GLENNIES CREEK COLLIERY

Environmental Assessment

of

Surface Facilities and Activities

August 2006

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Environmental Assessment

of

Surface Facilities and Activities

Prepared by:

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Declaration Form

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 Corbett
qualifications:	B.Sc(For)
address:	Lot 6 Enterprise Circuit, Maison Dieu Industrial Estate SINGLETON NSW 2330

(b) Planning Approval application by:

applicant name:	Glennies Creek Coal Management Pty Ltd
applicant address:	640 Middle Falbrook Road SINGLETON NSW 2330

(c) Address/land details
properties to be developed/
land description:

Pit Top Area:
Lot 1 DP 1083482, Lot 710 DP 642852, Lot 4 DP 606344, Lot 93 DP 752442, Lot 2 DP 1083482, Lot 1 DP 783398, Lot 792 DP 586255, Lot 791 DP 580967, Lot 1 DP 772332.

Forest Road Ventilation Shaft Area
Part Lot 1 DP 940619

Gas Drainage Borehole Area
Lot 1 DP 781057, Lot 1 DP 770733, Lot 2 DP 780607, Lots 10, 11, 12 and 13 DP 6830, Lot 1 DP 940619 and Various Crown Roads

(d) Project Outline:

The Project involves:
(a) the ongoing use of existing surface facilities; and
(b) the construction and use of additional surface facilities;
for mining operations at the Glennies Creek Colliery for the production of up to 4.5 Mtpa run-of-mine coal for the life of the mining operations.

(e) Assessment of Environmental Impact:

The assessment of environmental impacts of this Project includes the matters referred to in Director-General's requirements as provided by the Department of Planning dated 20 April 2006 under Section 75F of the *Environmental Planning and Assessment Act 1979*.

(f) Declaration:

I, Robert John Corbett, 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 of Planning dated 20 April 2006;
- the assessment contains all available information that is relevant to the environmental assessment of the Project; and
- the information contained in the document is neither false nor misleading.

Signature: _____

Name: Robert J. Corbett **Date:**

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EXECUTIVE SUMMARY

This *Environmental Assessment* has been prepared to accompany an application for planning approval by Glennies Creek Coal Management Pty Ltd ("the Proponent"), for and on behalf of its joint venture partners, for

(a) the ongoing use of existing surface facilities; and
(b) the construction and use of additional surface facilities;

for mining operations at the Glennies Creek Colliery for the production of up to 4.5 Mtpa run-of-mine coal for the life of the mining operations.

The planning approval sought would cover all surface facilities associated with the mining operations within the area of the mining leases for the colliery which are already covered by various mining and planning approvals. It would effectively ensure that all the surface facilities within the Colliery are covered by a single approval, a preference nominated by the Department of Planning, the NSW State Government agency responsible for the administration of Part 3A of the *Environmental Planning and Assessment Act 1979*.

The surface facilities and activities project (the "Project") has been determined by the Minister for Planning as a project to be assessed in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979*.

Figure A shows Glennies Creek Colliery is located approximately 12km north of Singleton. The Colliery holding covers a total of 41km^2 whilst the existing and additional surface facilities occur within a 4.6km^2 area.

Project Areas

For the purposes of the application, the surface facilities have been grouped in three separate Project Areas (see **Figure B**), namely:

- the Pit Top Area (which includes the Pit Top Facilities, Portal Area and Possum Skin Dam);

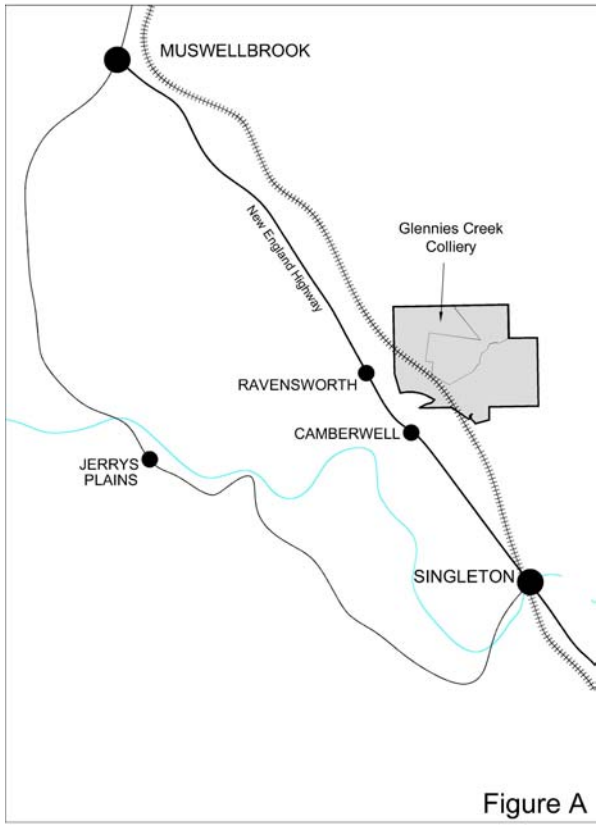
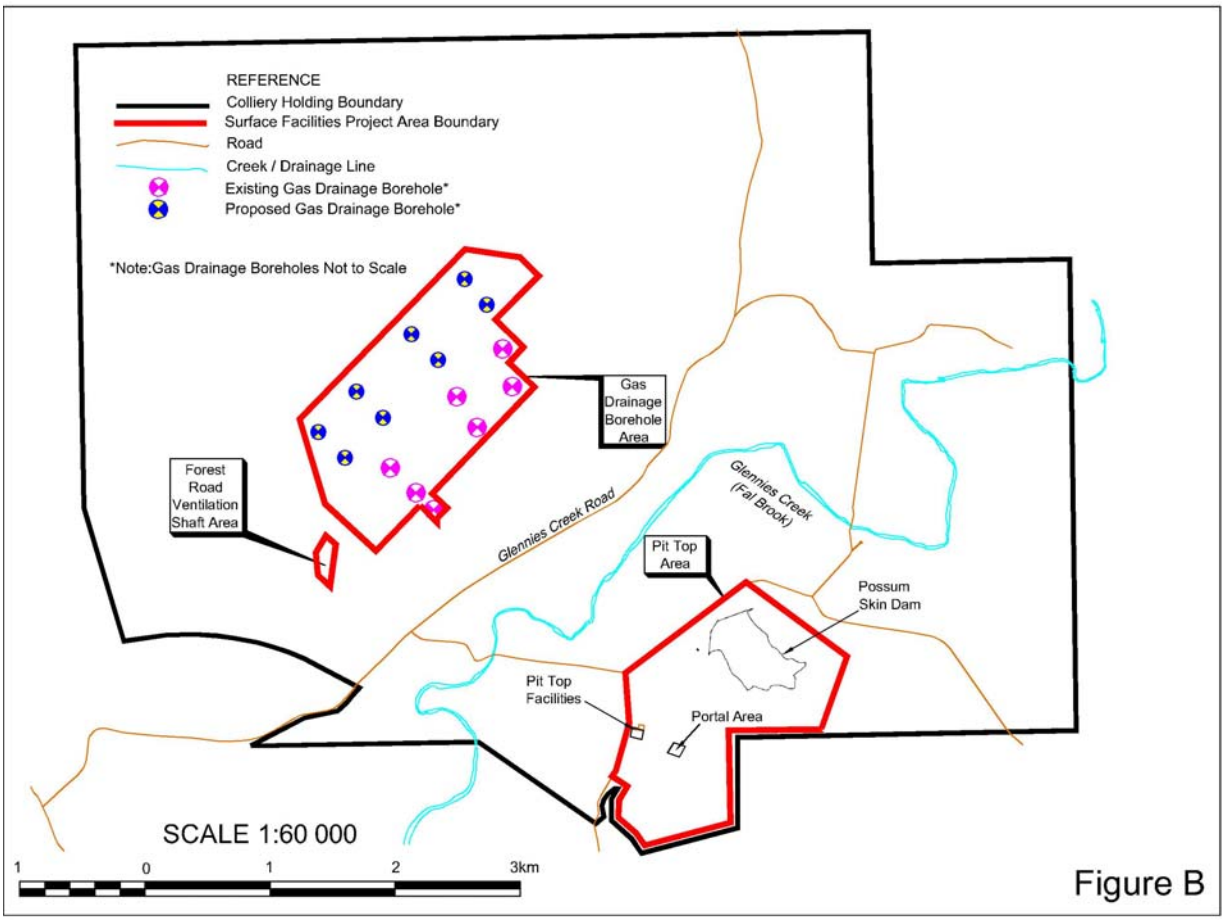


Figure A

- the Forest Road Ventilation Shaft Area; and
- the Gas Drainage Borehole Area.

Existing Surface Facilities and Activities

Glennies Creek Colliery comprises an underground mine that recovers coal by longwall mining methods from panels of coal up to 250m wide and 2.5km in length. The underground workings are supported by a range of existing surface facilities within the three Project Areas. An overview of the existing facilities and activities within each Project Area is provided below given these would continue under the new planning approval sought. An overview of the proposed additional facilities is also provided.



Pit Top Area

Pit Top Facilities and Portal Area

The Pit Top Facilities and Portal Area (**Plates A** and **B**) provide the support infrastructure for the underground mine. **Table A** lists the types of facilities already in place within these areas.

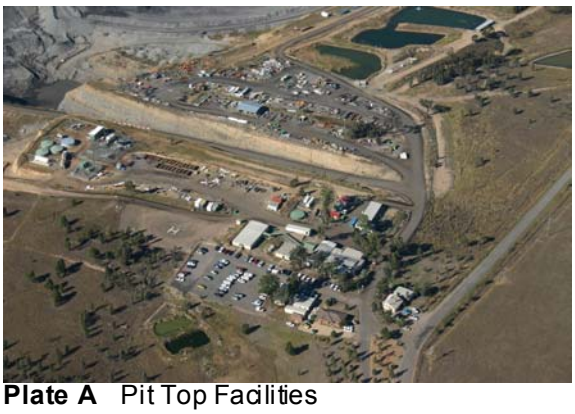


Plate A Pit Top Facilities

Plate B Pit Top Facilities and Portal Area

Possum Skin Dam

Possum Skin Dam (**Plate C**) provides a storage for mine water, a large evaporative surface to enhance mine water losses and a short term buffer storage capacity within the portal sump.

Table A
Range of Facilities within the
Pit Top Facilities and Portal Area

• Access road and internal roads
• Office buildings, training rooms etc
• Amenities for employees
• Water processing and storage tanks
• Various hardstand and storage areas
• Various hydrocarbon storage tanks
• Various operational buildings
• Various coal stockpile areas
• Conveyors
• Access ramp and haul roads
• Pipelines and pumps
• Power lines and transformers
• Fire station and magazines

Plate C Possum Skin Dam

The dam, which is isolated from upslope runoff by a perimeter diversion drain, has a maximum storage capacity of 1 563ML and operational storage capacity of 1 089ML. The materials in the floor of the dam are sufficiently impermeable to prevent seepage through the dam floor.

Forest Road Ventilation Shaft Area

The ventilation for the underground mining operation is achieved through a shaft and fan which, with the associated infrastructure, are positioned with associated infrastructure in a 3.9ha area (**Plate D**) almost 3km from the mine portal. The existing facilities within this fenced area incorporate the fan and ductwork; associated buildings and related services; and a mine dewatering borehole and pipeline; access road, drainage system and an acoustic / visual bund.

Plate D Forest Road Ventilation Shaft Area

Gas Drainage Borehole Area

A network of boreholes is located above the longwall panels to be mined to allow mine gas to be vented or extracted to the surface. Under normal operating circumstances, three to four boreholes are active at any given time, of which one or two are free venting and two are fitted with extraction equipment to remove gas from underground (see **Plates E** and **F**). Each borehole is typically in place for approximately 12 to 18 months before it is sealed and decommissioned.

Plate E Free venting gas drainage borehole assembly

Plate F Operating gas extraction plant

Additional Facilities and Activities

Pit Top Area

A total of nine minor additions are proposed to the facilities within the Pit Top Area – principally to upgrade the standard of the existing facilities or to improve operational efficiencies on site. These facilities would support the underground mine producing up to 4.5 million tonnes of coal per year. No modifications or additions are planned for the Possum Skin Dam.

Table B lists the proposed additional facilities.

Table B
Proposed Additional Facilities - Pit Top Area

• Bathhouse building.
• Bitumen sealing of a car park.
• Improved coal handling systems.
• A stores compound / sheds.
• An additional underground water supply tank and pump.
• Demountable office and cribroom.
• Fenced power factor correction units.
• Two coal stockpile area extensions.

