PART OF THE YANCOAL AUSTRALIA GROUP

Ashton Coal Project

ENVIRONMENTAL ASSESSMENT

FOR THE MODIFICATION OF DA 309-11-2001-i (MOD 10)

COMPRISING

CENTRAL GAS DRAINAGE PLANT AND ASSOCIATED SURFACE INFRASTRUCTURE

AUGUST 2012

Wells Environmental Services

Version	Date	Description	Author	Reviewer	Approved
Draft 01	8/05/2012	Environmental Assessment in support of a S75W modification application to DA 309-11-2001-i – MOD 10	P.Burns / A.Wells Wells Environmental Services	A. Wells	
Draft 02	4/07/2012	Environmental Assessment in support of a S75W modification application to DA 309-11-2001-i – MOD 10	P.Burns / A.Wells Wells Environmental Services	M.Moore	M Moore Approvals Manager
Draft 03	20/07/2012	Environmental Assessment in support of a S75W modification application to DA 309-11-2001-i – MOD 10	P.Burns / A.Wells Wells Environmental Services	M.Moore	M Moore Approvals Manager
Final	02/08/2012	Environmental Assessment in support of a S75W modification application to DA 309-11-2001-i – MOD 10	P.Burns / A.Wells Wells Environmental Services	M.Moore	M Moore Approvals Manager

ASHTON COAL PROJECT
ENVIRONMENTAL ASSESSMENT
CENTRAL GAS DRAINAGE PLANT
AND ASSOCIATED SURFACE INFRASTRUCTURE

1 INTRODUCTION 1

2 BACKGROUND 3

2.1 THE PROPONENT 3
2.2 ASHTON COAL PROJECT 3
2.3 LOCATION AND SETTING 5
2.4 LAND DEVELOPMENT SCHEDULE 5

3 CONSULTATION 7

3.1 OVERVIEW 7
3.2 NEIGHBOURING LAND OWNERS 9
3.3 ABORIGINAL COMMUNITY STAKEHOLDERS 12

4 APPROVAL FRAMEWORK 13

4.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 13
4.2 OTHER STATE LEGISLATION 13
4.3 COMMONWEALTH LEGISLATION 14
4.3.1 Environment Protection and Biodiversity Conservation Act 1999 14

5 PROPOSED MODIFICATION 15

5.1 SUMMARY OF PROPOSED MODIFICATION 15
5.2 NEED FOR PROPOSED MODIFICATION 17
5.3 PROJECT ALTERNATIVES 18
5.4 BENEFICIAL USE OPTIONS 18

6 MODIFICATION DESCRIPTION 20

6.1 SITE SELECTION 20
6.2 CENTRAL GAS DRAINAGE PLANT 21
6.3 GAS FLARING FACILITY 22
6.4 GAS DRAINAGE BORES 24
6.5 GAS PIPELINE NETWORK 27
6.6 MOBILE GAS DRAINAGE PLANT 28
6.7 SITE ACCESS 28
6.8 DECOMMISSIONING AND REHABILITATION 28

7 IMPACT ASSESSMENT 30

7.1 ENVIRONMENTAL RISK ASSESSMENT 30
7.2 NOISE 30
7.3 AIR QUALITY 31
7.3.1 Dust 31

7.3.2 Gases and Odour 31
7.3.3 Greenhouse Gas 32
7.4 ABORIGINAL HERITAGE 32
7.5 RIPARIAN AND TERRESTRIAL ECOLOGY 34
7.6 TRAFFIC AND TRANSPORT 36
7.7 VISUAL AMENITY 37
7.8 SOIL AND WATER 37
7.8.1 Soil Erosion and Sedimentation 37
7.8.2 Surface Water 38
7.8.3 Groundwater 38
7.9 WASTE 39

8 ENVIRONMENTAL MANAGEMENT COMMITMENTS 40

9 JUSTIFICATION AND CONCLUSION 42

10 REFERENCES 43

TABLES

Table 1: Summary of the existing approved Ashton Coal Project. 4
Table 2: Overview of stakeholder consultation 7
Table 3: Summary of other NSW legislation relevant to the modification application. 13
Table 4: Summary of disturbance areas 17
Table 5: Modelled noise levels 30
Table 6: Potential disturbance to vegetation communities 35
Table 7: Traffic impacts (average trips per day) 36
Table 8: Visual impact assessment with management recommendations 37
Table 9: Environmental management commitments 40

FIGURES

Figure 1: ACP Project Location Plan 2
Figure 2: Project Setting 6
Figure 3: Indicative Gas Drainage Infrastructure - Western Area 10
Figure 4: Indicative Goaf Gas Drainage Network 16
Figure 5: Central Gas Drainage Plant Indicative Layout 23
Figure 6: Indicative Goaf Gas Drainage Bore Arrangement 26
Figure 7: Indicative Mobile Gas Drainage Plant Layout 29

PHOTOGRAPHS

Photograph 1: Typical view of the undermined area 20
Photograph 2: View of proposed central gas drainage plant and flare site looking east 20
Photograph 3: Example gas drainage plant (as used at another NSW coal mine) 21
Photograph 4: Enclosed flares in use at another underground mine 24

APPENDICES

Appendix 1: Environmental Risk Assessment.
Appendix 2: Noise Impact Assessment.
Appendix 3: Air Quality and Greenhouse Gas Impact Assessment.
Appendix 4: Archaeological Impact Assessment.
Appendix 5: Terrestrial Ecology Impact Assessment.
Appendix 6: Traffic and Transport Impact Assessment.
Appendix 7: Visual Impact Assessment
Appendix 8: Assessment of Proposed Reticulated Goaf Gas Drainage and Associated Public Risk
Appendix 9: Ashton Coal Mine Greenhouse Gas Abatement Investigation Report

1 INTRODUCTION

Ashton Coal Operations Pty Ltd (ACOL) operates the Ashton Coal Project (ACP) located near the village of Camberwell in the Singleton local government area of New South Wales (**Figure 1**). The ACP comprises an open cut mine, a multi-seam longwall underground mine, a coal handling and preparation plant, coal stockpiles, rail loading infrastructure and associated surface support facilities.

ACOL is proposing to modify the development consent for the ACP (DA 309-11-2001-i) to maintain safe working conditions in the underground mine and integrate gas management across the underground. This modification (DA 309-11-2001-i - MOD 10) includes the construction and operation of:

- A central gas drainage plant and gas flaring facility compound, measuring approximately 25 x 75m, located on the ground surface in the north eastern corner of the underground mine area.
- Up to about 80 gas bores distributed across the underground mine area, (where the construction of the bores will be staged over the remaining 10-12 year life of the underground mine).
- A pipeline network to convey gas from the gas bores to the central gas drainage plant and gas flares.
- Minor associated works where required for access and electrical power.

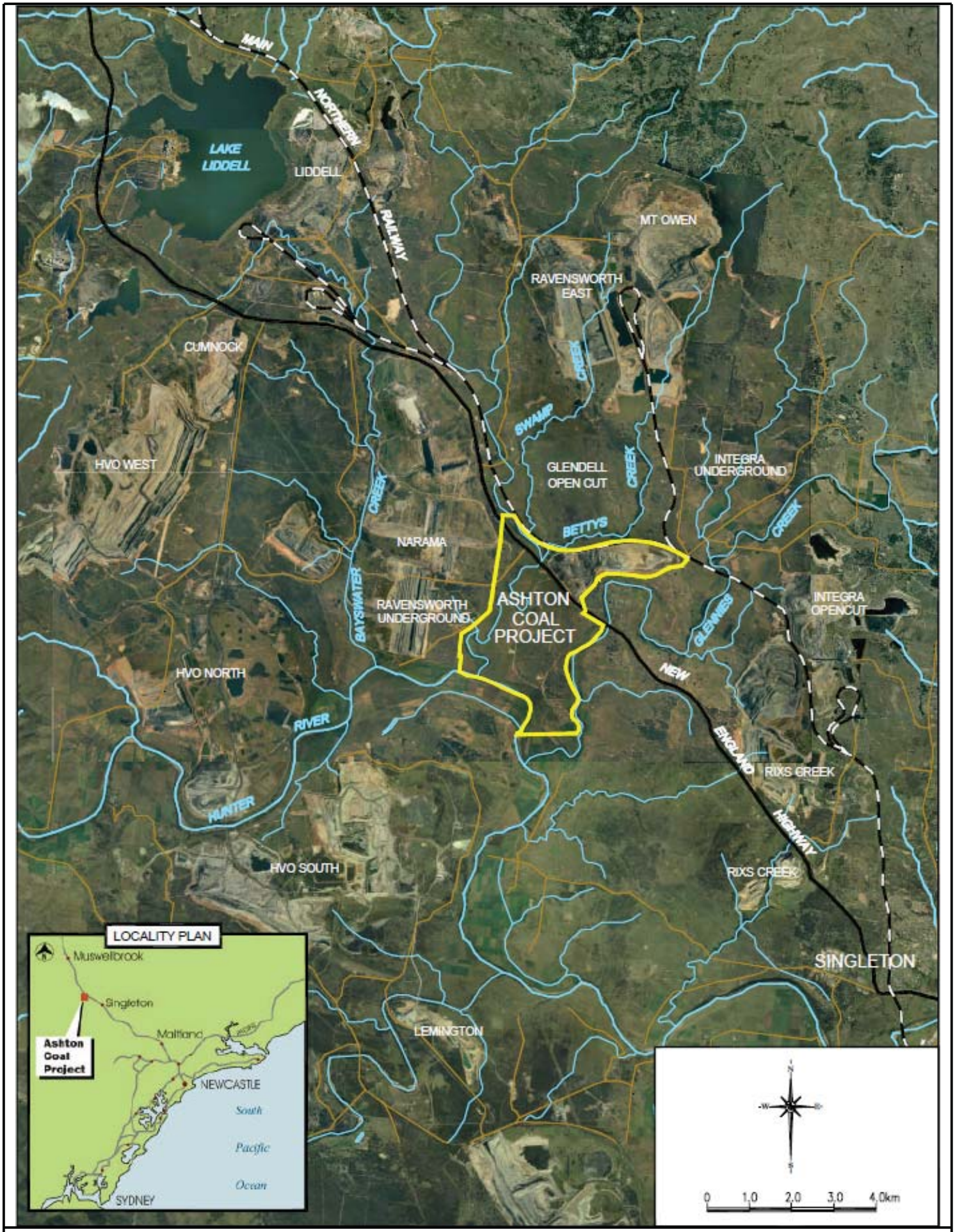
Gas (predominantly methane) is liberated from coal during mining, and can accumulate in the underground workings creating a significant safety risk and constraining mine development and efficiency. Generally, mine ventilation systems are capable of managing low gas levels. However, where gas levels exceed the capabilities of the ventilation system, additional infrastructure and gas management measures are required. As proposed by this modification, an effective and commonly used approach at other underground coal mines, including NSW, is to drain the gas from mined goaf areas and pipe this to a central location for management.

In June 2011, the Planning Assessment Commission approved a development consent modification application (DA 309-11-2001-i MOD 7) for the development and operation of 15 gas bores over Longwall Panels (LW) 6B, 7A, 7B and 8 in the Pikes Gully (PG) Seam of the ACP underground mine. It was noted in the Environmental Assessment (EA) for MOD 7 that a more substantial gas drainage arrangement would be required to effectively manage gas levels in the deeper seams of the multi-seam underground mine. This modification, (MOD 10) describes the more substantive gas drainage arrangement.. This will ensure safe and efficient mining operations for the remaining 10 to 12 years of mine life in the three deeper coal seams (i.e., Upper Liddell, Upper Lower Liddell and Lower Barrett seams).

In addition to the important and significant safety function this infrastructure will provide, the flaring of the drained gas will significantly reduce the Scope 1 fugitive greenhouse gas (GHG) emissions of the mine.

The proposed modification will not alter the overall area of the ACP or the mining method. Further, there will be no increase in the rate of coal extraction, production or frequency of rail loading and off-site rail transport to that already approved by DA 309-11-2001-i (as amended).

This EA report has been prepared with assistance of Wells Environmental Services (WES), Safe Production Solutions Pty Ltd (SPS), Spectrum Acoustics Pty Limited (Spectrum Acoustics), PAEHolmes Pty Ltd (PAEHolmes), Insite Heritage Pty Ltd (Insite Heritage), Pacific Environmental Associates Pty Ltd (PEA Consulting), AECOM Pty Ltd (AECOM), Sinclair Knight Merz Pty Ltd (SKM) and PacificMGM.



AshtonCoal
PART OF THE YANCOAL AUSTRALIA GROUP

ACP Project Location Plan

Figure 1

Scale: Refer to scale bar

DA 309-11-2001 MOD 10
Date: 17/07/2012
Wells Environmental Services
Drawn: PB

Filename: ACOLMOD10_Fig1_20120717_V1.pdf

2 BACKGROUND

2.1 The Proponent

ACOL is an unincorporated joint venture (JV) company comprising the following ownership:

- Yancoal Australia Pty Limited (90%).
- ICRA Ashton[1] (10%).

Yancoal is the managing operator of the ACP.

Following a recent merger between Yancoal and Gloucester Coal Limited, Yancoal is now one of the largest pure-play coal companies in Australia. The merged entity also owns and operates the Austar; Abel, Tasman and Donaldson mines in the Hunter Valley; the Duralie and Stratford mines in the Gloucester region north of Newcastle; has an 80% share in the ownership and is the operator of the Moolarben mine in the central west region near Mudgee; and is one of six equity partners in the Newcastle Coal Infrastructure Group (NCIG). In Queensland, Yancoal also owns and operates the Yarrabee mine; has a near 50 per cent share in the Middlemount mine; and has a stake in the Wiggins Island coal terminal. Yancoal is a wholly owned subsidiary of Yanzhou Coal Mining Company Limited, China's fourth largest coal mining company.

2.2 Ashton Coal Project

On 11 October 2002, the Minister for Planning granted development consent for the ACP. The approved development comprised an open cut and multi-seam longwall underground mine; coal handling and preparation plant (CHPP); run of mine (ROM) coal and product coal stockpiles; rail loading facilities; surface support facilities; and off-site product transport via rail to the Port of Newcastle.

