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BULGA
COAL
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BULGA OPTIMISATION PROJECT MODIFICATION 3 AND BULGA UNDERGROUND MODIFICATION 7

Submissions Report

December 2019

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Submissions Report

DRAFT

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Bulga Coal Management Pty Ltd

Project Director:	Bret Jenkins
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Report No.	4100/R13
Date:	December 2019

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Document Status

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	Name	Date	Name	Date
FINAL	Kirsty Davies	20 December 2019	Bret Jenkins	20 December 2019

Table of Contents

Figures

Appendices

1.0 Introduction

The Statement of Environmental Effects (SEE) for the Bulga Optimisation Project Modification 3 and Bulga Underground Modification 7 (Umwelt, 2019) was placed on public exhibition from 8 October to 4 November 2019. This Submissions Report has been prepared to address the key issues raised in the submissions received during the public exhibition period.

The Bulga Coal Complex (BCC) is an open cut and underground coal mining operation located approximately 12 kilometres (km) south west of Singleton in the Hunter Valley, of New South Wales (NSW) (refer to **Figure 1.1**). Bulga Coal Management Pty Ltd (BCM) operates the BCC on behalf of the Bulga Joint Venture, with mining operations occurring at the site for over 35 years. The BCC consists of open cut operations (Bulga Surface Operations) and underground operations (Bulga Underground Operations) that use shared coal washing and rail loading infrastructure as well as having an integrated water management system (WMS).

BCM is seeking to modify both the Bulga Surface Operations (SSD 4960 Modification 3) and the Bulga Underground Operations (DA 376-8-2003 Modification 7) through a modification application under section 4.55 (2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for both these planning approvals.

As a result of the public exhibition of the SEE, 17 submissions were made on SSD 4960 Modification 3 and DA 376-8-2003 Modification 7. This included 15 government agency submissions and two community submissions. A full analysis of the submissions is provided in **Section 2.0**.

This Submissions Report has been prepared by Umwelt (Australia) Pty Limited (Umwelt) on behalf of BCM to address the key issues raised in the submissions.

1.1 Overview of the Project

On 1 December 2014 BCM was granted approval for the Bulga Optimisation Project (BOP) (SSD 4960), which related to ongoing operation of the Bulga Surface Operations until 31 December 2035. SSD 4960 has been modified twice since it was approved, SSD 4960 Modification 1 in January 2017 to facilitate a revised Eastern Emplacement Area (EEA) design and a revised tailing management strategy and SSD 4960 Modification 2 in August 2018 to extend the period to complete the outer face of the noise and visual bund.

The Bulga Underground Operations at the BCC operate under a separate development consent (DA 376-8-2003) granted in 2004 (Bulga Underground Consent). The Bulga Underground Operations ceased mining in May 2018 and the mine was sealed in July 2018. The Bulga Underground Operations approvals are being retained and BCM is actively evaluating opportunities to recommence underground operations in the future.

SSD 4960 Modification 3 will maximise resource recovery within the approved Project Area through an extension of the open cut operations. The proposed extension of the open cut pit to the south-east also enables extraction of additional deeper resources below parts of the currently approved Bulga open cut operation. An additional disturbance of 20.2 hectares (ha) is required to accommodate the proposed extension of the mining areas. Approximately 200 ha of mine rehabilitation will also be re-disturbed and re-established as a result of SSD 4960 Modification 3. SSD 4960 Modification 3 will maintain the current approved open cut coal extraction rate of up to 12.2 Million tonnes per annum (Mtpa) of run of mine (ROM) coal while enabling the extraction of an additional approximately 63 Mt of coal. SSD 4960 Modification 3 will extend the life of the development consent by approximately four years until 2039.

SSD 4960 Modification 3 will require the removal of the tailings material currently stored in the existing Tailings Storage Facilities (TSF) and relocation to the Main Pit TSF, which is located within the existing Main Pit mining area. The capacity of the currently approved Main Pit TSF will be increased to receive the relocated tailings by increasing the depth of the emplaced tailings within the in-pit facility, whilst maintaining a similar surface area. SSD 4960 Modification 3 will also require the upgrade, relocation or removal of some components of the infrastructure servicing the Bulga Surface Operations as well as removal of components of the Bulga Underground Operations infrastructure, through DA 376-8-2003 Modification 7, including workshops, gas-fired power generation plant and associated gas infrastructure, electrical substation, fuel and oil storage. Proposed changes are identified by relevant approvals in **Tables 1.1** and **1.2**.

The Bulga Surface Operations will continue to use the BCC shared infrastructure approved to service both the open cut and the underground mining operations including the Coal Handling and Preparation Plant (CHPP), raw coal stockpiles and conveyors, train loading facilities, workshops, stores, offices and deployment areas, water management system, etc.