Forest Road Ventilation Shaft Area

Additional facilities and activities in this area would involve the installation and use of a 300mm diameter ballast drophole, stockpiling of aggregate and the long term use of an existing secondary shaft.

Gas Drainage Borehole Area

Approximately eight gas drainage boreholes are planned to be installed above longwall panels LW8 and LW9. These would be either free venting or fitted with a gas extraction plant.

Operational Safeguards and Impacts

The operational safeguards for the various existing activities are already in place and are recognised to be effective in avoiding or minimising impacts. The additional facilities and activities planned would effectively be installed / operated in a similar manner to the existing facilities and activities.

The Proponent would continue to operate the existing and proposed facilities in a manner consistent with past practices and monitor air quality, water quality and noise to confirm no adverse environmental impacts are being caused. The activities would also continue to be discussed with the local community through the Community Consultative Committee.

Conclusion

The assessment of environmental impacts of the operation of the existing and additional surface facilities and activities within the Glennies Creek Colliery has established that the adoption and ongoing use of a range of safeguards and mitigation measures would ensure a satisfactory level of environmental impact is maintained.

Overall, the use of the existing and additional surface facilities would create a number of improvements in daily operations within the Colliery – albeit with negligible change in environmental impacts.

The previous studies and the current assessments of the Project have identified that the Project should proceed because it would:

(a) contribute to maintaining the efficient supply of coal produced from the Colliery;

(b) continue to have minimal and manageable impacts on the biophysical environment;

(c) generally satisfy sustainable development principles;

(d) create a safer working environment for employees and contractors working at the Colliery; and

(e) continue to remain in the public interest through the economic benefits and low level of residual environmental impacts.

SECTION 1 INTRODUCTION

The Minister for Planning has formed the opinion under clause 6(1) of State Environmental Planning Policy (Major Projects) 2005 (*SEPP Major Projects*) the Surface Facilities and Activities Project, the subject of this *Environmental Assessment*, is development for the purposes of coal mining and a "Project" to which Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) applies. Based upon this outcome, the Director-General's requirements were issued for the Project on 20 April 2006. A copy of the Major Projects Application and the accompanying Project Description Report is reproduced as **Appendix 1**.

The Minister is the approval authority for the purpose of Part 3A and this report presents an assessment of the issues identified in the Director-General's requirements, a copy of which is reproduced as **Appendix 2**.

The Project Areas which are the subject of this assessment lie wholly within land zoned 1(a) under the Singleton Local Environmental Plan (LEP) 1996. The LEP identifies the ongoing and proposed activities as permissible land uses with development consent.

1.1 Scope

This *Environmental Assessment* has been prepared in support of an application by Glennies Creek Coal Management Pty Ltd (GCCM), for and on behalf of its joint venture partners, for the ongoing use of existing mine-related surface facilities and infrastructure and the construction and/or installation and use of additional surface facilities at the Glennies Creek Colliery.

The Project would not alter any existing or proposed underground mine facilities, activities or methods. This *Environmental Assessment* provides a description of the existing underground operations in order to give the reader an understanding of the total operation and the relationship between the surface facilities and the underground operations within the Glennies Creek Colliery. Reference is also made throughout this document to the use of the haul road and Camberwell CHPP beyond the southern boundary of the Glennies Creek Colliery holding. The ongoing use of these facilities for coal recovered from the Glennies Creek Colliery is already separately approved and again referred to solely for the benefit of readers.

Apart from describing the Project, this *Environmental Assessment* also provides relevant background information and a description of relevant aspects of the existing environment. The safeguards and procedures that would be adopted to minimise or ameliorate any impacts associated with all proposed activities are outlined, together with the predicted impacts once these safeguards are adopted.

The purpose of this *Environmental Assessment* is to support an application seeking an approval for all surface facilities under Part 3A of the EP&A Act. The application is consistent with the direction by the Department of Planning for the ongoing management of mining operations and the administration of Part 3A of the EP&A Act.

Given that the Project would involve the ongoing use of existing surface infrastructure / facilities, the construction and use of similar facilities, and in general, the adoption of safeguards and procedures which have been proven to be effective, emphasis is initially placed within this *Environmental Assessment* upon a description of the existing situation.

The information presented in this *Environmental Assessment* covers all relevant aspects of the planning, development, operation, environmental monitoring and rehabilitation within the Project Areas at a level consistent with the scale of the Project and the potential environmental impacts.

Table 1.1 presents a number of acronyms, abbreviations and symbols which are commonly used throughout this document.

Table 1.1
Frequently Used Acronyms, Abbreviations and Symbols

Terms		Symbols	
AEMR	Annual Environmental Management Report	CH_4	Methane
CHPP	Coal Handling and Preparation Plant	CO	Carbon Monoxide
Council	Singleton Shire Council	CO_2	Carbon Dioxide
CMRA 1982	Coal Mines Regulation Act 1982	C_2H_6	Ethane
DEC (EPA)	Department of Environment and Conservation (Environment Protection Authority)	C_2H_4	Ethylene
		km	Kilometre
DEC (NPWS)	Department of Environment and Conservation (National Parks and Wildlife Service)	kV	Kilovolt
		L	Litre
DoP	Department of Planning	ML	Megalitre
DPI (MR)	The Department of Primary Industries (Mineral Resources)	M	Million
		MW	megawatt
EA	Environmental Assessment	Mt	Million Tonnes
EP&A Act	Environmental Planning and Assessment Act 1979	Mtpa	Million Tonnes Per Annum
		N_2	Nitrogen
EP&A Regulation	Environmental Planning and Assessment Regulation 2000	tpa	Tonnes Per Annum
		>	Greater Than
GCCM	Glennies Creek Coal Management Pty Ltd	<	Less Than
MMC	Maitland Main Collieries Pty Ltd		
MOP	Mining Operations Plan		
ROM	Run-of-Mine		
LW	Longwall		
SMP	Subsidence Management Plan		
SoEE	Statement of Environmental Effects		
he Department	the Department of Planning		

1.2 Environmental Assessment Format

This *Environmental Assessment* has been prepared in seven sections with a set of Appendices and addresses those matters of relevance as specifically identified in the Director-General's requirements, together with those issues which have been raised either during the public notification / consultation process or in prior correspondence, communication or consultation with relevant stakeholders.

Section 1 Introduces the Project, its location, the Project Areas and the Proponent; reviews the history of the Colliery's development; identifies relevant State and Regional planning instruments and records the consultation undertaken relating to the Project.

Section 2 Documents the current mine approvals; provides a brief overview of the existing operations, and records the relationship between the Surface Facilities Project and the existing underground operations.

Section 3 Describes the Surface Facilities Project and its various elements which are the subject of the Major Projects Application, together with a description of the need for and staging of the Project.

Section 4 Describes the existing environment and presents an assessment of the Project in the context of the identified key issues, including surface and groundwater, noise, air quality, visibility, flora and fauna, cultural heritage and transportation. The assessment identifies the existing and proposed safeguards / mitigation measures to be employed. Where appropriate, the assessment is sub-divided into the construction and operational phases. Where appropriate, monitoring programmes to verify the effectiveness of existing and proposed safeguards are also identified.

Section 5 Provides a Statement of Commitments incorporating the desired outcomes, the proposed measures identified in Section 4 and timing for their implementation.

Section 6 Presents a conclusion summarising the justification of the Project, site suitability and issues of public interest.

Section 7: Presents a brief bibliography recording the documents containing information and data used during the preparation of the *Environmental Assessment.*

Appendices Present the following additional information.

- Major Projects Application
- Director-General's Requirements
- DA 105/90 (as amended)
- Environment Protection Licence 7622
- A Letter Report prepared by Global Acoustics Pty Ltd.

1.3 The Proponent, Project Location and Project Areas

1.3.1 The Proponent

The Glennies Creek Colliery is operated as an unincorporated joint venture, with the Proponent, Glennies Creek Coal Management Pty Ltd (GCCM) being the management company responsible for all operations undertaken at the Colliery on behalf of the following joint venture partners.

- AMCI Holdings Australia Pty Ltd (AMCI) (85%) through its subsidiary companies Maitland Main Collieries (MMC) and AMCI (GC) Pty Ltd.
- NS Glennies Creek Pty Limited (5%).
- POS-GC Pty Ltd (5%).
- JS Glennies Creek Pty Ltd (2.5%).
- JFE Steel Australia (GC) Pty Ltd (2.5%).

AMCI, the head entity for the Australian arm of the privately-owned international AMCI Group, is a large global producer, shipper and trader of high-grade metallurgical coal. AMCI commenced operations in Australia in 1991 and, since that time, has been involved with the development of a number of Australian coal mines including Burton, Coppabella, Carborough Downs, Isaac Plains and Broadlea in Queensland, and the Glennies Creek and Whitehaven mines in NSW. AMCI is also currently involved with a number of highly prospective exploration and potential new coal mine developments in Queensland and NSW where the focus is on the creation of value in the early stages of exploration and Project development activities.

The smaller shareholders constitute Australian incorporated subsidiaries of major Asian steel milling companies which are major customers for Glennies Creek coal and other coals produced in Australia.

1.3.2 Project Location

Figure 1.1 positions the Glennies Creek Colliery in its regional context, approximately 12km north of Singleton in the Hunter Valley of NSW, while **Figure 1.2** and **Plate 1.1** place the Colliery in its local setting. **Figure 1.2** and **Plate 1.1** also shows the three areas of surface activities referred to throughout this document, ie. the Pit Top Area, the Forest Road Ventilation Shaft Area and the Gas Drainage Borehole Area. **Figure 1.2** also shows the areas of underground mining and surface activities undertaken to-date, together with the underground mining activities approved by virtue of the recent Subsidence Management Plan (dated 14 March 2006) and s.138 (CMRA 1982) approvals.

Figure 1.1
Locality Plan

(A4 B&W)

Plate 1.1
Local Environment
A4 / Colour

Figure 1.2
Local Setting
(A3 Colour)

do not delete A3 (double page)

1.3.3 Project Areas

For the purposes of the Major Projects Application, the ongoing and proposed additional surface facilities and activities lie within the three Project Areas, namely:

(i) the Pit Top Area incorporating the Pit Top Facilities, Portal Area and Possum Skin Dam;

(ii) the Forest Road Ventilation Shaft Area; and

(iii) the Gas Drainage Borehole Area.

Each of the Project Areas are shown on **Figure 1.3** and comprise the following lands within the County of Durham, Shire of Singleton.

Pit Top Area:
Parish of Auckland - Lot 1 DP 1083482; Lot 710 DP 642852; Lot 4 DP 606344; Lot 93 DP 752442; Lot 2 DP 1083482; Lot 1 DP 783398; Lot 792 DP 586255; Lot 791 DP 580967; Lot 1 DP 772332.

Forest Road Ventilation Shaft Area:
Parish of Vane - Part Lot 1 DP 940619.

Gas Drainage Borehole Area:
Parish of Vane - Lot 1 DP 781057; Lot 1 DP 770733; Lot 2 DP 780607; Lots 10, 11, 12 and 13 DP 6830; Lot 1 DP 940619 and Various Crown Roads.

1.4 History of the Colliery Development

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 DA for an underground mine in August 1990. The DA sought approval for a range of activities including:

- establishment of 'initial surface facilities' and a box cut seam entry at a site approximately 2 km east of the existing highwall entry (the Barrett Seam Entry - **Figure 1.2**);
- construction and subsequent expansion of a modular CHPP on a site approximately 1km west of the Pit Top Area;

Figure 1.3
Surface Facilities Project Areas
(A4 Colour)

- construction of a rail loop and rail loading facility and inclined drift centred adjacent to the CHPP; and
- ROM coal extraction using continuous miners initially, and subsequently using longwall techniques.

Following a Commission of Inquiry in mid 1991, Development Consent (DA 105/90) was granted on 01 November 1991 by the then Minister for Planning subject to a total of 26 principal conditions. A copy of the conditions relating to this consent are included in **Appendix 3**. It is noted that the copy of the development consent reproduced as **Appendix 3** not only incorporates the 26 principal conditions referred to above but the copy also includes the additional conditional requirements that have been added to the development consent as a result of five modifications to the consent since 1998 which are discussed throughout the remainder of this section. The additional development consent conditions (or modified / deleted conditions) arising from the various modifications are distinguished with a coloured type face.

Although initial mining operations commenced in October 1996, economic circumstances dictated a postponement of major coal mining and processing infrastructure development activities until the latter part of the decade. In the interim, emphasis was placed on undertaking a range of activities required, and investigating alternative methods and arrangements, for a progression into full-scale operations. The development which was the subject of the consent was physically commenced for the purposes of the EP&A Act.