Since the grant of the original development consent, ACOL has applied to modify the mine on nine (9) separate occasions:

- DA 309-11-2001-i MOD 1, allowing for the Environment Protection Authority (EPA) to specify noise criteria in Table 5. The modification was approved on 15 October 2003.
- DA 309-11-2001-i MOD 2, allowing for an increase in the height of the Eastern Emplacement Area. The modification was approved on 27 January 2005.
- DA 309-11-2001-i MOD 3, allowing for the construction and operation of tailings pipelines between the mine and the former Ravensworth Mine. The modification was approved on 29 February 2007.
- DA 309-11-2001-i MOD 4, allowing for the development and mining of an additional longwall/miniwall panel in the Pikes Gully (PG) Seam of the underground mine, an increase in underground mine production (from 2.95 to 3.2 million tonnes per annum (Mtpa)) and amendment of conditions. The modification was approved on 26 March 2010.
- DA 309-11-2001-i MOD 5, allowing for an increase in the rate of underground ROM coal extraction, throughput of ROM coal handling, processing and product coal rail transport and the integration of the South East Open Cut (SEOC) Project (when approved) with the ACP. The modification is currently under consideration by the Planning and Assessment Commission (PAC).

[1] Itochu Corporation of Japan

- DA 309-11-2001-i MOD 6, allowing for longwall mining that may result in direct hydraulic connection with the overlying Bowmans Creek alluvial aquifer, diversion of Bowmans Creek and amendment of conditions. The modification was approved on 24 December 2010.
- DA 309-11-2001-i MOD 7, allowing for the installation of 15 gas drainage holes over the underground operations, extension of the open cut operation to allow mining of an additional 100,000 tonnes of ROM coal and amending the wording of condition 3.14 to schedule 2 of the development consent. The modification was approved on the 15 June 2011.
- DA 309-11-2001-i MOD 8, seeking to remove condition 1.20 and amend schedule 4 of the development consent, relating to the location of gas drainage holes in areas of Aboriginal heritage sensitivity. The modification was approved on 28 February 2012.
- DA 309-11-2001-i MOD 9, allowing for the installation of a 5.5m diameter upcast ventilation shaft, fans and two mine service drop holes over the underground operations. The modification was approved on 5 June 2012.

The ACP is approved to produce up to 5.45 Mtpa of ROM coal for a period of 21 years from the grant of mining lease. A summary of the existing approved ACP is provided in **Table 1**.

Table 1: Summary of the existing approved Ashton Coal Project.

Aspect	Approved Operations
Project life	21 years from grant of mining lease to 2023.
Mine production	Up to 5.45 Mtpa ROM coal.
Open cut operation	Coal to be mined over a period of about 7 years from the Arties, Pikes Gully, Upper Liddell, Upper Lower Liddell, Lower Barrett and Hebden coal seams in two pits – Arties and Barrett pits comprising the North East Open Cut (NEOC). (Open cut operations ceased in September 2011)
	Construction of environmental bunds.
	Construction of the Eastern Emplacement Area (north of the highway) to RL135 m.
	Final void filled with reject material.
	Progressive rehabilitation to mixed woodland and pasture end use.
Underground operation	Coal to be mined over a period of about 18 years from the Pikes Gully, Upper Liddell, Upper Lower Liddell and Lower Barrett coal seams via a descending longwall arrangement.
	Highwall entry from Arties Pit north of New England Highway, with main headings aligned beneath and parallel to highway.
	Extraction of up to 3.2 Mtpa of ROM coal.
	Diversion of Bowmans Creek.
	Pikes Gully Seam LW6-8 gas drainage boreholes
	5.5m diameter upcast ventilation shaft and fans
Coal handling, preparation, and processing	Construction and operation of pit top facilities for coal preparation, stockpiling and train loading.
	Coarse and fine rejects disposal within Ravensworth and NEOC mine voids.
Water	Supplied from site run-off, mine dewatering, sharing agreement (with neighbouring mines), licensed river extraction, and imported from external sources where required.
Support facilities and utilities	Offices, workshops, stores, bathhouses and vehicle parking areas.
	Power, telecommunications and water supply infrastructure.

Aspect	Approved Operations
Conservation and offsets	Conservation Agreement under Part 4 Division 12 of *National Parks And Wildlife Act 1974* for 65.66ha of land known as the "Conservation Area". The Conservation Agreement provides for the management and conservation of Aboriginal cultural heritage, flora, fauna and habitat, while enabling ongoing mining activities to be carried out subject to the conditions of the agreement.
Mine access	Open Cut, CHPP, Underground office and portal and main site office off Glennies Creek Road, Camberwell. Underground surface area access off New England Highway, Camberwell.
Operating hours	Open cut operations 7am to 10pm Monday to Saturday and 8am to 10pm Sunday and Public Holidays.
	Blasting 9am to 5pm Monday to Saturday.
	Underground operations 24 hours a day, 7 days a week.
	Coal handling and preparation, rail loading and off-site rail transport 24 hours a day, 7 days a week.
Employment	Up to 386 full time employees.

2.3 Location and Setting

The ACP is situated 14 km northwest of Singleton, adjacent to and west of Camberwell village, in the Hunter Valley, NSW (Figure 1). The North East Open Cut (NEOC) mine is located west of Camberwell and Glennies Creek and is bounded to the north and west by the Main Northern Railway Line, to the south by the New England Highway and to the southeast and east by Glennies Creek Road. The underground mine is located south of the NEOC and New England Highway, and is bounded to the west by the Ravensworth Underground Mine (RUM), to the south by the Hunter River and to the east by Glennies Creek.

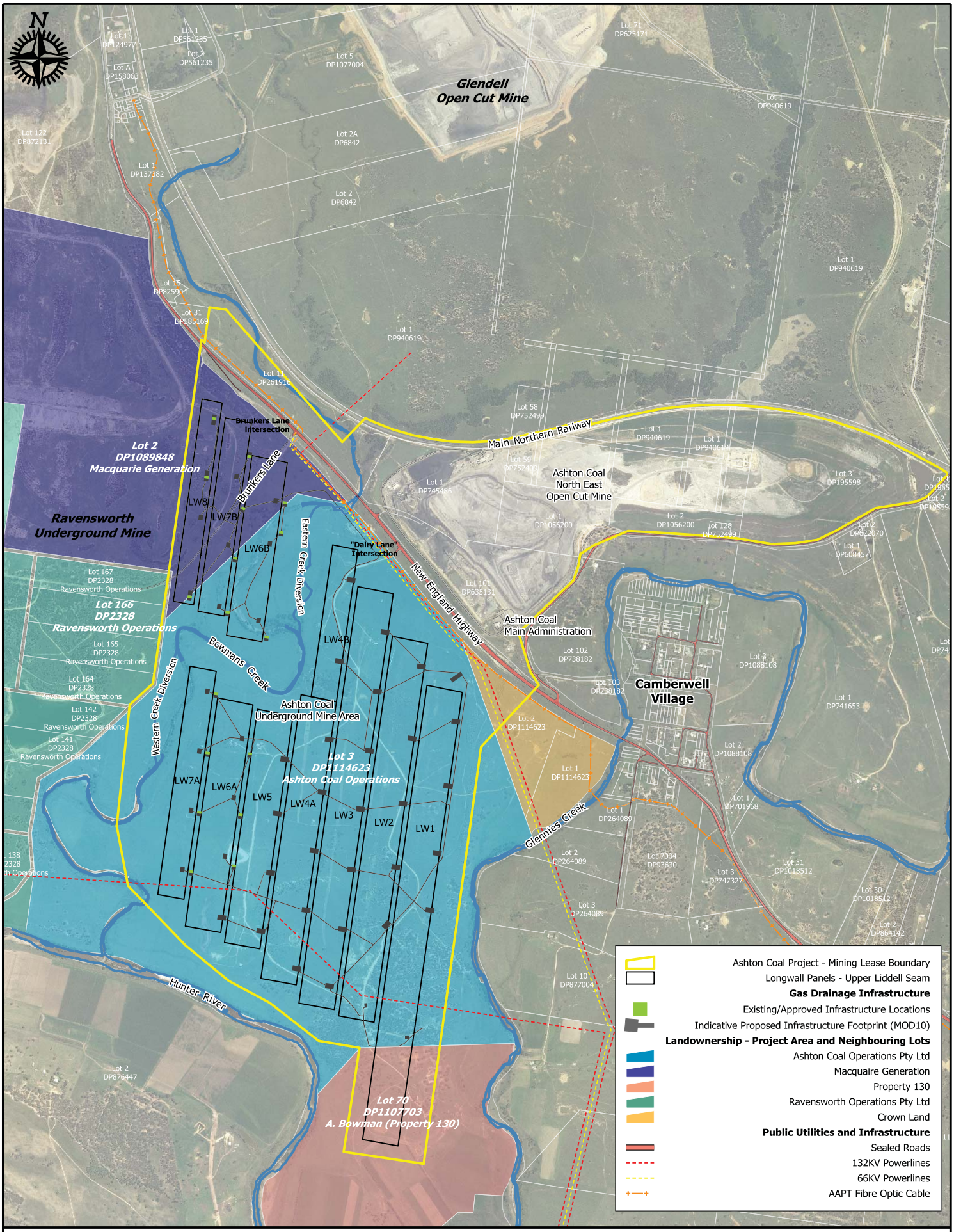
Land uses in surrounding areas include large scale intensive coal mining (open cut and underground), agriculture (pasture, grazing and dairy), major infrastructure (New England Highway, Main Northern Railway, 66 and 132 Kilovolt (kV) powerlines, and optic fibre telecommunications cable) and rural residences.

There are currently only four (4) privately-owned residences within Camberwell village and a further three (3) rural residences on larger properties within about 2.5 km of the proposed development site. All other residences are mine-owned. The closest privately-owned residence to the proposed main gas drainage infrastructure area (central gas drainage plant and flares) is over 1 km to the east, in Camberwell village. The closest gas bore to a privately-owned residence (Property 130) is about 400 m.

2.4 Land Development Schedule

All aspects of the proposed modification relate to development on land within the disturbance limits of the existing approved ACP. Hence there is no addition or change to the land development schedule described in the original consent in Schedule 1 to DA 309-11-2001-i.

With the exception of a portion of land owned by Macquarie Generation and located in the northwest of the proposed development area (Lot 2 DP 1089848, see **Figure 2**), ACOL owns the land (Lot 3 DP 1114623) on which the proposed infrastructure will be developed. (Note ACOL has an existing agreement with Macquarie Generation for the development of the proposed infrastructure on Lot 2 DP 1089848).



Project Setting

0 1 km

Figure 2

DA 309-11-2001 MOD 10
Date: 30/07/2012
Wells Environmental Services
Drawn: PB

Filename: ACOLMOD10_Fig2_20120730.pdf

3 CONSULTATION

3.1 Overview

ACOL has discussed the proposed project with neighbouring land owners, neighbouring mining operations, the local community, Aboriginal stakeholder groups and various Government Authorities, including Singleton Council. A summary of this consultation is provided in **Table 2**.

Table 2: Overview of stakeholder consultation

Stakeholder	Consultation	Date	Issues / Concerns / Discussion Points	Actions / Future Actions
Government Authorities				
Department of Planning and Infrastructure	Meeting and phone conversations (general ACOL approval needs)	5 August 2011, 12 October 2011, 13 December 2011, 27 April 2012	Nil raised	Environmental management plans to be reviewed and revised where required, post approval
Department of Trade and Investment, Division of Resource and Energy	Meeting	9 May 2012	Decommissioning of infrastructure and potential for integration with other projects or land uses post mine closure (e.g., ongoing provision of gas to third party users)	MOP / REMP to be updated following approval to incorporate gas drainage infrastructure and mine closure decommissioning objectives for this infrastructure
Singleton Shire Council	Community Consultation Committee (minutes distributed to council) Consultation regarding infrastructure associated with the realigned Lemington Road	9 June 2011, 13 September 2011, 6 December 2011, 6 March 2012, 30 May 2012, 15 June 2012, 3 July 2012	Nil raised Screening of gas bores visible from the realigned Lemington Road (Brunkers Lane) and New England Highway to reduce visual impacts where applicable	Continue consultation with Council on potential interaction of existing and future ACOL activities (e.g., gas drainage infrastructure) with the realigned Lemington Road (along the Brunkers Lane alignment) ACOL and Council to enter into agreement on ACOL interaction with the realigned Lemington Road, which will become a council controlled road
Neighbouring Mines and Landowners				
Ravensworth Mines (RavOps and RUM)	Meeting and presentation	17 April 2012, 22 May 2012, 15 June 2012(RavOps), 3 July 2012	Brunkers Lane / Lemington Road interaction issues	The design for the Lemington Road realignment (by Xstrata / RavOps) incorporates road culverts with sufficient capacity to enable future gas pipelines to be conveyed under the road Continue regular Ashton / RavOps / RUM (and Macquarie Generation) interaction meetings Advise RavOps / RUM once the MOD 10 EA is submitted

Stakeholder	Consultation	Date	Issues / Concerns / Discussion Points	Actions / Future Actions
Macquarie Generation	Letters, meetings and presentation	2 May 2012, 8 May 2012, 17 May 2012	Limiting the number of gas bores on Macquarie Generation owned land to 15 (maximum) Potential safety issues from free vented gas collecting in or near Macquarie Generation infrastructure and workers Screening of gas bores visible from Lemington Road (Brunkers Lane) and New England Highway to reduce visual impacts where applicable Issues raised in the March 2011 submission on the ACOL MOD7 proposal Acknowledge ongoing consultation with Macquarie Generation and neighbouring stakeholders through formal and informal channels High level discussions about future re-use options Requested a review of the Modification prior to lodgement to DP&I Potential future use of the gas	ACOL and Macquarie Generation have formalised an access and compensation agreement for ACOL activities to be carried out on Macquarie Generation owned land A report on the potential risk to Macquarie Generation infrastructure areas and workers and public safety risk from ACOL gas drainage activities has been completed (see Appendix 8) and recommendations to be reviewed as part of the project implementation Relevant issues relevant in Macquarie Generation's submission to DP&I on ACOL MOD 7 have been considered ACOL has committed to: • screen gas drainage bores on Macquarie Generation owned land in proximity to the realigned Lemington Road and New England Highway • investigate information sharing with RUM with the objective of improving gas management efficiencies Continue regular Ashton / Macquarie Generation (and RUM and RavOps) interaction meetings as appropriate Continue to consult about future gas supply / use options
Property 130 – A. Bowman (dairy farm and residence)	Meeting	4 May 2012	Maintenance of property access and right of way (ROW) across ACOL land Proximity of gas bores to ROW and property boundary Odours and potential safety risks from gas during free venting events within close proximity to the property boundary Interaction with heavy vehicles at the "Dairy Lane" intersection during school bus pick up and drop off times	ACOL has committed to: • setback gas bores from the property boundary by 50 m • setback gas bore compounds from the ROW by at least 12 m • monitor noise emissions at the property boundary during bore hole construction in proximity to the property boundary and use of temporary acoustic screening where required • monitor methane levels at gas drainage bores wherever free venting occurs within 100 m of the property boundary • ensure heavy vehicle access through the "Dairy Lane" occurs outside school bus pick-up / drop-off and milk tanker access times where possible Continue regular consultation on ACOL activities