Figure 1.2 shows SSD 4960 Modification 3 in relation to the currently approved open cut mining operations at BCC. A comparison between the approved development under SSD 4960 and SSD 4960 Modification 3 is provided in **Table 1.1**.

Table 1.1 Comparison of SSD 4960 and SSD 4960 Modification 3

Key Project Component	Approved Development (SSD 4960)	SSD 4960 Modification 3
Extraction rate limit	Extraction limit of 12.2 Mtpa of ROM coal	No change.
Total Recoverable Resource (ROM)	162 Mt	An additional approximately 63 Mt
Project life	Mining operations until 31 December 2035	Extension to the life of mine until 31 December 2039 (an additional four years)
Project boundary/ Schedule of Lands	Per SSD 4960 Appendix 1	No change to the approved Project Area or Schedule of Lands, subject to any land title changes in the interim
Mining Areas	Mining areas as approved – Main Pit, East Pit and South Pit Mining undertaken within existing ML1547	Extension of mining areas to the south east and west. Accessing deeper resources within the approved pit and the proposed extension area Mining undertaken within existing ML1547
Disturbance Areas	Approved mining disturbance footprint (3,786 ha)	Additional disturbance area of approximately 20.2 ha not currently part of the approved mining disturbance footprint
Key Infrastructure	Realignment of Broke Road (Complete) Relocation of 330kV transmission lines (Complete) Construction of new water storage dam (Complete) Upgrade to CHPP to improve yield and plant efficiency (Ongoing) Relocation of sections of Broke-Fordwich	Relocation of some mine owned open cut infrastructure Demolition of some open cut infrastructure to accommodate proposed mining Ongoing use of the existing East Pit deployment infrastructure Upgrade of the Bulga Surface Operations

Key Project Component	Approved Development (SSD 4960)	SSD 4960 Modification 3
	Private Irrigation District pipeline and Telstra infrastructure (Complete)	carpark and deployment infrastructure Replacement/relocation of some infrastructure to service open cut operations including the construction of a lube station and light vehicle workshop Installation of tailings relocation infrastructure (pumps and pipelines, power lines and access tracks)
Coal Handling and Processing	Upgrade of existing CHPP infrastructure in the current location. No change to approved CHPP throughput	Potential upgrade of CHPP to reprocess additional tailings No changes to CHPP throughput, ROM or product stockpiles
Coal Transport	20 Mt of product coal transported in any calendar year	No change
Equipment Fleet	Mining fleet as per BOP Amended Project Application Assessment (Umwelt 2013)	Minor increases to fleet numbers to provide flexibility for mining operations
Overburden / coarse reject management	Overburden placed in-pit	No change to overburden and coarse reject management
Tailings Management	Ongoing use of Deep Pit and Bayswater TSF Main Pit TSF approved in SSD 4960 Mod 1	Additional tailings relocation equipment will be required to remove tailings from the Bayswater and Deep Pit TSF prior to mining Increased capacity of Main Pit TSF to cater for relocated tailings and ongoing tailings production
Final void	One void at the end of mining operations	One void proposed to be of similar size to the approved void
Rehabilitation and final landform	Conceptual final landform is shown in SSD 4960 and includes a final void and areas for a range of vegetation communities and habitat types, wildlife corridors, and potential for some ongoing grazing use	No change to approved rehabilitation methods. Revised mining schedule will require revised rehabilitation sequencing Increases to typical overburden emplacement heights from 150 mAHD to 160 mAHD with selected areas emplaced to approximately 175 mAHD to accommodate the incorporation of micro-relief landform features Re-disturbance and re-establishment of approximately 200 ha of immature rehabilitation Revised conceptual final landform includes 1 final void
Employee Numbers	Approximately 700 FTE employees	No change

A comparison between the approved development under the Bulga Underground DA 376-8-2003 and the Proposed Modification 7 is provided in **Table 1.2**.

Table 1.2 Comparison of the Bulga Underground DA 376-8-2003 and DA 376-8-2003 Modification 7

Key Project Component	Approved Development (DA 376-8-2003)	DA 376-8-2003 Modification 7
Extraction rate limit	Extraction limit of 14 Mtpa of ROM coal per year	No change
Total Recoverable Resource (ROM)	212 Mt (per Modification 3)	No change
Project life	Mining operations until 23 February 2031	No change
Project boundary / Schedule of Lands	Per DA 376-8-2003 Appendix 1	No change to approved Project Area or Schedule of Lands, subject to any land title changes in the interim
Underground Access	Various portal and adit entries to seams exposed through the Bulga open cut, drift access to Blakefield South workings, service bores for materials	No change
Ventilation	Ventilation through upcast and downcast shafts, drifts and/or portals	No change
Mining Areas	Underground extraction of coal from the Whybrow, Blakefield, Woodlands Hill and Glen Munroe Seams in accordance with an approved Extraction Plan	No change
Mining Method	First workings development and longwall extraction	No change
Key Infrastructure	• Workshop and stores • Offices • Car parking • Bathhouse • Ventilation shafts • Gas extraction and management infrastructure • Gas fired power generation plant	Relocation of mine owned ancillary infrastructure (power lines, electrical sub-station, etc) Relocation of the gas fired power generator, associated infrastructure and underground equipment surface storage area
Surface Disturbance	Total of around 34 ha approved for disturbance	No additional disturbance area required
Operational Workforce	530 full time employees at Bayswater Underground including the CHPP.	No change