In August 1998, as a consequence of these investigations, MMC (the then major shareholder in the Glennies Creek Colliery) lodged a s.96(2) application and accompanying Statement of Environmental Effects (SoEE) with the then Department of Urban Affairs and Planning seeking the Minister's approval for amendments to DA 105/90 to enable:

(i) development of an underground entry to CL 382 from the highwall within the mined out North Pit of the adjoining Camberwell Coal Project ("Camberwell");

(ii) processing of 200 000t of coal extracted via the highwall entry through Camberwell's Coal Handling and Preparation Plant ("CHPP");

(iii) despatch of the washed coal via Camberwell's train loading facility; and

(iv) development of site facilities on and adjacent to the former Oak Park School grounds.

The application sought approval to undertake items (ii) and (iii) for a maximum period of three years, ie. a period which, at the time, was assessed to be sufficient to allow the commencement of production from the mine and the provision of the cash flow and time necessary for:

- a more detailed geological assessment of the coal resource;
- the detailed design of the previously-approved Glennies Creek coal preparation plant;
- the design and acquisition of longwall mining equipment; and
- the construction of the previously-approved Glennies Creek rail loop and train loading facility, coal preparation plant and other infrastructure necessary for the Glennies Creek Colliery to operate independent of Camberwell.

The application to amend DA 105/90 was approved on 16 November 1998. A copy of the development consent incorporating relevant amendments to the conditions of approval is included as **Appendix 3**.

Following the approval of MMC's application:

- the area now referred to as ML 1437 (**Figure 1.2**) was excised from the north-western corner of Camberwell's lease (CL 357) and issued to the Glennies Creek Colliery; and
- a Pollution Control Licence (No. 7622) was issued by the Environment Protection Authority. In December 1999, the Pollution Control Licence was converted to an Environment Protection Licence (EPL). A copy of the current EPL is presented in **Appendix 4**.

On-site activities during this development / assessment phase, including the installation of limited support facilities and infrastructure within the Portal Area and in the vicinity of the former Oak Park Schoolhouse, commenced in December 1998. The facilities and infrastructure installed during this period, particularly those within the Portal Area, were positioned and constructed with the objective of supporting the mine's approved operational requirements and achieving appropriate environmental performance whilst minimising capital expenditure.

Underground development commenced in May 1999 and, over the period to May 2000, involved the development of three underground roadways from the Portal Area (**Figure 1.2**) for a distance of approximately 1 700m underground. Five roadways (the North-West Mains – **Figure 1.2**) with interconnecting cut-throughs were then driven in a north-westerly direction.

In December 2000, the north-easterly development of two and three heading maingate and tailgate roads commenced in preparation for the introduction of a longwall mining system.

Although the 1998 s.96(2) application specified a limited duration for the preparation and despatch of Glennies Creek coal using Camberwell's facilities, that documentation also identified a commitment by MMC to the ongoing review of its activities as a means of minimising impacts. As a consequence of this review, an agreement was reached between Glennies Creek and Camberwell for the long-term coal preparation, storage, and rail despatch of Glennies Creek coal using Camberwell's facilities. An application (DA DIA-105-90-M2) to enable the implementation of that agreement was approved on 18 December 2001 (see **Appendix 3**).

Longwall mining in the first, narrow (90m wide) panel (LW1) commenced in August 2002 and, since that time, with increasing knowledge and understanding of local geological and mining conditions, has progressed through the developmental / viability assessment phase to what now constitutes a modern longwall mining operation.

On 28 June 2002, a further amendment to DA 105/90 (DA 105-90-M3) was granted enabling the establishment of a ventilation shaft and associated facility off Forest Road (above the then western extremity of the North-West Mains) and a private surface power line to that facility. A copy of the relevant additional conditions arising from the amendment are included in the consent reproduced as **Appendix 3**. Construction of the ventilation shaft commenced in October 2002 and was completed in April 2003.

On 16 February 2005 and 01 November 2005, further modifications to DA 105/90 were approved by the Minister for Planning authorising continued use of the surface facilities for ROM coal production to a maximum of 4.5Mtpa. The Glennies Creek Colliery is presently operating under the terms of DA 105/90 as modified, a copy of which is included as **Appendix 3**.

The Proponent has established that the ongoing development and operation of Glennies Creek Colliery would need some additional surface facilities to maximise the efficiency of the Colliery. As a consequence of discussions with the Department, it has been determined to be appropriate to draw together both the existing and additional surface facilities and activities into one planning approval. Hence, this *Environmental Assessment* has been prepared to support an application for a planning approval for all existing and additional surface facilities and activities under Part 3A of the EP&A Act.

1.5 Additional Applications in Preparation

In addition to this Part 3A Application for the surface facilities and activities at the Glennies Creek Colliery, GCCM currently has two further major project applications / *Environmental Assessments* in varying stages of preparation. The first of these applications relate to the proposed development of an open cut mine to recover approximately 7.7Mt of coal. The second is an application for underground mining operations for longwall panels LW10 to LW17 in the Liddell seam. The respective areas covered by each of the two proposals are identified on **Figure 1.4**. It is noted that the overlap between the area of the Project Site for the proposed open cut mine and the Pit Top Area relates primarily to the extent of highwall or auger mining, intended to occur at depths of at least 100m below the floor of Possum Skin Dam, albeit without subsidence impacts upon the integrity of the dam.

These two future projects are not described in detail in this *Environmental Assessment* as they are not expected to have any material impact upon the future operation of the surface facilities discussed in this document. If that changes during preparation of those applications, any additional impacts will be considered as part of those applications. Notwithstanding this assessment, where it is identified that there may be potential cumulative impacts associated with those projects and the Colliery's surface facilities and activities, these would be addressed in the *Environmental Assessments* for those projects.

1.6 State and Regional Planning Context

1.6.1 State Environmental Planning Policies

Two State Environmental Planning Policies (SEPPs) are potentially relevant to the Project, namely:

- SEPP 11 – Traffic Generating Developments; and
- SEPP 44 – Koala Habitat Protection.

Figure 1.4
Part 3A Applications
(A4 Colour)

SEPP 11 ensures that the Roads and Traffic Authority can make representation on new projects that may impact on traffic generation on public roads. Development for the purpose of, or being, mining is listed in the Policy as a type of development where referral of the Major Projects Application to the Roads and Traffic Authority is required.

The Singleton Local Government Area is identified within Schedule 1 of SEPP 44, that is, a Local Government Area to which the policy applies and for which an investigation is required to be undertaken to determine the presence of potential and core Koala habitat with those areas to be disturbed. Given that the Project Areas do not contain mapped Koala habitat and the Project would not result in the removal of listed Koala feed trees, SEPP 44 is not relevant to the Project.

1.6.2 Regional Environmental Plans

The Hunter Regional Environmental Plan (REP) 1989 regulates environmental planning matters of significance in the region, with the aim of promoting the balanced development of the region. The REP details objectives and policies to manage a range of specific issues including mineral resources.

The Project as described in this document, including the existing environmental management procedures, satisfies the objectives of the Hunter REP.

The Integrated Catchment Management Plan for the Hunter Catchment, 2002 sets the overarching natural resource priorities and the direction for management of native vegetation, biodiversity, water resources and soils in the catchment. The Plan (or Blueprint) has four catchment management targets, twelve management targets and 52 prioritized management actions designed to achieve the targets and guide natural resource management decisions over the period to 2012.

1.7 Consultation

Formulation of the Surface Facilities Project has been an evolving process and, through this process and the preparation of this *Environmental Assessment*, a range of consultations have been undertaken. Individuals and organisations consulted include:

- owners of land on which gas drainage wells are proposed (see **Figure 1.5**); and
- the Community Consultative Committee for the Glennies Creek Colliery.

It is noted from **Figure 1.5** that the Pit Top Area is either owned by the Proponent or agreements are in place with Camberwell. Similarly, an agreement is already in place between the Proponent and Glendell Tenements regarding the ongoing operation of the Forest Road Ventilation Shaft Area.

Figure 1.5
Land Ownership

A4 - Colour

Issues raised by the landowners consulted relate to:

- the composition of the gas in the mine;
- the duration the gas drainage boreholes would remain operational;
- the access to the gas drainage boreholes;
- protection for grazing cattle;
- rehabilitation / revegetation works and timetable;
- noise levels from gas extraction plant;
- the interrelationship between the Envirogen proposal at the gas drainage boreholes.

Further discussions will be held with each landowner to discuss individual agreements relating to access to the gas drainage borehole sites following receipt of the relevant planning approval.

The discussions with the Community Consultative Committee focussed upon providing information about the Company's proposal to consolidate all surface facilities and activities under one planning approval.

In addition, consultation has been undertaken with the Department of Planning prior and subsequent to the issue of the Director-General's requirements (which also refer to consultation by the DoP with DEC and the DPI (MR)). The issues raised by both of those agencies are included within the Director-General's requirements in **Appendix 2**. The relevant issues raised by these agencies are addressed in this document.

1.8 Document Preparation

The preparation of this document has been overseen by Mr Bob Corbett, (B.Sc. (For)), Group Manager - Environment with AMCI. The information included in the document draws upon a range of documents previously compiled for previous applications for approvals associated with the development and modifications of the Glennies Creek Colliery. These various documents are listed in the Bibliography presented as Section 7 of this document. Also listed in the Bibliography are the relevant State Government Technical and Policy Guidelines that were referred to during the preparation of this Environmental Assessment.

The final document has been compiled with input from Mr Rob Corkery, (M.Appl.Sc., B.Appl.Sc. (Hons)), Principal of R.W. Corkery & Co. Pty. Limited. Other technical personnel within Glennies Creek Coal Management also contributed information for inclusion in the document and the document's review. The document has been assembled and copied by R.W. Corkery & Co. Pty. Limited.

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SECTION 2 EXISTING SURFACE FACILITIES AND ACTIVITIES

This section reviews the existing operations in terms of the existing approvals, leases and licences, and presents an overview of the existing surface facilities and underground mining operations. The environmental controls and management relating to the existing surface facilities are described in Section 4 in conjunction with the controls and management relating to the ongoing use of all surface facilities and activities.

2.1 Approvals, Leases and Licences

Table 2.1 identifies the principal approvals, leases and licences currently held for the Glennies Creek Colliery, the issuing/responsible Authority, date of issue, duration (where limited) and relevant comments. The Colliery is currently operating in accordance with a Mining Operations Plan accepted by the DPI (MR) on 28 June 2006.

Table 2.1
Approvals, Licences and Leases as of 30 June 2006

Page 1 of 3

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue / Registration	Expiry	Comments
Department of Primary Industries (Mineral Resources)*[1]	• Coal Lease (CL) 382	12.11.1991	11.11.2012	Various surface exemptions (see **Figure 2.1**)
	• Mining Lease (ML) 1437	28.04.1999	27.03.2011	Part transfer of CL 357
	• Mining Lease (ML) 1525	18.11.2002	17.11.2023	Forest Road Ventilation Shaft Area (from 20m to 5m from surface)
	• Sub-lease of MPL 343	04.02.2005		Under agreement with Glendell Tenements Pty Ltd. Overlies ML 1525 (-5m to surface)
	• Exploration Licence 5824	19.03.2001	27.03.2011	
	• Mining Lease (ML) 1518	14.06.2004	27.03.2011	Part transfer of CL 357
	• Mining Lease (ML) 1551	10.01.2006	27.03.2011	Part transfer of CL 357
	• s.138 Approvals	Various	01.06.2009 *[2]	For LW1 to LW9; expiry date relates to LW7 to LW9
	• Gas drainage	Various	Not specified	Each hole to have maximum life of 5 years
	• SMP	14.03.2006	*[3]	For LW7 to LW9
Minister for Planning (or his predecessor)	• Development Consent 105/90	01.11.1991	11.11.2012	See DA 105/90, Condition 2
	• s.96 (2) modification (105/90/M1)	16.11.1998	11.11.2012	For development of underground entries off Camberwell North Pit highwall; processing and despatch of 200 000t coal using Camberwell CHPP / rail loader; site facility development on and adjacent to Oak Park School. Period of applicability sought = 3 years.