Stakeholder	Consultation	Date	Issues / Concerns / Discussion Points	Actions / Future Actions
Aboriginal Community Stakeholders				
ACOL Aboriginal Community Consultation Forum (ACCF)	Presentation and discussion	20 September 2011, 7 December 2011, 6 March 2012, 2 May 2012	Nil raised	Adopt recommended management measures, including managing and salvaging Aboriginal sites in accordance with AHIP conditions Continue regular consultation on ACOL activities
Local Community				
Community Consultation Committee	Project updates via presentations and discussion	9 June 2011, 13 September 2011, 6 December 2011, 6 March 2012	Nil raised	Continue regular consultation on ACOL activities

3.2 Neighbouring Land Owners

Macquarie Generation

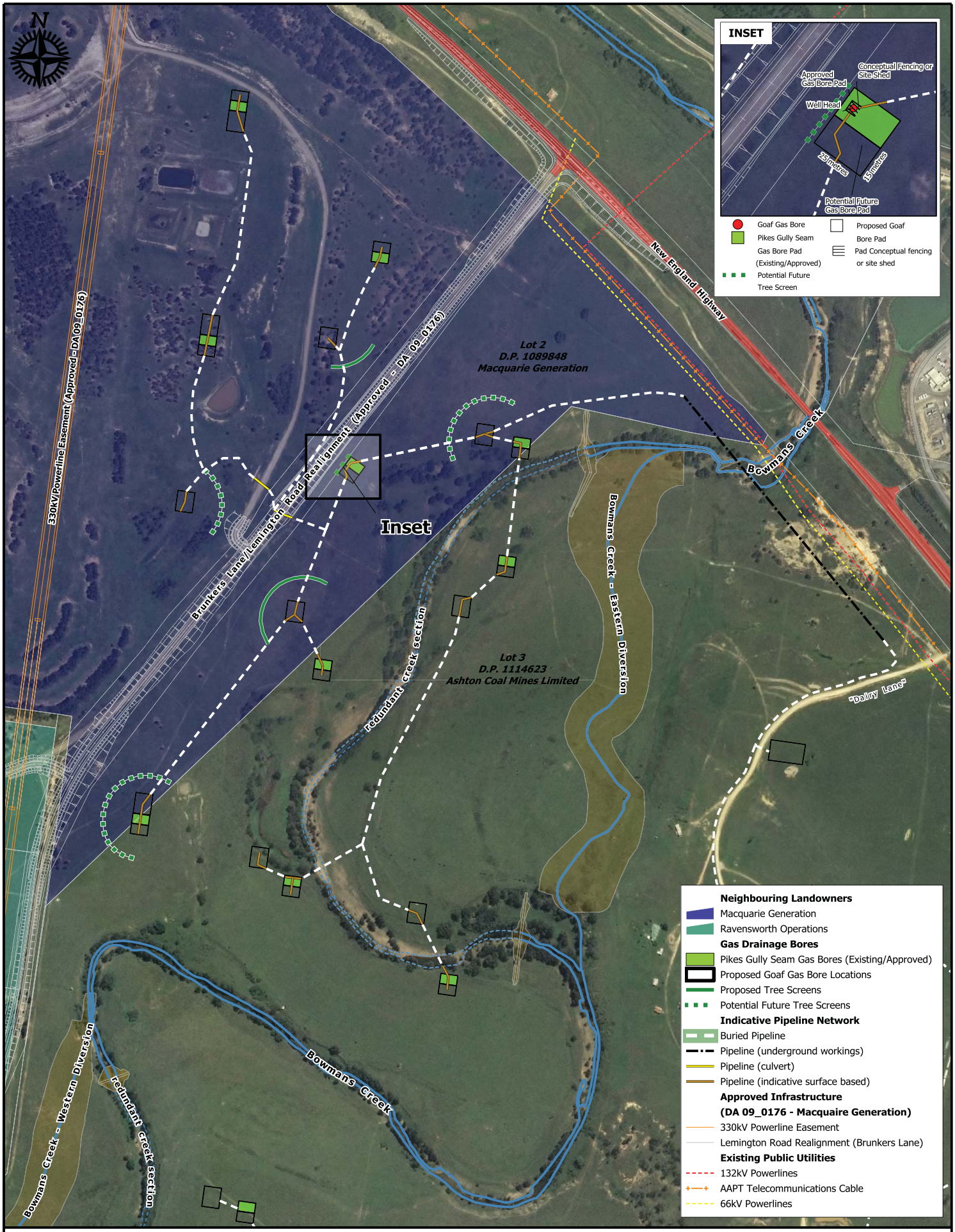
ACOL participates in regular meetings with Macquarie Generation to discuss the interaction of activities on the portion of land (Lot 2 DP 1089848) owned by Macquarie Generation that overlies the underground mine. These meetings also currently include representatives from Ravensworth Operations Project (RavOps) and RUM due to the additional interaction with Lemington Road realignment activities and neighbouring mine activities on or adjacent to this portion of land.

Consultation with Macquarie Generation on the proposed modification has included these regular interaction meetings, project specific meetings, site inspections, written correspondence and verbal communication. In response to this consultation Macquarie Generation has raised the following concerns regarding this project:

- The interaction of ACOL proposed gas drainage infrastructure with the current works being carried out by RavOps to realign Lemington Road (along Brunkers Lane) and 330kV powerlines in the area.
- Potential risks from gas collecting in areas near Macquarie Generation owned or proposed infrastructure (in particular Ravensworth Void 5) and employees or contract workers visiting or working in these areas.
- The issues raised in its submission to DP&I on ACOL's MOD 7 gas drainage proposal (Submission dated 25 March 2011).
- The visibility of gas drainage infrastructure to future road users of the realigned Lemington Road (currently Brunkers Lane).

ACOL has taken these concerns into consideration in its design of the project and proposes to implement the following measures where appropriate (shown on **Figure 3**):

- Limiting the total number of gas bores on Macquarie Generation owned land to a maximum of 15 (including those approved by MOD 7).
- Relocating some of the gas bores to ensure an adequate setback is maintained to Macquarie Generation infrastructure and potential work areas, and the realigned Lemington Road.
- Implementing visual screening (e.g., fencing, shade cloth, farm shed enclosure, etc) for gas bores in close proximity to, and visually exposed to, the realigned Lemington Road (and New England Highway), where appropriate.
- Implementing additional tree screens at strategic locations to diminish the potential visibility of gas bores on Macquarie Generation owned land to public road users (see Figure 3).



Indicative Gas Drainage Infrastructure
Western Area

0 200 m

Figure 3

DA 309-11-2001 MOD 10
Date: 30/07/2012
Wells Environmental Services
Drawn: PB

AshtonCoal
PART OF THE YANCOAL AUSTRALIA GROUP

Filename: ACOLMOD10_Fig3_west_20120730.pdf

In addition, ACOL has addressed the issues raised in the March 2011 submission on the MOD 7 proposal, including:

- Entering into an access agreement with Macquarie Generation for the construction and operation of gas drainage (and other mining support related) activities on that part of Lot 2 DP 1089848 that overlies the ACP underground mine.
- Limiting the total number of gas bores to be developed on Lot 2 DP 1089848 to 15.
- Investigating the potential for gas accumulations at or near Macquarie Generation infrastructure and work areas (particularly the Ravensworth Void 5), and any potential safety risks to Macquarie Generation employees or contract workers associated with the operation of the proposed gas drainage infrastructure (refer Section 6.8 and Appendix 8).
- Access to Lot 2 DP 1089848 from Brunkers Lane / realigned Lemington Road.
- Groundwater, land use and visual impacts.

ACOL has also held preliminary high level discussions with Macquarie Generation on the possible future supply of the drained gas for power generation purposes.

Property 130

Property 130 (Lot 70 DP 1107703) is immediately adjacent to and south of ACOL owned land, under which the underground mine has been developed. The property is a working dairy farm which is encompassed in part by ACOL's mining lease (ML) 1533. The southern extent of LW1 in the approved mine plan extends under part of this privately-owned property.

Access to the dairy and farm residence from the New England Highway is provided by a right of way (ROW) across ACOL owned land and the underground mine (see Figure 2). ACOL has an agreement with the landowner to maintain access to this property at all times, either via the ROW or via an alternative access track.

Consultation with the landowner and farm manager is carried out as part of the ongoing mining operation. More recently this has included meetings to discuss the requirement for and design of the proposed gas drainage infrastructure. In response to this consultation ACOL has proposed to implement the following measures:

- Gas bores or gas drainage infrastructure will not be located on any part of the privately-owned land holding (Lot 70 DP 1107703).
- Gas bores required to be located in proximity to the property boundary will be setback from the boundary by a minimum of 50 m, wherever possible and taking into account mine safety requirements.
- Gas bore compounds will be setback from the centre of the ROW (and alternative access track) by a minimum of 12 m.
- Monitoring of noise levels at the property boundary during construction of gas bores in proximity to the property boundary and use of temporary acoustic screening where required.
- Monitoring of methane and odour levels at the property boundary wherever free venting from gas bores (required to maintain mine safety) occurs within 100 m of the property boundary.
- Ensure heavy vehicle access through the "Dairy Lane" occurs outside school bus pick-up / drop-off and milk tanker access times, where possible.

ACOL will continue to consult with the landowner and manager of this property during construction and operation of gas drainage infrastructure in proximity to the property boundary, ROW and alternate access track, including communicating monitoring results and any additional measures implemented to mitigate impacts at the property boundary.

3.3 Aboriginal Community Stakeholders

ACOL regularly consults with its registered Aboriginal stakeholder groups (comprising 33 community groups and two individuals) on activities being carried out or proposed to be carried out at the ACP, where those activities interact with Aboriginal heritage.

More recently (September 2011), ACOL instigated an Aboriginal Community Consultation Forum (ACCF) to provide Aboriginal community stakeholders greater involvement in the management of Aboriginal heritage at the mine. To date ACCF meetings have been held in September 2011, December 2011, March 2012 and May 2012.

The proposed gas drainage works, potential interactions with Aboriginal heritage and the management thereof, has been tabled at each of these meetings. In addition, each registered Aboriginal community stakeholder group was provided a copy of the Aboriginal heritage impact assessment report and invited to provide specific feedback on the Aboriginal heritage management measures and recommendations proposed in the report. Of the 33 stakeholder groups and two individuals, ten have provided verbal feedback on the report, with each of these indicating the proposed management measures and recommendations are satisfactory.

The current list of ACOL Aboriginal stakeholders is outlined below:

- Aboriginal Native Title Consultants
- Bullen Bullen
- Cacatua Culture Consultants
- Carrawonga Consultants
- Culturally Aware
- Gidawaa Walang
- Girwirr Consultants
- HTO Environmental Management Services
- Hunter Valley Aboriginal Corporation
- Hunter Valley Cultural Consultants
- Hunter Valley Cultural Surveying
- Hunter Valley Natural & Cultural Resource Management
- Wanaruah Custodians
- Wanaruah Local Aboriginal Land Council
- Warren Taggart
- Wattaka Wonnarua C.C. Service
- Wonn1 Contracting (Kauwul P/L)
- Dan Hardy
- Junburra Consulting
- Kayaway Eco Cultural & Heritage Services
- Lower Hunter Wonnarua Council
- Lower Hunter Wonnarua Council Inc.
- Lower Wonnarua Tribal Consultancy
- Mingga Consultants
- Muswellbrook Cultural Consultants
- Tocomwall
- Ungooroo Aboriginal Corporation
- Ungooroo Cultural & Community Services Inc
- Upper Hunter Heritage Consultants
- Valley Culture
- Wonnarua Culture Heritage
- Wonnarua Nations Aboriginal Corporation
- Upper Hunter Wonnarua Council
- Yarrawalk Enterprises
- Yinarr Cultural Services

4 APPROVAL FRAMEWORK

4.1 Environmental Planning and Assessment Act 1979

The ACP was granted development consent as State Significant and Integrated Development by the Minister for Planning in October 2002, under Section 80 (Part 4) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The request to modify DA 309-11-2001-i is made pursuant to the provisions of clause 12 to Schedule 6A of the EP&A Act and clause 8J(8)(c) of the *Environmental Planning and Assessment Regulations 2000*. These provisions prescribe that the ACP can be taken as approved under Part 3A (EP&A Act) for the purposes of a modification and can be modified under section 75W of that part of the Act.

A political donations disclosure statement has been provided, in accordance with section 147 of the EP&A Act.

4.2 Other State Legislation

A summary of other potentially relevant State legislation and its applicability to the modification application is provided in **Table 3**.

Table 3: Summary of other NSW legislation relevant to the modification application.