FIGURE 1.1

Locality Plan

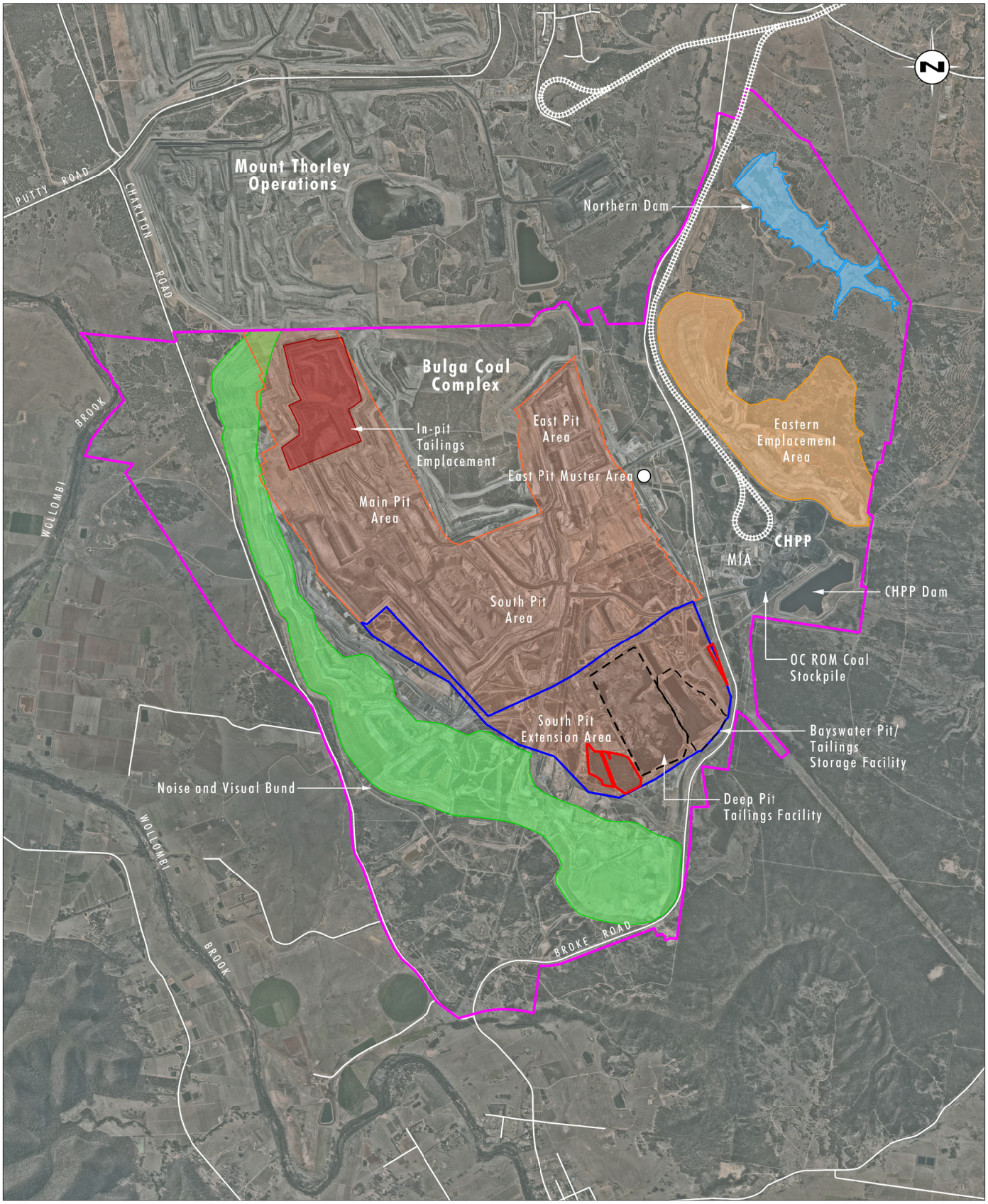


Image Source: Nearmap (Sep 2018)
Data Source: Bulga (2019)

0 1 2 3km
1:60 000

Legend

- Project Area
- Additional Disturbance Area
- South Pit Extension Area
- Mining Area
- Noise and Visual Bund
- Eastern Emplacement Area
- In-pit Tailings Emplacement
- Northern Dam
- Rail Line

