Plan for

Blakefield North Gas Drainage Management Plan

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# Table of Contents

1 Executive Summary .................................................................................. 4

2 Introduction .......................................................................................... 4
   2.1 Background .................................................................................. 4
   2.2 Purpose ....................................................................................... 5
   2.3 Scope .......................................................................................... 5
   2.4 Project Overview ......................................................................... 5
       2.4.1 Project Area ........................................................................ 5
       2.4.2 Land Ownership .................................................................. 9
       2.4.3 Land Use ................................................................................ 9
       2.4.4 Approved Gas Drainage Operations .................................. 9
       2.4.5 Overview of Current Gas Drainage Operations ................. 13
       2.4.6 Future Blakefield North Gas Drainage Infrastructure .......... 13
       2.4.7 Interaction with the Bulga Optimisation Project ............... 14
       2.4.8 Justification ......................................................................... 14

3 Regulatory Requirements ......................................................................... 14
   3.1 Legislative Requirements ................................................................ 14
   3.2 Project Approval Conditions ...................................................... 16
   3.3 Mining Tenement Conditions ...................................................... 17
   3.4 Environmental Protection Licence .............................................. 19

4 Stakeholder Consultation ......................................................................... 19
   4.2 Stakeholder Identification ............................................................ 19
   4.3 Stakeholder Consultation Strategy .............................................. 19
   4.4 Landholder Access Agreements .................................................. 20
   4.5 Complaints Procedures .............................................................. 20

5 Environmental Assessment ...................................................................... 20
   5.2 Noise .......................................................................................... 21
   5.3 Aboriginal Heritage ..................................................................... 24
   5.4 Biodiversity ................................................................................ 24
   5.5 Visual Impact ............................................................................... 25
   5.6 Traffic ........................................................................................ 26
   5.7 Air Quality .................................................................................. 26
   5.8 Greenhouse Gas .......................................................................... 27
   5.9 Land Use, Soils and Agriculture ................................................. 27
   5.10 Groundwater .............................................................................. 28
   5.11 Surface Water ............................................................................ 28
   5.12 Public Safety ............................................................................... 28

6 Mitigation Measures .................................................................................. 29
   6.2 Noise .......................................................................................... 29
   6.3 Aboriginal Heritage ....................................................................... 29
6.4 Biodiversity .......................................................... 30
6.5 Visual Impact .......................................................... 31
6.6 Traffic................................................................. 31
6.7 Air Quality ............................................................. 32
6.8 Greenhouse Gas ...................................................... 32
6.9 Land Use, Soils and Agriculture .................................. 33
6.10 Groundwater ........................................................ 33
6.11 Surface Water ........................................................ 33
6.12 Public Safety ........................................................ 33

7 Rehabilitation .................................................................... 34
7.2 Topsoil Management .................................................. 34
7.3 Surface Preparation .................................................... 35
7.4 Decommissioning ......................................................... 35

8 Implementation .................................................................. 35
8.1 Monitoring .................................................................... 35
8.2 Reporting ..................................................................... 36
8.3 Review ......................................................................... 36
8.4 Accountabilities .......................................................... 36
8.5 Training and Awareness ............................................... 37
8.6 Continual Improvement and Adaptive Management ........... 37

9 REFERENCES ..................................................................... 37
9.1 Related Documents........................................................ 37
9.2 Reference Information ................................................ 38
9.3 Change Information ...................................................... 39

Appendix A - Noise Assessment ............................................. 40
Appendix B - Archaeology Assessment ................................. 77
1 Executive Summary

Bulga Underground coal mine is 12 kilometres (km) southwest of Singleton, and 2 km from the townships of Broke and Bulga, in the Upper Hunter Valley of New South Wales (NSW). Bulga Underground comprises the Blakefield South Mine and the approved but yet to commence Blakefield North Mine.

To promote safe and efficient underground mining within the Blakefield, Glen Munro and Woodlands Hill seams, Bulga Underground uses a combination of pre-mining and post-mining (goaf) gas drainage techniques to remove methane from the mine workings.

This Blakefield North Gas Drainage Management Plan has been prepared to seek approval from the Department of Planning and Environment, as per Condition 7E, to construct and operate future gas drainage infrastructure associated with the Blakefield North Mine that is not previously subject to approval under DA 376-8-2003, including proposed gas drainage wells, access roads and methane pipelines.

Assessment of potential environmental impacts associated with the construction and operation of gas drainage infrastructure has been undertaken, including the preparation of additional technical assessments for environmental noise, Aboriginal heritage and biodiversity.

The Environmental Noise Assessment by Global Acoustics (2014) indicated that construction and drilling noise impacts at four drill sites are predicted to slightly exceed day time construction criteria, however, implementing the operational controls outlined in this management plan can prevent their occurrence. It is recommended that community consultation be undertaken prior to the commencement of critical gas drainage well sites, and that best practice management are implemented, including the use of acoustic barriers, selection of quietest available plant and placement of noise sources within the drilling compound as close to acoustic barriers as possible. This assessment has since been revised by Global Acoustics (February 2015) to model impacts of changing the location of HDD009.

An Aboriginal Archaeological assessment prepared by OzArk (2014) identified that there are no impacts to Aboriginal heritage expected, subject to the implementation of recommended management measures.

A Biodiversity Assessment completed by SLR (2014) concluded that removal of vegetation from the Project Area areas is not considered likely to impose any substantial adverse effects on native flora and fauna.

2 Introduction

2.1 Background

Bulga Underground is located 12 km southwest of Singleton, and 2 km from the townships of Broke and Bulga (refer to Figure 1). Bulga Underground and the Bulga Open Cut form Bulga Coal, which is managed by Bulga Coal Management Pty Ltd (BCM) on behalf of the Bulga Joint Venture (BJV). BCM is owned by Oakbridge Pty Ltd, which also is the majority shareholder (87.5%) of the BJV. Glencore is the majority shareholder of Oakbridge Pty Ltd. The Bulga Underground and Bulga Open Cut are serviced by a common Coal Handling and Preparation Plant (CHPP) and rail loading facility.

On 23 February 2004, the former Department of Planning (now Department of Planning and Environment (DP&E)) granted development consent under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) to Bulga Underground, pursuant to DA 376-8-2003. Consent was granted for mining in up to four seams (Whybrow, Blakefield, Glen Munro and Woodlands Hill seams). This consent has been modified on five occasions. Bulga Underground currently comprises two operations within the Blakefield Seam; the active Blakefield South Mine; and the approved but yet to commence Blakefield North Mine (refer to Figure 2). Underground mining operations within the Whybrow Seam mines (Beltana No.1 Underground Mine and the South Bulga Mine) have ceased and the portals have been sealed.
Underground mining operations are currently undertaken by Bulga Underground using longwall mining methods (namely longwall retreat mining techniques), which are used for the primary extraction of each longwall panel. Prior to panels being extracted by longwall methods, development headings (first workings) are mined to provide access to the panels. To ensure safe and efficient underground mining operations (both first workings and secondary extraction) within the Blakefield Seam, Bulga Underground utilises a combination pre- and post-mining gas drainage techniques to remove methane from the mine workings.

2.2 Purpose

In accordance with the requirements of Schedule 4, Condition 7E of DA 376-8-2003 (as modified), this Blakefield North Gas Drainage Management Plan (Gas Drainage Management Plan) has been prepared to seek approval from the DP&E for the construction, operation and future rehabilitation of future gas drainage infrastructure associated with the Blakefield North Mine. The condition specifies the following:

The Applicant shall prepare and implement a Gas Drainage Management Plan in respect of construction and future use of gas drainage infrastructure (i.e. gas drainage not subject to any approval at the date of Modification 5) to the satisfaction of the Director-General. This plan must be submitted to the Director-General for approval prior to the construction and operation of any future gas drainage infrastructure.

2.3 Scope

Gas drainage infrastructure for this Gas Drainage Management Plan consists of gas drainage infrastructure for the Blakefield North Mine that is not previously subject to approval under DA 376-8-2003, including proposed gas drainage wells (surface-to-inseam (SIS) and vertical pre-drainage wells); access roads and methane pipelines located within the Project Area (refer to Section 1.3). There is currently no proposed change to vertical post-drainage (goaf) wells as approved by DA 376-8-2003 and subsequently these activities have not been addressed within this Gas Drainage Management Plan. Figure 3 shows the locations of wells approved under the current approval, those wells that have been constructed generally in accordance with that approval, and those wells that are now planned to be moved and that are the principal subject of this management plan.