Legislation	Licence or approval	Required	Comment
State Environmental Planning Policy (SEPP) No 44 – Koala Habitat Protection	Consideration of impact by consent authority	No	The areas on which the proposed modification will be developed do not contain any potential or core koala habitat
Singleton Local Environment Plan 1996 (LEP)	Consideration of permissibility of development	No	The areas on which the proposed modification will be developed lie entirely on land as detailed in schedule 1 of DA 309-11-2001-i Mining is a permissible land use
Mining Act 1992	Mining lease (ML)	No	The modification relates to activities entirely within existing ACOL held ML 1533 ACOL will amend the mining operations plan (MOP) as required ACOL holds agreements with third party landowners for access and compensable loss, consistent with the Act
Protection of the Environment Operations Act 1997	Environment Protection Licence (EPL)	No	No aspect of the proposed modification will require EPL 11879 to be amended
Water Act 1912	Part 5 groundwater licence for mine inflows from non-alluvial aquifer sources	No	No aspect of the proposed modification will impact on mine inflows Gas bores will be drilled in accordance with bore construction guidelines where relevant
Water Management Act 2000 (WM Act 2000)	Water Access Licence; Works, Use and Activity Approvals	No	The proposed modification will not affect any water source regulated by a Water Sharing Plan in force under the WM Act 2000 Gas bores in water source areas regulated under Water Sharing Plans will be drilled by a licensed driller and in accordance with bore construction guidelines where relevant, including sealing through alluvial aquifer zones

Legislation	Licence or approval	Required	Comment
National Parks and Wildlife Act 1974 (NPW Act 1974)	Section 90 Aboriginal heritage impact permit (AHIP)	Yes	The proposed modification has been designed to avoid impacts on Aboriginal heritage as far as practically possible Notwithstanding, any disturbance to Aboriginal objects will be managed in accordance with the conditions of AHIP#1131017 and AHIP#1130976, which relate to the entire area in which the development is proposed
Native Vegetation Act 2003 (NV Act 2003)	Clearing permit	No	The proposed modification will require only minor clearing of native vegetation
Threatened Species Conservation Act 1995 (TSC Act 1995)	Licence to harm threatened species, populations or ecological communities or damage habitat	No	With the implementation of controls and safeguards, the proposed modification will not affect species prescribed in the schedules to the TSC Act 1995
Pipelines Act 1967	Pipeline Licence	No	The Pipelines Act 1967 (Pipelines Act) regulates the construction and operation of pipelines within NSW Subject to Section 5A of the Pipelines Act, a pipeline licence will not be required

4.3 Commonwealth Legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act 1999) requires the approval of the Commonwealth Environment Minister for all actions that will or are likely to have a significant impact on a matter of national environmental significance (MNES). The ACP was included within EPBC Referral 2001/524 in 2001 and was assessed and deemed not to have an impact on any MNES.

The proposed modification is within the area of EPBC Referral 2001/524 and will not result in any impact to MNES.

5 PROPOSED MODIFICATION

5.1 Summary of Proposed Modification

The modification provides for the drainage and management of gas from the ACP underground mine for the remaining 10 to 12 year mine life, thus ensuring continued safe and efficient mining operations.

The modification includes the construction and operation of:

- A central gas drainage plant.
- Gas flaring facility.
- Up to about 80 gas bores (staged over the remaining life of the underground mine).
- A pipeline network to convey gas from the gas bores to the central gas drainage plant and gas flares.

The modification also includes minor associated infrastructure to provide access and electrical power, where required for the development.

It is proposed that up to about 80 gas bores may be required to be located across the eight longwall blocks, over the surface of the underground mine. These will be developed in clusters at strategic locations along each longwall block, with the gas bores targeting strata within the goaf zone above each of the four coal seams to be mined. However, wherever possible, the number of gas bores required will be kept to a minimum, provided the safety of the mine is not compromised.

The project is designed to provide flexibility in the design and construction of the gas bores, piping, drainage plant and flares, such that the required infrastructure is developed progressively to accommodate potentially varying gas levels as successive longwall panels and coal seams are developed. The development of the gas bores and the pipeline network will be staged in advance of and in line with the progression of mining across the longwall layout and repeated as mining continues to each deeper seam, where required.

A gas bore will normally become active as longwall extraction passes under the drilled bore and goaf is formed. The gas will then be drawn to the central gas plant under vacuum and flared. Generally only a handful of gas bores will be drained simultaneously at any one time, with inactive bores remaining sealed and locked until required.

The central gas drainage plant and flares will be located at the northern end of LW1, adjacent to the recently approved (MOD 9) 5.5 m diameter upcast ventilation shaft and mine service drop holes (see **Figure 4**).

A mobile gas drainage plant will provide alternative gas drainage prior to the central drainage plant and flares becoming operational. It may also be used as a contingency for maintaining safe underground working conditions during maintenance of the central gas drainage plant, in the event of a system failure, or where greater environmental sensitivities preclude the development of the pipeline. The use of the mobile gas drainage plant will require free venting of the extracted gas.

To provide comprehensive gas drainage, the project will extend over the approved underground mine. While a specific location for the central gas drainage plant and flares has been selected, final gas bore sites and pipeline routes will be generally according to the locations indicatively shown in Figure 4. This approach allows flexibility to respond to changes in the distribution of gas and enables the construction of new gas bores in locations that will provide efficient drainage and reduce the requirement for additional bores. This flexibility in design will also ensure impacts to more sensitive environmental features are avoided as far as practically possible.

AshtonCoal
PART OF THE YANCOAL AUSTRALIA GROUP

Indicative Goaf Gas Drainage Network

0 1 km

Figure 4

DA 309-11-2001 MOD 10
Date: 30/07/2012
Wells Environmental Services
Drawn: PB

Filename: ACOLMOD10_Fig4_20120730.pdf

Potential disturbance areas have been selected taking into consideration the requirements for gas drainage, mine layout constraints, operational needs and the existing environment. Environmental considerations include known items of Aboriginal heritage, flora and fauna values, visual amenity and proximity to neighbouring private land holdings and residences. These considerations will also guide the final gas bore site selection and pipeline locations. Each potential location shown in Figure 4 represents the disturbance for up to four (4) gas bores (the maximum that may be required at any site). Locations with already approved bores will be reused to reduce the need for additional sites. The location of gas bores within sensitive areas will generally be restricted to existing disturbed areas as far as possible (provided mine safety is not compromised).

Up to 80 gas bores will be constructed at sites selected from these locations. The existing bores may be reused (or re-drilled to a deeper depth) where practicable to minimise any additional disturbance. The indicative maximum disturbance required for gas drainage requirements is outlined in **Table 4**.

Table 4: Summary of disturbance areas

Infrastructure	Details	Disturbance (Hectare (Ha))
Gas drainage bores	Up to about 80 gas bore pads, nominally 5 x 5 m (although larger pads up to 15 x 25 m may be required for some bores where use of the mobile gas drainage plant is required)	0.2 Ha *
Pipeline network	Approximately 16 km of pipeline with an initial 5 m disturbance corridor	8 Ha
Central gas drainage plant and flares	An approximately 25 x 75 m pad area	0.2 Ha
	Total (indicative):	8.4 Ha

** For the purposes of relevant specialist reports – it was assumed that all gas bores would require a larger (15 x 25m) pad, resulting in a larger disturbance area.*

5.2 Need for Proposed Modification

ACOL is statutorily required to manage gas levels in the underground mine for the safety of its employees. Further, it is required to implement measures to minimise the release of GHG emissions from the mine as far as reasonably and feasibly practical. It is also required to examine opportunities to flare or reuse methane drained from the mine, including goaf gas drainage.

Gas (predominately methane) entrained within the coal is liberated as a result of mining, including from coal bearing strata above and below the mined seam (due to goaf formation and strata fracturing). Generally an effective gas management strategy comprises a number of integrated processes, including integrating mine ventilation with other gas management techniques.

At low gas levels the mine ventilation system is generally capable of adequately managing the released gas. However at higher levels additional measures are generally required to prevent the accumulation of gas in working areas.

Geological investigations prior to the development of the ACP determined that the coal seams proposed for underground mining contained low to moderate gas yields and that the gas content in the shallower seams would not form a constraint to mining. It was also acknowledged that a gas management strategy would most likely be required when mining progressed to the deeper seams (HLA, 2001).

In 2010-2011 ACOL implemented an initial interim gas management program for PG Seam LW6-8. This included the installation of a number of gas drainage boreholes to drain gas from the goaf zone of the mined longwall panels (MOD 7). This free venting gas drainage arrangement was established as an interim measure until a more comprehensive gas management strategy could be developed.

This modification application (MOD 10) forms the basis of a long-term gas management strategy for the ACP underground mine and is consistent with the approved Ashton Coal Mine Greenhouse Gas Investigation Abatement Report (PacificMGM, 2011), prepared in fulfilment of condition 6.10B to schedule 2 of DA 309-11-2001-i following the MOD 7 approval.

The development will ensure ongoing safe working conditions are maintained and will reduce the amount of GHG that would otherwise be emitted from the mine.

5.3 Project Alternatives

Without modification for gas management, i.e. “the no development option" there would be significant implications for the safety and efficiency of the underground mine.

Alternatives to this modification for the management of gas within the underground mine include:

- Independent gas bores (i.e. with no connecting pipe line), that vent directly to the atmosphere. While this option reduces the gas within the underground mine, it is not preferred due to the duplication of infrastructure, inability to reduce greenhouse gas emissions and reduced ability to make use of the gas for a beneficial purpose.
- Independent gas bores as above, with mobile flaring facilities at each bore. This option manages the gas within the underground mine and reduces greenhouse gas emissions, however the duplication of infrastructure and reduced ability to make use of the gas for a beneficial purpose make this option not preferred.
- The modification as proposed comprises a network of gas bores connected by pipe line to a central gas drainage facility where the gas is flared to reduce greenhouse gas emissions. Providing the network of interconnected gas bores results in a slightly higher disturbance footprint but significantly reduces the duplication of infrastructure, improves the efficiency of gas management and reduces greenhouse gas emissions. Importantly, this option provides opportunity to integrate the network into an economically viable beneficial use of the gas. The options for a commercially viable, beneficial use of the gas are discussed in **Section 5.4**, below.

5.4 Beneficial Use Options

The Ashton Coal Mine Greenhouse Gas Investigation Abatement Report prepared by PacificMGM, 2011, provides an overview of the options available to ACOL to manage and reduce greenhouse gas emissions from the Ashton underground, including options for beneficial use of the captured gas. A copy of the report is provided within **Appendix 9**. The main management and abatement options considered by within the report include:

Flaring:

Flaring reduces greenhouse gas emissions through the combustion of methane, producing carbon dioxide and water vapour.

The main flare types typically used by industry include:

- Open flares – these flares emit a large highly visible flame and are not considered appropriate in developed areas.
- Enclosed flares – these flares are more efficient at combusting methane than open flares with an enclosure reducing the visibility of the flame.

ACOL proposes using enclosed flares to efficiently combust the extracted gas.

Use for power generation:

Methane is a common alternate fuel source used in electricity generation.

Options considered for supply and or use of the extracted gas for power generation include:

- Supplying the gas to an existing gas fired power generator – Glennies Creek Power Station (GCPS) is a 10 MW capacity power station operated by EnviroGen at the Glennies Creek Colliery (Integra Mine). The GCPS is located approximately 5km from the proposed site of the central gas plant (or about 6km via the local road network). The GCPS is currently operating at full capacity, with additional gas supplies available more locally from the Glennies Creek Colliery. Consequently there is no potential currently for use of the drained gas from the Ashton underground mine at the GCPS. For this to be a viable option in the future, EnviroGen would need to expand the capacity of the plant and a gas pipeline developed between the Ashton mine and the power station.
- Supplying the gas to Macquarie Generation – Macquarie Generation operates the Bayswater and Liddell power stations, about 16km northwest of the ACP. In July 2009 Macquarie Generation gained approval for the construction and operation of a gas pipeline from nearby coal mines, including the Ashton coal mine, for use as a supplementary fuel at the Liddell power station. This pipeline is yet to be constructed. Consequently, there is no current facility for gas extracted from the Ashton underground mine to be provided to the Liddell power station. Notwithstanding, ACOL has had discussions and is committed to continue discussions with Macquarie Generation on the potential for future supply of gas to the power plant (see Section 3). However until the pipeline is constructed this option is not viable.
- Development and operation of a gas fired power station at the ACP – While this is an attractive option, there are a number of issues that ACOL would need to resolve prior to committing to developing an onsite power station, including: assessing the feasibility of developing a gas fired power generation on site; gaining adequate understanding and expertise in its operation; moderating potentially variable gas flow rates and gas quality; economic viability; and gaining approval. As indicated in the Greenhouse Gas Investigation Abatement Report ACOL will continue to investigate this as a potential future option for beneficial use of the extracted gas.
- Development and operation of a shared gas fired power station, between ACOL and the neighbouring Ravensworth Underground Mine – Development of shared infrastructure would potentially enable and support a higher capacity power station to be developed locally, however in addition to the above issues, joint collaboration, ownership and operation poses further issues that would need to be resolved.

Supply into the natural gas market:

Currently there are no natural gas pipelines within the vicinity of the ACP. Eastern Star Gas (now Santos) had previously proposed developing a natural gas pipeline between Coolah and Newcastle. However, this application has now been withdrawn. Notwithstanding, there are considerable technical difficulties that would need to be resolved to enable ACOL to participate in this market, including: delivering the gas into a high pressure pipeline; and moderating potentially variable gas flow rates and gas quality.

6 MODIFICATION DESCRIPTION

6.1 Site Selection

The proposed development extends over a large area, encompassing the approved underground mine. Refer to **Photograph 1**.

Indicative proposed disturbance areas have been selected taking into consideration mine layout constraints, operational needs and the existing environment, including (inter alia) known items of Aboriginal heritage, flora and fauna values, visual amenity and proximity to neighbouring private land holdings and residences. These considerations will guide the final site selection for gas bores and pipeline routes. Notwithstanding the majority of the required total disturbance area will occur on land previously cleared for grazing, which has now been undermined (Photograph 1). The need for further tree clearing will be avoided wherever possible.

Photograph 1: Typical view of the undermined area (looking south from the proposed central gas drainage plant site)

The central gas drainage plant and flaring units will be located in the general vicinity of the recently approved 5.5 m upcast ventilation shaft (MOD 9). This site, refer to **Photograph 2**, is situated toward the north eastern corner of the underground mine area (Figure 4), on the south western slope of a ridgeline. The location of the site with respect to this topographic feature will provide visual and acoustic screening to Camberwell village residents and New England Highway road users.

Photograph 2: View of proposed central gas drainage plant and flare site looking east

6.2 Central Gas Drainage Plant

The central gas drainage plant will comprise the following components:

- Up to 4 x 1500 L/s electrically driven liquid ring vacuum pumps (3 operating pumps and 1 spare pump).
- Gas-water separator.
- Flow control recirculation.
- Control panel/room, gas analyser and electrical transformer.
- Cooling water tank.