FIGURE 1.2

SSD 4960 Modification 3 and DA 376-8-2003 Modification 7
Key Mining Features

File Name (A4): R13/4100_211.dgn
20191204 11.35

1.2 Report Structure

This Submissions Report includes:

- a brief summary of the SSD 4960 Modification 3 and DA 376-8-2003 Modification 7 to provide context for the submissions (**Section 1.1**)
- analysis of the issues raised in the submissions (**Section 2.0**)
- summary of the actions taken since the exhibition (**Section 3.0**)
- detailed response to the issues raised in the Government submissions (**Section 4.0**)
- detailed response to the issues raised in community submissions (**Section 5.0**)
- updated evaluation of the project merits (**Section 6.0**).

2.0 Submissions Analysis

2.1 Breakdown of Submissions

The SEE for SSD 4960 Modification 3 and DA 376-8-2003 Modification 7 was placed on public exhibition from 8 October 2019 to 4 November 2019. During the public exhibition period 17 submissions were made on SSD 4960 Modification 3 and DA 376-8-2003 Modification 7. This included 15 government agency submissions and 2 community submissions. **Table 2.1** provides a breakdown of the submissions received for SSD 4960 Modification 3 and DA 376-8-2003 Modification 7.

It is noted that the submissions for SSD 4960 Modification 3 and DA 376-8-2003 Modification 7 were the same expect one community submission related to SSD 4960 Modification 3 only.

Table 2.1 Breakdown of Submissions

Category	Number of Submissions
Agency (State/Public Authorities)	13
Council – Singleton Council and Muswellbrook Shire Council*	2
Community and Interest Groups	0
Members of the Public	2
Total	**17**

* Note that the BCC is located within the Singleton Council Local Government Area only

Appendix 1 provides the Register of Submitters.

2.1.1 Agency Submissions

As outlined in **Table 2.1**, thirteen (13) agency submissions and two (2) council submissions were received, which included:

- Department of Planning, Industry and Environment (DPIE)
- Environment Protection Authority (EPA)
- Biodiversity Conservation Division (BCD)
- Division of Resources and Geoscience
- Resource Regulator
- Department of Primary Industries (DPI)
- DPIE Crown Lands
- Heritage Council
- Roads and Maritime Services (RMS)
- Transport for NSW
- WaterNSW

- NSW Health
- Subsidence Advisory NSW
- Singleton Council
- Muswellbrook Shire Council.

None of the agencies indicated that they oppose the SSD 4960 Modification 3 or DA 376-8-2003 Modification 7. Several agencies made submissions seeking further clarification regarding aspects of the assessment. These submissions are discussed further in **Section 4.0**.

2.1.2 Community Submissions

Two submissions were received from members of the community and none were received from interest groups. Both community submissions objected SSD 4960 Mod 3. One of the submissions also objected to DA 376-8-2003 Modification 7.

The submissions were analysed based on proximity to the Project Area to determine the level of local (within approximately 10km), regional (between approximately 10 and 100km) and broader community (>100km) interest in the SSD 4960 Modification 3 and DA 376-8-2003 Modification 7. Of the two community submissions, one was received from the local area (Bulga) while the other came from Concord which is categorised as broader community.

The key issues raised in the two community submissions included:

- air quality
- climate change
- biodiversity
- socio-economics
- mine closure
- general objection to mining.

The community submissions are addressed in **Section 5.0**. Given there were only two community submissions made in relation to SSD 4960 Modification 3 and DA 376-8-2003 Modification 7, each submission has been addressed individually.

3.0 Actions Taken Since Exhibition

3.1 Stakeholder Consultation

During and post the public exhibition period for SSD 4960 Modification 3 and DA 376-8-2003 Modification 7, BCM has undertaken ongoing consultation with government agencies and the community.

A summary of the ongoing consultation undertaken for SSD 4960 Modification 3 and DA 376-8-2003 Modification 7 since the lodgement of the SEE for public exhibition is provided in **Table 3.1**.

Table 3.1 Consultation Undertaken Since Exhibition Phase

Stakeholder	Date	Description
DPIE	3 December 2019	Update on approach to Submissions Report and timing
Singleton Council	11 October 2019	Meeting to discuss voluntary planning agreement (VPA)
Singleton Council	28 October 2019	VPA variation offer submitted to Singleton Council via letter
Singleton Council	3 December 2019	Clarification sought on Singleton Council's submission and VPA discussions
BCD	24 October 2019	Update on the findings of the biodiversity assessment and proposed offset. BCD requested more information to assist its review of SEE, which was provided
DPIE and BCD	6 December 2019	Discussion with BCD regarding assessment of rehabilitation re-disturbance
Registered Aboriginal Parties	26 November 2019	Update on SEE, Submissions Report and Aboriginal Cultural Heritage assessment
Community BBQ / Stakeholder Meetings	6 and 7 November 2019	Update on SSD 4960 Modification 3, submissions content and approval process
Community Submission 1	18 December 2019	Discussion on SSD 4960 Modification 3 and the community members concerns

3.2 Biodiversity Assessment of Rehabilitation Re-disturbance

In response to the BCD submission, additional biodiversity assessment of components of rehabilitation that will be re-disturbed as a result of SSD 4960 Modification 3 has been undertaken.