2.4 Project Overview

2.4.1 Project Area

The Project Area for this Gas Drainage Management Plan (refer to Figure 4) has been conservatively defined using a buffer of 100m from the extents of existing approved and proposed vertical pre-drainage wells, associated access roads and methane pipelines. A buffer of 50m has also been included on either side of the expected access tracks associated with the SIS wells. These buffers have been included for the assessment of potential environmental constraints beyond the proposed disturbance areas in the event that changes to the gas drainage layout may be required. Changes to the gas drainage layout may result due to a number of operational constraints including mining conditions (e.g. identification of geological structures, higher than expected gas content associated with the coal seams), the effectiveness of various gas drainage configurations, and potential identification of additional environmental constraints (e.g. Aboriginal heritage and ecology).
Uncontrolled unless viewed on the intranet
2.4.2 Land Ownership

The land ownership associated with the Project Area is shown in Figure 5. The Project Area is located within Mining Lease (ML) 1547 which is held and operated by BCM.

The proposed gas drainage layout has been designed to avoid private property and all proposed infrastructure associated with this Gas Drainage Management Plan will be located on land owned by the BJV.

2.4.3 Land Use

The Project Area is located entirely within the Bulga Coal Development Consent and ML boundary and is currently utilised for mining and agricultural purposes. Vegetation within the Project Area is dominated by pasture and woodland species. Predominant land uses include underground coal mining, viticulture, grazing and rural-residential holdings (refer to Figure 5).

The proposed gas drainage infrastructure will predominantly be located on land already largely disturbed by the abovementioned land uses, in particular, land that has been previously cleared, grazed or subject to mining activities.

2.4.4 Approved Gas Drainage Operations

Bulga Underground operates under development consent DA 376-8-2003 in accordance with the Bulga Coal Continued Underground Operations Environmental Impact Statement (Umwelt 2003), for mining four seams (Whybrow, Blakefield, Glen Munro and Woodlands Hill). The Environmental Impact Statement (EIS) identified that methane would need to be drained from mine workings in the Blakefield, Glen Munro and Woodlands Hill seams to maintain a safe working environment, using a combination of pre- and post-mining gas drainage techniques. The EIS identified that methane would be drained from the coal seams and goaves via boreholes connected to gas drainage plants on the surface. The methane would be converted to carbon dioxide by combustion (flaring) unless a beneficial use could be found for the gas.

In October 2007 the consent was modified (Mod 3) to allow additional gas drainage infrastructure for the Blakefield South Mine. Mod 3 included the commencement of gas drainage at Bulga Underground by SIS drilling techniques.

The consent was again modified in July 2010 (Mod 4) to include the following:

i. Installation and operation of 8 gas-fired reciprocating engine electrical generator units (with associated infrastructure) generating up to 25 megawatt (MW) of gas fired power generation from the methane capture by pre- and post-mining drainage of the approved Blakefield South Mine as well as the future Glen Munro and Woodlands Hill seams as mining progresses; and

ii. Construction and operation of a pilot ventilation air methane (VAM) abatement system;

In October 2013 the development consent was further modified (Mod 5) under Section 75W of the EP&A Act. Operations approved under Mod 5 include the realignment of the previously approved Blakefield North Mine longwall layout, increased gas drainage infrastructure including increasing the total power generation to 41MW and relocation of mine ventilation fans. Increased gas drainage as approved by Mod 5 includes SIS gas wells, vertical wells (both pre- and post-mining) and associated buried pipelines, drill pads, power lines and access roads. This included up to four SIS gas wells for each longwall and between 6 and 20 vertical wells per longwall (based upon similar measures undertaken at the Blakefield South Mine), as shown in Figure 3. The relationship between the overlying mined Whybrow seam and the proposed mine plan for Blakefield North, and the proposed gas drainage infrastructure is shown in Figure 6.
2.4.5 Overview of Current Gas Drainage Operations

Gas drainage operations undertaken by the Bulga Underground consist of a pre-mining system and a post-mining (goaf) system. The function of the pre-mining gas drainage infrastructure is to reduce in-situ gas levels to permit safe development of underground roadways. The pre-mining system utilises a combination of SIS drilling and conventional vertical drilling. SIS drilling comprises long horizontal holes drilled within the coal seam along the length of the longwall block. Combined with the use of vertical pre-drainage wells which intersect with the horizontal in-seam well, gas drainage is able to be conducted from the surface, providing a safer working environment and more efficient mining. Methane gas flows out of the coal seam under reservoir pressure through these gas wells into the buried pipeline system, before being piped to the Pre-drainage Flaring Facility and 9MW gas-fired power station, where it is burned and converted to carbon dioxide.

The function of the post-mining (goaf) system is to allow high longwall extraction rates while maintaining compliance with gas content regulations in the longwall return roadway. Vertical post-mining wells are drilled and installed prior to mining, however gas extraction does not occur until the methane becomes liberated by the goaf. The gas is removed under suction to prevent it entering nearby mine workings. The gas is also collected through the buried pipeline system and is flared at the Post-drainage Flaring Facility.

More effective pre-drainage has enabled a higher proportion of seam methane to be captured for flaring, rather than flowing into the mine ventilation circuit and subsequently venting into the atmosphere. The Bulga Underground has a pilot VAM abatement system designed specifically to reduce greenhouse gas emissions from the mine ventilation air; however there is considerable trialling and development required prior to the connection of the pilot system to the mine ventilation system. It is proposed that the pilot VAM abatement system will be trialled with diluted methane from the gas drainage. The location of gas flaring facilities, the 9 MW power plant and VAM abatement system are shown on Figure 2.

In January 2014 construction started on vertical wells approved under the 2013 modification. Work concentrated on the wells needed to drain the Blakefield North Longwalls 1 & 2 first. The locations changed somewhat from the indicative locations included in the Blakefield North Environmental Assessment, mainly to adjust to land availability ownership. Work also commenced on the SIS drill sites, with a significant reduction in total sites because the plan is to reduce cost and impacts by drilling more angled holes from less locations.

For the sake of clarity, both the approved and planned sites have been included in this management plan and associated figures. That way this plan encompasses all activities for gas drainage in Blakefield North and does not exclude what is already approved in that area.

2.4.6 Future Blakefield North Gas Drainage Infrastructure

Bulga Underground proposes to construct and operate a revised pre-mining gas drainage layout for the approved Blakefield North Mine. This Gas Drainage Management Plan is seeking approval from the DP&E for the following future gas drainage infrastructure:

i. To construct and operate 15 vertical pre-mining gas drainage wells (VW44 – VW58), that have either significantly moved since Mod 5 or that are extra to the original design;

ii. To construct and operate six contingency vertical pre-mining gas drainage wells (VW46A, VW47A, VW55A – VW58A) Although it is envisaged that these sites are contingency rather than extra, approval is sought for the worst case scenario where they are extra infrastructure; and

iii. To construct the associated methane pipelines, well enclosures, unsealed access roads and power lines leading to the gas wells. All infrastructures will be located to the west of Charlton Road.

The proposed future pre-drainage gas infrastructure has been designed to enable the effective and ongoing management of methane gas from both the Blakefield North Mine (Blakefield Seam), and where possible, the underlying Glen Munro Seam; to also address future interactions with the Bulga Optimisation Project (refer to Section 2.4.7); and adequately address the gas drainage requirements that have been identified through increased sampling of relevant coal seams during exploration activities since the approval of Mod 5.
It is expected that the construction and operation of the gas drainage infrastructure will commence in Q4 2014 and will conclude in early 2016. The proposed works will result in the following disturbance areas as previously assessed for Mod 5:

i. Vertical well pads will be approximately 40m x 40m;

ii. Infrastructure corridors to enable the trenching of methane pipelines and the construction of unsealed access tracks will be 30m during construction (if existing tracks are not already present), and the installation of overhead power lines; and

iii. 1 SIS well pad approximately 100m x 100m.

There are currently no proposed changes to the vertical post-mining (goaf) system as approved by DA 376-8-2003, and therefore the location, installation and cumulative impacts of this infrastructure remain the same as the assessments that supported the 75W modification in November 2012.

2.4.7 Interaction with the Bulga Optimisation Project

In April 2013 Bulga Coal Management Pty Ltd submitted an EIS to the former Department of Planning and Infrastructure seeking development approval under Part 4 of the EP&A Act for the Bulga Optimisation Project. The EIS was placed on Public Exhibition during May and June 2013. Following the receipt of submissions Bulga Coal Management Pty Ltd submitted a document titled Response to Submissions and Revised and Amended Project Application Assessment Report (RTS) in August 2013. The RTS responded to the issues raised during the exhibition and also included a number of amendments to the Bulga Optimisation Project which resulted in a reduced disturbance footprint. Pending approval, the Bulga Optimisation Project will allow the Bulga Open Cut to continue open cut mining operations at existing rates of production from Bulga Coal until approximately 2035. Bulga Optimisation Project was approved in December 2014.

