composition, grain size distribution, and structure.

topography – the physical relief and contour of a region.

topsoil – the upper layer of soil, usually containing more organic material and nutrients than the subsoil beneath it.

total suspended particulates (TSP) – the mass of all particulate matter suspended in a solution.

total suspended solids – a common measure used to determine suspended solids concentrations in a waterbody and expressed in terms of mass per unit of volume (e.g. milligrams per litre).

tributary – a stream or river that flows into a larger river or lake.

weathered rock – rock affected to any degree by the processes of chemical or physical weathering.

weed – any plant (in particular an herbaceous one) that survives in an area where it is harmful or troublesome to the desired land use.

wildlife – non-domesticated fauna.

wildlife corridor – a strip of vegetation that has a design purpose of allowing animals to pass from one area to another and acting as an undisturbed area for wildlife preservation.

wind direction – the direction from which the wind, averaged over a certain period of time, is blowing.

wind erosion – wearing away of exposed soil, earth, or rock surfaces by the abrasive action of wind-blown particles (e.g. grains of sand).

wind rose – diagrammatic representation of wind direction, strength, and frequency of occurrence over a specified period.

woodland – plant communities dominated by trees whose crowns shade less than 30% of the ground.

yield – (of a water bore) 1) the capacity of the bore to produce water. 2) the amount of water actually withdrawn.



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Appendices

(No. of pages excluding this page = 40)

- Appendix 1: Major Projects Application
- Appendix 2: Director-General's Requirements and
Summary of Director-General's
Requirements and Relevant EA Sections.
- Appendix 3: Community Consultation Record



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Appendix 1

(No. of pages excluding this page = 4)

Major Projects Application

Note: Project Description Report Available on Department of Planning Website – www.planning.nsw.gov.au.

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Major Projects application



NSW GOVERNMENT
Department of Planning

Date received: ___/___/___

Project Application No. _____

1. Before you lodge

This form is required to apply for the approval of the Minister to carry out a Project to which Part 3A of the *Environmental Planning and Assessment Act, 1979* (the Act) applies.

Before lodging this application, it is recommended that you first consult with the Department of Planning (the Department) concerning your Project.

Please be aware that you may need to conduct a Planning Focus Meeting before lodging this application involving the Department, relevant agencies, Council or other groups identified by the Department. If you are required to conduct a Planning Focus Meeting, you will need to provide details and outcomes arising from the meeting.

To ensure that your application is accepted as being duly made, you must

- complete ALL parts of this form, and
- submit all relevant information required by this form.

All applications must be lodged with the Director-General, by courier or mail.

Ground floor, 23-33 Bridge Street, SYDNEY NSW 2000
GPO Box 39 SYDNEY NSW 2001
DX 10181 Sydney Stock Exchange
t: 02 9228 6111
f: 02 9228 6455

2. Details of the proponent

Company/organisation/agency		ABN
Integra Coal Operations Pty Ltd		96 118 030 998
<input checked="" type="checkbox"/> Mr <input type="checkbox"/> Ms <input type="checkbox"/> Mrs <input type="checkbox"/> Dr <input type="checkbox"/> Other		
First name	Family name	
Robert	Corbett	
STREET ADDRESS		
Unit/street no.	Street name	
Lot 6	Enterprise Crescent	
Suburb or town	State	Postcode
SINGLETON	NSW	2330
POSTAL ADDRESS (or mark 'as above')		
As above		
Suburb or town	State	Postcode
Daytime telephone	Fax	Mobile
02 6571 5935	02 6571 5963	0428 689 027
Email		
bcorbett@amci.com.au		

3. Identify the land you propose to develop

STREET ADDRESS

Unit/street no. <input type="text"/>	Street or property name <input type="text"/>	
Suburb, town or locality <input type="text"/>	Postcode <input type="text"/>	Local government area <input type="text"/>

REAL PROPERTY DESCRIPTION

OR: detailed description of land attached: See Attachment 1

The real property description is found on a map of the land or on the title documents for the land. If you are unsure of the real property description, you should contact the Department of Lands.

Please ensure that you place a slash (/) to distinguish between the lot, section, DP and strata numbers. If the Major Project applies to more than one piece of land, please use a comma to distinguish between each real property description.

Where the Major Project is subject to Clause 8F of the *Environmental Planning and Assessment Regulation 2000* and in lieu of completing the above, a description or detailed plan of the land affected must be included with the documents required with Part 4 below.

4. Proposed Major Project – Description and other Requirements

Provide a brief title for your Project that includes all significant components. If the application relates to only part of a Project, include a clear title that describes the relevant part.

Glennies Creek Open Cut Coal Mine

Is the application related only to a part of a Project? Yes No

You are also required to provide a Project Description Report and address any matters required by the Director-General in accordance with 75E of the Act. Failure to do so may lead to your application being rejected.

Is a Project Description attached:

Hard copy:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Electronic version:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

(NB: An electronic copy is required as all applications must be provided on the Department's website. You should contact the Department on the correct electronic format).

Is the Project Description Report consistent with the requirements of any Guideline produced by the Department (including any draft)? Yes No

Does the Project Description Report include additional matters required by the Director-General, such as evidence of a Planning Focus Meeting and consultation? Yes No

CONCEPT APPROVAL

If you are applying for a **concept approval**, the Department's *Concept Approval Guideline* should be consulted and the matters identified therein must be addressed as part of your application.

Does the Project Description Report submitted address the relevant guidelines for Concept Approvals? Yes No

FULL TIME EQUIVALENT JOBS

Please indicate the number of jobs created by the proposed Major Project. This should be expressed as a proportion of full time jobs over a full year.

Construction jobs (full-time equivalent)	<input type="text" value="20"/>
Operational jobs (full-time equivalent)	<input type="text" value="45 - 60"/>

5. Approvals from state agencies

Does the proposed Major Project require any of the following: (tick all appropriate)

- an aquaculture permit under section 144 of the *Fisheries Management Act 1994*
- an approval under section 15 of the *Mine Subsidence Compensation Act 1961*
- a mining lease under the *Mining Act 1992*
- a production lease under the *Petroleum (Onshore) Act 1991*
- an environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in section 43 of that Act)
- a consent under section 138 of the *Roads Act 1993*

6. Application fee

You are required to pay a fee for the assessment of a Major Project. This fee is based on the estimated cost of the Major Project.

The Department requires that you pay a proportion of the total fee with this application and you should consult with the Department before lodging this application to determine the proportion to be paid.

Estimated Project Cost

\$7 000 000

7. Owner's Consent

As the owner(s) of the above property, I/we consent to this application being made on our behalf by the Proponent:

Signature

Name

Date

Signature

Name

Date

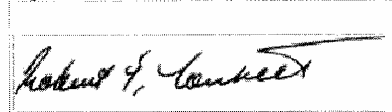
Note: The Department will not accept an application for a Major Project without having the signature of the owner of the land, unless the Major Project is subject to Clause 8F of the *Environmental Planning and Assessment Regulation 2000*.

8. Proponent's Signatures

As the proponent(s) of the proposed Major Project and in signing below, I/we hereby:

- provide a description of the proposed Project and address all matters required by the Director-General pursuant to Section 75E of the Act, and
- apply, subject to satisfying Clause 8D of the *Environmental Planning and Assessment Regulation 2000*, for the Director-General Environmental Assessment Requirements pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979*, and
- declare that all information contained within this application is accurate at the time of signing.

Signature



Name

Mr Robert Corbett

Date

In what capacity are you signing if you are not the proponent

Group Manager – Environment –
AMCI Australia Pty Ltd

Name, if you are not the proponent

Attachment 1 – Land Titles Description

Open Cut Project Area

- Parish of Auckland, County of Durham
 - Lot 792 DP 586255
 - Part Lot 791 DP 580967
 - Part Lot 710 DP 624852
 - Part Lot 4 DP 606344
 - Part Lot 93 DP 752442
 - Part Lot 1 DP 783398
 - Part Lot 1 DP 1083482
 - Part Lot 2 DP 1083482
 - Part Lot 100 DP 633743
- Parish of Broughton, County of Durham
 - Part Lot 1 DP 752450
 - Part Lot 2 DP 752450
 - Part Lot 10 DP 752450

The Open Cut Project Area also encompasses approximately 0.6 km Council road reserve and 1.5 km of Crown road reserve.

Coal Haul Route D

- Parish of Auckland, County of Durham
 - Part Lot 1 DP 752450
 - Part Lot 11 DP 1013180
 - Part Lot 92 DP 752442
 - Part Lot 3 DP 752455
 - Former Railway Line Easement within Lot 3 DP 752455

Coal Haul Route E

- Parish of Auckland, County of Durham
 - Part Lot 1 DP 1083482
 - Part Lot 2 DP 1083482
 - Part Lot 1 DP 810309
 - Part Lot 1 DP 246434
 - Part Lot 1 DP 212284
 - Part Lot 22 DP 752442
- Parish of Darlington, County of Durham
 - Part Lot 3 DP 752455

Coal Handling and Preparation Plant (CHPP)

- Parish of Darlington, County of Durham
 - Part Lot 3 DP 752455
 - Former Railway Line Easement within Lot 3 DP 752455

Appendix 2

(No. of pages excluding this page = 21)

Director-General's Requirements and Summary of Director-General's Requirements and Relevant EA Sections



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NSW GOVERNMENT
Department of Planning

Contact: Mike Young
Phone: (02) 9228 6481
Fax: (02) 9228 6466
Email: Mike.Young@planning.nsw.gov.au

Our ref: S03/00047

Mr Robert Corbett
Glennies Creek Coal Management Pty Ltd
Lot 6 Enterprise Crescent
SINGLETON NSW 2330

Dear Mr Corbett

**Director-General's Requirements
Proposed Glennies Creek Open Cut Coal Mine Project**

The Department has received your application for the proposed Glennies Creek Open Cut Coal Mine Project in the Singleton local government area (reference number: 06_0073).

I have attached a copy of the Director-General's requirements for the project. These requirements have been prepared in consultation with relevant government authorities and are based on the information that you have provided to date. I have also attached a copy of the government authorities' comments for your information.

Please note that under section 75F(3) of the *Environmental Planning and Assessment Act 1979*, the Director-General may alter these requirements at any time.

I would appreciate it if you would contact the Department at least two weeks before you propose to submit your draft Environmental Assessment for the project to determine the:

- fees applicable to the application;
- consultation and public exhibition arrangements that will apply; and
- number and format (hard-copy or CD-ROM) of the Environmental Assessment that will be required.

As you may know, the Department will review the draft Environmental Assessment in consultation with the relevant authorities to determine if it adequately addresses the Director-General's requirements. If the Director-General considers the Environmental Assessment to be inadequate, you will be required to revise it prior to public exhibition.

The Director-General's requirements will be placed on the Department's website along with other relevant information which becomes available during the assessment of the project. As a result, the Department would appreciate it if the documents submitted to the Department are in a suitable format for the web, and if you would arrange for an electronic version of the Environmental Assessment for the project to be hosted on a suitable website with a link to the Department's website.