*[1] Aggregated security of $872 000.00 held by DPI (MR)
*[2] May be extended by Chief Inspector of Coal Mines
*[3] Expiry earlier of 01 March 2013 or expiry of CL 382

Table 2.1 (Cont'd)
Approvals, Licences and Leases as of 30 June 2006

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue / Registration	Expiry	Comments
Minister for Planning (or his predecessor) (Cont'd)	• s.96 (2) modification (105/90/M2)	18.12.2001	11.11.2012	Long term use of highwall entries and Camberwell CHPP / train loader; coal transportation by internal road initially and subsequently by overland conveyor.
	• s.96 (2) modification (105/90/M3)	28.06.2002	11.11.2012	Forest Road Ventilation Shaft and facilities; overland power line to shaft.
	• s.96 (1A) modification	16.02.2005	11.11.2012	Upgrading of Portal Area facilities.
	• s.96 (2) modification (105/90/M4)	01.11.2005	11.11.2012	Increase in ROM coal production from 3.0Mtpa to 4.5Mtpa, installation of additional facilities and infrastructure; amendments to consent wording.
Department of Environment and Conservation	• Environment Protection Licence 7622	31 December 1999	Not Applicable Anniversary date: 31 December	Approved saleable coal production to 3.5Mtpa – 5.0Mtpa.
Department of Natural Resources	Water Access Licences:			
	• 961	01.07.2004	In Perpetuity	For 150 Units
	• 960	01.07.2004	In Perpetuity	For 50 Units
	• 484	01.07.2004	In Perpetuity	For 3 Units
	• 485	01.07.2004	In Perpetuity	For 99 Units
	• 1172	01.07.2004	In Perpetuity	For 3 Units
	• 1173	01.07.2004	In perpetuity	For 303 Units
	• 1242	01.07.2004	In perpetuity	For 13 Units
	• 10095	01.07.2004	In perpetuity	For 230 Units. Held jointly with Camberwell & RHA Pastoral Co.
	• 20BL167917	15.08.2000	In perpetuity	Monitoring Bore
	• 20BL169571	07.03.2005	In perpetuity	Test Bore
	• 20BL169573	07.03.2005	In perpetuity	Test Bore
	• 20BL169574	07.03.2005	In perpetuity	Test Bore
	• 20BL169862	26.09.2005	In perpetuity	Dewatering of Mine Workings
	• 20BL169864	26.09.2005	In perpetuity	Excavation of underground workings
WorkCover Authority	• Dangerous Goods Licence 35/034651	09.03.2005	09.03.2006	For magazines for explosives, detonators & on-site diesel storage. Amendment to upgrade licence details regarding total diesel storage above 100kL submitted 17 November 2005. Acknowledgement received 09 March 2006. Security Management Plan and application to store and handle explosives plus updated notification of dangerous goods submitted June 2006. Licence renewal pending.

Table 2.1 (Cont'd)
Approvals, Licences and Leases as of 30 June 2006

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue / Registration	Expiry	Comments
Singleton Shire Council	• Building Approval 1/99	26.03.1999	Nil	Muster area awning
	• Building Approval 2/99	26.03.1999	Nil	Bathroom / office complex
	• Development Consent 90/2001	05.04.2001	Nil	For new offices and bathhouse
	• Development Consent 90/2001 (Mod)	13.06.2001	Nil	Alteration / additions to transportable office building
	• Development Consent 719/2003	13.02.2004	Nil specified	For Glennies Creek to Ashton Water Pipeline
	• To use a Council Road (Forest Road) (under Roads Act)	12.05.2004	Nil	For Glennies Creek to Ashton Water Pipeline
	• Approval to Demolish Existing Dwelling & Shed	13.04.2005	Nil	Dwelling & shed located at Lot 93 DP 752442 Middle Falbrook Road
	• To use a Council Road (Forest Road) (under Roads Act)	01.07.2005	Nil	For use of Forest Road to access and service the Forest Road Ventilation Shaft Area
	• Approval to Occupy Temporary Structure	01.06.2005	31.05.2010	Bathhouse 2
	• Approval to Occupy Temporary Structure	01.06.2005	31.05.2010	Office 4
	• Approval to Occupy Temporary Structure	01.06.2005	31.05.2010	Induction Room
	• Approval to Occupy Temporary Structure	02.06.2005	01.06.2010	Office 1
	• Approval to Occupy Temporary Structure	02.06.2005	01.06.2010	Office 2
	• Approval to Occupy Temporary Structure	02.06.2005	01.06.2010	Office 3
	• Approval to Occupy Temporary Structure	21.07.2005	21.07.2010	Conveyor Gantry
	• Development Consent 473/2005	12.09.2005	Nil	Approval to Erect Control Room
	• Development Consent 703/2005	07.12.2005	Nil	Approval to Erect Hydrocarbon Storage Shed
	• Approval to Occupy Temporary Structure	06.01.2006	05.01.2011	Replacement for (middle) Bathhouse 2 – not yet installed
NSW Dam Safety Committee	• Possum Skin Dam design concurrence	24.12.2003		Dam life initially established by DSC as 8 years. Potential to extend life based on surveillance monitoring

2.2 Surface Facilities

Plates 2.1 and **2.2** display oblique aerial photographs of Glennies Creek Colliery and the various existing surface facilities taken from the locations shown on **Figure 2.1**. The remainder of this sub-section reviews the existing facilities and activities within the Pit Top Area, Forest Road Ventilation Shaft Area and Gas Drainage Borehole Area.

2.2.1 Pit Top Area

Pit Top Facilities and Portal Area

Figure 2.1 places the Pit Top Facilities and Portal Area in the context of the Glennies Creek Colliery holding. **Figure 2.2** presents a detailed layout plan of the existing Pit Top Facilities and Portal Area.

Table 2.2 identifies the various features on or in the vicinity of the Pit Top Area, their functions, their locations with respect to the Pit Top Area water management system and presents salient comments. **Table 2.2** draws the distinction between the location of each facility with respect to the surface / natural ground level. Those features recorded to be located "below natural ground level" are located within or leading to the former Camberwell North Pit which has been used to provide access to the Glennies Creek underground mine. Each facility forms part of the Surface Facilities Project, the use of which is to be continued under this Project for the life of the Glennies Creek Colliery. **Plates 2.3** and **2.4** provide oblique aerial views across these features.

The individual facilities, services and infrastructure within the Pit Top Area are accessed by mine vehicles and equipment, and/or supplies delivery and service vehicles. In the Portal Area in particular, the access routes are not permanent and are repositioned from time to time as part of normal mine operations. The Possum Skin Dam, though primarily accessed by a track which passes from the Pit Top Facilities along the southern boundary of CL 382, can also be accessed from Middle Falbrook Road.

Figure 2.1
Glennies Creek Colliery
(A3 Colour)

Figure 2.2
Pit Top Facilities and Portal Area – Existing Facilities and Activities
(A3 Colour)

Plate 2.1: An oblique aerial view to the northwest towards Glennies Creek Colliery Pit Top Facilities (left) and Possum Skin Dam (centre) Ref: E642-F107

Plate 2.2: 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 2.3: An oblique aerial view to the northwest towards the Portal Area and Pit Top Facilities. Ref: E642-F056

Plate 2.4: An oblique aerial view to the south across the Pit Top Facilities. Ref:E642-F129

Table 2.2
Glennies Creek Colliery - Existing Pit Top Facilities and Functions

IDENTIFIER (see Figure 2.2)	FACILITY	LOCATION S = on surface or above ground level B = below natural ground level	FUNCTION	COMMENT	MWMS (Mine Water Management System) C = "Clean" D = "Dirty"
1	Mine Entry and Existing Roads	S	Provide a singular access to / exit from surface facilities area, car parks etc.	Bitumen sealed roads from and onto Middle Falbrook Road. The roads incorporate speed humps. A "stop" sign is positioned adjacent to the exit road / Middle Falbrook Road intersection.	C
2	Main Office Buildings	S	Offices and support facilities for various GCCM management and support staff.	The former Oak Park school house, school teacher's residence and garage, and three fawn colorbond sheeted demountable structures.	C
3	Employee Car Park	S	Car parking for staff, wages and contracted employees.	Bitumen sealed area with a capacity for 80 vehicles, plus rolled aggregate surfaced unsealed hardstand area with a capacity of 30 vehicles.	C
4	Sewage Effluent Ponds	S	Effluent storage.	Prior to irrigation onto adjacent pastures (see Section 2.3.7.6). Forms part of Colliery Aerated Wastewater Treatment System (AWTS).	C
5	Training Room	S	Employee training / inductions and meetings.	Fawn colorbond cladded demountable building (12m x 6m).	C
6	Office and Bathhouse Complex and Muster Area	S	Offices for production engineers and support staff; employee ablutions and work assembly area; control room; lamp storage and bathhouse facilities.	An area approximately 36m x 24m comprising 12 fawn colorbond cladded demountable office buildings surrounding a covered, concreted area and a building for mine control.	D
7	Bathhouses	S	Bathhouse facilities for the workforce.	Two fawn colorbond cladded demountable buildings (24m x 12m and 12m x 12m) with interconnecting covered walkways.	D
8	Potable Water Tank	S	Receipt, storage and supply of potable water supplies to the Pit Top Area.	A 100 000 L tank which is filled using water transported from Singleton. Potable water usage approximates 11.5 MLpa.	D
9	Long wall Emulsion Storages	S	Provision of hydraulic fluid to the longwall.	Three off-white steel tanks in total comprising 1 x 30 000L raw concentrate tank and 1 x 17 000L mixing tank adjacent to the Potable Water tank (Feature 8) and a 12000 L mixed emulsion tank adjacent to the underground fire water tanks (Feature 12). The tanks are positioned within bunds with concrete floors and concrete block walls and with capacities >110% of the largest tank within each bund.	D
10	Process Water Filtration Plant	S		An intermediate station between the Process Water Dam (Feature 19) and the underground fire water tanks (Feature 12).	D

Table 2.2 (Cont'd)
Glennies Creek Colliery - Existing Pit Top Facilities and Functions

IDENTIFIER (see Figure 2.2)	FACILITY	LOCATION S = on surface or above ground level B = below natural ground level	FUNCTION	COMMENT	MWMS (Mine Water Management System) C = "Clean" D = "Dirty"
11	Electrical Power Yards, Substation and Switchroom	S	Receipt of incoming 66kV power, its conversion to 11kV and distribution to the Portal Area transformers and Forest Road Ventilation Shaft.	Incoming 66kV yard is owned by Energy Australia and provides a linkage between GCCM facilities and the power grid.	D
12	Underground Fire Water Tanks	S	Supply of process, cooling and fire water to underground operations.	Three off green PVC 100kL tanks. One galvanised 100kL tank.	D
13	Transformers	S	Redundant.	Pending sale / removal	D
14	Long wall Hardstand	S	Storage of longwall mining equipment, eg. during longwall changeouts.	Hardstand surface	D
15	Access Ramp and Associated Road Network	S/B	To provide equipment and personnel access between Pit Top Facilities and Portal Area.	Unsealed pavements.	D
16	66 kV Power Line	S	Power supply from Energy Australia grid		C
17	Stores Area	S	Supplies storage.	A fenced hardstand area with associated shipping containers.	D
18	Hardstand / Storage Areas	S	Mining equipment and supplies storage.	Unsealed hardstand areas. Includes a 15m x 12m open-sided hydrocarbon storage shed / transfer point.	D
19	Process Water Dam	S	Intermediate transfer station for mine water between the Portal Sump (Feature 24) and the process water filtration plant (Feature 10).		D
20	Sedimentation Dam	S	Collection of "dirty" water from Feature 18.	Discharges to the Process Water Dam (Feature 19).	D
21	"Clean" Water Dam	S	Collection of runoff from "clean" water areas and water extracted from Glennies Creek (if required).		C
22	Magazines	S	Storage of explosives and detonators.	Under WorkCover Licence 35/034651 (see **Table 2**).	D

Table 2.2 (Cont'd)
Glennies Creek Colliery - Existing Pit Top Facilities and Functions