The Bulga Optimisation Project will result in the establishment of an out of pit emplacement area along the western and southern limits of the open cut operations which has been designed to reduce associated noise and visual impacts. This emplacement area, referred to as the Noise and Visual Bund would be established to the east of Charlton Road and above the Blakefield North Mine. Figure 7 illustrates the locality of the SIS wells within the Project Area, in relation to the expected establishment of the Noise and Visual Bund at the end of 2015.

2.4.8 Justification

The proposed future gas drainage infrastructure is required to effectively manage methane gas levels within the Blakefield Seam for the approved but yet to commence Blakefield North Mine, and future mining within the underlying Glen Munro Seam. The proposed activities will provide a safe working environment within the underground workings and will reduce greenhouse gas emissions from the Bulga Underground through the flaring (combustion) or potential beneficial reuse of methane gas for power generation.

3 Regulatory Requirements

3.1 Legislative Requirements

Legislation applicable to the preparation and effective implementation of this Gas Drainage Management Plan includes but is not limited to the following:

i. EP&A Act;

ii. Mining Act 1992;

iii. Protection of the Environment Operations Act 1997 (POEO Act);

iv. Water Act 1912;

v. Water Management Act 2000;

vi. Threatened Species Conservation Act 1995 (TSC Act); and

3.2 Project Approval Conditions

DA 376-8-2003 (as modified) includes a number of conditions relevant to the preparation and implementation of this Gas Drainage Management Plan. Conditions relating specifically to the preparation of this Gas Drainage Management Plan have been summarised in Table 1. This table also outlines the sections where these conditions have been addressed within this document.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Condition Requirement</th>
<th>Section Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule 4, Condition 7D</td>
<td>The Applicant shall ensure that all gas drainage pipelines (other than connection points, monitoring points, dewatering facilities, regulation or isolation points) between gas drainage plants are buried, unless otherwise agreed with the relevant landowner or unless burial is inappropriate for safety or other reasons, to the satisfaction of the Director-General.</td>
<td>This document</td>
</tr>
<tr>
<td>Schedule 4, Condition 7E</td>
<td>The Applicant shall prepare and implement a Gas Drainage Management Plan in respect of construction and future use of gas drainage infrastructure (i.e. gas drainage not subject to any approval at the date of approval of Modification 5) to the satisfaction of the Director-General. This plan must be submitted to the Director-General for approval prior to the construction and operation of any future gas drainage infrastructure and must include details of the Applicant’s commitments regarding:</td>
<td>This document</td>
</tr>
<tr>
<td>(a) Community consultation;</td>
<td>Section 4.0</td>
<td></td>
</tr>
<tr>
<td>(b) Landholder agreements;</td>
<td>Section 4.4</td>
<td></td>
</tr>
<tr>
<td>(c) Assessment of noise, air quality, traffic, biodiversity, heritage, public safety and other impacts in accordance with approved methods;</td>
<td>Sections 5.0 – 5.12</td>
<td></td>
</tr>
<tr>
<td>(d) Avoidance of significant impacts and minimisation of impacts generally;</td>
<td>Sections 6.0 – 6.12</td>
<td></td>
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<tr>
<td>(e) Beneficial re-use or flaring of drained hydrocarbon gases, wherever practicable;</td>
<td>Sections 2.4.5 and 2.4.6</td>
<td></td>
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<tr>
<td>(f) Achievement of applicable standards and goals;</td>
<td>Sections 5 and 6</td>
<td></td>
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<tr>
<td>(g) Mitigation and/or compensation for significant noise, air quality and visual impacts (including minimising visibility of infrastructure from public roads); and</td>
<td>Sections 3.0, 4.4 and 6</td>
<td></td>
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<tr>
<td>(h) Rehabilitation of disturbed sites.</td>
<td>Section 7</td>
<td></td>
</tr>
<tr>
<td>Schedule 4, Condition 28B</td>
<td>The Applicant shall ensure that gas drainage well construction (except drilling of surface to in-seam wells) is conducted only between 7.00am and 6.00pm Monday to Friday and between 8.00am and 1.00pm Saturdays, unless noise impacts comply with the Noise Impact Criteria in Table 13 of Condition 30 of Schedule 4.</td>
<td>Section 6.2</td>
</tr>
<tr>
<td>Schedule 4, Condition 49A</td>
<td>The Applicant shall prepare and implement a Construction Traffic Management Plan for the development to the satisfaction of the Director General.</td>
<td>Section 6.2</td>
</tr>
</tbody>
</table>
This plan must

a) Be prepared in consultation with Council and RMS and submitted to the Director General before the commencement of gas drainage well constructions;

b) Detail the management of light and heavy vehicle movements associated with gas drainage well construction under Modification 5;

c) Identify overlaps with any other mine related construction projects in the area; and

d) Employ measures to minimise the impact of gas drainage well construction traffic on the network including measures to restrict the hours of heavy vehicle movements to avoid road use conflicts.

Schedule 4, Condition 51

The Applicant shall minimise the potential visual impacts associated with locating and constructing the proposed gas plants, and gas and dewatering bores on site to the satisfaction of the Director-General.

### 3.3 Mining Tenement Conditions

All proposed gas drainage operations within the Project Area are located within ML 1547. This mining tenement includes a number of conditions relating to the management and rehabilitation of land at Bulga Coal. Conditions relevant to the preparation of this Gas Drainage Management Plan have been provided in Table 2.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Condition Requirement</th>
<th>Section Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 18</td>
<td>The lease holder shall not interfere in any way with any fences on or adjacent to the subject area unless with the prior written approval of the owner thereof or the Minister and subject to such conditions as the Minister may stipulate.</td>
<td>Section 4.4</td>
</tr>
<tr>
<td>Condition 21</td>
<td>If so directed by the Minister, the lease holder shall rehabilitate to the satisfaction of the Minister any lands within the subject area which may have been disturbed by the lease holder</td>
<td>Section 7</td>
</tr>
<tr>
<td>Condition 22</td>
<td>Upon completion of operations on the surface of the subject area or upon the expiry or sooner determination of this authority or any renewal thereof, the lease holder shall remove from such surface such buildings, machinery, plant, equipment, constructions and works as may be directed by the Minister and such surface shall be rehabilitated and left in a clean, tidy and safe condition to the satisfaction of the Minister.</td>
<td>Section 7</td>
</tr>
<tr>
<td>Condition 23</td>
<td>If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by mining or prospecting operations whether such</td>
<td>Sections 7</td>
</tr>
<tr>
<td>Condition 25</td>
<td>The lease holder shall provide and maintain to the satisfaction of the Minister efficient means to prevent contamination, pollution, erosion or siltation of any river, stream, creek, tributary, lake, dam, reservoir, watercourse or catchment area or any undue interference to fish or their environment and shall observe any instruction given or which may be given by the Minister with a view of preventing or minimising the contamination, pollution, erosion or siltation of any river, stream creek, tributary, lake, dam, reservoir, watercourse or catchment area or any undue interference to fish or their environment.</td>
<td>Section 6.9 - 6.11</td>
</tr>
</tbody>
</table>
3.4 Environmental Protection Licence

Bulga Coal currently operates under Environmental Protection Licence (EPL) 563, which is renewed annually on 29th July. The licence covers the scheduled activities of ‘mining for coal’ and ‘coal works’ and applies to both the Bulga Underground and Bulga Open Cut.

EPL 563 outlines air quality, blasting and surface water monitoring criteria. EPL 563 also enables discharges off-site in accordance with the Hunter River Salinity Trading Scheme (HRSTS). Monitoring is reported to the Environment Protection Authority (EPA) as part of the Bulga Coal EPL Annual Return.

4 Stakeholder Consultation

Bulga Coal undertakes stakeholder consultation in accordance with the Annual Bulga Coal Stakeholder Engagement Strategy. The following approaches to stakeholder engagement are used to promote the effective and timely communication of relevant information to the identified stakeholders for this Gas Drainage Management Plan.

4.2 Stakeholder Identification

The following stakeholders have been identified, and will be considered during the implementation of this Gas Drainage Management Plan:

i. Directly affected landholders/occupiers;

ii. The Bulga Coal Community Consultative Committee (CCC);

iii. Nearby neighbours;

iv. Further afield, local community members: Broke, Bulga and Milbrodale;

v. DP&E;

vi. Singleton Council; and

vii. Bulga Underground personnel and contractors.

4.3 Stakeholder Consultation Strategy

Consultation with the identified stakeholders (refer to Section 3.1) will be undertaken in accordance with the stakeholder engagement strategy provided in Table 2.