An example of a gas drainage plant in shown in **Photograph 3**.

Photograph 3: Example gas drainage plant (as used at another NSW coal mine)

The central gas drainage plant will be constructed within a pad, approximately 25 x 75 m. The pad will be cut into the slope at its northern end. Suitable excavated material will be used to form the level surface. Any excess soil will be stockpiled and re-used for maintenance and repair works associated with the ongoing underground mining operation, including rehabilitation works.

The pad will be capped with road base material to form a free draining surface and a perimeter fence will be installed for security. The gas drainage plant (liquid ring pumps, control room and associated infrastructure) will be constructed on an appropriately sized concrete pad.

A small water source (tank or dam), constructed within the compound will provide clean water to the plant for operation and cooling of the pumps. An open shelter (similar to that in Photograph 3) will be constructed over the pumps and control room to provide adequate protection from the elements whilst not inhibiting ventilation of the area for safety. Alternatively, the control room may be located within a small site shed, next to the pumps. Appropriate safety signage will be installed at the site.

The gas drainage plant has been designed for a maximum flow capacity of 4500 L/s, comprising three modular 1500 L/s liquid ring pumps. The pumps will be established in stages, with up to 3000 L/s flow capacity, or two modular 1500 L/s liquid ring pumps, being initially required and installed. A third pump is planned to be included in the initial build of the plant for backup purposes during maintenance and in the event of a temporary breakdown of one of the other pumps.

The lead time for the pumps is about 14 months with the majority of components pre-assembled offsite. Hence on site construction activities will be limited to civil works and installation of pre-assembled components. It is expected site construction activities including plant commissioning will take about 16 weeks to complete.

A crew of about ten construction workers will be required to complete the onsite works, with up to an expected eight vehicle trips per day. Access from the New England Highway to the development site will be via the private property access intersection locally referred to as “Dairy Lane”. Internal site access will be via existing farm access tracks wherever possible, however additional access arrangements will be required particularly during pipeline construction.

Construction will generally be confined to daytime hours only (7am to 6pm), Monday to Saturday. However, some evening (6pm to 10pm) and Sunday (8am to 7pm) construction activities may be required. Where evening construction activities are required, these will be confined to non-impulsive noise generating activities.

A range of construction equipment will be required, including front end loader, excavators, crane, water cart (for dust suppression), diesel generator (for power) and various other light and heavy vehicles.

Following commissioning, the gas drainage plant will operate 24 hours a day, seven days a week to maintain controlled drainage of gas from active gas bores, generally in line with the progression of longwall extraction. The plant will be operated and monitored remotely from the main mine office or via an onsite control room during maintenance and repair periods.

Equipment for the monitoring and safety of the plant will be installed and integrated with an automated shut down system that will be triggered through the detection of pre-determined thresholds in the system. Regular inspections will be undertaken by ACOL staff for maintenance and security purposes. A gas analyser will monitor the composition of the gas entering and exiting the plant.

Sufficient lighting will be installed at the site to provide safe working conditions. The installed lighting will be shielded or directed away from New England Highway traffic and from privately-owned areas, as far as site safety allows.

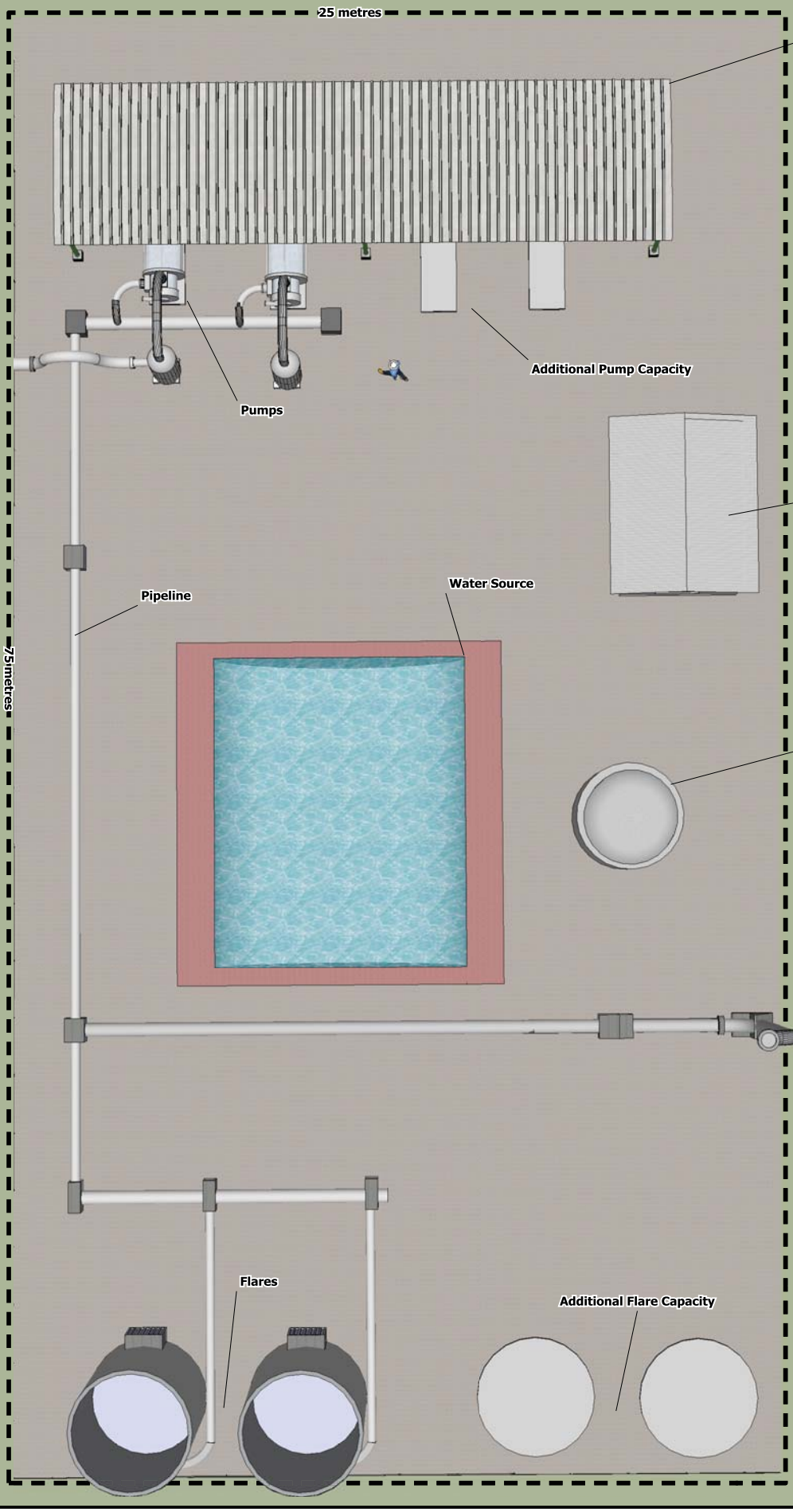
Permanent power will be sourced from nearby infrastructure (5.5 m upcast ventilation fan). If this proves unfeasible, a diesel or duel fuel (diesel/gas) generator will be used to power the plant.

An indicative layout for the gas drainage plant (and flaring facility) is shown in **Figure 5**.

6.3 Gas Flaring Facility

The gas drained from the underground workings will be primarily managed by flaring. This method is commonly used for underground mining operations as a means to reducing fugitive gas emissions. Flares combust the mine gas (primarily methane - CH_4) converting it into carbon dioxide (CO_2). Flaring of the gas provides an effective method of reducing fugitive GHG emissions from the mine.

A flaring facility will be constructed a safe distance (nominally 60m - within the fenced compound) from the gas drainage plant. The design of the gas flaring facility and associated network has been reviewed by PacificMGM (refer Appendix 8) for safety and potential public risk. ACOL proposes using enclosed vertical flaring units, with sufficient flares to be installed to manage up to 4500 L/s of gas. The number of flaring units initially installed will be commensurate with the initial capacity of the gas drainage plant. Further flaring units will be added as gas drainage flow rates and gas flaring demand increases.



Central Gas Drainage Plant
Indicative Site Layout

Figure 5

DA 309-11-2001 MOD 10
Date: 20/07/2012
Wells Environmental Services
Drawn: PB

Scale: Not to Scale

Filename: ACOLMOD10_Fig5_20120717.pdf

The flares will appear as a steel stack up to about 8 m high and 1.4 m in diameter, refer to **Photograph 4**. The flare housings will be coloured to be sympathetic to the surrounding landscape.

Photograph 4: Enclosed flares in use at another underground mine

Gas will be drawn into the base of the stack and pass through a series of burners where it will be combusted and converted to CO_2 and water vapour. A small LPG cylinder will be used to provide a source of fuel for the pilot light.

Combustion of the gas will be enclosed within the stack, limiting external visual exposure of the flaring gas. Monitoring and safety equipment will be fitted to each flare, including gas sensor, flame detector and temperature sensor.

The flares will be regularly inspected to ensure gas combustion and performance of the fares is efficiently maintained.

In addition to the flares, a small vent stack will be installed adjacent to the flares to allow the free venting of gas when required. The vent stack will be about 8 m in height and coloured to be consistent with the flares. The vent stack will be used where the supply of gas exceeds the capacity of the flaring units, or during the maintenance and repair of the flares.

An indicative layout for the gas flares and vent stack is shown in Figure 5.

6.4 Gas Drainage Bores

It is anticipated that up to about 80 goaf gas drainage bores may be required to effectively manage gas build up within the mine and to ensure provision of safe working conditions. This projected number of gas bores constitutes an estimated upper limit and it is likely that a smaller number of gas bores will ultimately be developed.

Installation of the gas bores will be staged progressively as each longwall block and coal seam is mined. Each gas bore will be drilled slightly in advance of mining into strata coincident with the goaf

zone above the seam being mined. Holes will be cased using a combination of 300 mm and 290 mm steel casing and sealed to prevent gas escaping up the outside of the casing (refer to **Figure 6**). Notionally, each gas bore will be spaced at 300 to 400 m intervals along each longwall panel. However, based on current experience with PG Seam LW6-8 gas management it is likely the distance between some gas bores may increase, reducing the overall number of gas bores required.

Figure 4 displays indicative gas drainage bore (and pipeline) locations. Up to four individual gas bores may be constructed at each location, targeting the goaf zone of each successive seam. Where gas bores exist or are already approved (shaded green on Figure 4) these will be re-used where possible, with additional bores targeting deeper seams installed at or in close proximity to these locations as required.

Construction will occur during daytime hours only. Drilling and completion of each bore is estimated to take between three (3) to five (5) weeks, depending on the targeted depth. Generally each drainage bore will require:

- Construction of a level pad surfaced with road base material (nominally 5 x 5 m).
- Construction of a small temporary sump to recirculate water during drilling. (Use of portable above ground sumps to limit surface disturbance in more sensitive areas will be investigated).
- Drilling of a maximum 300 mm (nominal diameter) borehole to the required depth.
- Completion of the gas bore, including installation of metal casing, sealing around the outside of the casing, and installation of bore head, shut-off valve and lock.
- Installation of 1.8 m high perimeter security fence around the bore pad.

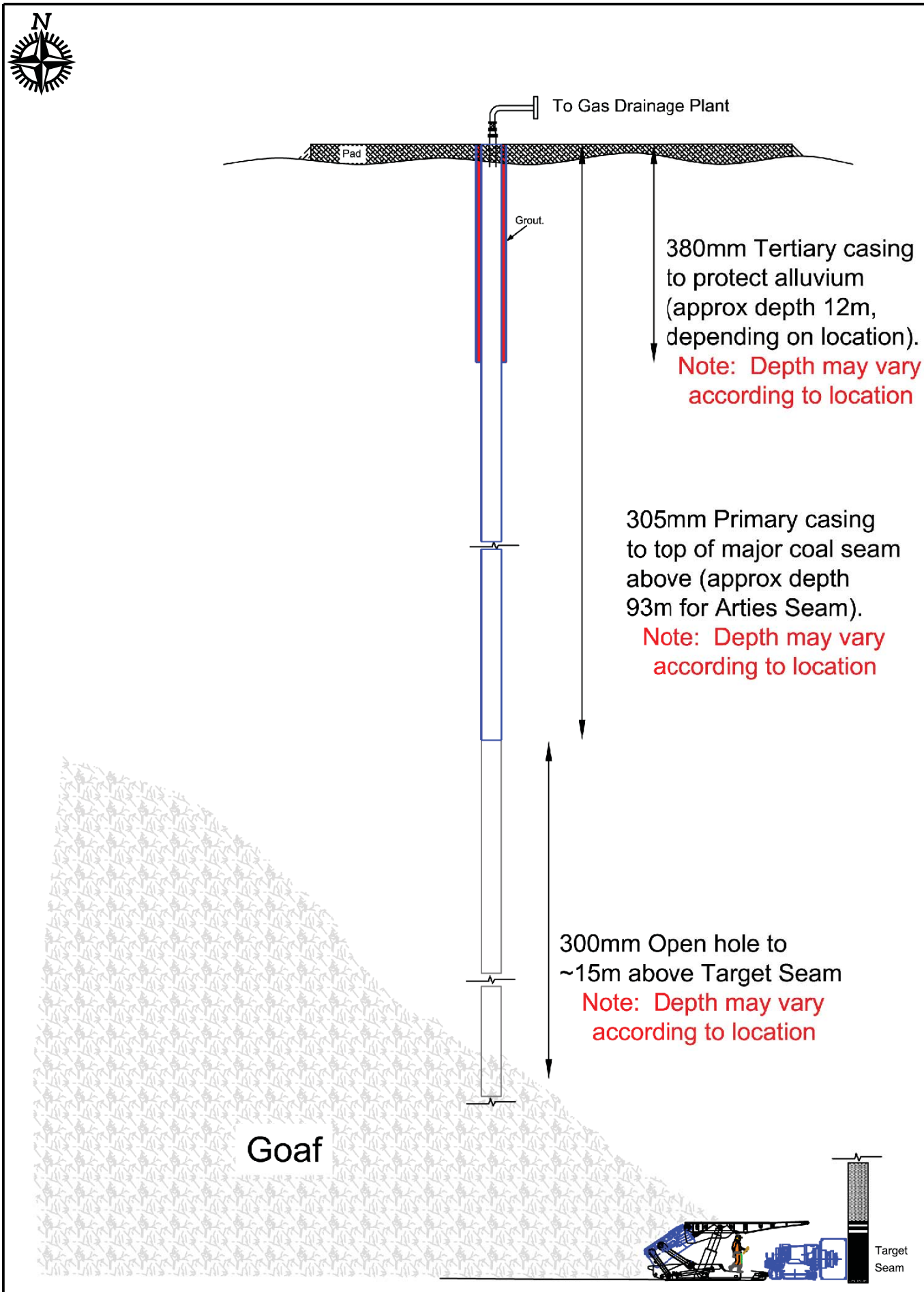
A range of equipment will be required during construction of the bores, including a front end loader (to level the pad and prepare drill sumps); drill rig and support vehicles; crane (to manage the steel casing); water cart (for dust suppression); grader (to establish access tracks, where required); and a small number of light vehicles and delivery trucks. Approximately eight daily light and heavy combined vehicle movements will be created for the construction of each bore.