IDENTIFIER (see Figure 2.2)	FACILITY	LOCATION S = on surface or above ground level B = below natural ground level	FUNCTION	COMMENT	MWMS (Mine Water Management System) C = "Clean" D = "Dirty"
23	Coal Transportation Contractors' Area plus access roads and run-off collection pond	S	Parking, laydown, maintenance, refuelling and office facilities area for the coal transportation contractor. Run-off collection. Access from Feature 18 and to Camberwell haul road network.	Incorporates an unsealed laydown area, 70 000L self-bunded diesel fuel storage, maintenance facilities and stores containers and an off-white coloured demountable office building. Diesel tanks covered under GCCM Dangerous Goods Licence. Feature visually obscured from all vantage points by topography and vegetation.	D
24	Portal Sump	B	An open water surface for sourcing water required underground by GCCM; for dust suppression water requirements for Camberwell and for process water requirements at Camberwell, Rix's Creek and Ashton.	A void within the backfilled spoil within the former North Pit with the water level reflecting the level of water within the former pit. Limit of sump as shown on **Figure 2.2** (Feature 24) approximates RL 48 or 4m below the Portal inverts. Further details of the existing Glennies Creek Water Management system are presented in Section 4.2.2.	D
25	Portals (3 off) within the North Pit Highwall	B	25(a) and (b) Entry / exit points for men and materials; the coal conveyor (CV001 – Feature 31) and the air intake for the underground workings. 25(c) decommission.	Concrete structures approximately 5m x 3m. During the initial years of mining, the air intake portal (25(c)) was used to exhaust air from the underground workings using ventilation fans. Underground ventilation is now provided by the Forest Road Ventilation Shaft within the MPL 343 sub-lease area (see Section 2.2.2). The former ventilation fans were removed in 2003.	D
26	Diesel Storage Tank	S	Fuel supply to mobile mining equipment.	Bunded 55 000L tank with associated tanker discharge area and pipework.	D
27	Stonedust Shed	B	Stonedust Storage	Prior to use underground for fire / explosion prevention.	D
28	Hydrocarbon Storage and Dispensing; Washdown and Maintenance Area	B	Hydrocarbon storage; equipment refuelling, washdown and maintenance.	Bunded, steel framed, concrete floored building.	D
29	Workshop	B	Welding and electrical equipment maintenance.	Steel framed, concrete floored building (10m x 12m) with shipping containers. Approval in place for building expansion to 10m x 18m.	D
30	Transformers	B	Conversion of power from 11kV to 415V for underground distribution.	Two transformers.	D
31	Stacker Belt Conveyor CV001	B	Transfer coal from underground to the RL 48 coal stockpile area (Feature 35) or conveyor SC001 (Feature 37).	Covered conveyor on elevated gantry.	D

Table 2.2 (Cont'd)
Glennies Creek Colliery - Existing Pit Top Facilities and Functions

IDENTIFIER (see Figure 2.2)	FACILITY	LOCATION S = on surface or above ground level B = below natural ground level	FUNCTION	COMMENT	MWMS (Mine Water Management System) C = "Clean" D = "Dirty"
32	Conveyor Starter / Control House	B	Electrical control of the underground conveyor system.	A 12m x 3m transportable building mounted above ground, adjacent to CV001 (Feature 31).	D
33	Fire Station	B	Storage of fire suppression equipment.	A 5m x 2m transportable building for storage of fire suppression equipment.	D
34	Compressor Building	B	Provision of compressed air to underground equipment.	A covered, concrete floored area 9m x 10m.	D
35	RL 48 Coal Stockpile Area	B	Emergency coal stockpiling and loading area.	Nominal 50 000t capacity. The original coal stockpiling area for the mine but now used in the event of stoppage or failure of the surface conveyor system (SC001 or SC002 – Features 37 or 39).	D
36	RL 75 Coal Stockpiling and Stone Storage Area	B	Emergency coal stockpiling and loading area. Breaker stone disposal area.	Nominal 150 000t capacity. An emergency stockpiling area used in the event of a major surface conveyor system failure and inadequate capacity in the RL 48 stockpile area. Area also to be used as a breaker stone disposal area.	D
37	Conveyor SC001	B	To transfer coal from the underground coal conveyor (CV001) to the transfer / breaker station (Feature 38).	A 1 400mm wide covered conveyor. Can be loaded directly from CV001 or from the RL 48 stockpile area (Feature 35) using a front-end loader tipping coal into an integrated dump hopper.	D
38	Transfer / Breaker Station (Pre-treatment) Area / Stone Stockpile Area	B	Acceptance of ROM coal from conveyor SC001 (Feature 37), stone removal and stockpiling, and broken coal discharge to conveyor SC002 (Feature 39).	Incorporates a scalping screen, 600tph rotary breaker, stone discharge conveyor, 50 000t capacity stone stockpile area and associated maintenance containers. Under normal operating circumstances, the live stone stockpile approximates 5 000t. The rotary breaker can be by-passed to enable the direct transferral of ROM coal to Conveyor SC002 (Feature 39).	D
39	Conveyor SC002	B/S	Transfer of coal to RL 100 stockpile area.	A covered 1 400mm conveyor. Coal is discharged via a 20m high gantry to a 15 000t live stockpile.	D
40	RL 100 Stockpile Area.	S	Broken and/or ROM coal storage prior to loading and despatch to the Camberwell CHPP via the RL 100 haulroad or, in the future, the overland conveyor.	A 3ha area with a nominal storage capacity of 500 000t. Coal is moved from the live stockpile area using a bulldozer. A minimum 3m high acoustic bund is located along the eastern and northern margins of the stockpile area.	D
41	RL 100 Area Access Ramps	B	Access between RL 48 and RL 75 areas to RL 100 area	Positions, shapes and slopes may change over time in association with mine-related activities such as breaker stone disposal.	D

Table 2.2 (Cont'd)
Glennies Creek Colliery - Existing Pit Top Facilities and Functions

IDENTIFIER (see Figure 2.2)	FACILITY	LOCATION S = on surface or above ground level B = below natural ground level	FUNCTION	COMMENT	MWMS (Mine Water Management System) C = "Clean" D = "Dirty"
42	Portal Sump Pumps	B	Transfer of water from the Portal Sump to underground operations, Possum Skin Dam, Camberwell and Rix's Creek Coal Mines.	Variable numbers of pumps depending on demand. Water supply to underground is via pipeline PL2 and PL5 (Features 44 and 47) to process water dam (Feature 19), the process water filtration system (Feature 10) and the underground fire water tanks (Feature 12). Transfer to Camberwell is via lines PL2 (Feature 44) and PL3 (Feature 45). Transfer to Rix's Creek is via PL2 (Feature 44). Transfer to the Possum Skin Dam is via PL3 and PL4 (Features 45 and 46).	D
43	Pipeline PL1	B/S	Water transfer to Camberwell.	A Camberwell-controlled 225mm welded poly pipeline fed from a pontoon mounted electric pump. PL1 is positioned on the surface and located such that in the event of a line failure, the flows would remain within the Camberwell or Glennies Creek "dirty" water management systems	D
44	Pipeline PL2	B/S	Water transfer to Camberwell, Rix's Creek and the Glennies Creek underground.	A 225mm welded poly pipeline with off-takes which enable water transfers to the Glennies Creek underground via pipeline PL5 and Rix's Creek. Currently fed by diesel powered pumps. PL2 is positioned such that in the event of a line failure, the flows would remain within the Glennies Creek, Camberwell or Rix's Creek "dirty" water management systems.	D
45	Pipeline PL3	B/S	Water transfer to Camberwell and the Possum Skin Dam.	A 400mm welded poly pipeline with a branch line (PL4) to the Possum Skin Dam. PL3 is buried and/or positioned such that a line failure will not result in off-site discharge of mine water.	D
46	Pipeline PL4	S	Water transfer from PL3 to the Possum Skin Dam and Possum Skin Dam to PL3 and beyond.	A valve-controlled, buried, 400mm welded poly pipeline off-take from PL3 with an additional T-piece (uptake line) allowing water transfer to Camberwell or return to the Portal Sump.	D
47	Pipeline PL5	B/S	Water transfer from PL2 to Process Water Dam.	A valve-controlled 225mm welded poly pipeline off-take from PL2.	D
48	RL 100 Haul Road	S	Access for coal haulage to Camberwell CHPP.	Unsealed 20-30m wide pavement on emplaced spoil. Bunded on western margin to provide acoustic and/or visual shielding.	D
49	Ventilation Shaft Power Line	S	Power supply to Forest Road Ventilation Shaft.	11kV above ground power line extending from Pit Top Sub-station to the Ventilation Shaft	C/D

Possum Skin Dam

The Possum Skin Dam (**Figure 2.1** and **Plates 2.5** to **2.7**) was constructed over the December 2003 to March 2004 period to provide:

- a storage for mine water;
- a large evaporative surface to enhance mine water losses; and
- establish a short-term buffer storage capacity within the Portal Sump (Feature 24, **Table 2.2**) sufficient for the containment of a major rainfall event without the risk of mine flooding.

It is proposed under this Project that the Possum Skin Dam be retained and utilised as an integral part of the Glennies Creek Colliery Water Management System. This function of the Dam is addressed in detail as part of the consideration of the key issues in Section 4.

Dam design was undertaken by Pells Sullivan Meynink Pty Ltd (PSM), engineering consultants and approved by the NSW Dam Safety Committee (DSC). Dam construction was subsequently supervised by PSM with DSC inspections undertaken both during and on completion of the construction activities.

The dam, comprising a 13m high, 600m long graded homogenous earthen structure with upstream and downstream batter slopes of 1:2.5 (V:H) and 1:3 (V:H) respectively, incorporates:

- a 4m wide cut-off trench beneath the embankment;
- a starter embankment with a geotextile liner;
- zones of low permeability sandy clays and gravelly clays, and cobble and gravel materials;
- rip rap lining to the upper 7m internal dam wall face to prevent wind induced wave erosion;
- a 20m wide spillway at 90.5m AHD. Both the dam embankment and spillway were designed to pass the probable maximum flood (PMF). The full supply level (FSL) storage within the dam is 1563 ML;
- gravel-filled finger drains within the embankment to enable any seepage downstream of the dam core to be drained, and collected and returned to the impoundment; and
- piezometers to monitor the phreatic surface within the dam embankment.

The dam layout and sections through the dam embankment are presented on **Figures 2.3** and **2.4**.

All materials used in the construction of the dam were geotechnically tested for their suitability, as were surficial materials within the floor of the dam to ensure achievement of a permeability $<1 \times 10^{-9}$ m/s as required by DEC (EPA) for tailings storages.

Plate 2.5: An oblique aerial view to the west across Possum Skin Dam.
Ref: E642-F053

Plate 2.6: An oblique aerial view to the southeast across Possum Skin Dam.
Ref: E642-F096

Plate 2.7: Possum Skin Dam looking south-southwest from Middle Falbrook Road. Ref: DSC 01139.jpg

Figure 2.3
Possum Skin Dam Layout

(A4 Colour)

Figure 2.4
Possum Skin Dam Sections

(A3 B&W)

In order to minimise the catchment area reporting directly to the dam, the design incorporated the installation of a peripheral, uni-directional diversion drain to collect "clean" water from areas upstream of the dam impoundment and direct it to the natural drainage line below the dam embankment.

The diversion drain, designed to convey a 1 in 100 year ARI event, comprises an excavated channel and a downslope diversion drain bund constructed using the excavated materials. The excavated channel and bund vary in profile depending on the upstream catchment area, graduating from a simple 'V' drain with 1:2 (V:H) internal batters to a trapezoidal section with a 4m wide invert and batter slopes graduating from 1:1 (V:H) in weathered rock to 1:2 (V:H) in the surficial soils. **Figure 2.4** presents a selection of typical cross-sections along the diversion drain.

A cut-off drain (swale drain) was also installed immediately upslope of the diversion drain to collect run-on waters and direct them to the diversion drain via geotextile and rip-rap lined drainage slots (see **Figure 2.4**), thereby preventing uncontrolled, potentially erosive discharges over the drain embankment.

The diversion drain also incorporates bunds / sedimentation basins on each of the two upslope ephemeral drainage lines (**Figure 2.3)** and rock drop structures which act as energy dissipators for any drainage line inflows or diversion drain flows and, as such, also provide an opportunity for settlement of any entrained particles. The floor of the diversion drain also carries a vegetation cover which assists the entrainment of particles.

The diversion drain outlet design comprises a rip rap-lined channel which widens from an invert width of 4m adjacent to the southern end of the dam embankment to 20m at the point of discharge to low and high flow channels, energy dissipators and, ultimately, the natural surface.

In accordance with the PSM design, soil was removed from areas upstream of a 250m exclusion zone and along the alignment of the diversion drain (**Figure 2.3**) with a total of in excess of 30 000m^3 stripped and stockpiled. Topsoil was subsequently re-applied to the downstream face of the dam embankment, the upper parts of the diversion drain batters and all other areas of disturbance above 89.0m AHD, and seeded. The remaining soil is stockpiled (see **Figure 2.3**) pending post de-commissioning rehabilitation of the dam area.

At the maximum dam operating level of 89.0m AHD, the structure has a storage capacity of 1 089ML, with the difference between the operating level and FSL (474ML) more than adequate to contain the inflow from a 1 in 100 year ARI event, even in the event of diversion channel embankment failure, ie. the 100 year ARI multi-day wet period would not cause a discharge.

Given the location of GCCM's "Oak Park" residence downstream of the dam embankment at the time of dam construction, the dam was initially assigned a "High C" Consequence Category rating by DSC. However, following the demolition of that residence and the removal of the transportable "Baime Den" residence during the July to December period 2005, the Consequence Category Rating was reduced to "Significant".

An operational monitoring and reporting programme, including presentation of the results to the dam design engineers for review, is in place in accordance with DSC requirements.