Table 2 Stakeholder Consultation Strategy

<table>
<thead>
<tr>
<th>Condition</th>
<th>Condition Requirement</th>
<th>Section Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directly affects landholders/occupiers</td>
<td>• Face to face meetings;</td>
<td>July/August 2014 (ongoing)</td>
</tr>
<tr>
<td></td>
<td>• Community newsletter;</td>
<td>July 2014</td>
</tr>
<tr>
<td></td>
<td>• Community barbeque;</td>
<td>July/August 2014</td>
</tr>
<tr>
<td></td>
<td>• Ongoing communications.</td>
<td>Regular communications throughout life of gas drainage activities (if requested)</td>
</tr>
<tr>
<td>Bulga Coal CCC</td>
<td>• CCC Meeting;</td>
<td>May/October 2014</td>
</tr>
<tr>
<td></td>
<td>• Community newsletters;</td>
<td>July 2014</td>
</tr>
<tr>
<td></td>
<td>• Community barbeque.</td>
<td>July/August 2014</td>
</tr>
<tr>
<td>Nearby neighbours</td>
<td>• Community newsletters;</td>
<td>July 2014</td>
</tr>
<tr>
<td></td>
<td>• Community barbeque;</td>
<td>July/August 2014</td>
</tr>
<tr>
<td></td>
<td>• Ongoing communications.</td>
<td>Regular communications</td>
</tr>
</tbody>
</table>
### 4.4 Landholder Access Agreements

Within the current design for Blakefield North there are no plans for gas drainage infrastructure on private land. If this were to change in the future, then BUO will develop Agreements with all landholders whose property will be accessed to construct, operate and rehabilitate the gas drainage infrastructure within the Project Area. These agreements will be adhered to by all personnel and contractors during the gas drainage works. The agreement will include details of the following:

i. The location and size of Blakefield North gas drainage infrastructure to be located on the property (including a locality figure);

ii. Any specific conditions to be adhered to by Bulga Underground at the request of the landholder;

iii. Procedures for dispute resolution; and

iv. Details of any agreed compensation to the landholder.

Bulga Underground will not interfere in any way with any fences on or adjacent to the Project Area unless they receive prior written approval of the landowner.

### 4.5 Complaints Procedures

Community complaints received by Bulga Coal are managed according to Section 3.39 of the Bulga Coal Environmental Management Strategy. Complaints pertaining to Blakefield North Gas Drainage works will be circulated and actioned by the responsible party. In summary the procedures and protocols are as follows:

i. Depending upon the nature of the complaint, a revision to the procedures may be required to avoid similar complaints;

ii. Actions required in response to complaints are to be effected in a timely manner. The response to complaints shall be communicated to the complainant by the responsible party via a formal letter; and

iii. A register of all of the complaints, actions and responses will be kept and reported in the AEMR.

### 5 Environmental Assessment

In October 2013 the Bulga Underground development consent DA 376-8-2003 was modified (Mod 5) under Section 75W of the EP&A Act. The application to modify the consent was supported by the Environmental Assessment (EA) titled Proposed Modification to DA 376-8-2003 under Section 75W of the EP&A Act 1979 Blakefield North Underground Mine Project (GSS Environmental 2012a). The EA included the preparation of technical reports to examine potential consequences that may occur as a result of the Blakefield North Underground Mine Project (the Project). The associated technical reports relevant to this Gas Drainage Management Plan include the following:

i. Environmental Noise Assessment (Global Acoustics 2012);

ii. Aboriginal Heritage Assessment (OzArk 2012);

iii. Ecological Assessment (Umwelt 2012);
iv. Visual Impact Assessment (Terras Landscape Architects 2012);
v. Traffic Impact Assessment (GHD 2012);
vi. Air Quality and Greenhouse Gas Assessment (Todoroski Air Sciences 2012); and

Other aspects relevant to the preparation of this Gas Drainage Management Plan that were addressed within the EA by GSS Environmental include groundwater; surface water; and soil and land capability.

Following the confirmation of the proposed gas drainage infrastructure for this Gas Drainage Management Plan it was identified that the modified layout (including minor aspects of the Project Area had not previously been subject to field assessment and changes regarding the proximity of infrastructure to sensitive receptors) and that they would warrant the preparation of additional technical assessments for potential consequences associated with the construction and operation of gas drainage infrastructure within the Project Area. Additional assessments prepared to support this Gas Drainage Management Plan include the following:

i. Environmental Noise Assessment (Global Acoustics 2014);

ii. Constraints and Opportunities Analysis – Aboriginal Archaeological Values (OzArk 2014); and

iii. Biodiversity Assessment (SLR 2014).

The minor nature of potential consequences resulting from the construction and operation of gas drainage infrastructure within the Project Area such as air quality; greenhouse gas; visual amenity; traffic; agriculture; groundwater and surface water remain largely unchanged from those approved by the former DP&I in October 2013 for the Project.

A summary of the predicted environmental consequences associated with the construction and operation of future gas drainage infrastructure within the Project Area has been provided in Sections 5.2 – 5.12.

5.2 Noise

An environmental noise assessment was prepared by Global Acoustics to investigate operational noise, construction noise, low frequency noise and potential sleep disturbance associated with the proposed gas drainage infrastructure within the Project Area. A copy of this report is included in Appendix A.

Management of construction noise is outlined in BSM SD PLN 0126 BFN Contruction Noise Management Plan.
5.3 Aboriginal Heritage

An Archaeological assessment was prepared by OzArk to investigate potential consequences to Aboriginal cultural heritage resulting from the construction of the proposed gas drainage infrastructure. A copy of the report is included in Appendix B. The location of known Aboriginal cultural heritage sites within the Project Area is shown in Figure 8.

The report outlines the following:

i. Approximately 149 hectares (ha) of the 241.4 ha Project Area is either previously unassessed or has not undergone assessment within the past 10 years;

ii. Approximately 144.5 ha of the Project Area has been previously assessed; sometimes more than once;

iii. There are no known extant Aboriginal sites within the Project Area; and

iv. It was concluded that should there be Aboriginal sites located within the Project Area that they are likely to be low-density artefact scatters or isolated finds.

OzArk (2014) concluded that portions of the Project Area should be subject to archaeological assessment under the Due Diligence Code as there are unassessed landforms that;

i. Are contiguous with other landforms where sites have been recorded; and

ii. Have had less historic disturbances to the ground surface when compared to other nearby landforms.

Of the 241.1 ha Project Area, it is has been determined that 109 ha (45% of the Project Area) requires no further assessment as these portions of the Project Area have been assessed more recently either by the assessment titled Aboriginal Archaeological Values Assessment, Bulga Optimisation Project (OzArk 2013) or by the report titled Aboriginal Heritage Assessment, Proposed Modification to DA 376-8-2003 for the Blakefield North Underground Mine Project (OzArk 2012). Further Assessment was completed by OzArk for the revised location of HDD009 (OzArk 2015).

Recommended management measures to mitigate potential impacts upon Aboriginal cultural heritage have been outlined in Section 6.3 with the impacts having been assessed as low.

5.4 Biodiversity

A Biodiversity Assessment was prepared by SLR to investigate potential consequences to threatened flora, fauna and vegetation communities within the Project Area. This included fieldwork to map vegetation communities within aspects of the Project Area that were not previously assessed by Umwelt (2012) for the Project. A copy of this report is included in Appendix C.

The assessment found that the gas drainage infrastructure is proposed to be constructed within areas of predominately disturbed grassland paddocks, crops and vineyards, and that some construction will result in clearing small areas of native vegetation. The vegetation communities, shown in Figure 8, will be:

i. Central Hunter Grey Box – Ironbark Woodland;

ii. Central Hunter Bulloak Forest Regeneration; and

iii. Central Hunter Swamp Oak Forest.

The Central Hunter Grey Box – Ironbark Woodland community is listed as an Endangered Ecological Community (EEC) in the TSC Act. A total of 1 ha of Central Hunter Grey Box – Ironbark Woodland will require to be cleared.

No threatened species of flora or fauna listed under the TSC Act or the EPBC Act have been detected within the Project Area (refer to Figure 8). The only fauna species that would be
likely to utilise the Project Area would be highly mobile bird and bat species. There is no likelihood that individuals of any such species would be dependent upon the Project Area in isolation.

The Biodiversity Assessment (SLR 2014) concluded that the planned removal of vegetation from the Project Area is not considered likely to impose any substantial adverse effects on native flora and fauna, given:

i. The small area of native vegetation to be disturbed;
ii. The presence of larger, more intact stands of native vegetation adjacent to the Project Area;
iii. The modified nature of the site and the low quality of habitats present (and hence the limited diversity and abundance of native fauna); and
iv. The assemblage of flora and fauna within the Project Area comprises species that are widespread and common across the Hunter Valley and Sydney Basin bioregion.