The results of the additional assessment are provided in **Section 4.3.1**.

3.3 Water Licensing

The Groundwater Impact Assessment (KCB 2019) included a statement that:

> *Glencore holds significant quantities of transferable hard rock aquifer allocations at other mining operations in the upper Hunter Valley which will be available to transfer to Bulga Coal Management Pty Ltd if increased water extraction is required beyond current allocation volumes.*

While this statement is correct, the specific identification of Hunter Valley Operations (HV0) in Table 4-5 of the Groundwater Impact Assessment (KCB 2019) was an error. A revised table is provided in **Table 3.2** below.

Table 3.2 Approved Groundwater Licence Volumes (Glencore)

Licence No.	Volume Limit (ML/a)	Purpose
Bulga Coal Complex		
20BL169347	365	Mining: Underground workings
20BL168475	500	Dewatering (mining): Beltana Longwall 1 Borehole
20BL169514 (WAL415543)	500	Dewatering (mining): Beltana MG4
20BL172658 (WAL41544)	500	Dewatering (mining): South Bulga MGE1
20BL172673 (WAL41545)	500	Dewatering (mining): South Bulga MGE4
Other Glencore Operations		
Glendell	550	Mining
Integra	950	Mining
Liddell	15500	Mining
Mangoola	700	Mining
Ravensworth	4096	Mining

Glencore holds significant quantities of transferable hard rock aquifer allocations at other mining operations in the upper Hunter Valley, which would be available to transfer to BCM if increased water extraction is required beyond current allocation volumes.

There is no change to the outcomes of the Groundwater Impact Assessment or ability for necessary licence allocation to be obtained if increased water extraction is required beyond current allocation volumes.

4.0 Response to Agency Submissions

The issues raised in the agency submissions are identified in the following sections in text boxes, with the response provided following each text box.

It is noted that the submissions for SSD 4960 Modification 3 and DA 376-8-2003 Modification 7 were the same expect one community submission related to SSD 4960 Modification 3 only. Given the minor nature of DA 376-8-2003 Modification 7, discussion will be based on SSD 4960 Modification 3.

4.1 Department of Planning, Industry and Environment

4.1.1 Mine Design

Scope:

The Department notes that the proposal seeks to extract deeper coal seams down to the Bayswater seam, however the maximum extraction depth of 400 metres below ground level is only mentioned in the Appendix 5, and not clearly discussed in the SEE. Please provide further clarity on the proposed maximum extraction depth.

Cross-sections of the open cut pit are presented in Figure 3.6 of the SEE which demonstrate the proposed deeper mining within the approved open cut pit and proposed extension.

Mining is approved to a depth of approximately 200 m below the original topography in the Main and East Pit Areas and approximately 350 m below the original topography in the South Pit Area to the base of the Broonie series (to approximately RL -270 mAHD).

SSD 4960 Modification 3 aims to extract an additional coal seam down to the Bayswater seam. The maximum extraction depth will be approximately 400 m below the original topography in the South Pit Area (to approximately RL –320 mAHD).

Figures:

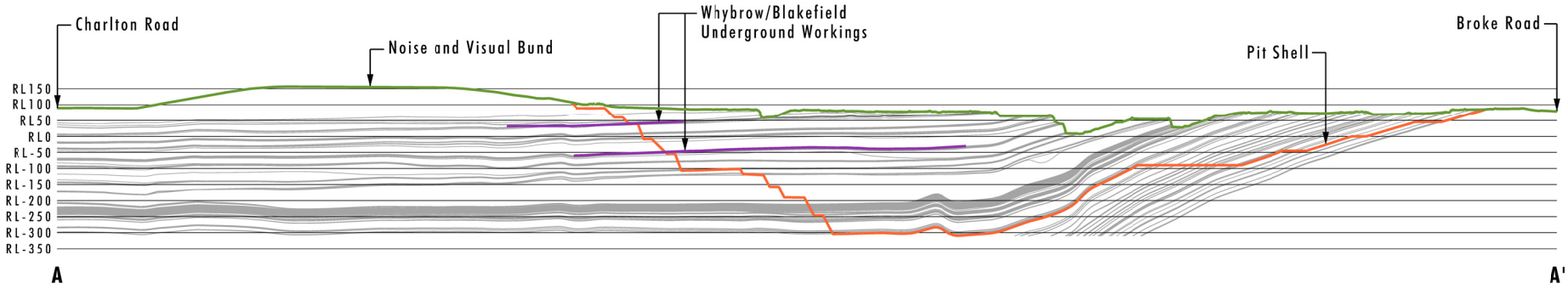
Figure 3.6 provides depth of extraction cross-sections. In addition, the Department requests a figure representing a cross-section of the targeted coal seams and the proposed maximum depth of extraction including any interactions with underground workings and their depths.