2.2.2 Forest Road Ventilation Shaft Area

The Forest Road Ventilation Shaft and associated facilities lie within a 3.9ha area approximately 2.9km west-northwest of the Glennies Creek Colliery Pit Top Area as shown on **Figure 1.2**, and comprises a sub-lease of Mining Purposes Lease (MPL) 343 held by Glendell Tenements Pty Ltd. MPL 343 extends from the surface to a depth of 5m and overlies:

- ML 1525 – which extends from 5m to 20m below the surface; and
- CL 382 – which extends from 20m below the surface to an unspecified depth.

Figure 2.5 presents a layout plan of the Forest Road Ventilation Shaft Area showing the existing infrastructure and services while **Table 2.3** identifies the various features, their functions and relevant comments. **Plate 2.8** displays an oblique aerial photograph of the entire Forest Road Ventilation Shaft Area while **Plate 2.9** presents a view of the area from Forest Road. As with the facilities and services within the Pit Top Area, all features identified on **Figure 2.5** and **Table 2.3** would be retained for the life of the Glennies Creek Colliery. Power to the Forest Road Ventilation Shaft Area is supplied by an 11kV overhead power line which extends from the Glennies Creek Colliery Pit Top Area (see **Figure 2.1**).

No personnel are stationed at the Forest Road Ventilation Shaft Area, with visitations confined to inspection and maintenance personnel, averaging one to two per day.

2.2.3 Gas Drainage Borehole Area

During coal extraction in LW2, there were frequent periods during which the CH_4 levels within the return airway exceeded 1% (the level at which diesel equipment is not permitted to operate and access is prevented), and occasional CH_4 levels of 2.0% or greater (ie. levels which made the roadways unusable by men and equipment and required the cessation of production). The source of the CH_4 was identified as being the coal seams above and below the Middle Liddell seam which release the gas into the goaf following the retreat of the longwall.

In order to minimise downtime and improve overall mine safety and production, three gas drainage boreholes were introduced during mining in LW3 and three have subsequently been installed on each of LW4 to LW7.

The gas drainage boreholes are installed in the undisturbed strata in advance of the longwall face, are geologically logged to record local stratigraphy and coal seams, and routinely comprise:

- a 337mm diameter borehole with a 260mm grouted casing to approximately 100m below the surface; and
- a 250mm diameter borehole from approximately 100m below the surface to approximately 5m above the roof of the coal seam, cased with a 200mm floating steel casing.

Figure 2.5
Forest Road Ventilation Shaft Area – Existing Layout

A4 / Colour

Table 2.3
Forest Road Ventilation Shaft Area - Existing Facilities and Functions

Identifier (see Figure 2.5)	Facility	Function	Comment
A	Ventilation Shaft	Provides the conduit for exhausting air from the underground mine workings to the atmosphere.	A fully enclosed 4.5m diameter, 330m deep concrete lined shaft.
B	Low Profile Eschenberg Bend	Directs air extracted from the ventilation shaft to the ventilation fan.	Ducting which changes the direction of the exhausted airflow from vertical to horizontal. Green colorbond cladding.
C	Ventilation Fans	Suck air from the underground workings and discharges it via the evassees (Feature D).	Twin centrifugal fans which currently remove air from the workings at a rate of approximately 230 m^3/sec. Green colorbond cladding.
D	Evassees	Exhaust the air to the atmosphere.	One structure per ventilation fan. The evassees are 9.2m in height and inclined at an angle of approximately 25° from the vertical. Green colorbond cladding.
E	Tube Bundle Room	Collection and analyses of underground air samples.	Analyses the air from various locations within the underground workings for O_2, CO, CH_4 and CO_2. Data is transferred to the central colliery computer system via Feature F. Green colorbond cladding.
F	Switch / Control Room	Controls and monitors fan operations and performance.	Building has green colourbond cladding.
G	11kV Power Line	Power transfer from the 66kV / 11kV sub-station at the Pit Top (Feature 11, **Table 2.2**).	Overland power line located on private land under land licence agreements. The line has been constructed to enable subsequent energizing to 66kV, if required.
H	Transformer	Converts incoming current from 11kV to 415V.	
I	Mine Dewatering Borehole and Pipeline	Mine water transfer to Ashton.	A 406mm diameter borehole with an internal 200mm galvanized pipeline which conveys water pumped from or via the underground workings to the surface, and hence via a 225mm welded polypipe to the Ashton leases via the Forest Road easement and an underbore beneath the Main Northern Railway Line. The pipeline is fitted with a leak detection and automatic shutdown system.

Table 2.3 (Cont'd)
Forest Road Ventilation Shaft Area - Existing Facilities and Functions

Identifier (see Figure 2.5)	Facility	Function	Comment
J	Secondary Shaft	Currently unused.	Formerly used to remove materials from underground which were produced during the development of the ventilation shaft. Now sealed to prevent inadvertent entry. Approved for possible future use for delivery of services underground or as an emergency (secondary) egress from the mine.
K	Acoustic / Visual Bund	Visual and acoustic screening to the east and south-east.	Constructed using spoil removed via the secondary shaft (Feature J), shaped and vegetated.
L	Sedimentation Dam and Catch Drain	Collection of potentially sediment-laden runoff from areas of disturbance within the sub-lease area.	1.5 ML capacity excavated structure with earthen walls formed from the excavated materials. Area of disturbed catchment <2ha.
M	Access Road	Access to and from Forest Road and to Features A to L.	A gravelled road extending from the unsealed Forest Road via gates within the sub-lease area perimeter fencing. A culvert installed by Council provides unimpeded drainage flows southwards along Forest Road. Maintenance of Forest Road undertaken by Council in accordance with agreement of 28 May 2004 and subject to review in May 2009.

Plate 2.8: An oblique aerial view to the south across the Forest Road Ventilation Shaft Area. Ref: E642-F003

Plate 2.9: The Forest Road Ventilation Shaft Facilities looking south-southwest from Forest Road. The Ashton out-of-pit overburden emplacement lies in the background.
Ref: DSC 01124.jpg

Prior to the longwall face reaching each borehole, surface infrastructure is installed at the collar of the hole. This includes a free venting stack complete with flame arrestors and a fire suppression system, lightning protection, monitoring and telemetry equipment and an 8m x 8m fenced enclosure (**Plate 2.10**). Following the retreat of the longwall face under the borehole and subsequent roof caving to expose the base of the borehole, gas is allowed to vent to atmosphere via the free vent stack. A gas extraction plant (**Plate 2.11**), comprising a CH_4-fired generator, a 30kW electric motor and exhaust fan is connected to the borehole, as required, to increase the volume of gas removed from the underground workings. Once each gas drainage borehole is no longer effective in managing gas levels underground, usually once the subsequent longwall face has retreated past the location of the borehole, the surface infrastructure is removed, the borehole is sealed with concrete and the site is rehabilitated

Plate 2.10: A free venting gas drainage borehole assembly.
Ref: DSC 00607.jpg

Plate 2.11: An operating gas extraction plant.
Ref: DSC 00602.jpg

Under normal operating circumstances, three to four boreholes are active at any given time, of which one or two are free venting and two are fitted with extraction equipment to remove gas from the active goaf and/or adjacent sealed goafs.

To-date, each borehole has been in place for approximately 12 to 18 months and venting gas for approximately 6 months. It is noted, however, that Envirogen Pty Ltd, a company specialising in power generation using CH_4 from underground coal mines, has lodged a development application with Singleton Shire Council for the installation of a mine gas-fired power generation plant which will utilise the CH_4 which is currently vented to the atmosphere from the gas boreholes within CL 382. The plant will have the capacity to generate up to 12MW electrical power which will be fed into the State power grid. A network of permanent and temporary pipes will transfer the gas from the active boreholes to the plant. Given that the Envirogen proposal aims to maximise the use of gas produced rather than undertake gas removal solely to facilitate coal extraction, should approval be granted to that Project, the potential exists for each drainage borehole to remain in operation for a period greater than has occurred in the past.

2.3 Existing Mine Activities

2.3.1 Introduction

The following sub-sections present information on the existing activities at the Glennies Creek Colliery to enable the reader to gain an understanding of the Colliery activities in total, and the interrelationship between the underground and surface-based activities, infrastructure, facilities and services.

2.3.2 Mining Methods

Underground mining at the Glennies Creek Colliery is currently confined to the Middle Liddell seam at a depth of approximately 300m to 400m below the surface and involves the activities identified below.

- Mine development (mains and gateroad establishment) using continuous miners with electrically powered shuttle cars loading onto a 1 200mm (panel) conveyor belt. The mains and gateroads (and associated cut-throughs) comprise 5.2m x 2.8m tunnels within the coal seam which provide access for men and materials movement and mine ventilation. The gateroads also define the width of each longwall panel.
- Longwall extraction using a DBT longwall unit feeding via an underground crusher to a 1 200mm panel belt.

The longwall unit comprises a shearer with a 1m web depth delivering coal to a 1 152mm armoured face conveyor. The longwall unit and the armoured face conveyor are rated at 2 500 to 3 000tph.

Roof support at the longwall face is provided by 1.75m wide, two legged hydraulic roof supports each with a capacity of 1 050t, with the number of hydraulic supports in use at any one time determined by the longwall panel width. Longwall panel widths over the life of the mine have increased from 90m (LW1) to 250m (LW7), with LW8 and subsequent panels also planned to approximate 250m in width.

The coal from the panel belts is delivered to 1 400mm, 3 000tph trunk conveyors within the North-West Mains which deliver the coal to the surface and hence via SC001, the pre-treatment plant and SC002 (Features 37, 38 and 39 - **Figure 2.2**) to the RL 100 stockpile area (Feature 40 – **Figure 2.2**).

Chain pillars, ie. the pillars of coal retained between longwall panels to provide roof support and access, vary in width with the depth of cover and stress but currently approximate 38m x 110m.

Following the completion of mining in the Middle Liddell seam, GCCM intends to recover coal from the underlying Hebden seam. Development of underground roadways within the Hebden seam would occur concurrently with the final stages of mining in the Middle Liddell seam to enable the longwall unit to be transferred to the seam below following the completion of mining in the Middle Liddell seam.

2.3.3 Mining Equipment

Table 2.4 lists the principal existing mining and support equipment in use at the Glennies Creek Colliery.

During periods of longwall changeout and other high activity, additional items of equipment such as chock carriers, petito mules, ramcars, shearer carriers and cranes may be brought on-site for the duration of specific activities.

Table 2.4
Mining Equipment

Item	Number Routinely in Operation	Function	Duration of Use (full-time (FT) / part-time (PT)
Personnel Transporter	7	Personnel movement	FT
Load Haul Dump (LHD/FBL)	8	Materials movement	FT
Grader	1	Underground road maintenance	PT
Continuous Miner	3 *1	Mine development	FT
Shuttle Car	4	Mine development	FT
Ramcar	1	Ballast transportation	PT
Longwall Unit	1	Coal production	FT *2
Surface Bulldozer	1	Coal stockpile management	FT
Surface Front-end Loader	2 *3	Loading coal trucks	PT
Surface Haul Truck	4	Transporting coal to CHPP	PT
Surface Water Truck	1	Dust suppression	PT
Surface Forklift	1	Supplies management	FT

*1 Four on site.
*2 Other than during longwall move.
*3 One loader on coal trucks. The other has quick-release couplings also enabling its use as a forklift.

2.3.4 Processing

Processing of Glennies Creek Coal prior to its despatch to the export market comprises on-site and off-site components.

2.3.4.1 On-site Components

On-site processing takes two forms, namely:

(i) underground size reduction of longwall and continuous miner production to nominally <200mm and <300mm respectively; and

(ii) pre-treatment whereby a component of the non-carbonaceous materials incorporated within the ROM coal is removed prior to transportation of the coal to the Camberwell CHPP for beneficiation (washing). The pre-treatment system (Feature 38, **Figure 2.2**) comprises 3 000tph input and output conveyors (SC001 and SC002), a scalping screen, a rotary breaker and a stone (reject) conveyor. To-date, the stone rejected from the breaker has been primarily used for hardstand construction and maintenance, and erosion protection. However, in the longer term, the materials will also be used for highwall and batter buttressing, access road and ramp construction and the progressive development of the final (ie. post-mining) landform in available areas of MLs 1518 and 1551.

2.3.4.2 Off-site Components

The Camberwell CHPP processes all ROM coal from both the Camberwell and Glennies Creek operations. The CHPP has an approved ROM coal throughput of approximately 8.5Mtpa.