Finally, if your proposal contains any actions that could have a significant impact on Matters of National Environmental Significance, it will require an additional approval under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in addition to any approvals required under NSW legislation. If you have any

Bridge St Office 23-33 Bridge St Sydney NSW 2000 GPO Box 39 Sydney NSW 2001
Telephone (02) 9228 6111 Facsimile (02) 9228 6191 DX 10181 Sydney Stock Exchange Website planning.nsw.gov.au



R. W. CORKERY & CO. PTY. LIMITED

questions about the application of the EPBC Act to your proposal, you should contact the Commonwealth Department of Environment and Heritage in Canberra (6274 1111 or <http://www.deh.gov.au>).

If you have any enquiries about these requirements, please contact Mike Young, Manager of the Department's Mining & Extractive Industries team (02 9228 6481).

Yours sincerely



27.9.06

Chris Wilson
A/Executive Director
as delegate for the Director-General





NSW GOVERNMENT
Department of Planning

Phone: (02) 9228 6308
Fax: (02) 9228 6466
Email: howard.reed@planning.nsw.gov.au

Mr Robert Corbett
Glennies Creek Coal Management Pty Ltd
Lot 6 Enterprise Crescent
SINGLETON NSW 2330

Our ref: S03/00047

Dear Mr Corbett

**Modification to Director-General's Requirements
Proposed Glennies Creek Open Cut Coal Mine Project
(Project Application 06_0073)**

I wish to advise you that in accordance with section 75F(3) of the *Environmental Planning and Assessment Act 1979*, the Director-General has modified his requirements for the proposed Glennies Creek Open Cut Coal Mine Project. I have attached a copy of the modified Director-General's requirements (DGRs) for the project.

The DGRs now require a greenhouse gas assessment to be included in the Environmental Assessment for the project. The greenhouse gas assessment must include a quantitative analysis of greenhouse gas emissions associated with the combustion of product coal, and a qualitative assessment of the impacts of these emissions on the environment.

If you have any enquiries about the modified requirements, please contact Howard Reed, A/Manager of the Department's Mining & Extractive Industries team (02 9228 6308).

Yours sincerely

A handwritten signature in black ink that reads "Yolande Stone".

Yolande Stone
A/Executive Director
Major Project Assessments
As delegate for the Director-General

25/1/07



Director-General's Requirements

Section 75F of the *Environmental Planning and Assessment Act 1979*

Project	The proposed Glennies Creek Open Cut Coal Mine Project, which includes: <ul style="list-style-type: none"> • construction and operation of a new open cut coal mine and associated infrastructure; • production of up to 1.5 million tonnes of coal over a mine life of up to 6 years; and • rehabilitation of the mine.
Site	Glennies Creek Coal Mine, approximately 12km north of Singleton
Proponent	Glennies Creek Coal Management Pty Ltd
Date of Issue	25 January 2007
Date of Expiration	25 January 2009
General Requirements	<p>The Environmental Assessment (EA) must include:</p> <ul style="list-style-type: none"> • an executive summary; • a detailed description of the project including the: <ul style="list-style-type: none"> - need for the project; - alternatives considered; and - various components and stages of the project; • consideration of any relevant statutory provisions; • an overview of all the environmental impacts of the project (including an environmental risk analysis) and identification of the key issues for further assessment, taking into consideration the issues raised during consultation; • a detailed assessment of the key issues specified below and any other significant issues identified in the environmental risk analysis (see above), which includes: <ul style="list-style-type: none"> - a description of the existing environment; - an assessment of the potential impacts of the project, including any cumulative impacts associated with the concurrent operation of the project with the other mining operations at the Glennies Creek mine as well as the operations at the Mt Owen, Ashton, Camberwell and proposed Glendell mines; - a description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage, and/or monitor the impacts of the project; • a draft Statement of Commitments, outlining environmental management, mitigation and monitoring measures; • a conclusion justifying the project, taking into consideration the environmental impacts of the proposal, the suitability of the site, and whether or not the project is in the public interest; • a signed statement from the author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading.
Key Issues	<ul style="list-style-type: none"> • Noise – including construction, operation, traffic and rail noise impacts; • Blasting and Vibration; • Air Quality – including construction and operation related impacts; • Surface and Groundwater - including detailed modelling of potential surface and groundwater impacts, a site water balance, and a detailed description of any proposed creek diversions. A surface and groundwater contingency strategy must be included as part of the mitigation measures for the project which details the measures proposed to protect the water supply to landowners in the region and the environment; • Flora and Fauna – including impacts on critical habitats, threatened species, populations, ecological communities, groundwater dependent ecosystems and native vegetation. A comprehensive offset strategy must be included as part of the mitigation measures for the project to ensure



	<p>that there is no net loss of flora and fauna values in the area in the medium to long term;</p> <ul style="list-style-type: none"> • Rehabilitation, Final Landform and Final Void Management – including a justification for the proposed final landform and use in relation to the strategic land use objectives; a detailed description of how the site would be progressively rehabilitated and integrated into the surrounding landscape, including adjacent mines; and a detailed description of the measures that would be put in place to ensure sufficient resources are available to implement the proposed rehabilitation measures, and for the ongoing management of the site following the cessation of mining activities; • Heritage - both Aboriginal and non-Aboriginal, including conservation outcomes for significant heritage items and areas in the mine affectation zone; • Visual – including lighting impacts; • Traffic and Transport; • Social and Economic; • Greenhouse Gases - a greenhouse gas assessment (including a quantitative analysis of greenhouse gas emissions associated with the combustion of product coal, and a qualitative assessment of the impacts of these emissions on the environment); and • Cumulative Impacts - potential cumulative impacts (particularly on noise, air quality, flora and fauna, surface water and groundwater,) that may arise from the combined operation of the project, together with the other approved and existing mines in the region
References	The Environmental Assessment must take into account relevant State government technical and policy guidelines. While not exhaustive, guidelines which may be relevant to the project are included in the attached list.
Consultation	During the preparation of the Environmental Assessment, you must consult with the relevant local, State or Commonwealth government authorities, service providers, community groups or affected landowners. The consultation process and the issues raised must be described in the Environmental Assessment.
Deemed refusal period	60 days



State Government Technical and Policy Guidelines - For Reference

Aspect	Policy /Methodology
Soil and Water	<ul style="list-style-type: none"> • <i>Managing Urban Stormwater: Soils and Construction Volume 1 4th Edition</i> (Landcom); • <i>Acid Sulfate Soil Manual</i> (NSW Acid Sulfate Soil Advisory Committee 1998); • <i>Guidelines for Fresh and Marine Water Quality and Guidelines for Water Quality Monitoring and Reporting</i> (ANZECC); • <i>Rehabilitation Manual for Australian Streams</i> (Land and Water Resources Research and Development Corporation); • <i>NSW State Rivers and Estuaries Policy - NSW Sand and Gravel Extraction Policy for Non Tidal Rivers</i> (DNR); • the various <i>State Groundwater Policy</i> documents (DNR); • <i>Approved Methods for the Sampling and Analysis of Water Pollutants in NSW</i> (DEC); • <i>Environmental Guidelines: Use of Effluent by Irrigation</i> (DEC);
Flooding	<ul style="list-style-type: none"> • <i>Floodplain Development Manual 2005</i> (DNR);
Flora and Fauna	<ul style="list-style-type: none"> • draft <i>Guidelines for Threatened Species Assessment</i> (DEC); • <i>Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities</i> (DEC); • <i>Guidelines for Developments Adjoining Department of Environment and Conservation Land</i> (DEC); • <i>Guidelines for Assessment of Aquatic Ecology in EIA (DoP)</i>; • <i>Policy and Guidelines Aquatic Habitat Management and Fish Conservation</i> (DPI); • <i>NSW Wetlands Management Policy 1996</i> (DNR); • <i>NSW Groundwater Dependent Ecosystem Policy</i> (DNR); • <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (DPI);
Noise	<ul style="list-style-type: none"> • <i>NSW Industrial Noise Policy</i> (DEC); • <i>Environmental Criteria for Road Traffic Noise</i> (DEC); • <i>Construction Site Noise - Environmental Noise Control Manual</i> (DEC);
Air Quality	<ul style="list-style-type: none"> • <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (DEC);
Heritage	<ul style="list-style-type: none"> • draft <i>Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation</i> (DEC); • <i>Assessing Heritage Significance</i> (NSW Heritage Office); • <i>NSW Heritage Manual</i> (NSW Heritage Office);
Traffic	<ul style="list-style-type: none"> • <i>Guide to Traffic Generating Development and Road Design Guide (RTA)</i>; • relevant Austroad standards;
Greenhouse Gases	<ul style="list-style-type: none"> • <i>AGO Factors and Methods Workbook</i> (Australian Greenhouse Office);
Coastal Development	<ul style="list-style-type: none"> • <i>NSW Coastal Policy 1997</i> (Department of Planning);
Rehabilitation	<ul style="list-style-type: none"> • <i>Guidelines for Rehabilitation of Land for Agricultural End Use</i> (DPI);
Waste	<ul style="list-style-type: none"> • <i>Environmental Guidelines: Assessment and Classification and Management of Liquid and Non-Liquid Wastes</i> (DEC).