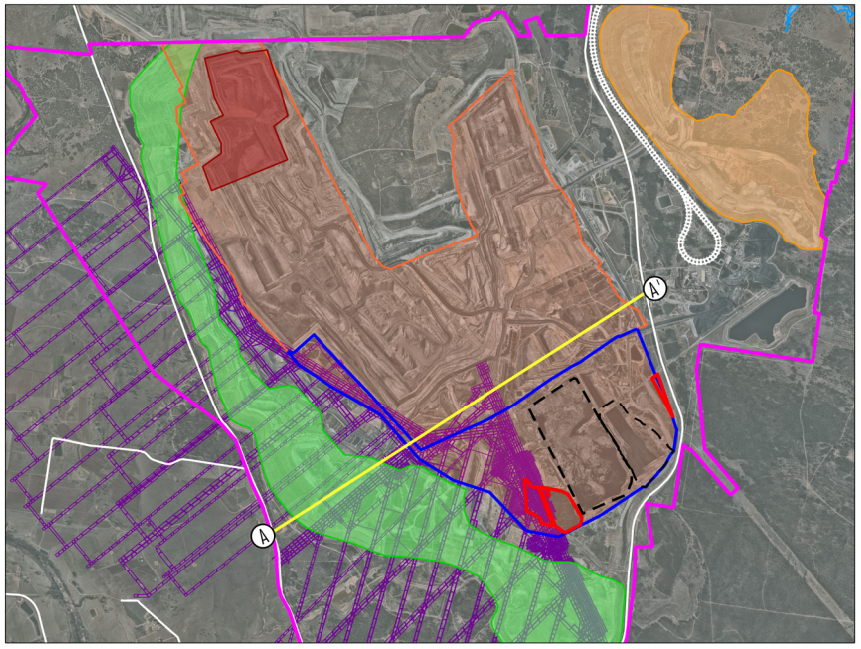
Figure 4.1 provides a cross section of the targeted coal seams and the proposed maximum depth of extraction.

Visual Impacts:

Section 6.8 of the SEE notes that infrastructure will be relocated to an area south of the noise and visual bund, and references Figure 3.8. However, the noise and visual bund is not shown on this figure. Please provide a figure representing the proposed placement area for the infrastructure in relation to the noise and visual bund.

Refer to **Figure 4.2** for an updated figure that shows that the noise and visual bund in relation to the proposed changes to underground infrastructure. While the relocated infrastructure will no longer be shielded by the noise and visual bund, there will be no visibility from private residences due to shielding from local topography and existing vegetation, and only limited views from elevated parts of Cobcroft Road due to topographical shielding from existing vegetation.





Data Source: Glencore (2019)

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Additional Disturbance Area
- South Pit Extension Area
- Mining Area
- Noise and Visual Bund
- Eastern Emplacement Area
- In-pit Tailings Emplacement