At the Camberwell CHPP, the coal is crushed to below 50mm prior to its entry into the washing circuit. Within the CHPP, the coal is sized into three different fractions. The coarsest size fraction (50mm to 1mm) is treated in the dense medium circuit while the intermediate size fraction (1mm to 0.07mm) is treated in the spirals circuit. The smallest size fraction (<0.07mm) is sent to the thickener where it is treated with flocculant, thickened, and then pumped to the active tailings dam for disposal.

The products from the dense medium circuit and the spirals are dewatered, deposited onto the product conveyor and transferred onto the product stockpile to await despatch by rail.

The rejects from the dense medium circuit are trucked to dumps in the Camberwell Open Cuts while the rejects from the spirals circuit are sent to the thickener where they are mixed and then discarded with the tailings. Water decanted from the active tailings dam is pumped back to the plant for re-use in the washing process.

It is noted that further refinements to the Camberwell CHPP approved by the DoP are currently being installed. These refinements, which include the addition of froth flotation cells and a vacuum filter, will be used to increase the recovery of fine coal which would otherwise report to the tailings dams.

2.3.5 Coal Stockpiling

The Glennies Creek Colliery currently operates three coal stockpile areas as shown on **Figure 2.2**, ie. the RL 100, RL 48 and RL 75. Of these stockpile areas, the RL 100 stockpile area (Feature 40) is the principal storage area. The RL 48 and/or RL 75 stockpile areas (Features 35 and 36 – **Figure 2.2**) are used for emergency coal storage only, ie. in the event of a failure in the surface conveyor system used to transport the coal to the RL 100 stockpile area, or at times where the RL 100 stockpile area reaches capacity due to, for example, extended periods of CHPP downtime. Haulage of coal from these stockpile areas is onto and along the RL 100 haulroad. Over the past two years, a maximum of 350 000t has been stored on the RL 100 stockpile area and 184 000t has been stored on the RL 75 stockpile area. The RL 48 stockpile area has not been used since the installation of the pre-treatment system.

2.3.6 Coal Transportation

Coal transportation external to the Glennies Creek Portal Area is limited to the trucking of coal from stockpile areas within the Pit Top Project Area to the Camberwell CHPP by the RL 100 haulroad. Coal is transported via access ramps and associated feeder roads within the Pit Top Project Area to the coal stockpiles and RL 100 haulroad. The use of the RL 100 haulroad, a pre-existing haulroad within the Camberwell Coal Lease CL 357, was approved under a modification to the development consent issued for the Camberwell Coal Mine. Only that part of the haulroad presently located within the Pit Top Project Area is the subject of this environmental assessment, the remainder being the subject of the Camberwell development consent. The location, upgrading and use of the RL 100 haulroad is consistent with the approved Camberwell water management plan; is compliant with the adopted management plans for noise, dust, erosion and sediment control, land, landscaping and landuse; and includes a 3.5 m high visual and acoustic bund along the western margin to limit noise intrusion and prevent headlight spill onto privately owned dwellings. These management plans remain current for the use of the RL 100 haulroad.

The Camberwell development consent provides that truck haulage from Glennies Creek to the Camberwell CHPP shall cease no later than 31 December 2010 in anticipation that the overland

conveyor would be operational by that time. However, the development consent enables coal to be transported on the RL 100 haulroad after that time during conveyor maintenance or in an emergency situation. The RL 100 haulroad will be maintained within the Pit Top Project Area for the life of the Glennies Creek Colliery and will be utilised as permitted under the development consent for the Camberwell Coal Mine.

Coal transportation is undertaken by Contractor, with haulage by semi-tippers, B-doubles and Cat 777s approved. Haulage is currently undertaken with Cat 777s, with semi-tippers having been ordered and due to replace the Cat 777s as the principal mode of coal transportation during 2006. Haulage is routinely undertaken 24 hours per day, 3 days per week, but is also undertaken during other periods when additional processing capacity is available at the Camberwell CHPP.

2.3.7 Waste Management

2.3.7.1 Introduction

The principal waste streams generated at the Glennies Creek Colliery comprise:

(i) general type wastes from on-site buildings and underground activities, and routine maintenance consumables;
(ii) oils, grease and solvents;
(iii) equipment tyres and batteries;
(iv) scrap metal;
(v) sewage;
(vi) gas drainage borehole spoil; and
(vii) breaker stone rejected from the pre-treatment plant.

GCCM has a pro-active waste management regime in place which encompasses the waste hierarchy principles of Reduce – Reuse – Recycle and Dispose, with the management of waste streams (i), (ii), (iii) (batteries) and (iv) above primarily undertaken by Thiess Services Pty Ltd (Thiess) following a comprehensive evaluation of the waste streams. Coarse and fine rejects produced at the Camberwell CHPP are managed as part of that mine's existing approved reject management system while the management of sewage, gas drainage borehole spoil and breaker stone are undertaken by GCCM personnel. Waste tyres are managed by Singleton Tyre Service.

The following sub-sections describe the management procedures currently in place at the Glennies Creek Colliery for each of the identified waste streams.

2.3.7.2 Domestic Type Wastes and Maintenance Consumables

Domestic wastes originating from surface administration, stores and workshop facilities, together with routine maintenance consumables such as grease cartridges, are separated and placed in colour-coded wizbins, drums and skips for collection. The colour-coded bins are placed strategically around the administration areas whilst colour-coded metal skips are positioned at the Portal Area, upper and lower hardstand areas, bathhouses, carpark, stores and muster area (**Figure 2.2**). 240 litre orange bins are used for recyclable materials and green 3m^3 skips are used for general wastes. Blue 15m^3 bulk skips located in the Portal Area are also used for general wastes. The general wastes collected within the skips are subsequently sorted to remove unacceptable or recyclable materials.

2.3.7.3 Oils, Grease and Solvents

The majority of routine Glennies Creek mobile equipment maintenance is undertaken off-site, with wastes from on-site maintenance and servicing limited to oils and grease from the limited activities undertaken within the Portal Area, underground, or within the Pit Top Facilities, together with solvents from parts cleaning.

Grease and solvents are collected / stored in leakproof tanks or drums and collected by Nationwide Oils (under contract to Thiess) on a six-weekly basis, with additional collections undertaken on an as-needs basis. Waste oils are pumped directly or via separator tanks, sinks and sumps to a 2 000L bunded waste oil tank located in the new workshop adjacent the portal entrance.

The workshop area also incorporates a drum crusher and self-contained parts washer unit. Oil from the drum crusher is transferred to the waste oil tank and the crushed drums are placed with the recyclables, while the contents of the parts washer (a self-contained unit) are removed by Bulbeck Enviro Solutions every four to six weeks.

2.3.7.4 Tyres and Batteries

Old and/or damaged tyres from mining equipment or associated vehicles are stored on the upper hardstand area (Feature 18 - **Figure 2.2**) and collected by Singleton Tyre Service on an as-needs basis. Under the terms of the contract, Singleton Tyre Service is responsible for the offsite management and disposal of these tyres.

Old cap lamp and other batteries are stored in a dedicated plastic lined black 220 litre drum located adjacent to the lamp room in the muster area (Feature 6, **Figure 2.2**), for subsequent collection and recycling on an as-needs basis.

2.3.7.5 Scrap Metal

Scrap metals suitable for recycling are placed within designated light blue skip bins located adjacent the hardstand areas. Thiess Services or their designated sub-contractors are responsible for the removal and recycling of all scrap metals.

2.3.7.6 Sewage

Effluent from administration areas and bathhouses is processed through three Aerated Wastewater Treatment Systems (AWTS). Treated effluent is then pumped to two ponds (one anaerobic and one aerobic) located to the north-east of the main office building (Feature 4 - **Figure 2.2**). The treated effluent is then irrigated onto the adjacent pasture. Chemical toilets are located in the Portal Area and underground and are serviced weekly by Shorco. There are no sewage facilities in place (or currently required) at either the Forest Road Ventilation Shaft Area or Gas Drainage Borehole Area.

2.3.7.7 Gas Drainage Borehole Drill Cuttings

Approximately 16m^3 of drill cuttings are removed during the development of each gas drainage borehole. These materials are excavated and transferred to the Portal Area for disposal in areas awaiting final landform creation.

2.3.7.8 Pre-treatment Plant Stone

Stone segregated from the ROM coal at the scalping screen or breaker (Feature 38 - **Figure 2.2**) is temporarily stockpiled prior to its placement in selected areas of the ML 1434, ML 1518 and ML 1551 for hardstand construction or maintenance, road construction, drainage treatments, buttressing of steep slopes or final landform creation, with the initial 100 000 m^3 of stone available for final landform creation to be used primarily to develop upslope and downslope batters of approximately 10^o in the vicinity of the ramp leading from the Portal Area to the RL 100 haulroad.

2.3.8 Hazardous and Explosives Materials Management

The Glennies Creek Colliery has a Hazardous Substance Management Plan in place that controls the purchase, storage, and use of Hazardous Substances, and defines the actions that need to be taken to achieve the required outcomes. The Plan:

- identifies Hazardous Substances that are purchased, stored, and/or used at the Colliery;
- ensures that any Hazardous Substances that are purchased are of a type that will minimise the potential for occupational health and safety exposure, fire risks, and potential adverse effects on the environment;
- ensures that the identified Hazardous Substances are stored in compliance with the requirements of the Dangerous Goods Act and relevant Standards or Codes of Practice; and
- provides for education, training and competency assessments to ensure personnel can use the Hazardous Substances without risk of injury or harm, together with compliance monitoring and the identification of improvement opportunities.

Prior to any materials or product being introduced to the Colliery by GCCM personnel, Materials Safety Data Sheets (MSDS) are assessed and a decision made as to each material's acceptance or rejection at the Colliery. A similar procedure is applied for materials and products proposed for introduction to the site by any contractor. MSDS are retained within the Colliery library for all hazardous materials, independent of the quantity.

GCCM also has an Explosives and Detonator Management Plan which provides information, detail and arrangements for the management and control of risks associated with shot firing and explosives in its underground operations. The Plan addresses aspects such as purchase, storage, transportation, training, review and audit procedures and record keeping.

Prior to November 2005, no materials other than Class 1.1D Type A and E explosives and Type 1.1B electronic detonators were retained at the Glennies Creek Colliery in sufficient quantities as to require licencing under the *Dangerous Goods Act 1975* and *Regulation 1999*. However, in the latter part of 2005, changes to Dangerous Goods legislation occurred which resulted in the storage and handling of most classes of dangerous goods being regulated under the *Occupational Health and Safety Regulation 2001* (under the *Occupational Health and Safety Act 2000*), and the storage and handling of explosives being regulated under the *Explosives Regulation 2005* (under

the *Explosives Act 2003*). As a consequence of these changes, which also introduced the concept of "manifest quantity" with respect to the storage of dangerous goods, GCCM submitted an amendment notification to WorkCover NSW to reflect an aggregate diesel fuel storage on the mine site in excess of 100 000L. Acknowledgement of receipt of the notification was received from WorkCover on 09 March 2006. Additionally, in June 2006, a Security Management Plan and application for a licence to store and handle explosives, together with an updated notification of dangerous goods, was submitted to WorkCover. Verbal acknowledgement of receipt has been received and licence renewal is pending.

2.3.9 Mine Gas Management

2.3.9.1 Introduction

Coal seams contain varying levels and concentrations of gases, with the principal gases found being methane (CH_4) and carbon dioxide (CO_2). Collectively, these and other gases encountered such as carbon monoxide (CO) are referred to throughout this document as "mine gases". At the Glennies Creek Colliery, the Middle Liddell seam gas composition approximates 90% CH_4 and 10% CO_2, with the most recent data showing the in-situ gas content to approximate $2m^3$ gas per tonne of coal at 400m depth. Gas content values can vary across the lease area for similar depths of cover, however, it is generally expected to increase as the mine progresses deeper.

The Glennies Creek Colliery does not currently have any problems with gas emissions from the ribs in mining areas, with the mine ventilation system adequate to dilute any rib emissions in roadways. However, gas in goaf areas, ie. areas where a substantial proportion of the coal seam has been extracted causing the collapse of the overlying rock strata, can pose a problem for a mine in terms of safety and production loss as it may enter roadways from the open tailgate end of the longwall face or through leakage around seals. Gas in the Glennies Creek Colliery goaf originates from two sources, namely:

- coal seams below the Middle Liddell seam as the floor strata crack when subject to increased stress levels post extraction; and
- coal seams above the Middle Liddell seam as the roof strata cave and fall to fill the void left by the extracted coal.

2.3.9.2 Control

Glennies Creek Colliery currently utilises boreholes extending from the goaf areas to the surface to manage mine gases in goaf areas. On the top of each open borehole is a venting stack (**Plate 2.10**) which has a fire suppression system and flame arrestors to prevent any ignition of exhausting CH_4, travelling down the borehole into the goaf. Due to the natural buoyancy of CH_4, it tends to free vent up the boreholes easily. Typical mine gas flows up the free venting boreholes vary from 100L/s to 200L/s and exhibit CH_4 concentrations of 80% to 90%.