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Table A2-1
Director-General's Requirements from Relevant EA Sections
(Department of Planning – 25 January 2007)

Page 1 of 2

Paraphrased Requirement	Relevant EA Section
GENERAL	
<p>The EA must include:</p> <ul style="list-style-type: none"> • an executive summary; • a detailed description of the project including the: <ul style="list-style-type: none"> - need for the project; - alternatives considered; and - various components and stages of the project. • consideration of any relevant statutory provisions; • an overview of all the environmental impacts of the project (including an environmental risk analysis) and identification of the key issues for further assessment, taking into consideration the issues raised during consultation; • a detailed assessment of the key issues specified below and any other significant issues identified in the environmental risk analysis which includes: <ul style="list-style-type: none"> - a description of the existing environment; - an assessment of the potential impacts, including any cumulative impacts associated with the concurrent operation of the project with the other mining operations at the Glennies Creek mine as well as the operations at the Mt Owen, Ashton, Camberwell and proposed Glendell mines; - a description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage, and/or monitor the impacts of the project; • a draft Statement of Commitments, outlining environmental management, mitigation and monitoring measures; • a conclusion justifying the project, taking into consideration the environmental impacts of the proposal, the suitability of the site, and whether or not the project is in the public interest; • a signed statement from the author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading. 	<p>Executive Summary Parts B and F</p> <p>Various Part C</p> <p>Part D</p> <p>Part E</p> <p>Part F</p> <p>Covering page</p>
CONSULTATION	
<p>Consult with the relevant local, State or Commonwealth government authorities, service providers, community groups and affected landowners. The consultation process and the issues raised must be described in the EA.</p>	<p>Part C</p>
STATUTORY REQUIREMENTS AND PLANNING	
<p>Consider relevant State government technical and policy guidelines.</p>	<p>Various</p>
REHABILITATION AND FINAL LAND USE	
<p>Include a justification for the proposed final landform and use in relation to the strategic land use objectives.</p>	<p>Parts D5, D8 and F</p>
<p>Describe how the site would be progressively rehabilitated and integrated into the surrounding landscape including adjacent mines.</p>	<p>Part B15</p>
<p>Describe measures put in place to ensure sufficient resources are available to implement the proposed rehabilitation, and ongoing management following the cessation of mining activities.</p>	<p>Part B15</p>



Table A2-1 (Cont'd)
Director-General's Requirements from Relevant EA Sections
(Department of Planning – 25 January 2007)

Paraphrased Requirement	Relevant EA Section
SURFACE WATER AND GROUNDWATER	
Include detailed modeling of potential surface and groundwater impacts, a site water balance, and a detailed description of any proposed creek diversion.	Parts D10 and D11
Include a surface and groundwater contingency strategy as part of the mitigation measures which detail the measures proposed to protect the water supply to landowners in the region and the environment.	Parts D10 and D11
NOISE AND VIBRATION	
Determine construction, operation, traffic and rail noise impacts.	Part D3.7
Assess blasting noise and vibration impacts.	Part D3.7
VISUAL	
Include lighting impacts.	Part D9
AIR QUALITY	
Determine construction and operation related impacts.	Part D2.7
FLORA AND FAUNA	
Determine impacts on critical habitats, threatened species, population, ecological communities, groundwater dependent ecosystems and native vegetation.	Parts D4, D5 and D6
Include a comprehensive offset strategy as part of the mitigation measures for the project to ensure that there is no net loss of flora and fauna values in the area in the medium to long term.	Parts D4, D5 and D6
HERITAGE	
Include conservation outcomes for significant heritage items and areas in the mine affectation zone (for both Aboriginal and non-Aboriginal heritage).	Parts D7 and D13
CUMULATIVE IMPACTS	
Assess potential cumulative impacts (particularly on noise, air quality, flora and fauna, surface water and groundwater) of the project together with other approved and existing mines in the region.	Various Part D
TRAFFIC AND TRANSPORT	
Assess impacts on traffic and transport.	Part D12
SOCIO-ECONOMIC	
Assess socio-economic impacts.	Part D14
GREENHOUSE GASES	
Greenhouse gas assessment, including a quantitative analysis of greenhouse gas emissions associated with the combustion of product coal, and a qualitative assessment of the impacts of these emissions on the environment.	Part D2



Table A2-2
Requirements from Other Government Agencies from Relevant EA Sections

Page 1 of 11

Government Authority	Paraphrased Requirement	Relevant EA Section
GENERAL		
Department of Primary Industries (Undated)	Prepare Resource and Reserve estimates in accordance with the "JORC Guidelines for the Estimation and Reporting of Australian Black Coal Resources and Reserves".	Part B2.3
	Submit a detailed Resource/Reserve Statement in digital format prior to completion of the EA. The Statement should include: <ul style="list-style-type: none"> • the exploration and geology of the project area, • coal seam geology and coal quality, • estimated in situ coal resources for all seams, • recoverable and marketable Coal Reserves, and • limits of proposed mining and parameters used to define these limits. 	Separate Report Submitted to DPI-MR
	The EA should include a brief summary of the information contained in the Resource/Reserve Statement.	Part B2.3
Department of Environment and Conservation (22/12/04)	The size and type of the operation.	Part B
	The anticipated level of performance in meeting required environmental standards and cleaner production principles.	Parts B and D
	The staging and timing of the proposal.	Part B
	The proposal's relationship to any other industry or facility.	Parts B and D
	The location of the proposed facility and details of the surrounding environment.	Parts B and D
	The proposed layout of the site.	Figure B3
	Appropriate land use zoning.	Part A1
	Ownership details of any residence and/or land likely to be affected by the proposed facility.	Part D1.4
	Maps/diagrams showing the location of residences and properties likely to be affected and other industrial developments, conservation areas, wetlands, etc in the locality that may be affected by the facility.	Figure D5
	All equipment proposed for use at the site.	Table B7
	Chemicals, including fuel, used on the site and proposed methods for their transportation, storage, use and emergency management;	Part B11
Waste generation and disposal.	Part B11	
Site rehabilitation following the termination of the development.	Part B15	
Department of Environment and Conservation (22/12/04)	The EA must determine whether contaminated soils are likely to be disturbed during the proposed works.	Part D8
Singleton Council (3 December 2004)	Sufficient detail on proposed buildings and facilities needs to be included in the EA.	Part B10
	Contributions for community facilities / community enhancement that will be applicable to the application.	Part D14



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Page 2 of 11

Government Authority	Paraphrased Requirement	Relevant EA Section
CONSULTATION		
Department of Primary Industries (Undated)	Consult with all neighbours within the near vicinity of the mine and the proposed haul road.	Part C2
	Conduct public information meetings within the Communities of Glennies Creek, with a possible open day being held at the project site.	Part C2.1
	Provide regular updates to the community via newsletters or letter-drops.	Part C2.1
	Form a formal Community Consultative Committee.	Part C2.1.5
LAND TENURE		
Department of Primary Industries (Undated)	The proponent will be required to part transfer the subject portion of CL 357 and have it included within the Glennies Creek Colliery Holding. A mining lease will also be required from the surface to 20 metres depth above CL 382 to give title from the surface down.	Part B1.4
STATUTORY REQUIREMENTS AND PLANNING		
Department of Natural Resources (10/04/06)	Address the principles, objects and targets of both the <i>Water Act 1912</i> and <i>Water Management Act 2000</i> .	Parts D10 and D11
	Address the relevant NSW State Government natural resource management policies, including: <ul style="list-style-type: none"> • NSW State Rivers and Estuaries Policy • NSW Wetlands Management Policy • NSW Groundwater Policy Framework Document - General • NSW Groundwater Quantity Management Policy • NSW Groundwater Quality Protection Policy • NSW Groundwater Dependent Ecosystem Policy 	Parts D10 and D11
	Consider : <ul style="list-style-type: none"> • Land and Water Resources Research and Development Corporation. 2000 <i>Rehabilitation Manual for Australian Streams</i>. • Healthy Rivers Commission. May 2002 <i>Independent Inquiry into the Hunter River System</i>. 	Part D10
	Provide details of current development approvals and water licences for the Glennies Creek Coal operations.	Parts A5.2.4 and A5.3.4
Department of Primary Industries (Undated)	Comply with requirements of the <i>Coal Mine Health and Safety Act 2002</i> and the <i>Coal Mines Regulation Act, 1982</i> .	Part B13
Department of Environment and Conservation	Address requirements of Section 45 of the <i>Protection of the Environment Operations Act 1997</i> (POEO Act).	Part D
Roads and Traffic Authority (13 December 2004)	PlanningNSW EA Guidelines: <ul style="list-style-type: none"> • <i>Extractive Industries – Mining (Transportation Issues)</i>. 	Part D12
	Roads and Traffic Authority's <i>Guide to Traffic Generating Developments</i> .	Part D12
	EPA's <i>Environmental Criteria for Road Traffic Noise</i> .	Part D3



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Page 3 of 11

Government Authority	Paraphrased Requirement	Relevant EA Section
STATUTORY REQUIREMENTS AND PLANNING (CONT'D)		
Singleton Council (3 December 2004)	Blasting within 500m of a public road will be subject to an agreement with Council.	Part D12
	Determine whether an approval under the Roads Act will be required.	Part D12
	There are outstanding matters regarding disabled access to existing mine premises which need to be addressed.	Not Relevant
Note 1: Matters relating to existing facilities or operations are beyond the scope of this document and application		
SAFETY ISSUES		
Department of Primary Industries (Undated)	A commitment to compliance with the <i>Coal Mine Health and Safety Act 2002</i> and <i>Coal Mines Regulation Act 1982</i> .	Part B13
	Nomination of a person (or persons) as Operator and Manager as required by the <i>Coal Mine Health and Safety Act 2002</i> and <i>Coal Mines Regulation Act 1982</i> .	Part B13
	Details of the procedures the proponent intends to adopt in addressing any safety issues identified by an Inspector or Mine Safety Officer or an authorised Government Official as specified in the <i>Coal Mine Health and Safety Act, 2002</i> .	Part B13
REHABILITATION AND FINAL LAND USE		
Department of Primary Industries (Undated)	Fully detail the conceptual rehabilitated final landform of the void and emplacements.	Part B15
	Maximising efficient placement of the emplacement and the use of overburden to cap the tailings dam at Camberwell.	Part B7
	Design of the final void and waste emplacements to achieve revegetation, slope stability, erosion and sediment control. Design of the void and mining method to minimise the area left as open void in the Glennies Creek and Camberwell area.	Part B15.5
	Conceptual long-term water management of the void including quantity and quality is essential. Supply geotechnical information on possible barriers and groundwater information.	Parts D10 and D11
	The Department's preference is for final landforms to have maximum slopes of 1:6 (V:H), although the Proponent proposes steeper slopes at a maximum of 1:3. This is acceptable provided the Proponent makes provision for soil conservation, slope stability and erosion controls on the steeper rehabilitated slopes of 1:3.	Part B15.6
Department of Primary Industries (Agriculture) (9 December 2004)	Objectives for rehabilitation and sustainable post mining use land use.	Parts B15 and D8.3
	Indicative final landform, land capability, voids, high walls, drainage and vegetation patterns, including the total area to be disturbed, predicted farming and conservation areas and the size of all final voids within the combined lease.	Part B15
	Proposed rehabilitation strategies to effectively re-establish and maintain biodiversity pastures and water storages, including improvements to existing 'rehabilitated' areas within acquired lands.	Part B15