FIGURE 4.1

Proposed Modification Cross-section

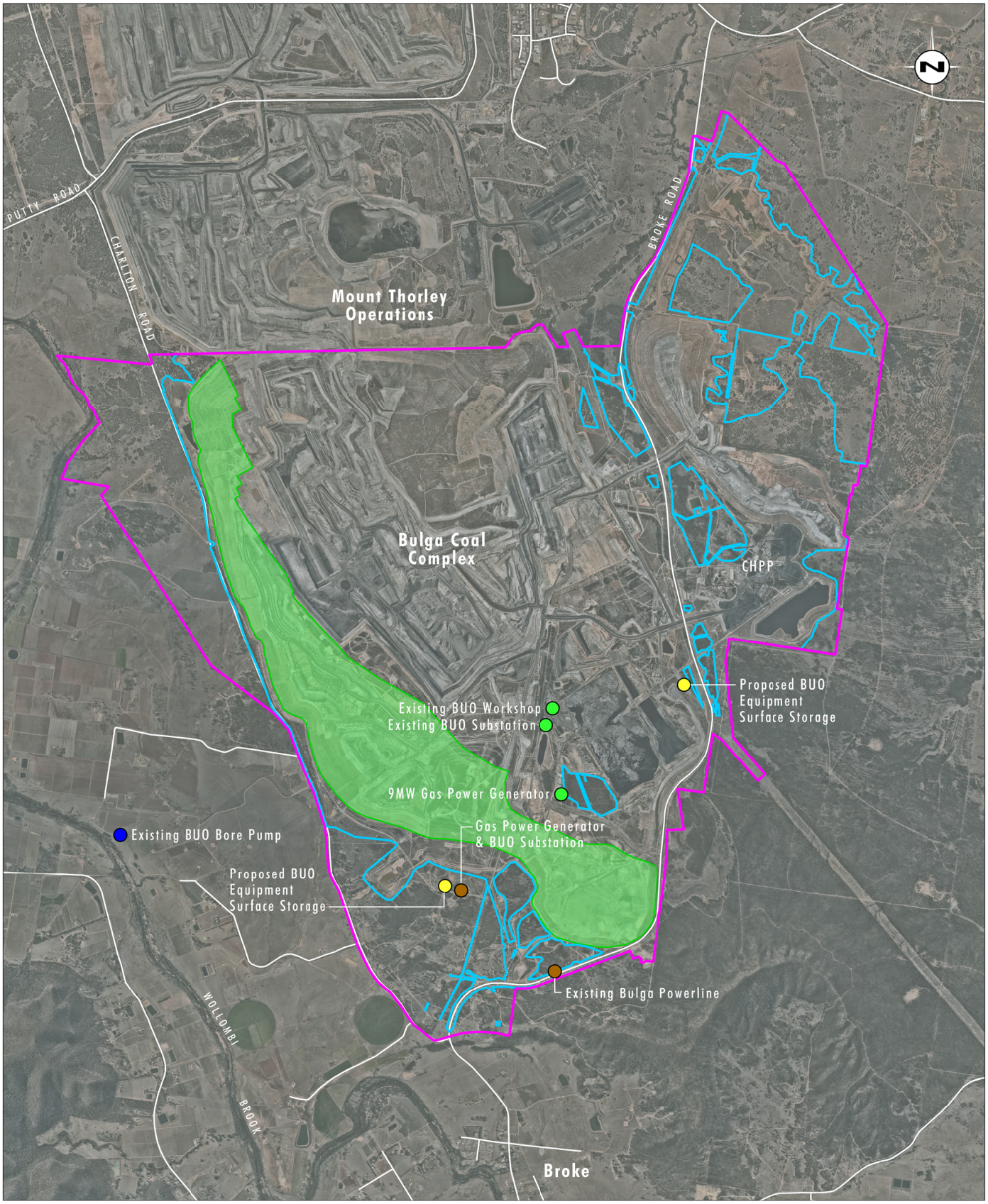


Image Source: Nearmap (Sep 2018)
Data Source: Bulga (2017)

0 1.0 2.0 3.0km
1:60 000

Legend

- Project Area
- Current Disturbance Footprint - BOP (SSD 4960)
- Approved Noise and Visual Bund
- New Facility
- Existing Facility to be Demolished
- Relocated Facility
- Existing Facility Proposed to be Upgraded

FIGURE 4.2

Bulga Underground (DA 376-8-2003) Modification 7
Infrastructure Relocations and Upgrades

File Name (A4): R13/4100_208.dgn
20191204 11.32

4.1.2 Air Quality

You are referred to the EPA's submission, dated 4 November 2019, and specifically to its request for additional information contained in that submission's Attachment A. Two public submissions raised the issue of air quality impacts associated with the proposed modification and the cumulative effects of mining in the locality. Please consider these submissions and provide a detailed response to the concerns raised with particular reference as to the predicted cumulative impact of the proposed modification on local air quality.

A detailed response to the EPA submission in relation to air quality is provided in **Appendix 2** and summarised in **Section 4.2**. Community submissions relating to air quality have been addressed in **Sections 5.13** and **5.2.3**.

A comprehensive Air Quality Impact Assessment (AQIA) of potential air quality impacts associated with SSD 4960 Modification 3 was prepared by Jacobs Group (Australia) Pty Limited (Jacobs 2019) and presented in Appendix 6 of the SEE.

The potential for SSD 4960 Modification 3 to result in increased air quality impacts was raised by surrounding residents as a key local community issue and is a high priority established environmental management commitment for BCM.

A key consideration of the project design for SSD 4960 Modification 3 was to continue to operate the BCC in accordance with approved air quality criteria. BCM implements a range of proactive and reactive air quality management measures, currently implemented as part of the existing approved Air Quality Management Plan, which will continue to be adopted as part of SSD 4960 Modification 3.

The AQIA included a review of the local meteorological and ambient air quality conditions in the vicinity of the BCC with the objective of identifying any existing air quality issues and meteorological conditions which would typically influence the local air quality conditions. The review considered data collected from existing meteorological and air quality monitoring networks in the area surrounding BCC.

The following conclusions were made from the review of local meteorological and ambient air quality monitoring data:

- Wind patterns in the vicinity of BCC are similar to other parts of the Hunter Valley, with the prevailing winds being from either the northwest or southeast. Winds from the south are also common for this area.