Each pad will be slightly raised using excavated material from drill sumps and covered with road base (i.e., gravel) to provide a generally level free draining surface. Perimeter fencing will be installed around each pad for security. Disturbed areas not required for ongoing access and operation of the gas drainage bores (e.g. drill sumps and spoil piles) will be rehabilitated at the completion of drilling.

Each gas bore will become operational once the longwall has passed underneath it and goaf forms. At this point the bore will be connected to the pipeline network. This process will be repeated as the longwall advances passing beneath each successive bore.

Each bore will remain active until such time when the methane content falls below a pre-determined threshold. The bore will then be sealed (valve and lock arrangement) until such time that drainage of gas associated with mining lower seams is required. It is anticipated that each bore will remain active for about three months. However, this will be guided by experience as the deeper seams are mined.

As underground mining continues to subsequent seams it is expected that the buoyancy effect of methane will allow the gas to rise into the previous goaf zone. This will enable the bores to be reactivated and may avoid the need to drill new bores (or extend existing bores) to a lower depth. The gas bores will be required to continue to operate intermittently until completion of the underground mine.



Indicative Goaf Gas Drainage Bore Arrangement

Figure 6

Scale: Not to Scale

DA 309-11-2001 MOD 10
Date: 19/07/2012
Wells Environmental Services
Drawn: PB

Filename: ACOLMOD10_Fig6_20120719.pdf

6.5 Gas Pipeline Network

Individual gas drainage bores will be connected to the central gas drainage plant via a reticulated pipeline network. The layout of this network (see Figure 4) has been designed to account for existing environmental features and constraints, predicted mine subsidence impacts, infrastructure, access tracks, dams, buildings and existing land use activities wherever possible. This includes using existing farm access tracks and other disturbed areas for the pipeline route as far as practically possible. Further flexibility has been built into the proposed layout to enable known items of Aboriginal heritage and clearing of woody vegetation to be avoided wherever possible.

The pipeline will range in nominal diameter from 300 to 700 mm and be generally constructed of reinforced high density polyethylene (HDPE) piping which has been manufactured to comply with the appropriate specifications for the required end use (e.g., pressure rating, cracking and wear resistance, etc) in accordance with the relevant Australian Standard (AS/NZS 4130:2009). Up to about 16 km of pipeline will be required to connect to all potential gas bore locations.

A primary trunk pipeline (nominally 700 mm diameter) will extend from the central gas drainage plant along the length of LW1, stopping short of the boundary with Property 130. This will form the main branch of the network. Several branches of pipeline (nominally 500 mm diameter) will extend generally west from the trunk pipeline across the longwall panel layout. Smaller pipeline (nominally 300 mm diameter) branches will be constructed to connect the gas drainage bores to the pipeline network.

Construction of the pipeline network will be undertaken on a campaign basis, consistently with the installation of the gas drainage bores. The main branch of the network will be installed first, with the remaining pipeline installed and connected as required. Water traps will also be required to be installed at strategic locations along the pipeline route. The pipes will be buried in a trench up to about 1 m wide and about 1.5 m deep. This will prevent the risk of damage from grass fires and general mine and property traffic and will also improve the efficiency of the pipeline to convey gas by reducing the ambient temperature of the pipeline. However some small sections of pipeline may need to remain on the surface, particularly in topographically or geologically constrained areas. Where this occurs additional safeguards will be used to reduce the risk of pipe damage.

An initial disturbance area of about 5 m wide will be required, enabling vehicle and equipment access, trench digging and soil stockpiling. Disturbed areas will be re-grassed to minimise the potential for erosion. Excess soil will be stockpiled and used for landscape restoration works or backfilling of trenches once mining is completed. Appropriate erosion and sediment controls will be implemented for all ground disturbance activities.

A pipeline network will be required to cross Bowmans Creek to connect gas bores on the western side of the creek. It is initially envisaged that this will be achieved by routing a small section of the pipeline into and along one of the main PG Seam gate roads (see Figure 4). This will require two additional vertical boreholes to be drilled into the PG Seam gate road either side of the creek, allowing the pipe to enter and leave the underground workings. If this proves unfeasible from a gas reticulation perspective (e.g., additional drag caused by increased pipe length) or compromises the safety of the underground mine then alternate creek crossing arrangements will be investigated and implemented (e.g., via under-boring or overhead gantry system).

The east west sections of the pipeline network that cross the longwall panels will be subjected to subsidence as each seam is mined. There is sufficient flexibility built into the pipeline design to minimise subsidence impacts on the pipeline network. However, inspection of these pipeline sections will be required with ensuing potential repairs. This will require unearthing the relevant buried pipeline sections to facilitate inspection and or repair.

6.6 Mobile Gas Drainage Plant

A mobile gas drainage plant is already utilised by ACOL to provide vacuum assisted free venting of gas from the PG Seam. This will continue to be used as an interim measure until the central gas drainage plant has been completed and at times where use of the central plant is limited, or in more sensitive areas that preclude the construction of the pipeline.

The mobile gas drainage plant consists of a small (1000 cfm) diesel powered air compressor; 2000 L self-bunded diesel storage tank; suction pump apparatus and associated piping; safety and low gas content shut down system; and solar powered monitoring and telemetry equipment fitted to the bore head. The use of this gas drainage apparatus was described in the MOD 7 EA. The layout of the mobile gas drainage plant is shown in **Figure 7**.

Where potential long-term use of the mobile plant may be required, ACOL will investigate modifying the plant to enable use of mobile flares.

6.7 Site Access

Access will be required to all gas drainage bores and pipeline sections for construction and for inspection and maintenance during operation.

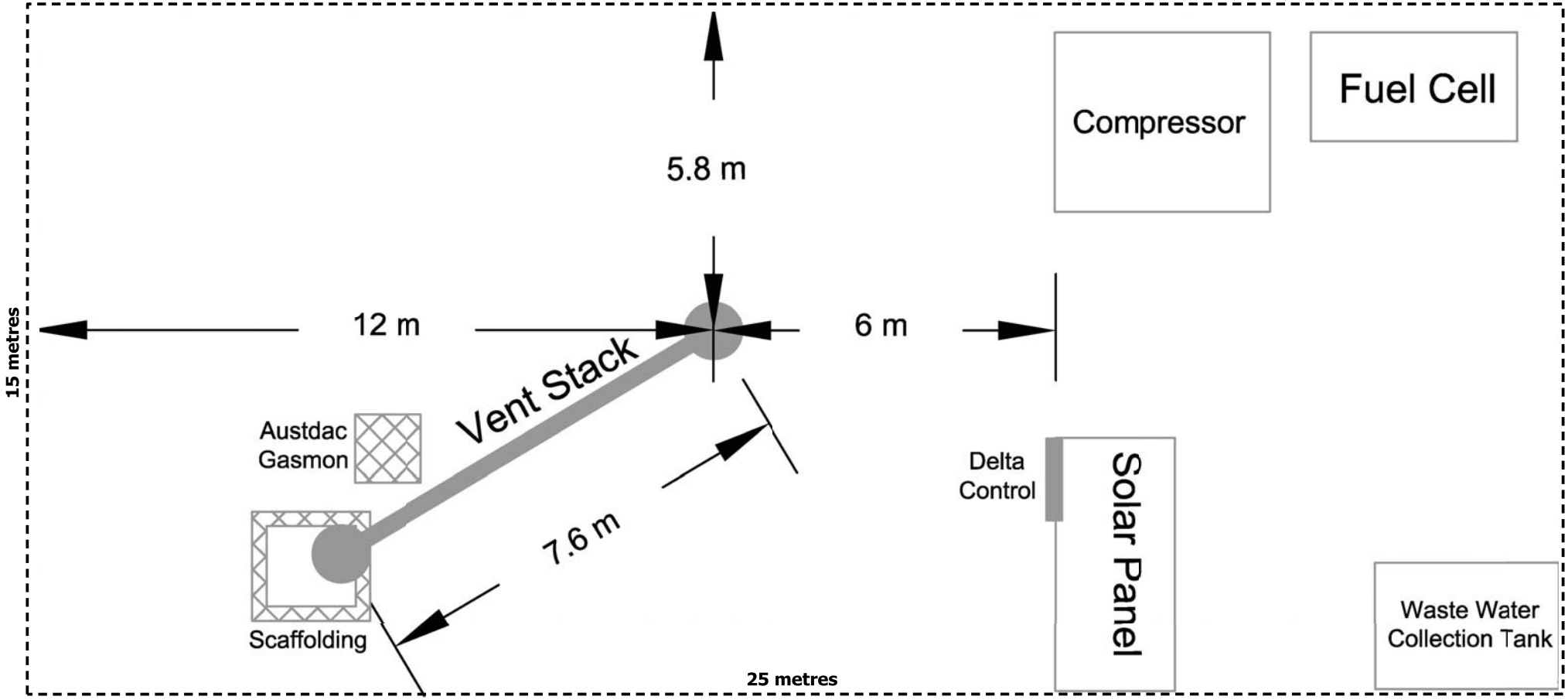
Site access from the New England Highway will be provided via the “Dairy Lane” intersection and via the realigned Lemington Road (currently Brunkers Lane).

Existing site access tracks will be used wherever possible

6.8 Decommissioning and Rehabilitation

All components of the project will be incorporated into the ACOL MOP (or future equivalent) and decommissioned upon the completion of underground mining. Unless otherwise required, all infrastructure will be removed from the site and the goaf gas drainage bores decommissioned and sealed in accordance with industry best practice and government guidelines, as required.

Notwithstanding, prior to decommissioning, ACOL will investigate possible ongoing or future use of the installed infrastructure, such as continuing provision of gas for power generation or possible use of some sections of the pipeline network for property irrigation.



AshtonCoal
PART OF THE YANCOAL AUSTRALIA GROUP

Indicative Mobile Gas Drainage Plant Layout

Figure 7

Scale: Not to scale

DA 309-11-2001 MOD 10
Date: 19/07/2012
Wells Environmental Services
Drawn: PB

Filename: ACOLMOD10_Fig7_20120719.pdf

7 IMPACT ASSESSMENT

7.1 Environmental Risk Assessment

An Environmental Risk Assessment was facilitated by SP Solutions at ACOL offices on the 1 June 2011. The results of the risk assessment are included as **Appendix 1.**

The risk assessment was used to help identify key environmental issues requiring further consideration in the assessment of the proposed modification.

A summary of the assessment outcomes for relevant environmental and stakeholder issues is provided below.

7.2 Noise

Spectrum Acoustics assessed the potential noise impacts of the development on privately-owned residences in the surrounding area. This included modelling the sound power levels of equipment used during construction and operation of the development under different atmospheric conditions. The complete noise impact assessment report is included as **Appendix 2**.

The noise emission levels for the following activities were considered:

- Construction activities – including gas plant and pad construction, gas bore drilling and trench digging for pipelines (daytime only).
- Operational activities – including 24-hour operation of the central gas drainage plant and use of the mobile gas drainage plant at a point closest to a Property 130.

A temperature inversion (4.7^{o}C/100 m) and westerly wind conditions were adopted as worst case noise generating conditions during 24-hour operation of the gas plant and flares. As construction will only occur during daytime hours, temperature inversion conditions were not assessed for construction activities. Worst case modelled noise impacts are summarised in **Table 5**.

Table 5: Modelled noise levels

Modelled scenario	Predicted dB(A) - $L_{Aeq(15min)}$				Existing ACOL Criteria dB(A) - $L_{Aeq(15min)}$
	Westerly Wind Conditions		Inversion* Conditions		
	Highest modelled noise level	Receiver	Highest modelled noise level	Receiver	
Construction – gas plant pad construction, gas bore drilling and pipeline trench digging for 700 mm pipeline (westerly wind)	41	Property 130	N/A	N/A	38 (daytime) 36 (night)
Operation – operation of the central gas plant, flares and operation of the mobile gas drainage plant at the closest site to any privately-owned receiver (inversion and westerly wind)	31	Property 18 (in Camberwell village)	23	Property 18 & Property 23 (in Camberwell village)	38 (daytime) 36 (night)

** Based on the inversion strength of 4.7^{o}C/100 m measured at the ACOL meteorological station.*

The results predict a moderate (3 dB) exceedance of the existing ACOL criteria at one (1) private residence (Property 130) during borehole and pipeline construction in the vicinity of the property boundary. The dominant source of noise during construction is the drilling rig. The drill sound power level of 108 dB(A) was determined as the logarithmic average of noise levels at four locations at the front, rear, left side and right side of the drill. Orientating the drill with the quietest side (the front) facing the impacted property residence, would adequately reduce the relative sound power level to 102 dB(A). Notwithstanding, Spectrum has recommended the following measures to ensure ACOL complies with its offsite noise impact criteria at this residence:

- Use of a temporary noise barrier (2.4 to 3 m high).
- Noise monitoring (at the property boundary) to ensure compliance with existing ACOL noise impact criteria.

Spectrum concluded that implementation of these recommendations would be sufficient to prevent the minor exceedance predicted.

ACOL will implement these measures to ensure its noise levels at the private residence are maintained below its consented noise limits. Alternatively it will seek to enter into a temporary agreement with the land owner to allow increased noise levels during construction.