Recommended management measures to mitigate consequences to local flora and fauna have been outlined in Section 6.4 with affects having been assessed as low.

There are no vegetation communities listed as being threatened under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) in the Project Area.

5.5 Visual Impact

Changes to the location and number of gas wells have not changed enough from the currently approved layout to warrant a new visual impact assessment. A Visual Impact Assessment (Terras Landscape Architects) was prepared in 2012 to assess the potential changes to visual amenity that would result from the Blakefield North Project, including increased gas drainage. A summary of that assessment has been provided below.

The SIS wells and drill pads will be located at the eastern end of the longwall panels on land owned by the mine. These wells are located near the highwall of the Bulga Open Cut within an area which has a low scenic quality rating (mainly arising from the amount of disturbance caused by previous mining activities). Therefore, there would be no further loss of scenic quality resulting from the installation of the proposed wells.

The proposed gas wells above the longwalls would be most visible when they are located on the western side of Charlton Road, especially when sited in open pastures. The visual impact of the proposed gas drainage wells would be most obvious during construction (due to the presence of drilling rigs and noise attenuation barriers). However, the construction phase is temporary and has previously been managed successfully by Bulga Underground at the Blakefield South and Beltana No. 1 Underground Mines. This has included streamlining operations to minimise construction times, providing screening and undertaking rehabilitation as soon as practically possible.

The visual impact of the gas wells would be temporary as they are usually in place for two to four years to extract gas during the development and mining of each mining panel. Following this, rehabilitation works would be progressively undertaken returning the affected areas to their pre-mined condition. Overall, the change in visual amenity from the gas drainage wells would be around 9-10 years which includes an allowance for the rehabilitation works to take effect. However, the access tracks would remain, where necessary, to provide for future gas drainage infrastructure needed to mine subsequent seams in the same mining area until completion of mining in 2031.

The Visual Impact Assessment concluded that the proposed gas drainage infrastructure produced a low to insignificant impact on the local visual environment either as individual elements or as a collective group in the long term. These impacts can be readily addressed with appropriate siting and the use of tree planting in selected locations, or unobtrusive screens or fencing.
Further it is noted that the proposed gas drainage layout has resulted in a reduction to the number of SIS wells and a small increase in vertical pre-mining gas drainage wells required for the Blakefield North Mine since the approval of Mod 5. Nevertheless, the revised layout has resulted in some vertical pre-drainage wells being located on low lying open pastures in proximity to private properties (refer to Figure 5).

The changes to visual amenity associated with the construction and operation of gas drainage infrastructure within the Project Area are considered consistent with those previously assessed and approved for Mod 5. The impacts will be mitigated by Bulga Underground through the implementation of the management measures outlined in Section 6.5.

### 5.6 Traffic

The location and number of gas wells have not changed enough from the currently approved layout to warrant a new traffic assessment. A Traffic Impact Assessment was prepared by GHD (2012) to assess the potential effects of the Project upon traffic. The assessment concluded that mitigation measures would not be required for operational activities as the critical period of the Project comprises the overlapping of certain construction activities over around a 6 month period. Minimal traffic is generated during operations which are ongoing activities. The assessment also outlined that prior to the commencement of construction, a Construction Traffic Management Plan would be prepared and implemented to minimise impacts on the intersection of Broke Road and the Golden Highway.

In 2013 the Blakefield North Longwalls 1 and 2 Construction Traffic Management Plan (Construction Traffic Management Plan) was prepared by GHD, after consultation with Singleton Council, to satisfy Schedule 4, Condition 49A of DA 376-8-2003. The Construction Traffic Management Plan was prepared to assess traffic movements associated with the construction and operation of gas drainage wells for Blakefield North Longwalls 1 and 2. The document found that:

1. Traffic volume and composition (light and heavy vehicles) can be readily accommodated within the existing road network;
2. The times of operation proposed by the contractor for all activities associated with the gas drainage are suitable for the operation of the road network. They do not coincide with the road network peak hours;
3. The northern and eastern routes for access the egress from the site are suitable. An alternative for the northern route via Putty Road could be used in part or full; and
4. There are no known developments that could compound impacts associated with the gas drainage works.

GHD concluded that the proposals for the construction of enabling and drilling works can be undertaken as currently proposed by the contractor without specific restriction, however controls are to be implemented for the duration of work. The recommended controls have been outlined in Section 6.6.

### 5.7 Air Quality

Changes to the location and number of gas wells have not changed enough from the currently approved layout to warrant a new air quality assessment. An Air Quality and Greenhouse Gas Assessment was prepared by Todoroski Air Sciences (2012) to assess the potential impacts upon air quality that may result from the Project. This assessment outlined that the primary emissions from the construction phase of the Project would be dust and particulate matter occurring from the following activities:

1. Vegetation clearing and earthmoving during site preparation for surface activities;
ii. Drilling of gas drainage wells and gas drainage pad preparation works;

iii. Stockpiling of excavated material;

iv. Haulage of excavated material and movement of heavy plant and machinery within the site;

v. Graders/scrapers involved in the construction of the access roads to the gas drainage infrastructure; and

vi. Wind erosion from exposed ground.

The assessment noted that the construction phase would be short and relatively small scale in nature. The report concluded that construction impacts could be effectively controlled through commonly applied dust management measures (refer to Section 6.7). There has been no significant change to the proposed gas drainage activities and subsequently there is not expected to be any increase to air quality impacts from the proposed construction and operation of the future gas drainage infrastructure.

5.8 Greenhouse Gas

The volume of methane to be extracted has not changed sufficiently from the currently approved layout to warrant a new greenhouse gas assessment. An assessment of the potential for the Project to increase in the generation of greenhouse gases emitted to the atmosphere was undertaken by Todoroski Air Sciences (2012). The assessment demonstrated that the Project would in fact result in a significant reduction in greenhouse gas emissions through the capture and combustion of methane gas (or potential beneficial reuse).

The proposed future gas drainage layout for this Gas Drainage Management Plan will maintain the effective drainage of methane gas from the coal seams. This gas will then be converted to carbon dioxide through flaring or following the completion of construction may be beneficially utilised by the 9 MW power plant or the pilot VAM abatement system.

As the existing and proposed Bulga Underground gas drainage activities result in a reduction to the total greenhouse gas emissions no recommended management measures are required.

5.9 Land Use, Soils and Agriculture

Changes to the location and number of gas wells have not changed enough from the currently approved layout to warrant a new agricultural impact assessment. An Agricultural Impact Statement was prepared by GSS Environmental (2012b) to assess the consequences of the Project on the agricultural resources of the locality and region. The assessment outlined that the Project would result in ongoing disturbance and handling of soils both above the proposed underground mining areas and the areas within and around the proposed surface infrastructure locations. These works have the potential to cause erosion and result in sediment export from disturbance areas if appropriate controls are not implemented. Disturbance activities that pose a risk of accelerating natural erosion processes include vegetation clearance, track construction, plant and pipeline construction.

The Agricultural Impact Assessment (GSS Environmental 2012b) assessed that the Project would result in the disturbance (temporary removal from agriculture) of a relatively small area of 30.3 ha. This equates to 11.8 ha of the mapped Strategic Agricultural Land (SAL) in the Draft Upper Hunter Strategic Regional Land Use Plan (NSW Government 2012). In the wider Broke-Fordwich Region (which contains approximately 22,569 ha of SAL) the area impacted by disturbance associated with the Project represents 0.05% of mapped SAL. Based upon the expected disturbance areas associated with gas drainage infrastructure within the Project Area (refer to Section 1.4.3), there is now expected to be approximately 29.9 ha of SAL disturbed. This represents an increase of 18.6 ha. However, once the well sites and tracks...
are no longer needed and are decommissioned the disturbed areas will be returned to the same agricultural land use class as prior to construction.

As shown on Figure 5, all gas drainage infrastructures in the Project Area are planned to be built on land owned by BCM. Following successful rehabilitation the disturbed areas will return to similar agricultural production with similar agricultural land capability, as before the gas drainage infrastructure was installed. On this basis there will be no net changes to the overall land capability within the Project Area.

Whilst there is a predicted minor increase in the areas disturbed, it is considered that the potential effects upon agricultural resources resulting from the gas drainage infrastructure are consistent with the impacts assessed by GSS Environmental (2012b) which was assessed as low. Bulga Underground will undertake the management of land within the Project Area in accordance with relevant site environmental management plans as outlined in Section 6.9.