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Page 4 of 11

Government Authority	Paraphrased Requirement	Relevant EA Section
REHABILITATION AND FINAL LAND USE (CONT'D)		
Department of Primary Industries (Agriculture) (9 December 2004)	Proposals to integrate landforms, vegetation and water management and adjoining mines including potential regional / local conservation corridors.	Part B15
	Performance indicators and monitoring for rehabilitation and land management and how the proposed rehabilitation practices, landform, vegetation patterns and water storages would contribute to the realisation of rehabilitation and land use goals.	Part B15
SURROUNDING LAND USE		
Department of Primary Industries (Agriculture) (9 December 2004)	Clearly identify all potential impacts on current agricultural enterprises in the locality and how any adverse impacts would be mitigated.	Part D
	Land use and agricultural operations within the surrounding area.	Part D1.4
	Natural resources of significance for agricultural development, in particular the alluvial lands and water resources of Glennies Creek and its tributaries.	Part D10
Singleton Council (3 December 2004)	Justify and ensure that the integrity of the road will not be affected by the mining activities.	Part D12
	Impacts on the amenity of residents need to be fully assessed and suitable mitigation measures established.	Parts D2, D3, D9 and D12
OPERATIONAL INFORMATION AND MINE PLANNING		
Department of Environment and Conservation (22/12/04)	Identify any fuel or chemical storage areas and describe the measures proposed to minimise the potential for leakage or the migration of pollutants into the soil/waters or from the site.	Part B11.3
Department of Primary Industries (Mineral Resources) (Undated)	Mining leases have as a standard condition the requirement to lodge a Mining Operations Plan (MOP) and Annual Environmental Management Report (AEMR).	Part A6
WASTE MANAGEMENT		
Department of Environment and Conservation (22/12/04)	An assessment of the process, comparing it with other alternate waste management strategies for the wastes to be received at the facility.	Not Relevant
	Comprehensive details of the quantity and proposed sources of wastes.	Part B7
	Nature of the wastes.	Parts B7 and B8
	The composition and classification of the wastes arriving at the proposed facility.	Not Relevant
	Detail the transportation, assessment and handling of waste arriving at or generated at the site.	Parts B7 and B8
	The measures to be used to store, treat and dispose of this material.	Parts B7 and B8
	Classification and investigation of recycling/disposal options for residue waste.	Parts B7 and B8
	Full details and classification of wastes generated from the process and their disposal options.	Parts B7 and B8
Characterisation of the composition of the finished products and certification that the final product will meet appropriate local and international standards for those products.	Parts A4 and B2.4	



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Page 5 of 11

Government Authority	Paraphrased Requirement	Relevant EA Section
WASTE MANAGEMENT (CONT'D)		
Department of Primary Industries (Undated)	Analyse overburden and coal for: <ul style="list-style-type: none"> • Acid generation potential – overburden • Salinity potential – overburden • Spontaneous combustion potential - coal 	Parts B2.5 and B7.1
SURFACE WATER AND GROUNDWATER		
Department of Natural Resources (10/04/06)	Provide details of any proposed groundwater extraction, including purposes, location and construction details of all proposed bores and expected annual extraction volumes.	Part D11.3
	Provide details of any proposed works likely to intercept groundwater.	Parts B4 and D11
	Describe different aquifer systems including their extent and inter-relationships (surface water bodies and dependent ecosystems).	Part D11.2
	Describe flow directions and rates and the physical and chemical characteristics of the aquifers.	Part D11.2.7
	Detail predicted impacts of any final landform on the groundwater regime.	Parts D10.3 and D11.6
	Detail the existing groundwater users within the area of the proposal and any potential impacts on these users including the environment.	Part D11.2.6
	Detail proposed method of disposal of any tailings or waste water.	Part D10.2
	Detail of the results of any models or predictive tools used, including inputs, limitations for models used and any sensitivity analyses conducted.	Part D10.4 and D11.4
	Interaction of this proposal with other existing and proposed mining operations in the catchment.	Part D11.5
	Provide a site-specific water balance including: <ul style="list-style-type: none"> • sources of water supply • location and design specifications for all clean water diversion • details of internal drainage of the contaminated water circuit. • details in regard to any mine water storage proposed for the development • discussion of proposed monitoring programs and reporting procedures. • Description of integrated water management system, including an assessment of the water management system under a range of conditions. 	Parts D10.2, D10.3, D10.4, D10.5 and D11.6
Department of Natural Resources (10/05/06)	The Environmental Assessment must address the following. <ul style="list-style-type: none"> • Details of existing groundwater interception and management on site. • Details of any anticipated increase in groundwater interception. • Details of the location of all existing and proposed groundwater monitoring bores. • Details of any additional dewatering and water management facilities. 	Part D11
Department of Environment and Conservation (22/12/04)	Demonstrate compliance with <i>Protection of the Environment Operations Act (1997)</i> , including the protection of water quality.	Parts D10.2 and D10.4
	Document and justify the methodology, data and assumptions used to design any pollution control works and assess the potential impact of the proposal on water quality.	Parts D10.3, D10.4, D11.4 and D11.5



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Government Authority	Paraphrased Requirement	Relevant EA Section
SURFACE WATER AND GROUNDWATER (CONT'D)		
Department of Environment and Conservation (22/12/04)	The EA must include a water management plan and site water balance incorporating the following principles: <ul style="list-style-type: none"> • Maximum on-site reuse of wastewater; • Prevention of wet weather overflows of contaminated stormwater; • Segregation of contaminated water from non-contaminated water; • Spillage controls and bunding; • Sealing and effectively bunding material storage areas and active areas of the plant; • Effective management of stormwater; • Maintenance of sediment and erosion control structures; • Sealing, kerbing and guttering of trafficable areas; and • Provision of truck washing facilities. 	Parts B10 and D10.2
	The EA should also describe the sewage treatment and effluent management processes used on site.	Part B11
	If a wastewater discharge is proposed it must be justified and it must be demonstrated that controlled discharges can be managed in compliance with the requirements of the Hunter River Salinity Trading Scheme.	Not Relevant
	If a discharge under the Hunter River Salinity Trading Scheme is found to be necessary and the discharge would be via a tributary of the Hunter River, the EA must include a tributary impact assessment that addresses the following: <ul style="list-style-type: none"> • Impacts on downstream landholders: <ul style="list-style-type: none"> - A list of downstream landholder/tenants including a record of permanent or seasonal activities; - A description and list of all crossings, culverts and other in-stream structures. • Physical and biological impacts: <ul style="list-style-type: none"> - existing flow and stream characteristics, including current bank and bed profiles, potential flow volumes at key points of inflection within the stream course, stability of stream banks and beds and an assessment of soil types. - Assessment of likely impacts of proposed discharge including impacts on flow characteristics, potential for erosion of banks, bed or damage to riparian vegetation. • Proposed measures to: <ul style="list-style-type: none"> - minimise the impacts of discharge on downstream landholders, including a discharge notification procedure; - reduce potential erosion hazards at vulnerable points in the stream banks, protect and maintain riparian vegetation and bank stability, and provisions for energy dissipation of discharge waters where necessary. 	Not Relevant
	In cases where more than one mine discharges to a tributary, the EA must also address the collective impacts of discharge to that tributary.	Not Relevant



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Page 7 of 11

Government Authority	Paraphrased Requirement	Relevant EA Section
SURFACE WATER AND GROUNDWATER (CONT'D)		
Department of Primary Industries (Agriculture) (9 December 2004)	Possible changes to surface and groundwater flows and quality that could affect other water users and the environment.	Parts D10.4 and D11.5
	Saline and wastewater management, and the changes the development will have on saline water generation, including controls to prevent the saline water storage structure 'Possum Skin Dam' from discharging water into Glennies Creek because of a run off event.	Parts D10.3, D10.4 and D10.5
SOILS		
Department of Primary Industries	The Proponent should apply 'Best Practice' for soil handling and management. The Proponent needs to complete extensive soil profiling prior to stripping of vegetation. Selective stripping of the topsoil and subsoil should be utilised to efficiently secure and maintain the current available resources. The utilisation of the cleared vegetation in the rehabilitation program should also be reviewed in the EA.	Part D8
NOISE AND VIBRATION		
Department of Primary Industries (Agriculture) (9 December 2004)	Predicted cumulative environmental and socio-economic impacts on agricultural activities and potential.	Parts D3.7 and D14
Environment and Conservation (22/12/04)	The EA must include a comprehensive noise assessment of the existing environment, potential impacts and proposed noise amelioration measures.	Parts D3.2, D3.5 and D3.7
	Determine the existing background (L_{A90}) and ambient ($L_{Aeq(15\text{ min})}$) noise levels in accordance with the NSW Environmental Criteria for Road Traffic Noise, where road traffic noise impacts may occur.	Part D3.4.4
	Identify any noise sensitive locations, such as residential properties, schools, churches, and hospitals.	Parts D3.2 and Figure D5
	For each identified potentially affected receiver, this should include: <ul style="list-style-type: none"> • determination of the intrusive criterion for each identified potentially affected receiver, • selection and justification of the appropriate amenity category for each identified potentially affected receiver, • determination of the amenity criterion for each receiver, • determination of the appropriate sleep disturbance limit. 	Parts D3.2 and D3.4
	The noise and vibration levels likely to be received at the most sensitive locations should be determined. Potential impacts should be determined for any identified significant adverse meteorological conditions.	Part D3.7
	Sound power levels measured or estimated for all plant and equipment should be clearly stated and justified. The expected noise level and noise character (eg: tonality, impulsiveness, vibration, etc) likely to be generated from noise sources during the following phases should be determined: <ul style="list-style-type: none"> • site establishment • construction • operational phases • transport including traffic noise generated by the proposal • other services. 	Part D3.5.1
	The Noise Assessment should identify the transport route(s) to be used, the hours of operation and quantify the noise impacts.	Parts B9 and D3.7



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Page 8 of 11

Government Authority	Paraphrased Requirement	Relevant EA Section
AIR QUALITY		
Department of Primary Industries (Undated)	The EA should detail the management plan for dust suppression.	Part D2.5
Department of Environment and Conservation (22/12/04)	The EA must include a detailed Air Quality Impact Assessment (AQIA). The AQIA must describe in detail all possible sources of air pollution and activities/processes with the potential to cause air pollutants including fugitive dust and odour emissions beyond the boundary of the development site.	Parts D2.3 and D2.7
	Demonstrate that the facility will operate within DEC's objectives to minimise adverse effects on local residents, sensitive land users and air quality.	Part D2.7
	A description of existing air quality, using existing information and site representative ambient monitoring data including: <ul style="list-style-type: none"> • dust deposition; • total suspended particulates; and • PM₁₀ particulate matter. 	Part D2.2
	Identification and location of all fixed and mobile sources of dust/air emissions from the development including rehabilitation. The location of all emission sources should be clearly marked on a plan for key years of the quarry development. Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source(s) and discharge point(s).	Parts D2.3 and D2.6
	Details of the project including: <ul style="list-style-type: none"> • the quantity and physio-chemical characteristics of materials to be handled, stored or transported; • an outline of the procedures for material handling, storage and transport; • the management of activities and areas with potential for impacts on air quality. 	Parts B and D2
	A description of the topography and surrounding land uses.	Parts D1.2 and D1.4
	Details of the exact locations of dwellings, schools and hospitals etc.	Part D1.4.1 and Figure D5
	Estimate the resulting ground level concentrations of all pollutants. Use an appropriate dispersion model to predict ambient TSP and PM ₁₀ dust concentrations and dust deposition levels.	Part D2.7
	A detailed description of the methodology used to assess the air quality impacts of the development. The use of a particular dispersion model and model parameters used should be justified and discussed. The dispersion model input/output files should be included.	Part D2.6
	Air quality impact predictions should include plans showing projected incremental levels of 24-hour average PM ₁₀ concentrations, annual average dust deposition rates and annual average total suspended particulate concentrations throughout the life of the operation.	Part D2.7 and Figure D9
	An assessment of cumulative air quality impacts and a description of the methodology used.	Parts D2.6 and D2.7
An assessment of the potential impacts on air quality other than by dust, for example nitrogen oxide emissions from diesel equipment.	Part D2.1	