7.3 Air Quality

PAEHolmes assessed the potential air quality impacts of the development, including consideration of dust, combustion gases, odour and GHG emissions associated with the construction and operation of the development. The complete air quality impact assessment report is included as **Appendix 3**.

7.3.1 Dust

Generation of dust from construction vehicles, equipment and activities has the potential to cause increased offsite dust emissions. This can be controlled through application of water to bare surfaces and to dust generating activities.

Construction will occur sporadically over the remaining life of the underground mine with associated dust generating activities occurring remotely to surrounding private residences. During operations, dust generating activities will generally be restricted to light vehicle access for site inspections and maintenance. Consequently, there are no increased dust impacts predicted at any private residence as a result of the development.

Notwithstanding, PAE Holmes has recommended implementing the following dust mitigation measures to ensure that minimal offsite dust impacts are achieved:

- Watering of unsealed access tracks, particularly during dry and windy conditions.
- Limiting the extent of vegetation and topsoil clearing as far as practically possible.
- Minimising the number of soil stockpiles.
- Ensuring vehicle speeds on unsealed access tracks are restricted to a level that minimises dust generation.
- Coordinating delivery and removal of materials to avoid unnecessary trips on unsealed access tracks.

ACOL will implement these measures to ensure its dust emissions are maintained below the relevant criteria at privately-owned residences.

7.3.2 Gases and Odour

PAEHolmes also considered the potential gas and odour emissions (CH_4, NO_x, SO_x and VOC) of the development. This included an assessment of odour from free vented methane gas and an

assessment of nitrogen dioxide levels from combustion of the gas. The latter also included combustion products from diesel engines required for power generation during construction.

Because methane is less dense than air, directly vented gas will generally rise and disperse quickly within the air column. Methane is also a non-odorous and non-toxic gas.

Notwithstanding, PAEHolmes assessed the likely ground level odour concentrations of the development from venting of excess goaf gas at up to 4500 L/s at the central gas plant. The results indicate that the ground level odour will be less than the most stringent odour goal of 2 OU at all surrounding private residences.

Flaring of the gas and operation of diesel compressors and generators will lead to emission of NO_x and other gases. PAEHolmes also modelled the concentrations of these gases (conservatively assuming 100% conversion of NO_x) to assess the potential impacts on private residences. The results indicate that the maximum predicted 1-hour NO_2 ground levels at the closest private residence will be well below the guideline criterion of 246 µg/m^3 (for NO_2).

7.3.3 Greenhouse Gas

The GHG emissions associated with the proposed development have been estimated using the following conservative assumptions:

- The gas flow rate will vary up to a maximum of 4500 L/s.
- The maximum flow rate (4500 L/s) will occur 20% of the time, average flow rate (1200 L/s) will occur 60% of the time and low flow rate (600 L/s) will occur 20% of the time.
- The gas comprises approximately 90% CH_4 and 10% CO_2.
- Flares will be added as gas flow is increased, up to a maximum of 4500 L/s.

Using the methods detailed in the National Greenhouse and Energy Reporting System Measurement Technical Guidelines (NGER guidelines, June 2009), PAEHolmes estimates that flaring 100% of time at the maximum flow rate (4500 L/s) will provide savings in GHG emissions at the ACP of up to 438 kt CO_2-e, annually. Alternatively, assuming flaring occurs at the average flow rate (1200 L/s) 100% of the time with excess gas needing to be vented 20% of the time (at maximum flow rate) would result in GHG emissions savings of about 271 kt CO_2-e, annually.

This provides an indicative range of savings in scope 1 fugitive GHG emissions at the mine of between 271 and 438 kt CO_2-e, annually.

A small increase in GHG emissions will also occur from the increased consumption of diesel from the use of additional equipment during construction and operation. However, this increase will cause no significant impacts in the context of the overall GHG emissions from the underground mine.

As noted in Section 5.4, ACOL has and continues to investigate options for the beneficial use of the extracted gas such as onsite power generation use or supply to offsite third party power generators. The use of the gas for power generation has a number of benefits, including reducing GHG emissions from the site as well as providing an alternate, cleaner fuel source (i.e., lower GHG emissions than derived from coal fuel) for power generation.

7.4 Aboriginal Heritage

Insite Heritage assessed the potential impacts to Aboriginal heritage proposed to be caused by the development. The complete Aboriginal heritage impact assessment report is included as **Appendix 4**.

The results of earlier Aboriginal heritage surveys across the ACP underground area and the resultant site database of known Aboriginal objects were used as a first pass to assist guide locating gas bores and connecting pipeline outside areas of Aboriginal heritage, as far as practically possible.

A further survey, conducted in November 2011 with Aboriginal stakeholder representatives, was completed for the purpose of assessing the potential disturbance impacts of the proposed development and to update site condition records across the proposed disturbance areas. For the purposes of this assessment, the underground mine area was broken up into 21 landform units (refer to Appendix 4). Although visibility was generally low across the majority of the survey area a further 30 previously unrecorded site loci were recorded. These sites are in the process of being registered on AHIMS, and will be managed consistently with previously recorded sites.

On this basis Insite Heritage concluded the potential for identification of further sites across the proposed development disturbance area was likely to be high. Further, potential development impacts on each unit ranged from negligible to major, with areas of high site densities and high potential for sub-surface deposits likely to be disturbed. Where the development uncovers additional sites not currently known or recoded, then these sites will be registered on AHIMS and managed in accordance with the conditions of the relevant AHIP and ACOL's approved Archaeology and Cultural Heritage Management Plan (ACHMP) in consultation with Aboriginal community stakeholders.

The construction and operation of goaf gas drainage infrastructure is an approved activity under the two AHIPS held by ACOL encompassing the underground mine area:

- AHIP#1130976 covering LW5-8 includes provisions for:

  "…gas bores and other activities and establishment of infrastructure to provide for the safe ongoing operation of the mine, such as but not limited to, dewatering facilities, ventilation, and geological investigations".

  "Upgrade and maintenance of existing access and formation of new access tracks".

- AHIP#1131017 covering LW1-4 includes provisions for:

  'Activities and establishment of infrastructure to provide for the safe ongoing operation of the mine'.

  "Upgrade and maintenance of existing access and formation of new access tracks".

Further, each AHIP includes conditions for the management and salvage of Aboriginal objects. Notwithstanding, Insite Heritage has recommended additional measures for the management of Aboriginal objects in each landform unit (detailed in Appendix 4) as well as the following general measures, which will be implemented by ACOL where appropriate:

- Highly visible perimeter barricades should be placed around the known objects that are located in proximity of proposed works to avoid unintentional impacts during construction and operation.
- All areas of impact should be inspected and assessed in accordance with the methodology prescribed in the relevant AHIP.
- Following the marking of the final pipeline route, the entire length should be inspected and Aboriginal objects recorded and collected.
- In accordance with the AHIP methodology the requirement to identify areas of potential subsurface objects should be identified prior to excavation works.
- Pipeline routes (both surface and sub-surface) should avoid passing through or over known sites and should be laid within previously disturbed areas wherever possible (e.g., along road verges, adjacent to tracks or along fence lines).
- Gas bores should be located as far from known sites as the operational plan allows.
- Site access should be via existing tracks, wherever possible.

Aboriginal stakeholders have indicated their support for the implementation of these measures.

ACOL's ACHMP and detailed site disturbance procedures will be maintained as a mandatory component of site inductions for all workers involved in the construction and operation of the proposed development. Further, Aboriginal stakeholder groups will continue to be consulted and have ongoing involvement in managing Aboriginal heritage at the ACP.

7.5 Riparian and Terrestrial Ecology

PEA Consulting assessed the potential ecological impacts of the development. The complete riparian and terrestrial ecology impact assessment report is included as **Appendix 5**.

Previous site based field surveys have identified a range of habitats occurring across the surface of the underground mine on which the proposed infrastructure will be developed, including riparian corridors, floodplain pasture, flood terraces, upland forest, woodland remnants, farm dams and pasture with scattered trees. In addition, there a small number of isolated hollow-bearing trees scattered across the area.

The following flora and fauna attributes (species, populations and communities) have been recorded within these habitat areas:

- Eight (8) vegetation communities, including Central Hunter Grey Box-Ironbark Woodland which is a listed Endangered Ecology Community (EEC) under Schedule 1 of the *Threatened Species Conservation Act 1995*.
- Two (2) endangered flora populations: Hunter Weeping Myall and River Red Gum.
- Six (6) significant fauna species: Grey Crowned Babbler, Turqoise Parrot, Speckled Warbler, Scarlet Robin, Hooded Robin and Flame Robin.

In addition, there is habitat potential for a further seven (7) fauna species not previously recorded at the site: Green and Golden Bell Frog, Diamond Firetail and Red-backed Button-quail, Masked Owl and Eastern Bentwing-bat, Eastern Freetail-bat and South or Large Footed Myotis.

The design and location of the proposed development (gas bores, pipelines, central drainage plant and flares) has taken these ecological attributes into account such that mature trees, remnant vegetation and ecologically sensitive areas will be avoided as far as practically possible during construction and ongoing operations. One such area is the Ashton Voluntary Conservation Agreement (VCA) area.

The conditions of the VCA enable the development of mine related infrastructure where it is required for the safety of the mine and where the infrastructure cannot be located in an area outside the VCA area. ACOL has determined that for safety reasons a gas bore is required within close proximity to the start line of each panel. Notwithstanding, the property owner of the land overlying the start location for LW1 and bordering the VCA area has indicated a strong preference for mine infrastructure not to be located on his land (see Section 3). Hence, for safety reasons a gas bore will be required to be developed in the VCA area to manage gas within the initial part of LW1. The next LW1 gas bore is proposed to be located outside the VCA area proximal to its northern boundary. The distance between these two LW1 gas bore locations is approximately double the distance proposed between gas bores to provide adequate gas drainage and management within the underground mine. Hence, while not specifically proposed, ACOL may need to locate an additional gas bore along the LW1 panel within the northern part of the VCA area, if gas levels in the panel indicate additional management measures are required. Similarly, the start line for LW2 is beneath the VCA area and for safety reasons will also require a bore to be located within the VCA area (see Figure 4).

The proposed design and location of gas drainage infrastructure within the VCA area will be restricted to areas with prior disturbance or degradation as far as practically possible, such as the verge of access tracks or on disused tracks. ACOL may consider using the mobile gas drainage plant (free-venting) at these two required bore locations rather than developing the connecting pipeline in this area, to limit the amount of disturbance. Although a free venting bore requires a bore pad area up to about fifteen times larger than that proposed for bores connected to the pipeline. Whatever the case, ACOL will ensure that every effort is made to avoid impacting threatened or endangered tree species within the VCA area.

PEA Consulting conservatively considered a total disturbance footprint of about 12.7 ha will be required to facilitate the construction of the proposed infrastructure, including existing disturbed areas. This assumes a 15 x 25 m disturbance footprint for each bore pad, although it is expected that

the majority of bore pads will have a much smaller disturbance footprint of only about 5 x 5 m (see Table 4). Hence, the total disturbance footprint will be less than that assessed for ecological impacts.

Notwithstanding, under this conservative assessment of ecological impacts it is estimated that only about 0.7 ha of native vegetation will potentially be disturbed as a result of the development. This represents less than 0.5% of the local habitat area, and as such the impact of the development is considered minor. A summary of the disturbance to each vegetation community is presented in **Table 6**.

Table 6: Potential disturbance to vegetation communities

Vegetation Unit No.	Vegetation Community	Maximum Potential Disturbance Hectares (ha)
1	Disturbed Areas/Dry pasture	11.37ha
2	Riparian Pasture	0.670ha
3	Riparian Woodland 1	0.162ha
4	Relic Ironbark Trees 1	No impact.
5	Bulloak Scrub 1	0.065ha
6	Bulloak Scrub with Emergent Box and Ironbark (Endangered Ecological Community) 1	0.178ha
7	Box Ironbark Woodland (Endangered Ecological Community) 1	No Impact
8	Planted Eucalypt and Acacia Woodland 1	0.25ha
	Total impact	12.7ha
	[1] Total impact on native vegetation	0.655ha

The impacts within these vegetation communities will be generally limited to the removal of grasses and small shrubs. Mature trees will be avoided as far as practically possible.

Notwithstanding, PEA Consulting has recommended implementing the following additional measures to ensure ecological impacts are minimised:

- The selection of final locations for pipe laying and excavation should be assisted by a qualified ecologist.
- Areas of suitable habitat for target species (such as the Green and Golden Bell Frog) should be walked over by a suitably qualified ecologist immediately preceding commencement of construction.
- The area within the woodland bird habitat should be rehabilitated with seed collected from the site.
- Areas containing EEC species should be avoided. However, where avoidance is not possible, areas to be disturbed should be selected to avoid the clearing of any trees as far as practically possible.
- Erosion protection measures should be installed within EEC habitat and maintained through the construction phase.

In addition to implementing the above measures ACOL will also ensure:

- Construction activities will be carried out in accordance with existing approved site environmental management plans (i.e., soil stripping, flora and fauna and land management plans) and procedures.
- Disturbed areas not required for ongoing operations will be promptly rehabilitated.
- Activities required to be conducted within the VCA will be minimised as far as practically possible, with all activities being confined to tightly controlled and designated work areas.

7.6 Traffic and Transport

SKM assessed the potential traffic related impacts of the development. The complete traffic impact assessment report is included as **Appendix 6**.

Access to the site from the New England Highway will be via "Dairy Lane" and the future realigned Lemington Road (currently Brunkers Lane), for works west of Bowmans Creek. During construction, light and heavy vehicles will be required to access the site each day. The predicted traffic volumes assume light vehicles arriving and departing twice each day. Following construction, traffic will generally be restricted to light vehicles only, with access required for inspection and maintenance purposes.

It is estimated that up to about 25 vehicles a day will access the site via "Dairy Lane" when construction and operation of various phases of the development overlap, decreasing to about 6 vehicles a day following completion of the gas plant construction.

Access via Brunkers Lane / realigned Lemington Road will only be required for construction and operation of the gas bores and pipeline network in the western area of the project, with up to about 16 vehicles each day required to access the site via this route. Predicted construction and operation traffic volumes are summarised in **Table 7**.