5.10 Groundwater

Groundwater in-flows from pre drainage gas wells for the Blakefield South Mine have been generally less than 3ML/yr per well. This groundwater make is metered and reticulated into the Bulga Coal Integrated Water Management System. These groundwater draws do not represent an increase in overall groundwater yield to the Bulga Underground as the wells actually dewater the target coal seam thus reducing the overall yield to the working/dewatering bores. Bulga Underground currently holds licenses for greater than the total groundwater extracted from the mining and gas drainage activities undertaken on the site.

5.11 Surface Water

The location of watercourses in proximity to the Project Area has been shown in Figure 9. There are no major creeks or watercourses located within the Project Area. There are a number of ephemeral drainage lines that cross the Project Area.

Construction of the proposed surface infrastructure and associated surface water runoff has the potential to impact on water quality in Wollombi Brook, however with the implementation of the existing water management and sediment/erosion control systems the potential for the proposed gas drainage infrastructure to contribute to adverse water quality impacts on these creek systems is considered low.

5.12 Public Safety

The construction of the proposed SIS wells will be undertaken within areas of the site which are fenced and sign posted as ‘no public access’, with padlocked gates. These boundary fences and gates are monitored daily by contract security personnel.

The construction of pre-drainage vertical wells, HDD009 and associated access roads and methane pipelines will be undertaken on land owned by BCM. Every effort will be made to prevent unauthorised access to construction sites, including the installation of temporary security fencing around wells Heads during construction. The completed installations will have fenced and locked compounds with security cameras in place.

If any activities take place on private property, they will be conducted according to a Landholder Access Agreement that will include conditions for restricting landholder access to areas of the property where mine infrastructure has been constructed.

It is considered that potential risks to public safety during the construction of gas drainage infrastructure can be adequately managed through the implementation of activities in accordance with the Bulga Coal Safety Management System. BUO has had gas
infrastructure in proximity to public areas for some years and believe that the exposure at Blakefield North is no greater.

6 Mitigation Measures

Bulga Coal operates within a comprehensive Environmental Management System (EMS). This includes a wide range of environmental management plans and procedures which have been developed by Bulga Coal in accordance with conditions of DA 376-8-2003 (as amended), ML conditions, SMPs, EPL 563 and Glencore Corporate standards. This system includes water, noise and air quality management; visual mitigation; land rehabilitation; and subsidence remediation. These plans are updated on a regular basis and are backed by an environmental monitoring network including meteorological, air quality, water quality, noise and subsidence monitoring. The existing environmental management plans outline environmental performance standards for the operations and are available on the Bulga Coal website (www.bulgacoal.com.au).

The management measures outlined below in Sections 6.2 – 6.12 are in accordance with relevant existing Bulga Coal environmental management plans.

6.2 Noise

Noise is managed in accordance with the approved BSM SD PLN 0126 BFN Construction Noise Management Plan.

6.3 Aboriginal Heritage

OzArk identified that there were no Aboriginal sites known to exist within the Project Area (refer to Figure 8), however the desktop assessment also identified that there were areas within the Project Area that had not been subject to previous assessment or field inspections. Accordingly, Bulga Underground will implement the following management measures as recommended by OzArk.

a) The following management recommendations will be considered and followed wherever possible in accordance with the status of the areas as indicated on Figure 8, as follows:

Further archaeological assessment: The areas indicated for ‘further investigation’ will be assessed by a suitably qualified archaeologist under the terms of the Due Diligence Code to satisfy Glencore’s Due Diligence process in relation to Ground Disturbance Permits (GDPs).

Spot checks only: The areas indicated as ‘spot checks only’ will be assessed by a suitably qualified archaeologist under the terms of the Due Diligence Code to satisfy Glencore’s Due Diligence process in relation to GDPs.

No further survey required: Where the disturbance remain within the Project Area in the areas indicated in Figure 8 there are no further archaeological requirements relating to the proposed works. Notwithstanding, as per the Due Diligence Code, work may proceed with caution in these areas as long as if any Aboriginal objects are found, work is stopped and the site will notify the NSW Office of Environment and Heritage (OEH). If human remains are found, work will stop, the site will be secured and Bulga Underground will notify NSW Police and OEH.

b) Works including the excavation of trenches for gas pipelines and the construction of access tracks (but not for the installation of gas wells) is permissible in the area shown in Figure 7 of Appendix B under Aboriginal Heritage Impact Permit (AHIP) C0000331. Such works are to be completed before 21 May 2024. This AHIP covers all aspects of
the work and the fact that some of the sites have had their recorded locations corrected;

c) It is recommended that the disturbance footprint of any earthworks within the Project Area be fenced and signposted for the duration of work in those areas to avoid inadvertent impacts beyond the boundary of the Project Area;

d) Care should be taken to avoid the fenced area surrounding site BMU20 during the construction phase of access tracks in the vicinity;

e) All workers during the initial ground breaking phase of construction should be informed of Aboriginal heritage sites in the vicinity and their legislative protection under the NPW Act. This induction should include instruction not to excavate or store materials anywhere outside of designated areas within the Project Area.

f) In the unlikely event that human skeletal remains are unearthed during construction, work in the vicinity should cease immediately and the police be contacted. If the remains are deemed to be an archaeological deposit OEH should be contacted to discuss how to proceed.

6.4 Biodiversity

Bulga Underground will minimise effects upon local flora and fauna and the surrounding environment (as shown in Figure 9) during construction of the gas drainage infrastructure by applying the following mitigation measures as recommended by SLR (2014):

a) Access tracks and pipeline excavations will avoid trees and shrubs where possible, and will endeavour to follow routes of ‘least disturbance’;

b) Access roads, pipeline excavations and drill pads will be clearly marked with flagging tape and posts to contain works and minimise the disturbance area;

c) All erosion and sediment control works will generally be undertaken in accordance with the Blue Book (Landcom 2004 and DECC 2008) and the Bulga Coal Erosion and Sediment Control Plan (Bulga Coal Management 2013c);

d) Weed control in areas disturbed by gas drainage works will be implemented in accordance with Bulga Coal Flora and Fauna Management Plan (Bulga Coal Management 2013a).

e) Where works occur within EEC vegetation (at HDD07), measures to allow ‘rehabilitation and enhancement of woodland remnants’ will be implemented in accordance with the Flora and Fauna Management Plan (Bulga Coal Management 2013a). This will include the following measures where applicable:

i. Salvage of cut sections of tree stems and larger branches, for placement in adjoining areas of retained native vegetation (ground mammal habitat features);

ii. Where trees are seeding, seeding branches will be cut and retained for placement in adjoining bush land or use as ‘brushmatting’ in rehabilitation areas elsewhere within the colliery holding; and

iii. Collection of seed will be undertaken from any seeding native trees and shrubs prior to clearing, as part of the current seed collection program across the colliery holding.

In the event that there are changes to the proposed gas drainage layout shown in Figure 4:

a) A desktop analysis of ecological constraints will be undertaken to determine the need for site inspections for any new infrastructure/disturbance sites;

b) Pre-clearing inspections will be undertaken for any areas mapped as containing native woodland vegetation or derived grassland that were not previously inspected during the preparation of the Biodiversity Assessment (SLR 2014) (refer to Figure 9);
c) If necessary, any adjustments to drill pad, pipeline or access road locations within the assessed project area will be considered to avoid any ‘point location’ ecological constraints, such as habitat trees (i.e. containing nests, hollows, winter flowering gums) or burrows;

Bulga Coal conducts an annual ecological monitoring program in accordance with the *Flora and Fauna Management Plan* (Bulga Coal Management 2013a). This monitoring program has been designed to effectively monitor onsite revegetation, surrounding vegetation, species diversity and riparian habitat.

### 6.5 Visual Impact

Mitigation of impacts to visual amenity associated with gas drainage operations are undertaken by Bulga Underground in accordance with the *Visual Impact Procedure* (Bulga Underground 2014b).

Prior to the construction of any gas drainage wells, an assessment of the likelihood of the public being able to observe the infrastructure from any surrounding viewing location will be undertaken. The measures outlined below have been developed to make infrastructure less conspicuous within the landscape and may vary for specific infrastructure dependent upon the size of the facility as well as the nature of the potential visual impact:

a) Gas wells will be screened using one of the following methods, depending on their proximity to public view points:

   i. Wire caging will be used to enclose gas drainage wells that are located at a significant distance from public view points;

   ii. Photo decals or green Colorbond sheds may be used in proximity to public view points. These barriers will be supplemented with native vegetation planting to further increase the visual screen effect;

   iii. Locally sourced, endemic native tree and shrub species that are moderately fast growing may be used for screening instead of compounds. These will be non-fruiting plant species that will not attract frugivorous birds (encouraging frugivorous birds may increase predation of the local vineyard fruit). Mature trees may be sourced for plantings to accelerate the development of the visual screen; and

   iv. The final choice of screening will be influenced by consultation with near neighbours in the area, including consideration of the placement of visual screens; the required height; and the need for supplementary plantings.