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Page 9 of 11

Government Authority	Paraphrased Requirement	Relevant EA Section
AIR QUALITY (CONT'D)		
Environment and Conservation (22/12/04)	Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals.	Part D2.1
	Describe the contribution (if any) that the development will make to regional and global pollution, particularly in sensitive locations.	Part D2.7
	An assessment of the impacts on air quality of dust and any other pollutants generated during construction works. In this context, particular attention should be given to: <ul style="list-style-type: none"> • the nature, extent and duration of dust generating activities; • consideration of the location of dust sources. 	Part D2
	Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions. Where possible, this should include cleaner production processes.	Part D2.5
	Include details of an air quality monitoring program to determine effectiveness of mitigation and to verify predictions, including provision for investigations in response to complaints.	Part D2.8
	Control measures to be implemented to minimize dust generation during construction activities, haulage roads and product stockpiles.	Part D2.5
FLORA AND FAUNA		
Department of Primary Industries (Undated)	The proposal area contains a significant area of native vegetation. This area links to native vegetation corridors that Camberwell mine has earmarked as its contribution to the Synoptic Plan. Revegetation methods for this area should be detailed in the EA and offsets should be considered.	Parts D4.6, D5.4 and D6
Department of Environment and Conservation (22/12/04)	Provide a detailed assessment of vegetation communities including: <ul style="list-style-type: none"> • their conservation significance at both a local and regional scale; • the habitat values of the vegetation; • the extent and impact of clearing, earthworks and other disturbances; and • the extent and nature of revegetation, rehabilitation and/or landscaping proposed. 	Part D5.3
	The description of vegetation communities should wherever possible be correlated with known classifications, such as those used in the Lower Hunter Central Coast Regional Environmental Management Strategy (REMS) (NPWS 2000).	Part D5.3
	Provide a detailed assessment of threatened flora species and endangered ecological communities and their conservation significance including: <ul style="list-style-type: none"> • those listed as ROTAP (Rare or Threatened Australian Plants); • listings under the Commonwealth Environment Protection and Biodiversity Conservation Act; • listings under the NSW Threatened Species Conservation Act (including preliminary listings and/or determinations); and • regionally significant flora. 	Part D5.3



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

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Government Authority	Paraphrased Requirement	Relevant EA Section
FLORA AND FAUNA (CONT'D)		
Department of Environment and Conservation (22/12/04)	Provide a plan showing the distribution of any threatened or ROTAP species and vegetation communities on the subject site.	Parts D4.3 and D5.3
	Where threatened species, populations or their habitats or communities exist the effect of the development should be determined pursuant to Section 5A of the <i>Environmental Planning and Assessment Act 1979</i> .	Parts D4.6 and D5.5
	Describe the measures proposed to mitigate and/or ameliorate the impact of the development on the plant communities, threatened and ROTAP species.	Part D5.4
	Provide a detailed assessment of threatened fauna species and their conservation significance including: <ul style="list-style-type: none"> • listings under the <i>Commonwealth Environment Protection and Biodiversity Conservation Act</i>; • listings under the <i>NSW Threatened Species Conservation Act</i> (including preliminary listings and/or determinations); • those recorded on the site or in the vicinity of the site; • those with the potential to occur; • an assessment of how identified species utilise the habitat on or in the vicinity of the development site; • consideration of listed Key Threatening Processes including clearing of native vegetation and bushrock removal. 	Parts D4.2 and D4.3
	Undertake a fauna survey to identify the distribution and abundance of fauna species known that are likely to use the subject site. Include a description of available fauna habitats and assessment of conservation status of each.	Part D4
	Provide a plan showing results of fauna study at a project scale.	Figures D16 to D19
	Describe the measures proposed to mitigate and/or ameliorate the impact of the development on fauna.	Part D4.5
	Flora and fauna surveys are to be undertaken by suitably qualified persons and qualifications and experience provided. Dates and times, site locations, survey design and methodology, analysis techniques and weather conditions at the time of the assessments and surveys must be provided.	Parts D4.1 and D4.2
	Conclusions drawn in surveys and assessments should be substantiated by evidence.	Parts D4.1 and D4.21
TRAFFIC AND TRANSPORT		
Roads and Traffic Authority (13 December 2004)	Maintain an efficient and safe road system (includes <i>SEPP 11</i> consideration).	Part D12
	Facilitate the integration of land use and transport (includes draft <i>SEPP 66</i> consideration).	Part D12.2
	Maintain the integrity and security of the road network, property and assets.	Part D12
	The RTA preference is to minimise transport on public roads, particularly through urban areas. A thorough investigation of alternative transport modes and route is required, as there may be more strategic network or local community issues that need to be addressed.	Part D12.2



Table A2-2 (Cont'd)
Requirements from Other Government Agencies from Relevant EA Sections

Government Authority	Paraphrased Requirement	Relevant EA Section
HERITAGE		
Department of Environment and Conservation (22/12/04)	Provide a detailed assessment of Aboriginal heritage including: <ul style="list-style-type: none"> an archaeological assessment in accordance with the NPWS IDA Guidelines for Aboriginal Cultural Heritage (Attachment 2); an Aboriginal cultural heritage assessment in accordance with the NPWS IDA Guidelines; details (as indicated in the IDA Guidelines) of inclusive consultation with the local Aboriginal community; 	Part D7
	If sites or areas of Aboriginal heritage significance are identified through the assessment process, consideration will need to be given to appropriate conservation options.	Part D7.4
	Conduct a search of the Aboriginal Heritage Information Management System.	Part D7.1.1
	An assessment should be undertaken by an appropriately qualified person in consultation with the local Aboriginal community.	Part D7
	Detail on a plan Aboriginal objects and places of significance.	Part D7.3 and Figure D21
	Prepare a contingency plan that details the measures to be taken in the event that Aboriginal objects are discovered.	D7.4
	Provide details of extensive consultation with the local Aboriginal community as per the DEC <i>Interim Community Consultation Requirements for Applicants</i> .	Part D7.1.2
ENVIRONMENTAL MONITORING		
Department of Primary Industries (Undated)	Conduct an impact assessment on the effect of blasting on the surrounding community.	Part D3.7.3
	Monitor the effects of the operations lighting on the surrounding residences at night time.	Part D9.2
Department of Environment and Conservation (22/12/04)	A detailed assessment of any noise, air quality, water quality or waste monitoring required during the construction phase and on-going operation of the facility to ensure that the development achieves a satisfactory level of environmental performance. The evaluation should include a detailed description of the monitoring locations, sample analysis methods and the level of reporting proposed.	Parts D2, D3, D10 and D11
Department of Primary Industries (Agriculture) (9 December 2004)	Performance indicators and monitoring for rehabilitation and land management and how the proposed rehabilitation practices, landform, vegetation patterns and water storages would contribute to the realisation of rehabilitation and land use goals.	Parts B15, D4 and D5



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Appendix 3

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Community Consultation Record



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A3.1 INTRODUCTION

During the preparation of the *Environmental Assessment* the local community was consulted in a number of ways, as follows.

- The Proponent initiated discussions with the local community through the Glennies Creek Colliery Community Consultative Committee.
- A newsletter was circulated in February 2005 (see attached copy), after which a community meeting was convened, on 22 March 2005.
- An information forum was held on 2 May 2006 to further explain the status of the Project and discuss any further issues.
- The Proponent maintained contact with various neighbours and welcomed telephone contact through the Colliery or R.W. Corkery & Co.

Throughout the consultation program, a number of issues relating to the Project were raised and were taken into consideration during the preparation of the *Environmental Assessment*. **Table A3.1** within this appendix records the various issues raised, their frequency and where each issue is addressed in the *Environmental Assessment*.





Newsletter No. 1 - Glennies Creek Open Cut Coal Mine Proposal
 February 2005

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PURPOSE OF THIS NEWSLETTER

This initial information newsletter has been prepared to introduce you to the Glennies Creek Open Cut Coal Mine proposal, provide you with information on the planned activities and the various environmental studies that have commenced, and a contact number for more details. All components of the proposal as described will be subject to ongoing review and refinement based on the outcome of the various studies undertaken. Additionally, we request that you complete the insert and register with us to receive additional information.

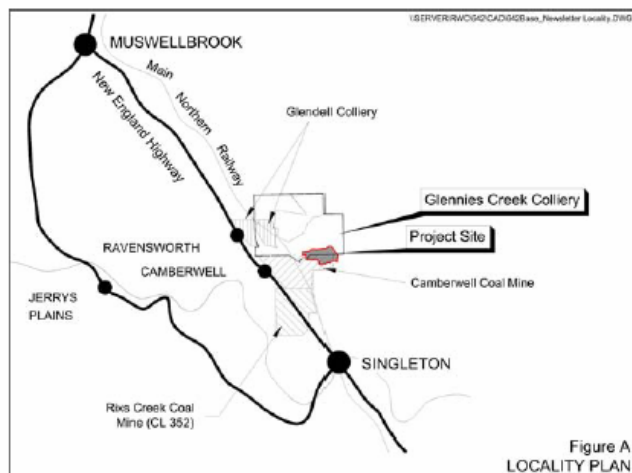
INTRODUCTION

Glennies Creek Coal Management Pty Ltd (GCCM) proposes to further develop the coal resources at the Glennies Creek Colliery, 12km north of Singleton (Figure A). On this occasion, GCCM is targeting coal recoverable by open cut methods adjacent to the northern boundary of the former Camberwell North Pit and centred approximately 1km east of the Glennies Creek underground mine entries. The open cut resource is relatively small with only approximately 9 million tonnes (Mt) of coal able to be economically recovered

The Project Site referred to throughout this newsletter is the area encompassing surface disturbance related to the proposed open cut mining activities. The Project Site covers approximately 400ha.

MAXIMUM AREA OF DISTURBANCE

The proposed open cut development would involve the disturbance of approximately 200ha. Of this 200ha, the open cut will cover approximately 100ha with the majority of the remaining 100ha required for out-of-pit overburden disposal. Of the total area, approximately 110ha has been previously disturbed by mining activities.



THE PROPONENT

Glennies Creek Coal Management Pty Ltd is the management company responsible for all operations at the Glennies Creek Colliery. The colliery is owned by AMCI through wholly owned subsidiary companies, Maitland Main Collieries Pty Ltd and AMCI (GC) Pty Ltd.

AMCI is the head entity for the Australian arm of the AMCI Group - an international producer, shipper and trader of high-grade metallurgical coal.

PLANNING CONTEXT

The Project Site lies within land zoned Rural 1(a) under the Singleton Local Environmental Plan 1996. Coal Mining (including associated activities) is a permissible activity within this zone with development consent.