Construction of additional gas bores and sections of the pipeline network may occur intermittently for the remaining life of the underground mine. As such, there may be short periods where this construction may occur during operation of the existing infrastructure, resulting in an estimated maximum (daily average) traffic impact of 16 vehicle trips during these times.

Currently the New England Highway carries about 11,000 vehicles per day. A maximum increase of 25 daily vehicle movements as a result of the development will have negligible effect on existing highway traffic conditions.

Table 7: Traffic impacts (average trips per day)

Element	Construction		Operation	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
Unnamed "Dairy Lane"				
Central Gas Drainage Plant	10*	3	1	1
Gas bores	4*	2	2	0
Pipeline Network	4*	2	2	0
Brunkers Lane				
Gas bores	4*	2	2	0
Pipeline Network	4*	2	2	0

** Predictions of construction traffic assume light vehicles departing the site for lunch each day and returning, resulting in two (2) incoming and two (2) outgoing movements for each vehicle each day.*

Where construction may occur concurrently with other approved ACP development the traffic mitigation measures implemented for those works will apply. In the event construction does not occur concurrently with other approved ACP development, SKM has recommended the following actions be implemented to ensure the potential traffic related impacts are minimised:

- The "Dairy Lane" property access intersection will be used as a 'right in' intersection for south bound vehicles accessing the site when other approved ACP development is occurring with approved traffic controls. In the event these traffic controls do not exist, the 'dairy lane' intersection will be operated as a 'left in left out' only.
- Temporary "Trucks Turning" caution signs should be installed in both directions on the New England Highway approximately 200 to 300 m in advance of the "Dairy Lane" and Brunkers Lane / realigned Lemington Road intersections during construction works.

- Grass cutting in the vicinity of the intersection to enhance sight distance.

These recommendations will be adopted by ACOL, where appropriate. In addition, heavy vehicles use of the "Dairy Lane" intersection during school bus pickup/drop off and milk tanker access times will be minimised as far as practically possible.

7.7 Visual Amenity

AECOM assessed the visual impacts of construction activities and surface infrastructure on public road users and surrounding private residences. The complete visual impact assessment report is included as **Appendix 7**.

The visual impact was assessed from three (3) observer locations – two on the New England Highway, north and south of the site, the third on Brunkers Lane (see Appendix 7). A summary of the visual impacts assessed from each of the selected observer locations is provided in **Table 8**.

Initial construction works will generally be short lived, although additional campaign based construction activities will occur intermittently for the remaining mine life. The visual impact of the constructed infrastructure will be low, with only minor infrastructure (gas bore compounds, bore heads and small sections of exposed piping) being visible to public road users for only a short period of time as they pass by the site. Views to the central gas drainage plant will not be significant due to separation distances and general topographic screening.

On this basis, the visual impacts of the development were assessed to be of low to moderate significance.

Table 8: Visual impact assessment with management recommendations

Observer Location	Visual Impact	Visual Impact with Screen Planting
1a – New England Highway, North-West	Low to Moderate	Low
1b – New England Highway, South East	Very Low	N/A
2 – Brunkers Lane (realigned Lemington Road)	Low to Moderate	Low

Notwithstanding, AECOM recommended use of screening vegetation to minimise the visibility of surface infrastructure from public road users, particularly for gas bores established in close proximity to the New England Highway and Brunkers Lane (realigned Lemington Road).

This is consistent with ACOL's commitment to screen gas bore compounds on Macquarie Generation owned land that are adjacent and in close proximity to Brunkers Lane (see Figure 3). This will be achieved through use of tree plantings, farm sheds or other appropriate visual screening alternatives.

7.8 Soil and Water

The potential impacts to soil and water were considered minor and capable of being adequately managed under existing site protocols. As such, a specialist report was not considered warranted.

The management of potential impacts to soil, surface water and groundwater is briefly discussed below:

7.8.1 Soil Erosion and Sedimentation

Disturbance to soils will be required to enable construction of the infrastructure pads and pipeline network. Infrastructure pads will be surfaced with road base to limit erosion. Soils disturbed during construction of the pipeline trench will be backfilled over the pipe and stabilised with grass cover. Any

excess soil will be stockpiled and re-used for maintenance and repair works associated with the ongoing underground mining operation, or for use in rehabilitation works, where appropriate.

ACOL's standard erosion and sediment control measures will be implemented to minimise impacts to soils and surface water, including:

- Diverting clean water runoff around construction areas.
- Installing sediment fencing, hay bales or other suitable controls down slope of disturbed areas.
- Surfacing pad areas and access tracks identified to have long term use with road base.
- Stabilising stockpiles that will be left for any length of time with jute mesh or grass cover.
- Immediately remediating erosion damage.
- Promptly rehabilitating disturbed areas no longer required for ongoing operations.
- Regular inspection and maintenance of erosion control and sediment containment structures.

With these appropriate controls, no significant impacts to soils are predicted.

7.8.2 Surface Water

The general locations of gas bore pads were selected to be a sufficient distance from any natural or diverted watercourse so as to avoid all direct impacts on surface waters from the development. However, some gas bores and sections of pipeline are proposed within close proximity to sections of Bowmans Creek made redundant by the creek diversions. Where gas bores and pipelines are proposed in these areas, existing ACOL management controls will be put in place to ensure impacts to the diverted Bowmans Creek are avoided.

Clean water diversions will be implemented around all construction areas. A sediment dam to be developed as part of MOD 9 will serve as the main control measure for surface water runoff at the central gas drainage plant site.

A self-bunded diesel storage tank will be used to store fuel for generators used during construction to reduce the risk of fuel spillage, and a spill containment kit installed at the site.

Each gas bore head will be fitted with a non-return valve and locked to eliminate any potential for the entry of surface water to the mine during flood events.

7.8.3 Groundwater

The gas bores will be constructed into strata within the goaf zone specifically for the purpose of gas drainage and will not be capable of drawing groundwater. However, as the gas drainage infrastructure is progressively developed across the site, some gas bores will be drilled through the alluvial aquifer associated with Bowmans Creek.

In these areas, the gas bores will be drilled and constructed under the control of a licensed water bore driller and generally in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (3rd Edition, 2012), including sealing around the bore casing through the alluvial aquifer zone (see Figure 6 and Section 6.4). Notwithstanding all gas bores will require sealing between the tertiary casing and the surrounding rock through which the bore is developed. This will be achieved by use of a suitable sealing mixture such as cement grout, cement/bentonite grout, bentonite pellets/chips, or concrete. The construction of the bores and selection of the sealing mixture will have regard to potential material limitations where the bore may be subject to subsidence related movement.

This bore construction methodology will ensure intersected alluvial groundwater is protected from possible cross contamination; prevent uncontrolled groundwater inflows into the underground mine; and will ensure the efficient capture and conveyance of the gas under negative pressure provided by the central gas plant.

All gas bores will be monitored to ensure the integrity of the sealing is maintained, the bores continue to operate at maximum efficiency and there is no adverse interference with alluvial groundwater. This will include promptly implementing remediation actions, where required.

7.9 Waste

ACOL maintains an approved waste management plan for its ongoing operations. All waste generated by the proposal will be recycled or disposed of in accordance with this plan.

8 ENVIRONMENTAL MANAGEMENT COMMITMENTS

In conjunction to existing approved development consent conditions, commitments, Environmental Management Plans and site procedures, ACOL will implement the following additional management measures (outlined in **Table 9**) to avoid, minimise and manage the potential impacts associated with the proposed modification as far as practically possible.

Table 9: Environmental management commitments

Item	Action
1	Noise
1a	A temporary noise barrier will be used to minimise drill noise while ever gas bore construction activities are in close proximity to Property 130.
1b	Noise monitoring will be conducted at the boundary of Property 130 during gas bore construction in proximity to the property boundary.
2	Air Quality
2a	Site disturbance will be minimised as far as practically possible, including limiting vegetation clearing and soil disturbance and minimising the number and size of soil stockpiles.
2b	A water cart will be used to suppress dust on access tracks and on disturbance areas, particularly during dry and windy conditions.
2c	Disturbed areas not required for ongoing operations will be promptly rehabilitated.
2d	Vehicle speeds on unsealed access tracks will be restricted to a level that minimises dust generation. Vehicle movements (such as delivery and removal of materials) will be coordinated to avoid unnecessary trips on unsealed access tracks.
2e	When a mobile gas plant is used on Macquarie Generation owned land or within 100 m of Property 130, Air sampling near non-ACOL owned land work areas will be implemented to measure methane levels.
3	Greenhouse Gas
3a	Drained gas will be flared wherever practicably possible.
3b	Use of mobile flares in conjunction with use of the mobile gas plant will be investigated.
3c	Economically viable alternative uses of the drained gas will be investigated.
4	Aboriginal Heritage
4a	Aboriginal heritage sites will be avoided as far as practically possible. Where Aboriginal heritage sites cannot be avoided, potentially impacted objects will either be salvaged or relocated in accordance with an approved AHIP, ACOL's ACHMP and in consultation with Aboriginal community stakeholders.
4b	A perimeter barricade will be placed around known objects located in proximity to the proposed works to avoid unintentional impacts during construction and operation.
4c	Site inductions will include identification of Aboriginal heritage exclusion areas and actions to be undertaken where additional Aboriginal objects are identified, in accordance with ACOL's existing Aboriginal heritage management protocols.
5	Riparian and Terrestrial Ecology
5a	Ecologically sensitive areas will be avoided as far as practically possible.
5b	Ground disturbance will be minimised as far as practicable.
5c	The location of pipe laying and excavation will be assisted by a qualified ecologist including walk over of suitable habitat areas for target species immediately preceding construction.

Item	Action
5d	Areas containing EEC species will be avoided as far practicably possible, provided the safety of underground mine workers is not compromised. Where avoidance is not possible, areas to be disturbed will be selected to avoid clearing trees as far as practically possible.
6	Traffic
6a	The "Dairy Lane" property access intersection will be used as a 'right in' intersection for south bound vehicles accessing the site when other approved ACP development is occurring with approved traffic controls. In the event these traffic controls do not exist, the 'dairy lane' intersection will be operated as a 'left in left out' only.
6b	Temporary "trucks turning" signs will be installed on the New England Highway in advance of site access intersections during construction.
6c	Heavy vehicle use of the "Dairy Lane" intersection during school bus pick-up / drop-off and milk tanker access times will be minimised as far as practically possible.
7	Visuals
7a	Visual screening will be used to reduce the visibility of gas bores on Macquarie Generation owned land to the Brunkers Lane / realigned Lemington Road and New England Highway as far as practically possible.
7b	Gas flares will be finished with visually recessive colours where possible.
8	Soils and Erosion Control, Surface Water and Groundwater
8a	Industry standard sediment control measures will be implemented prior to ground disturbance.
8b	Clean water diversions will be implemented around the gas drainage plant site.
8c	Disturbed areas will be revegetated as soon as possible.
8d	Gas bores will be drilled by a licence driller and in accordance with bore construction guidelines, where relevant, including sealing off alluvial aquifer zones.
9	Waste
9a	Construction waste will be recycled or disposed of in accordance with the existing ACOL approved Waste Management Plan.
10	Macquarie Generation
10a	Visual screening will be used to reduce the visibility of gas bores on Macquarie Generation owned land to the Brunkers Lane / realigned Lemington Road and New England Highway as far as practically possible. (See 7a)
10b	Monitoring for methane will be undertaken during free-venting in close proximity to Macquarie Generation work areas (including the Void 5 ash dam).
10c	Continue regular Ashton / Macquarie Generation interaction meetings as appropriate
10d	Continue to consult about future gas supply / use options
11	Property 130
11a	Access to Property 130 will be maintained throughout all stages of the project through the ROW access track or the alternative access track.
11b	Gas bores will be set-back a minimum of 12 m (from the edge of the pad) from the centre of the ROW access tracks.
11c	Gas bores will be set-back a minimum of 50 m from the Property 130 boundary.
11d	Monitoring for methane and odours will be undertaken during free-venting within 100 m of the Property 130 boundary.
11e	Heavy vehicle use of the "Dairy Lane" intersection during school bus pick-up / drop-off and milk tanker access times will be minimised as far as practically possible.

9 JUSTIFICATION AND CONCLUSION

ACOL proposes to modify DA 309-11-2001-i to allow the installation of a central gas drainage plant and associated surface infrastructure. The modification is required to maintain safe working conditions and prevent gasses accumulating in the underground mine workings. The proposed development will also reduce Scope 1 fugitive GHG emissions at the mine.

The modification will not alter the size of the approved ACP, the operating hours, the mining methods, the rate of approved coal extraction and production, or the method and frequency of off-site coal transport. Further, the proposed modification will not significantly alter or transform the approved project.

Adoption of the management and mitigation measures recommended by specialist consultants will minimise the potential for adverse environmental and community impacts that may result from the modification.

10 REFERENCES

Department of Climate Change and Energy (2009) “National Greenhouse and Energy Reporting System Measurement Technical Guidelines”.

Evans and Peck (2010) “Bowmans Creek Diversion Environmental Assessment”, prepared by Evans and Peck Pty Ltd.

HLA (2001). “White Mining Limited Ashton Coal Project Environmental Impact Statement”, prepared by HLA-Envirosciences Pty Limited.

National Uniform Drillers Licensing Committee (2012) "Minimum Construction Requirements for Water Bores in Australia". Third Edition. Funded by the Australian Government National Water Commission.

NSW Department of Mineral Resources (1997) “Borehole Sealing Requirements On Land: Coal Exploration”.

NSW Department of Primary Industries (2006) “Guidelines to the Mining, Rehabilitation and Environmental Management Process”.

PacificMGM (2011) “Greenhouse Gas Investigation Abatement Report Ashton Underground Mine”, prepared by PacificMGM mining and gas management consultants.

Wells Environmental Services (2009) “South East Open Cut Project and Modification to the Existing ACP Consent”, prepared by Wells Environmental Services Pty Limited.

Wells Environmental Services (2011) “Underground Mine Interim Gas Drainage, Open Cut Hebden Seam Recovery, Condition 3.14 (Schedule 2) Amendment”, Prepared by Wells Environmental Services Pty Ltd.

Wells Environmental Services (2012) “Upcast Ventilation Shaft, Fans and Mine Service Infrastructure”, prepared by Wells Environmental Services Pty Ltd.