GCCM also owns two CH_4 extraction plants, one of which is shown on **Plate 2.11**. Each plant consists of a CH_4-powered generator and an electric motor driving an exhaust fan. These plants, which are fitted to the venting stacks to increase the amount of CH_4 exhausted from a particular borehole, are progressively relocated with the advance of the mine. The typical gas flows through the plants vary from 200L/s to 1 200L/s and exhibit CH_4 concentrations of 70% to 90%.

Real time gas monitoring and control systems are fitted to the plants and connected via radio link to the mine to allow monitoring of their performance and emissions of O_2, CO and CH_4, and to control exhaust fan operations and speed.

2.3.9.3 Gas Monitoring

Gas monitoring is an important component of gas management at underground coal mines and, although there are a number of different systems and tools available, two main outcomes are essential, namely:

(i) timely and accurate data collection;

(ii) an ability to store and trend data over time; and

(iii) an ability to alarm at set trigger levels.

Gas monitoring methods/systems can give immediate warning of a safety hazard, eg high concentrations of a particular gas at a specific location, can show trends of gas concentrations over time which may indicate a potential future hazard, and can also be used to determine atmospheric emissions.

Gas monitoring at the Glennies Creek Colliery is carried out using:

- real time gas monitoring;
- tube bundle gas monitoring;
- portable gas detectors; and
- a regime of gas sampling through a gas chromatograph,

with the combination of gas monitoring and goaf gas drainage allowing the Colliery to effectively manage goaf gas entering the underground roadways.

The real time gas monitoring system consists of sensor heads at certain locations within the underground roadways and on the gas drainage plants which feed live data on O_2, CO and CH_4 levels to the surface computer system located in the mine's control room. This system enables immediate notification, via an alarm, if there is an elevated concentration of gas at a particular location. CH_4 levels in the main return are routinely 0.3% to 0.4%.

The tube bundle gas monitoring system utilises a series of plastic tubes run out to various locations in the mine, including return airways, sealed goafs and the active goaf. These tubes are directly connected to a vacuum pump on the surface which constantly sucks air from all tubes. A set of analysers on the surface (within the tube bundle room within the Forest Road Ventilation Shaft Area) cycles through each of the tubes, sampling gas concentrations. This

system analyses for O_2, CO, CH_4 and CO_2. It also has alarm levels which are triggered if certain gas levels are reached. This system does not give real time information as there is a delay in sucking the sample from the underground location through the tubes to the analysers on the surface.

Portable gas detectors are carried by some personnel underground and give an instantaneous reading of O_2, CO and CH_4 gas concentration. They are alarmed to give the carrier a warning of elevated or reduced levels of particular gases.

Bagged samples of gas are also collected regularly from various goaf seals in the mine and each active gas drainage borehole. These samples are sent off-site to be analysed by a gas chromatograph. A gas chromatograph has the ability to detect a large number of different types of gas and hence is very useful in determining whether or not there are any indications of spontaneous combustion present. Samples from the Glennies Creek Colliery are routinely analysed for O_2, CO, CH_4, CO_2, Hydrogen (H_2), Ethane (C_2 H_6), Ethylene (C_2 H_4) and Nitrogen (N_2).

2.3.10 Safety and Security Management

Management of security and public safety at the Glennies Creek Colliery is achieved through a combination of physical measures, education and training, as outlined below.

Security

The Glennies Creek Colliery Pit Top Facilities are fenced with only one main access road leading onto the facilities. Public entering the Pit Top Facilities are directed by a sign stating "NO UNAUTHORISED ENTRY, ALL VISITORS AND CONTRACTORS TO REPORT TO THE MAIN OFFICE" with an additional sign which directs the visitors and contractors to the car park and main office complex. All visitors and contractors are required to sign the mine register when coming onto and leaving the site. Closed circuit television cameras monitor the carpark.

A private security company also provides security patrols of the various Colliery facilities.

Mine Inductions

No person is allowed to work on the Glennies Creek Colliery site without attending an appropriate induction. The inductions, which determine the areas where persons are allowed to go on the mine site, are valid for a period of one year.

When on-site, visitors are escorted by mine personnel at all times.

Personal Protection Equipment

Personal protection equipment, which complies with the relevant Australian Standards, is available to all GCCM employees, visitors and contractors that come onto site.

All areas where personal protection equipment is to be worn are clearly sign-posted.

2.3.11 Subsidence Management

Longwall mining involves the removal of a substantial proportion of the coal seam which causes collapse of the overlying rock strata into the goaf, with the consequent subsidence of the natural surface. The extent of subsidence depends on the width and thickness of the coal seam removed in each longwall panel, the characteristics of the overlying rock, and the depth of mining. The settlement and binding of the strata to the surface results in a subsidence trough which is wider than the actual longwall panel extracted.

By contrast, development of first workings, such as the North-West Mains (**Figure 1.2**), only involves the removal of a minor portion of the coal seam and is designed for stability. First workings do not cause any collapse of the rock strata and hence, do not cause subsidence.

The surface facilities (other than those in the Gas Drainage Borehole Area) will not be directly or indirectly impacted by subsidence as they are not located in the zone of subsidence impact due to secondary extraction.

In terms of the Gas Drainage Borehole Area, the boreholes and associated infrastructure are/will be located in areas which will be impacted by mine subsidence, but designed to accommodate that subsidence.

Subsidence management within all longwall panels mined to-date at the Glennies Creek Colliery has been undertaken in accordance with approvals granted under s.138 of the Coal Mine Regulation Act (CMRA) 1982, with all mining within LW7 and beyond also to be undertaken in accordance with the new subsidence management approval process administered by DPI (MR). This process, an extension of the former s.138 process, requires an assessment of the surface environment in the area of proposed underground mining; identification and characterisation of surface and sub-surface features that may be affected by the proposed mining; subsidence prediction; an assessment of the subsidence impacts and risks, and approval of a Subsidence Management Plan (SMP) prior to an approval being granted under s.138 (CMRA, 1982).

The SMP for LW7 to LW9 inclusive was submitted to DPI (MR) in August 2005 and approved, subject to conditions, on 14 March 2006. The s.138 approval for LW7 to LW9 was approved on 12 April 2006.

As with the former s.138 process, central to the SMP is monitoring, reporting and a review of outcomes against predictions. Subsidence monitoring currently undertaken at the Glennies Creek Colliery in order to verify modelled subsidence predictions and, if required, model refinement, involves:

(i) surveys along a single fixed transect crossing all longwall panels, normal to the chain pillars after the completion of each longwall block;
(ii) surveys along each alternate panel along the panel centreline and extending from the North-West Mains and barrier pillar for a distance of approximately 300m at the completion of each longwall block;
(iii) surveys of Main Creek and its tributaries prior to, during and following the subsidence to measure changes in gradient and cross-section and identify any pondages; and
(iv) photography of high risk areas to monitor for increases or changes to erosion and sedimentation.

Subsidence monitoring transects identified in (i) and (ii) above, and in place as of 31 March 2006, are shown on **Figure 2.1**.

Additional monitoring required in accordance with the LW7 to LW9 SMP and s.138 approvals includes:

- establishment of further transect lines, including parallel to the Mt Owen Rail Spur;
- visual monitoring of surface facilities / structures including the Forest Road formation, power lines, fences etc; and
- farm water storage integrity and pre- and post-subsidence storage capacities.

2.3.12 Spontaneous Combustion

2.3.12.1 Introduction

Spontaneous combustion results from circumstances where coal surfaces oxidise and the heat developed by the chemical process is not dissipated, resulting in a continuing temperature rise which can ultimately cause the coal to ignite.

The avoidance of potential spontaneous combustion is best achieved by the implementation of preventative control measures supplemented by continuous gas monitoring and physical inspection procedures.

Indicators of a spontaneous combustion event include:

- an increased level of carbon monoxide (CO) make;
- an increased level of higher hydrocarbons eg H_2, C_2H_4 or C_2H_6; and/or
- the presence of smoke, haze, sweating, a unique smell or heat.

Any incident of a self heating or fire due to spontaneous combustion is defined as a Dangerous Occurrence under the CMRA (1982) and must be reported to the DPI (MR) Inspectorate.

The only areas covered by the application which are at risk from spontaneous combustion are coal stockpiles. Management of such an occurrence is addressed in the Colliery's Spontaneous Combustion Management Plan (Section 2.3.12.3).

2.3.12.2 Propensity and History

Coal from Glennies Creek Colliery has been analysed for its potential to spontaneously combust. Results from this Adiabatic Self-Heating Test (R70) indicate that the coal has a "moderate to high propensity to spontaneous combustion", thereby placing the Colliery in the range of other Hunter Valley mines. Although there have been no recorded incidents of spontaneous combustion at the Glennies Creek Colliery to date, either underground or in surface stockpiles, spontaneous combustion of coal contained in the Middle Liddell seam has been experienced in other underground mines in the district.

2.3.12.3 Management

Glennies Creek Colliery has a Spontaneous Combustion Management Plan in place which was submitted to (and approved by) DPI (MR) as part of the s.140 (CMRA 1982) approval process.

Controls implemented by GCCM in accordance with the Plan in order to reduce the potential for spontaneous combustion include the following.

- The installation of real time gas monitoring sensors at strategic locations in roadways. This system monitors CO (an early indicator of spontaneous combustion) as well as other gases, and results are displayed on the colliery computer system. The gas monitoring software has certain trigger levels for various gas concentrations which, when reached, activate alarms on site and report to an external monitoring firm if not acknowledged within a specified time frame. This software also allows the storage and trending of monitoring data.
- The installation of the tube bundle gas monitoring system which samples the atmosphere in both sealed areas and general body roadways. As with the real-time monitoring, the tube bundle gas monitoring software has trigger levels for various gas concentrations which activate internal or external alarms and allows storage and trending of monitoring data.
- A regime of weekly atmosphere bag sampling through seals from goaf areas. These samples are then analysed off site by a laboratory using a gas chromatograph. This system allows the detection of further indicators of spontaneous combustion including H_2, C_2H_4 and C_2H_6.
- A regime of weekly pressure monitoring of seals to measure differential pressure across seals.
- A regime of weekly seal inspections by deputies using a check sheet.
- The sealing of goaf areas using high quality seals, well supported with secondary roof and rib support, to minimise oxygen ingress into the goaf.
- Full seam extraction by the longwall mining equipment.
- Visual inspections of surface stockpiles.
- Implementation of a ventilation management system including the use of pressure balance chambers on final seals to minimise oxygen ingress into the goaf.

2.3.13 Employment

As of 30 June 2006, a total of 172 persons were employed by GCCM at the Glennies Creek Colliery comprising:

- 40 Staff;
- 15 Deputies;
- 44 Tradespersons / Leading Hands; and
- 73 Mineworkers.

In addition to the GCCM personnel, varying numbers of casual employees and contractors are engaged depending on the nature of activities being undertaken. For example, during longwall moves, up to 30 contractor-employed personnel are typically on site.

2.3.14 Traffic and Transport

Light and heavy vehicle movements to and from the Glennies Creek Colliery occur routinely as follows.

- On weekdays, light vehicle movements vary from 350 to 420 per day and heavy vehicle movements vary from 20 to 36 per day.
- On weekends, light vehicle movements vary from 200 to 250 per day and heavy vehicle movements vary from 0 to 4 per day.

Traffic levels vary throughout each day with most vehicles travelling to and from the Colliery before and after shift change-overs. The current shifts at the Colliery are as follows.

Weekdays	**Weekends**
6:30am to 3:00pm	10:00am to 10:00pm
1:30pm to 11:30pm	10:00pm to 10:00am
10:00pm to 8:00am	

The staggered weekday shift changes results in no concentrated traffic levels at shift changeovers.

2.3.15 Hours of Operations

Table 2.5 identifies the routine hours of operations for the various mining and mining-related activities undertaken at the Glennies Creek Colliery.

Table 2.5
Routine Hours of Operation

Activity	Hours	Days/Week	Comments
Mine Development	24	7	Underground activity
Longwall Extraction	24	7	Underground activity
Longwall Moves	24	7	Underground activity *[1]
Coal Transportation	24	3	By haultruck to Camberwell
Gas Drainage Borehole Installation (drilling)	7.00am – 5.00pm 8.00am – 2.00pm	Monday – Saturday Sunday	
Gas Drainage Borehole Operation	24	7	
Ventilation Shaft Operation	24	7	

*[1] Longwall move frequency is determined by panel width and length. Duration of each move approximates 4 to 6 weeks.