Tenements

Glennies Creek Colliery operates under a total of four mining tenements.

1. Coal Lease (CL) 382 (4070ha).
2. Mining Lease (ML) 1437 (14.8ha).
3. Mining Lease 1518 (9.6ha).
4. Mining Lease 1525 (4ha).

A further 43ha around the pit top is currently subject to a transfer from the Camberwell lease, CL 357. The proposed open cut development lies entirely within CL 382 and CL 357.

Existing Underground Mining Operations

Underground mining at the Glennies Creek Colliery commenced in 1999 and, to date, has been developed in three stages.

- **Stage 1** – development of entries in the Middle Liddell Coal Seam from the highwall of the Camberwell North Pit.
- **Stage 2** – mine development, installation and operation of a longwall unit with a maximum face width to-date of 152m.
- **Stage 3** (in progress) – widening of longwall face to 250m and installation of a surface conveyor system.

DESCRIPTION OF THE PROPOSAL

The Open Cut Resource

Three principal coal seams occur within the proposed open cut, namely the Liddell, Barrett and Hebden Coal Seams, and are overlain or separated by overburden and interburden strata comprising conglomerate, sandstones, mudstones and claystones.

The coal seams are bituminous high-volatile, low sulphur and vitrinite-rich and can be washed to meet export specifications.

The quantity of coal likely to be mined from within the defined open cut mine area is in the order of 9Mt yielding in the order of 5.5Mt of product coal.

Reasons for Proposed Open Cut Development

The potential for a small open cut has been examined in the past and, on each occasion, been rejected on economic grounds. However, with the recent increase in the demand and price for coking coal, a small open cut is now considered viable.

THE PROPOSED MINING OPERATION

Please note that as the environmental impact assessment progresses, details of the proposed mining operation may change to allow the design and implementation of impact mitigation measures.

Based on current planning, mining will commence with the establishment of a box cut and then progress in a north-easterly, then south-westerly and westerly direction (**Figure B**).

Overburden, interburden and coal removal will utilise dump trucks and excavators with blasting required throughout the mining activities. It is envisaged that blasting will occur approximately twice per week.

Annual ROM coal production will be up to 1.5Mtpa. Based on the identified reserves, the mine would have a life of approximately 6 years.

It is proposed that the initial overburden and interburden mined would be placed in an area south of the box cut formerly mined by Camberwell as part of their North Pit development and tie into the rehabilitated slopes of Camberwell's former overburden emplacement. It is proposed that the top of the overburden emplacement would be below the level of the existing Camberwell emplacement. Subsequent progressive placement of overburden would occur within and over the open cut.



As is the case with the underground coal, the ROM coal from the proposed open cut will be transported to the Camberwell Coal Handling and Preparation Plant (CHPP) for washing (**Figure B**).

The washed coal would be despatched via the Camberwell coal rail loading facility to the Port of Newcastle.

Once sufficiently low in the landscape, it is planned that mining be undertaken for up to 24 hours per day, 7 days per week, ie. subject to demonstrating compliance with relevant noise criteria, particularly for sleep disturbance. Notwithstanding the hours of operation for which approval is to be sought, GCCM's objective is to optimise coal production within the least number of operational hours.

It is envisaged that approximately 45 persons will be directly employed in mining. Approximately 15 sub-contractors would also be routinely engaged at the mine

REHABILITATION

Rehabilitation, including earthworks, drainage and revegetation, would be undertaken progressively. The main features of the rehabilitated landform as currently proposed would include the following.

- An out-of-pit overburden emplacement covering an area of 100ha, with completed slopes comparable to those already created on the northern slopes of the Camberwell emplacement, ie. approximately 10°.
- An in-pit overburden emplacement blending into the out-of-pit overburden emplacement and constructed to an elevation of approximately 110m AHD.
- A final mine void at the western extremity of the open cut. Final void use options, such as a water storage, access to underground coal resources or reshaping to blend with the Glennies Creek portal area landform, will be assessed.

The post mine land uses will be assessed during the environmental impact assessment process but are likely to be a combination of grazing and nature conservation.

APPROVALS REQUIRED

In order for the Glennies Creek Open Cut Mine proposal to proceed, the following approvals, licences or leases will be required.

1. Development Consent – from the Minister for Infrastructure and Planning.
2. A mining lease covering that section of CL 382 affected by a surface exemption and 20m depth restriction.
3. The excision of the affected portion of land from CL 357 and its transfer to GCCM.
4. An amendment to the existing Environment Protection Licence 7622 or a new Environment Protection Licence to cover the proposed open cut operation.

ENVIRONMENTAL SETTING

Topography

The Project Site lies within an area of undulating topography which has been extensively cleared for grazing and, immediately to the south, has been substantially modified by coal mining activities at Camberwell and Rixs Creek Mine.

The landform within the Project Site comprises a low northwest trending ridge in the centre with side slopes to both the east and west. Elevations range from approximately 80m AHD at the eastern and western extremities of the Project Site to in excess of 140m AHD near the southern boundary of the Project Site. Natural slopes within the Project Site range from 1° to 5°. Small localised drainage lines traverse the Project Site creating an irregular topography.

Surrounding Land Uses

Much of the land to the south and southwest of the Project Site is used for coal mine developments.

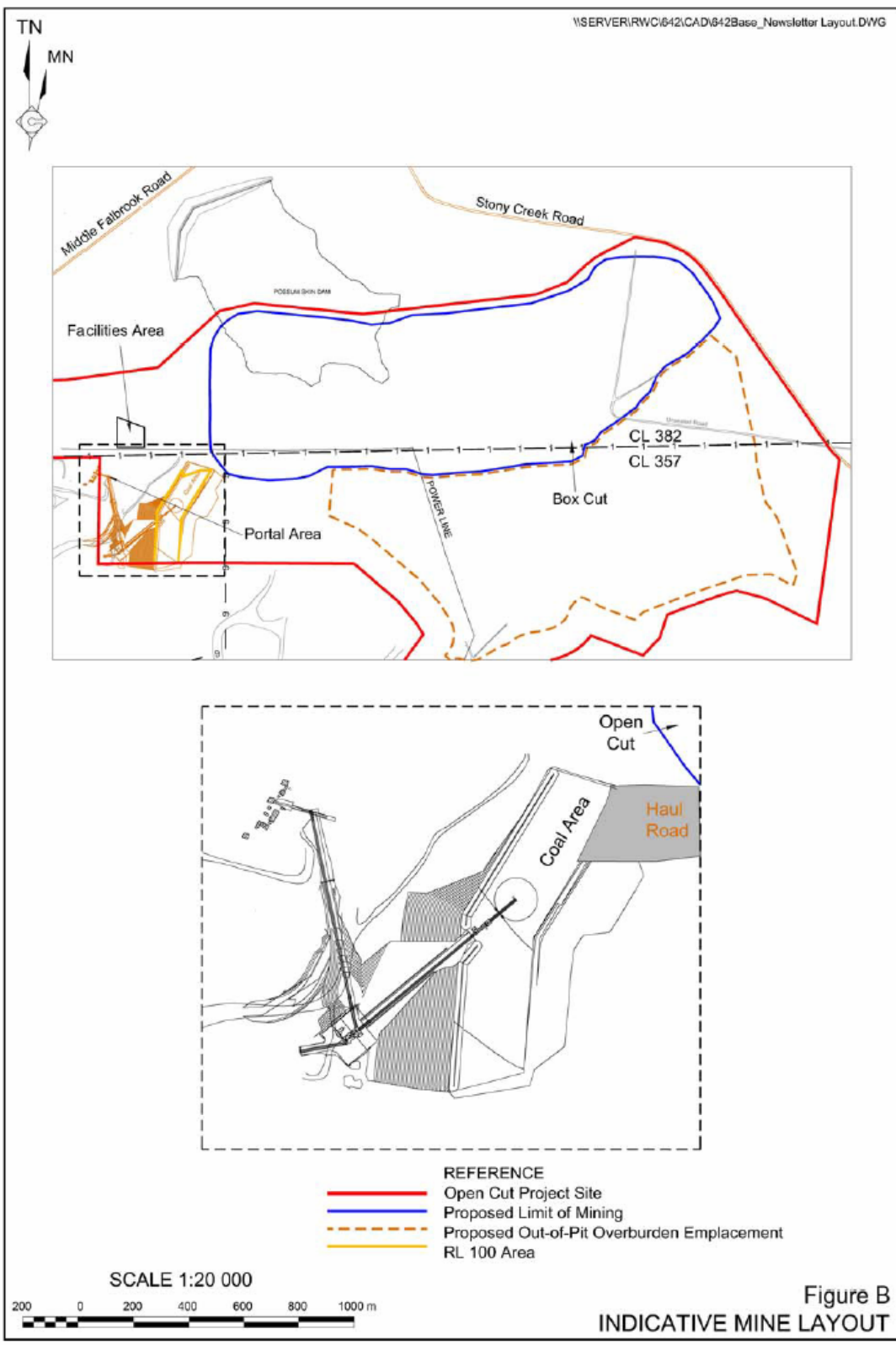
The areas not disturbed by mining around the Project Site are primarily used for dairy farming and grazing with limited rural-residential development.

Some of the floodplain terraces of Glennies Creek are irrigated from the creek and used for fodder cropping.

Land Ownership and Surrounding Residences

The land within the Open Cut Project Site is owned principally by AMCI and RHA Pastoral Co. Pty Ltd. The Project Site is also traversed by a public road (the north-south component of the former Stony Creek Road) and a Crown road.





The two closest non-project related residences are approximately 300m and 700m respectively from the closest boundary of the proposed limit of mining (Figure C).

Flora

Four native vegetation communities have been identified on the Project Site (Figure D), namely:

1. Open cleared land;
2. Rehabilitated mined land;
3. Bull Oak (*Allocasuarina luehmannii*) Forest; and
4. Narrow-leaf Ironbark (*Eucalyptus crebra*) – Spotted Gum (*Corymbia maculata*) – Grey Box (*Eucalyptus moluccana*).

No threatened flora species were identified within the Project Site and surrounds, nor were any endangered flora populations, critical habitat or Endangered Ecological Communities identified.

The flora assessment has not yet been completed and the flora impact assessment is still underway.

Fauna

No threatened reptiles or amphibians have been identified within or are known to inhabit the Project Site or its surrounds.

One bird species classified as vulnerable has been identified within the Project Site. It is, however, recognised that other Threatened bird species as well as some migratory species may utilize the Project Site from time to time.

Both the Vulnerable Eastern Mastiff-bat and Common/Large Bent Wing Bat have been recorded on the Project Site, however, no roost sites were identified.

A number of other Threatened mammal species have previously been identified within 10km of the Project Site. However, although some species may utilize components of the Project Site on occasions, it is considered unlikely that any could persist as permanent residents.

The fauna assessment has not yet been completed and the fauna impact assessment is still underway.