### 6.6 Traffic

In accordance with Condition 49A of DA 376-8-2003, Bulga Underground will implement the recommendations of *Construction Traffic Management Plan* (GHD 2013) as listed below.

a) Contractor traffic (light and heavy) will use the Cessnock and Wollombi Roads when travelling through the Broke township;

b) Heavy vehicles passing on Fordwich Road and Cobcroft Road will be under positive radio communications, with the empty vehicles to pull over to the road verge so loaded vehicles can remain on the bitumen. All construction vehicles are to pull over for private vehicles;

c) Heavy vehicles passing at road intersections (Cobcroft/Charlton and Charlton/Broke) will be under positive radio communications, with empty vehicles giving way to loaded vehicles. Empty vehicles will remain 100m from intersection until the loaded vehicle has passed through the intersection;
d) Intersections at Charlton/Fordwich, Charlton/Cobcroft and Charlton/Broke are to have “Caution Trucks Turning” signs in place on all approaches for the duration of the works;

e) Internal tracks connecting to public roads will have 20m of coarse gravel to prevent mud an stone being tracked onto bitumen; and

f) Bulga Underground will arrange for pre and post construction visual inspections of the pavements of Cobcroft Road and Fordwich Road.

The inclusion of these recommendations in this plan supercedes the previous construction Traffic Management Plan.

6.7 Air Quality

Dust management controls already implemented at Bulga Coal, including those outlined in the Bulga Coal Air Quality Management Plan (Bulga Coal Management 2014f) will continue to apply to operations at the Bulga Underground and Bulga Open Cut. The following measures will be implemented by Bulga Underground to mitigate dust during the construction of gas drainage infrastructure:

a) Use of a water cart on all trafficable areas as required;

b) Cessation of dust generating activities during periods of high wind;

c) Delivery and removal of materials planned and coordinated to avoid unnecessary trips;

d) Dirt that has been tracked onto sealed roads will be cleaned as necessary;

e) The clearing of vegetation and topsoil would be limited to the designated footprint required for construction; and

f) All areas exposed for construction will be rehabilitated as soon as possible upon completion of works.

6.8 Greenhouse Gas

Management of greenhouse gas emissions at Bulga Underground is undertaken in accordance with the Bulga Underground Operations Greenhouse Gas Management Plan (Bulga Underground 2014c). Greenhouse gas emissions from Bulga Underground are mitigated through the successful implementation of the pre-mining and post-mining gas drainage systems (refer to Section 2.4.2). These systems are used to capture methane gas from underground mining activities, prior to the gas being flared and therefore converted to carbon dioxide. This process results in the significant reduction of greenhouse gas emissions as the global warming potential of methane is 21 times the carbon dioxide equivalent (CO₂-e) (Department of Climate Change and Energy Efficiency 2011).

Following the commissioning of the 9 MW power plant Bulga Underground will further reduce the greenhouse gas emissions from the operations through the beneficial reuse of methane gas. Once commissioned it is proposed that captured pre-drainage gas will be used to generate onsite power through the combustion of methane. This will reduce greenhouse gas emissions for the Bulga Underground by reducing the need for the outside purchase of electricity. Any pre-drainage gas in excess of the power generation capacity will be flared.

The pilot VAM abatement system is expected to be trailed with diluted methane from the gas drainage system in 2014. The function of the VAM abatement system is to oxidise the uncaptured methane in the mine ventilation stream. This process would result in further reductions in greenhouse gas emissions from the Bulga Underground by converting methane which would normally be emitted into the environment through the ventilation system into carbon dioxide and water vapour. Subject to the success of these trials consideration may be
6.9 Land Use, Soils and Agriculture

Management measures that will be implemented by Bulga Underground to mitigate potential impacts to agricultural resources will be undertaken in accordance with the Bulga Underground Mining Operations Plan (MOP) (Bulga Underground 2007), the Bulga Coal Landscape Management Plan (Bulga Coal Management 2011) and the Bulga Coal Erosion and Sediment Control Plan (Bulga Coal Management 2013c). The following measures will be undertaken by Bulga Underground during the construction, operation and rehabilitation of gas drainage infrastructure:

a) Conducting land clearing and installing erosion and sediment control measures in accordance with the Bulga Coal Erosion and Sediment Control Plan;

b) Appropriate storage of topsoil stockpiles (bunded or fenced) in areas away from roadways and other drainage lines;

c) Stockpiles which will be kept longer than three months are seeded immediately with a cover crop to reduce erosion and weed growth;

d) Care to reinstate the land to an agricultural land capability similar to prior to disturbance;

e) Use of diversion structures to separate ‘clean’ water runoff from disturbed areas runoff, to minimise volumes of sediment-laden water for management;

f) Implementation of an effective maintenance program for the site; and

g) Engaging a suitably qualified and experienced contractor to remove vineyards and associated infrastructure such as trellises and irrigation systems, if and as required.

6.10 Groundwater

Groundwater at Bulga Underground is managed in accordance with the Bulga Coal Site Water Management Plan (Bulga Coal Management 2013d). In accordance with the requirements of DA 376-8-2003 this plan includes a comprehensive groundwater monitoring program and a groundwater response plan. No further mitigation is required over and above what is already in place at the site.

6.11 Surface Water

The management of surface water consequences resulting from the construction of gas drainage infrastructure will be managed in accordance with the Bulga Coal Erosion and Sediment Control Plan (Bulga Coal Management 2013c) and the Bulga Coal Site Water Management Plan (Bulga Coal Management 2013d). These management plans include a surface water monitoring program and surface water response plan.

Erosion and sediment control measures will be used in areas disturbed by installing gas infrastructure, to prevent soil erosion from, and to trap any sediment prior to, leaving the disturbance zones. Inspections will be carried out to check the effectiveness of erosion and sediment control structures are maintained. Additional stabilisation works for these areas may include reshaping, amelioration of dispersive soil, revegetation, fencing, and weed control.

6.12 Public Safety

Bulga Coal implements a variety of control strategies to minimise the potential for public safety incidents at the site. These include the implementation of the following:
a) Implementation of a security system for public and employee safety during all aspects of the operation. These systems and procedures have been established in accordance with the relevant requirements under the Coal Mines Regulation Act 1982, Occupation Health and Safety Act 1983, Mining Act 1992 and conditions stipulated in the relevant mining tenements;

b) Management of public safety associated with underground mining activities is undertaken in accordance with the approved Blakefield South Longwalls 1 – 6 Surface and Public Safety Subsidence Management Plan (Bulga Underground 2012);

c) Use of the Damstra electronic visitors book;

d) Secure fencing around property owned by Bulga Coal;

e) Temporary fencing around construction areas throughout the duration of works to prevent unauthorised access;

f) Security patrols; and

g) Employee and contractor inductions regarding mine safety and environmental management issues prior to commencement of work at the site.

CCTV cameras are used at various locations throughout the site, including operating wells sites, and is able to effective monitor access of employees/contractors, deter unauthorised access and for increased security at Bulga Coal.

7 Rehabilitation

Rehabilitation activities at the Bulga Underground are completed in accordance with the Bulga Underground MOP (Bulga Underground 2007), the Bulga Coal Landscape Management Plan (Bulga Coal Management 2011). The objective of this rehabilitation is to restore the land to a condition that is equal or greater to that prior to disturbance.

Rehabilitation of gas drainage infrastructure is undertaken progressively in accordance with the Drill Pad Consolidation Rehabilitation Procedure (Bulga Underground 2014d) and the Pipeline Rehabilitation Procedure (Bulga Underground 2014e). Each longwall panel has its own set of pre-drainage gas wells which are usually in place for two to four years to extract gas during the development and mining of each panel. The post-drainage (goaf) gas wells are usually in place for two to three years after mining has been completed in each panel. Once the gas drainage infrastructure is no longer needed the methane gas pipelines and well heads are removed and the infrastructure is reused for drainage of methane in future panels.