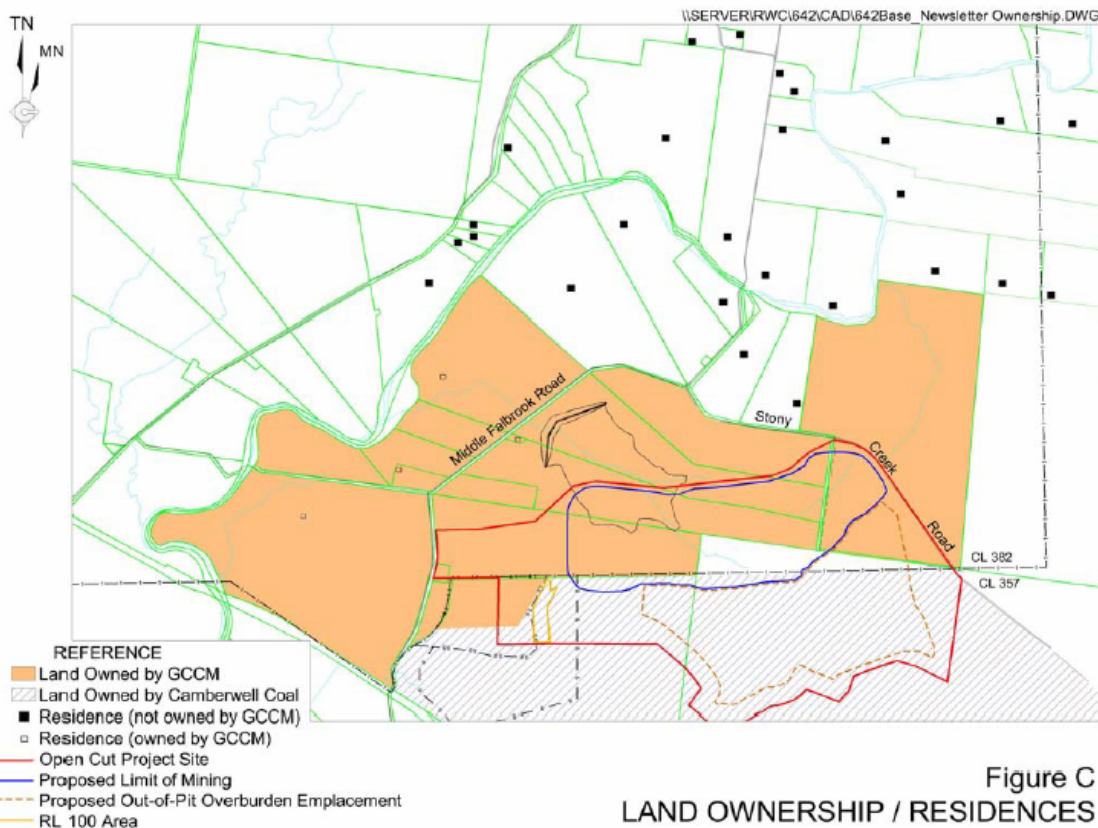


Figure C
 LAND OWNERSHIP / RESIDENCES

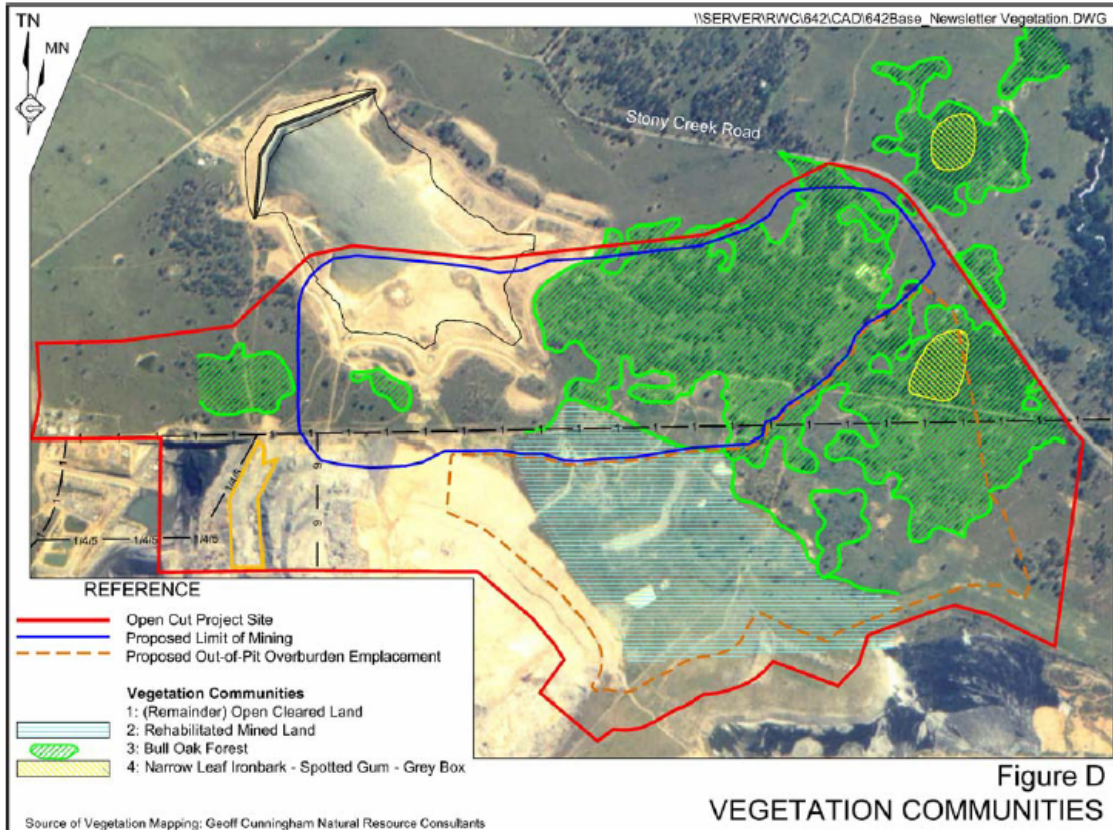


Figure D

VEGETATION COMMUNITIES

Aboriginal Heritage

Previous studies of Aboriginal heritage which have incorporated parts of the Project Site have not identified any items of significance or sites of importance to the local Aboriginal community.

A site specific survey will be commissioned as part of the environmental impact assessment.

Soils / Land Capability

Studies carried out as part of the Glennies Creek Underground Coal Mine EIS investigations established that soils within the previously undisturbed sections of the Project Site are generally dominated by duplex clay soils ranging from clay loam topsoil to medium clays within the subsoil.

A site specific soils and land capability survey will be commissioned to make recommendations on soil stripping, management and rehabilitation activities.

Noise and Blasting

The existing local noise climate is dominated by various coal mining and related activities. Other noise sources include local traffic and train movements.

A project specific noise assessment will be commissioned to assess the existing noise climate, determine the project specific noise goals and make recommendations in order to minimise impacts.

The impacts of proposed blasting will also be assessed to predict the likely noise and vibration impacts and to identify suitable management controls.

Air Quality

Existing air quality in the vicinity of the Project Site is principally influenced by the various open cut coal mining activities in the locality.

A project specific air quality assessment to examine the impact of the proposal on local air quality and recommend measures to reduce any impacts has been commissioned.

Groundwater

The coal measures are the principal groundwater aquifer in the area of the proposed open cut.

The groundwater is typically saline with total dissolved salts approaching 6 000mg/L. The low permeability of the in situ material suggests limited potential for groundwater inflows to the open cut mine area. A detailed groundwater investigation assessing the potential impact on inflow to Glennies Creek and interactions with the Camberwell Pit will be undertaken as part of the EIS process.

Surface Water

The Project Site is traversed by several natural or constructed ephemeral drainage lines which direct surface runoff to the north-east and Glennies Creek via GCCM's "The Oaks" property, or to the north-west and Glennies Creek via GCCM's "Baime Den" and "Oak Park" properties. Surface runoff to the north-west is currently directed around and isolated from the Possum Skin Dam.

The quality and quantity of any runoff discharging from the Project Site would not change significantly.

A site specific surface water assessment will be undertaken as part of the EIS process to predict potential surface water impacts, particularly on Glennies Creek, and identify appropriate management controls.

Visibility

The existing visual amenity of the area reflects both rural and coal mining activities. Distant views of the various components within the Project Site will be possible from rural and rural residential vantage points, principally to the north-west, with local views restricted to travellers on Stony Creek Road and from elevated surrounding residences. In the short term, however, the views from many vantage points would be tempered by the backdrop created by the unrehabilitated components of Camberwell's overburden emplacements.

Socio-economic Environment

The potential impact from coal mines can extend to the socio-economic environment of the local community through employment and impacts on local infrastructure and services such as schools. GCCM have commissioned a full socio-economic assessment to be completed to predict these impacts and identify practical impact mitigation measures.

Cumulative Impacts

The Project Site lies within an area subject to a high level of coal mine-related disturbance activity, and as such, all studies undertaken during the environmental impact assessment process will also assess the cumulative impacts of the proposal and those from existing coal mines and associated activities. The cumulative impact assessment will also extend to the socio-economic study and particularly the potential impact on the local residents, community and community services and infrastructure.

THE EIS PREPARATION PROCESS

R.W. Corkery & Co. Pty. Limited have been commissioned by the Applicant to undertake the environmental impact assessment process and prepare the Environmental Impact Statement to support the development application.

The EIS preparation process comprises the following stages.

1. Planning Focus Meeting - a meeting involving all relevant government agencies to introduce them to the proposal and identify the issues that they would like covered in the EIS. This was held in December 2004.
2. Constraints Assessment - a variety of specialist consultants are commissioned to study various aspects of the local environment such as surface water, flora, noise and air quality. These studies are designed to identify any issues that would pose a constraint to the development. These studies are underway.
3. Finalise Proposal Design - the design of the proposed mining development is then finalised, with the final design reflecting the constraints that have been identified.
4. Management Control Identification and Impact Assessment - the specialist consultants then identify appropriate management controls to minimise potential impacts of the proposal on the local and Project Site environments and then predict the likely impact.
5. The specialist consultant reports are summarised into the EIS.



THE APPROVAL PROCESS

The EIS is then submitted with the development application to Department of Infrastructure, Planning and Natural Resources. The EIS is placed on public exhibition and anyone can make a submission regarding the proposal and/or the information presented in the EIS. The Minister then considers all submissions, as well as the Applicant's response to the submissions and determines whether to approve the proposal or not. If the proposal is approved, a development consent will be issued, containing a number of operational conditions that the Proponent must abide by.

INDICATIVE PROJECT TIMETABLE

GCCM propose to:

- undertake Environmental Impact Assessment Process and Community Consultation - now to May 2005;
- lodge the Development Application - May 2005;
- development consent / approvals - December 2005;
- commence site development - January 2006; and
- commence coal production - April 2006.

COMMUNITY / STAKEHOLDER CONSULTATION

Throughout the environmental impact assessment process, the Proponent, R.W. Corkery & Co. Pty. Limited and/or various specialist consultants will be consulting with surrounding residents, the local community and stakeholder groups to ensure that any concerns are understood and adequately addressed in the EIS. Additionally, we recognise that you know the local area intimately and consequently may seek your advice and input on some issues. Consultation will be in a number of forms including newsletters, personal meetings and community forums.

Please note that a community forum will be held in the near future (likely March 2005) to discuss the proposal with the broader community and identify issues to be assessed during the environmental impact assessment process. This forum will be advertised in the local press.

FEEDBACK

If you would like to be included in the consultation process for this proposal, please complete the registration form (included) and return it to us.

Alternatively, if you would like to discuss any aspect of the information contained in this newsletter, please do not hesitate to contact Miss Kim Ferguson, Senior Environmental Consultant with R.W. Corkery & Co. Pty. Limited or discuss the proposal with the following local community or council representatives on the Glennies Creek Coal Mine Community Consultative Committee.

- Alan Noble Tel: 6576 1214
(Glennies Creek Resident)
- Graham Cheetham Tel: 6577 3199
(Glennies Creek Resident)
- Mary Robinson Tel: 6572 2827
(Singleton Council Councillor)
- Brian Thomas..... Tel: 6578 7340
(Singleton Council)



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ORANGE NSW 2800
Telephone: (02) 6362 5411
Facsimile: (02) 6361 3622



A3.2 ISSUES RAISED BY THE COMMUNITY

Table A3.1 presents the issues raised by the community during the community consultation process, how each issue was raised and where each issue is addressed within the *Environmental Assessment*.

Table A3.1
Issues Raised by the Community and Coverage within the EA Community Issue Log

Page 1 of 6

Environmental Aspect	Issue	How Issue Raised	# of Times Raised	EA Section
Noise	8 noise loggers is not enough	Community Forum 1	1	Part D3.2.2
	Noise loggers do not appear to have been placed where potential impact will be eg: to the southeast. Why were they not placed based on topography and prevailing winds?	Community Forum 1	1	Part D3.2
	12 days is not enough to get a true background (anything less than 12 months is not acceptable),	Community Forum 1	1	Part D3.2.2
	Noise measurements will be abnormally high due to Council roadworks on Middle Falbrook Road on the northern ridge and trucks carting quarry material to Mt Owen along Glennies Creek and Middle Falbrook Roads.	Community Forum 1	1	Part D3.2.2
	Is there a noise limit over which the government will not approve a mine?	Community Forum 1	1	Part D3.4
	How can you do the assessment if you do not know for sure how many trucks will be operating yet?	Community Forum 1	1	Part B9
	Who did Mt Owen noise study?	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Modelling methodology always questionable for noise.	Community Forum 1	1	Part D3
	General Noise	Phone Discussions, Information Evening	6	Part D3
	Noise from dozers & reversing alarms	Information Evening	1	Part D3
	Noise kicks in regularly between 3.00 and 3.15pm	Information Evening	1	Part D3
	Can here the chink chink of the bulldozer	Information Evening	1	Part D3
	Noise from Boral trucks (3 trucks between 7.00 and 7.45am)	Information Evening	1	Part D3



Table A3.1 (Cont'd)
Issues Raised by the Community and Coverage within the EA Community Issue Log

Page 2 of 6

Environmental Aspect	Issue	How Issue Raised	# of Times Raised	EA Section
Assessment validity and use of weather data	Want assessments to use more than 12 months weather data to ensure extreme conditions (eg strong winds) are accounted for.	Community Forum 1	1	Parts D1 to D3
Air Quality Assessment	If the dust gauges are out now, rain would cause a lower background to be recorded.	Community Forum 1	1	Part D2.2
	Is there an air quality limit over which the government will not approve the mine?	Community Forum 1	1	Part D2.4
	No monitoring to the north for dust	Information Evening	1	Part D2.2
	General Air Quality	Information Evening	1	Part D2
Government Approvals	State government will always approve coal mines in the Hunter Valley.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	How come the mine can get a Bore Licence and I cannot?	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
Night time operations and light	How can light impact be measured?	Community Forum 1	1	Part D8
	The existing 'aura' or glow of night mining operations is already too much.	Community Forum 1, Information Evening	2	Part D8
	Cumulative impact must be addressed.	Community Forum 1	1	Part D, Various
	Reversing Alarms heard at night.	Phone Discussion	1	Part D3
Acquisition Zones	How are acquisition and management zones determined? – sometimes does not seem fair or logical.	Community Forum 1, Phone Discussions	4	Not Relevant to <i>Environmental Assessment</i>
	Replacement value is very different to market value.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Wants to be bought out by the Company.	Phone Discussion	1	Not Relevant to <i>Environmental Assessment</i>



Table A3.1 (Cont'd)
Issues Raised by the Community and Coverage within the EA Community Issue Log

Page 3 of 6

Environmental Aspect	Issue	How Issue Raised	# of Times Raised	EA Section
Visual Impact	Stockpiles on RL100 ROM, already visible – will this proposal increase the size of the stockpiles?	Community Forum 1	1	Parts B6.2 and D8
	Visual bund constructed to block view of RL100 ROM stockpiles does not work.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Invitations were extended to go to residences during the visual assessment and assess their views of the Project Site.	Community Forum 1, Phone Discussion	2	Part D8 and Plates D1, D2 and D4
Flora and Fauna	Fauna surveys done in winter and spring last year: not good enough – need updated surveys.	Community Forum 1	1	Part D4
	How can the Lower Hunter Ironbark and spotted Gum ecological community be endangered and the Upper Hunter Ironbark and not Spotted Gum community? How can they be different?	Community Forum 1	1	Part D4
	Effect of dust & noise on native animal enclosure in back yard.	Phone Discussion	1	Parts D2 to D4
Reputation of Company	Lied already: increased resource from 6Mt to 8Mt and estimated resource north of Stony Creek Road was increased.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	The company has made previous commitments that have not been honoured. Nobles Crossing, Bridgeman Road intersection – how can we trust that you will do as you say?.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Why had the change of an extra 3 million tonnes occurred between the initial meeting & the newsletter coming out – typical of mines not knowing what they are doing and changing their mind.	Discussion with G. MacKenzie	1	Not Relevant to <i>Environmental Assessment</i>
Water	How much water will be pumped to Glennies Creek? All mines discharge and it is not acceptable.	Community Forum 1	1	Part D9
	If the mine really wanted to impact on Possum Skin Dam they would just do it – do not lie to us.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Groundwater bore information from DIPNR Search wrong/misleading.	Community Forum 1	1	Part D10
	Quality of water in final void	Information Evening	1	Parts D9 and D10



Table A3.1 (Cont'd)
Issues Raised by the Community and Coverage within the EA Community Issue Log

Page 4 of 6

Environmental Aspect	Issue	How Issue Raised	# of Times Raised	EA Section
Reputation / experience of specialists	If only measuring noise for 12 days at 8 locations, then they are not specialists.	Community Forum 1	1	Part D3
	None of the specialists are based in the Hunter - they have no local expertise/experience.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	How many EIS's has R W Corkery & Co done in the Hunter?	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	How can the reports/assessments be independent if paid for by the company?	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
Community Consultation	Why aren't the community consultative committee meetings advertised, I want to attend.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Will there be another community forum?	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	A number of attendees did not receive newsletters in the letterbox drop – consultation deficient.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Can the dust monitoring be made public?	Community Forum 1	1	Part D2
	What compensation will there be for the local community?	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Does GCCM advertise their environmental hotline?	Community Forum 1	1	Parts A5.2.5 and A5.3.5
	Regular community newsletters	Information Evening	1	Not Relevant to <i>Environmental Assessment</i>
Blasting	Potential traffic disruption on Stony Creek Road.	Community Forum 1	1	Parts B5, B9 and D11
	Vibrational impact.	Community Forum 1, Phone Discussion, Information Evening	4	Part D3
	Potential distance to nearest resident.	Community Forum 1	1	Part D1.4.1
	Resident lives on rockshelf and house is already impacted by blasting, this proposal would mean more impact – has had enough.	Community Forum 1	1	Part D3



Table A3.1 (Cont'd)
Issues Raised by the Community and Coverage within the EA Community Issue Log

Page 5 of 6

Environmental Aspect	Issue	How Issue Raised	# of Times Raised	EA Section
Blasting (Cont'd)	Cutting Stony Creek Road during blasting.	Phone Discussions	2	Parts B5, B9 and D11
	Will the Company inspect house.	Information Evening	1	Not Relevant to <i>Environmental Assessment</i>
	Blasting on weekends?	Information Evening	1	Part B5
	General Blasting	Information Evening	2	Part B5
General	Do not want the mine and if you are continuing with the environmental assessment process, then you are not listening to our concerns.	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Such a small coal resource – why bother?	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Do not want a final void: "Camberwell's was going to be small as well".	Community Forum 1	1	Part B15.5
	Export coal: not needed for Australian electricity generation so no local benefit.	Community Forum 1	1	Part D13
	"When will it stop?" (emotional)	Community Forum 1	1	Not Relevant to <i>Environmental Assessment</i>
	Could at least one aerial photo in the EIS depict all the regional mines (Rixs, Camberwell, Mt Owen, Ashton)?	Community Forum 1	1	Figure D6
	What will be the increase in infrastructure?	Community Forum 1	1	Part B
	What will be the increase in traffic – eg: explosive trucks?	Community Forum 1	1	Parts B9 and D11
	Better access for complaints line	Information Evening	1	Table E1
	Walls on final void too steep	Information Evening	1	Part B15.5
	Kangaroos in off-set area	Information Evening	1	Part D4
Property Value	Concerns of property value in near future.	Phone Discussions	2	Part D13



Table A3.1 (Cont'd)
Issues Raised by the Community and Coverage within the EA Community Issue Log

Page 6 of 6

Environmental Aspect	Issue	How Issue Raised	# of Times Raised	EA Section
Traffic	Will there be temporary disruption to Middle Falbrook Rd during intersection works?	Phone Discussion	1	Part B9.1
	Fuel & explosives trucks.	Phone Discussion	1	Part B9
	Speeds on local roads	Information Evening	1	Parts B9 and D11
	Where will trucks delivering come from?	Information Evening	1	Part B9
	School bus on poor road (Middle Falbrook Road)	Information Evening	1	Not Relevant to <i>Environmental Assessment</i>
	Trucks on haul road	Information Evening	1	Part B9
Dust	General Dust	Phone Discussions	2	Part D2
	Lots of black dust	Information Evening	1	Part D2
	Regular sweeping?	Information Evening	1	Part D2
	Grey dust everywhere	Information Evening	1	Part D2
	Dust on lucerne	Information Evening	1	Part D2
	Dust suppression on waste dumps	Information Evening	1	Part D2.5
Hours of Operation	Hours of Operation	Information Evening	1	Part B12



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