7.2 Topsoil Management

The management of topsoil, like erosion and sediment control, is addressed by Bulga Underground Operations through the Glencore Work Authorisation permitting system. Activities such construction works also trigger a Ground Disturbance Permit which accompanies the Work Authorisation. Ground The Ground Disturbance Permit considers the following:

a) Where possible, soil horizons are stripped and stockpiled separately so that the A horizon (containing nutrients and seed) can be replaced on the top layer of the rehabilitation;

b) Topsoil stockpiles are located away from construction areas, heavily trafficked roads and watercourses wherever possible;

c) Stockpiles should not be more than 3 m high and should be shaped into windrows to maximise surface exposure and biological activity;
d) Stockpiles which will be kept longer than three months are seeded immediately with a cover crop to reduce erosion and weed growth;

e) Stockpiles are located on level or gently sloping areas to minimise erosion, wherever possible;

f) Clean water diversions are used to divert surface water runoff around stockpiles;

g) Where necessary and/or practical, sediment fencing is installed around the base of the stockpile to minimise soil loss; and

h) Weed growth is monitored and controlled as required.

7.3 Surface Preparation

The following surface preparation is undertaken by Bulga Underground to rehabilitate drill pads and/or disturbance following the installation/removal of methane gas pipelines:

a) Removal of drill pad ballast (as relevant);

b) Ripping/tilling and reshaping to a similar landscape as prior to construction;

c) Spreading of topsoil;

d) Revegetation; and

e) Application of hay (unless landholder indicates otherwise).

Prior to the commencement of drill pad rehabilitation, drill pad ballast is excavated and stockpiled onsite or is used for the next drill pad or access road.

The earthworks contractor prepares the final landform for the rehabilitation area using the teeth of an excavator to rip/tilt the surface. The landform for rehabilitation of areas following the installation of methane pipelines is gently rounded with no steep edges.

Topsoil is spread over the prepared final landform prior to the commencement of rehabilitation for drill pads and pipeline corridors; generally to a depth of 100 mm. Seeding of the area is to be undertaken as soon as practicable following the surface preparation using a site and season specific grass mix, however this will be subject to weather conditions (seeding will be delayed during windy conditions). The seed mix is applied to ensure consistent ground cover.

Following seeding mulched hay is sometimes applied to provide a light and even covering over the seed to promote germination and retard dust generation.

7.4 Decommissioning

Following the cessation of gas drainage activities all infrastructure such as well heads and methane gas pipelines are removed from the site. Following the removal of well heads the wells are sealed with concrete in accordance with the publication titled *EDG01 Borehole Sealing Requirements on Land: Coal Exploration* (NSW Department of Mineral Resources 1997).

8 Implementation

8.1 Monitoring

Bulga Underground will monitor the environmental performance of gas drainage activities in accordance with monitoring programs outlined within site relevant environmental management plans, including the following:
a) Blakefield North Mine Construction Noise Management Plan – LW1 & 2 (Bulga Underground 2014a);
b) Flora and Fauna Management Plan (Bulga Coal Management 2013a);
c) Bulga Coal Dust Management Plan (Bulga Coal Management 2013b);
d) Bulga Underground Operations Greenhouse Gas Management Plan (Bulga Underground 2014c);
e) Bulga Coal Landscape Management Plan (Bulga Coal Management 2011);
f) Bulga Coal Erosion and Sediment Control Plan (Bulga Coal Management 2013c); and
g) Bulga Coal Site Water Management Plan (Bulga Coal Management 2013d).

8.2 Reporting

Bulga Underground will include an overview of the activities undertaken in accordance with this Gas Drainage Management Plan in the AEMR. This will include details regarding performance of relevant environmental monitoring (e.g. construction noise, air quality, greenhouse gas and surface water), stakeholder consultation, and the implementation of management measures including the mitigation of impacts to visual amenity resulting from the construction of gas drainage infrastructure during the reporting period.

8.3 Review

In accordance with the requirements of Schedule 6, Condition 3 of DA 376-8-2003 Bulga Underground will review this Gas Drainage Management Plan within 3 months of the following:

a) Submission of an AEMR/Annual Review;
b) Submission of an incident report;
c) Submission of an Independent Environmental Audit; and
d) Any modification to the conditions of DA 376-8-2003.

Where the review leads to revisions of this Gas Drainage Management Plan, the revised document will be submitted to the Director-General for approval within 4 weeks of the review.

8.4 Accountabilities

Table 4 defines the personnel who are responsible for the monitoring, review and implementation of this Gas Drainage Management Plan.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Condition Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations Manager</td>
<td>● Provide resources required to support and implement this Gas Drainage Management Plan.</td>
</tr>
<tr>
<td>Environment and Community Manager</td>
<td>● Implement, monitor and review the programs and procedures linked to this Gas Drainage Management Plan; ● Report the progress regarding the implementation of this Gas Drainage Management Plan in the AEMR; and ● Undertake site based actions to implement this Gas Drainage Management Plan in cooperation with the Gas Drainage Manager.</td>
</tr>
</tbody>
</table>
| Gas Drainage Manager / Gas Drainage Planner | ● Undertake site based actions to implement this Gas Drainage Management Plan in cooperation with the Environment and Community Manager; ● Undertake training in relevant management plans and procedures as
8.5 Training and Awareness

Personnel and contractor new starter training and awareness programs, which include subsidence and environmental components, are undertaken within induction programs outlined within the site EMS. Training records are kept for personnel that have undertaken additional training regarding the construction, operation and rehabilitation of gas drainage infrastructure on site.

8.6 Continual Improvement and Adaptive Management

Bulga Coal manages environment and community aspects, impacts and performance in accordance with the *Bulga Coal Environmental Management Strategy* (Bulga Coal Management 2012). This document is the framework for the EMS implementation, as well as relevant Glencore policies and standards, and all relevant licences and approvals pertaining to the operations.

The *Bulga Coal Environmental Management Strategy* has been developed generally in accordance with the ISO 14001 environmental management framework and centres around the philosophy of a continuous improvement whereby planning → implementation → evaluation → review and then the findings from the review feeds back into the planning, and the process repeats.

9 REFERENCES

9.1 Related Documents

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSM SD PLN 0122</td>
<td>Bulga Coal Management (2011) Bulga Coal Landscape Management Plan.</td>
</tr>
<tr>
<td>BSM SD PLN 0003</td>
<td>Bulga Coal Management (2013a) Flora and Fauna Management Plan</td>
</tr>
<tr>
<td>BSM SD PLN 0038</td>
<td>Bulga Coal Management (2014f) Bulga Coal Air Quality Management Plan.</td>
</tr>
<tr>
<td>BSM SD PLN 0006</td>
<td>Bulga Coal Management (2013c) Bulga Coal Erosion and Sediment Control Plan.</td>
</tr>
</tbody>
</table>
9.2 Reference Information

Reference information, listed in Table 9-2 below, is information that is directly related to the development of this document or referenced from within this document.

<table>
<thead>
<tr>
<th>Title</th>
</tr>
</thead>
</table>


NSW Department of Mineral Resources (1997) EDG01 Borehole Sealing Requirements on Land: Coal Exploration.


OzArk (2013) Aboriginal Archaeological Values Assessment, Bulga Optimisation Project.

OzArk (2014) Constraints and Opportunities Analysis – Aboriginal Archaeological Values.

OZArk (2015) Aboriginal Heritage Due Diligence Assessment – HDD009


### Table 9-2 – Reference information

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Review team (consultation)</th>
<th>Change Summary</th>
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<tbody>
<tr>
<td>1.0</td>
<td>July 2014</td>
<td>BUO E&amp;C Manager</td>
<td>New document</td>
</tr>
<tr>
<td>1.1</td>
<td>February 2015</td>
<td>BUO E&amp;C Officer</td>
<td>HDD009 location change, incorporate Construction Traffic Management Plan</td>
</tr>
</tbody>
</table>
Appendix A - Noise Assessment
Appendix B - Archaeology Assessment
Appendix C - Biodiversity Assessment
Dear Ned,

Bulga Coal Complex – Blakefield North Mine Construction Noise Management Plan Revision and Gas Drainage Management Plan Revision Approval

Thank you for forwarding the revised Blakefield North Mine Construction Noise and Gas Drainage Management Plans required under the requirements of the Bulga Underground Operations DA 376-8-2003 for the Department’s consideration.

The Department has reviewed the 2 revised plans and is satisfied that they generally address the requirements set out in the relevant condition of the development consent. Consequently, I would like to advise you that the Secretary has approved the plan.

Could you please forward finalised copies of the above plans (preferably in PDF format with a copy of this approval letter appended) for the Department’s records by the end of April 2015.

If you require further information or clarification in this matter please contact Scott Brooks on 6575 3401 or by email to scott.brooks@planning.nsw.gov.au.

Yours sincerely

Scott Brooks
Investigations (Lead) Compliance

As Nominee for the Secretary, Department of Planning & Environment

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Website: www.planning.nsw.gov.au