- There are seasonal variations in particulate matter concentrations, with PM_{10} levels higher in spring and $PM_{2.5}$ levels higher in winter.

- In terms of PM_{10}, air quality conditions can be regarded as good, with annual average concentrations well below the assessment criterion of 25 µg/m^3. Most monitoring sites in the vicinity of BCC have experienced at least one day above the EPA's 50 µg/m^3 criterion in the past five years. This is not uncommon for most locations in NSW, including in both rural and urban areas with contributing influences including bush fires, drought etc.

- In terms of $PM_{2.5}$, annual averages have been below the recently introduced assessment criterion (8 µg/m^3) at both BCM monitoring locations. Results from Singleton were above 8 µg/m^3 in one of the past five years. A study by the OEH (2013) found that wood smoke from domestic heating was one of the main factors that influenced $PM_{2.5}$ concentrations in the Singleton area, especially in winter.

- TSP, dust deposition and NO_2 levels are below their relevant EPA criteria.

One property (1A) is predicted to experience exceedances of the annual average PM_{10} concentration criterion of 25 µg/m^3, with a prediction of 27 µg/m^3 in both 2022 and 2026. The contribution of the BCC to annual average PM_{10} concentrations at property 1A is predicted to be up to 7 µg/m^3 (in 2022). It is noted that the annual average PM_{10} contribution from BCC at property 1A is not predicted to significantly increase as a result of SSD 4960 Modification 3, however given the change in criteria from 30 µg/m^3 currently approved under SSD 4690 to 25 µg/m^3 applied to SSD 4960 Modification 3, the exceedance at property 1A is now predicted to occur due to the reduced criteria.

In relation to cumulative air quality impacts, the AQIA found that the cumulative maximum 24-hour average PM_{10} concentrations may exceed 50 µg/m^3 at various private properties, due to contributions from the Bulga Surface Operation, MTW mine and background (other) sources of particulate matter. The potential contributions of each source to cumulative concentrations at three locations (195, 217s and 311) have been examined. There are days predicted when the background levels plus the contribution from MTW mine would be below 50 µg/m^3 and the contribution of the Bulga Surface Operations may contribute to an exceedance of 50 µg/m^3.

BCM implements a range of proactive and reactive emission management measures, currently implemented as part of the existing approved Air Quality Management Plan (AQMP), which will continue to be adopted as part of SSD 4960 Modification 3.

Reactive air quality management includes the modification or suspension of activities in response to the following triggers:

- visual conditions, such as visible dust from trucks above wheel height as observed by operators and via the in-pit camera system
- meteorological conditions, such as dry, windy conditions, with winds blowing towards sensitive receptors
- ambient air quality conditions (that is, elevated short-term PM_{10} concentrations) identified through real-time air quality monitoring.

Specific “triggers” are defined in the BCM AQMP. These triggers are linked to specific actions for managing dust at both private and mine owned residences.

Proactive air quality management involves the discussion and planning of activities in advance of potentially adverse conditions. Specifically, the pro-active air quality management approach includes:

- plant operator training and awareness of potentially adverse conditions
- implementation of a system to provide environmental personnel with a daily forecast of expected dust conditions in the vicinity of the operation
- discussion of the dust forecast at daily pre-shift meetings
- modifying the planned mining activities, as appropriate, to minimise or avoid the potential dust impacts.

The meteorological and air quality monitoring network currently operated by BCM is designed to measure the key air quality parameters, compliance with air quality criteria, and to allow for the contribution of mining activities to be determined. This monitoring network will continue to be operated as part of SSD 4960 Modification 3.

Monitoring data has shown that, in the past five years, there have been between zero and seven days where cumulative 24-hour average PM_{10} concentrations have exceeded 50 µg/m^3, at locations to the west of the Project Area. With this information it can be anticipated that 24-hour average PM_{10} concentrations will continue to be variable from day-to-day, due to existing conditions and sources, and that operations will need to be managed in a way which minimises the contribution to off-site PM_{10} levels, as is done under the existing approved operation at BCC.

Compliance with the cumulative annual average PM_{10} criteria is predicted at all other private sensitive receptors.

The predicted cumulative maximum 24-hour average $PM_{2.5}$ concentrations due to all modelled sources and with the derived background dataset indicate that concentrations at all private sensitive receptors will not exceed the 25 µg/m^3 criterion at any stage of SSD 4960 Modification 3.

4.1.3 Biodiversity

You are referred to the Biodiversity Conservation Division's (BCD) submission, dated 11 November 2019, and specifically to its request for additional information contained in that submission's Attachment A and supported by detailed comments in its Attachment B. In particular, BCD has requested a full assessment of the approximately 200 hectares of rehabilitated proposed to be cleared. This data is required for the BCD to confirm the biodiversity credit calculations of the impacted vegetation and to clearly assess the proposed biodiversity offset package.

Refer to **Section 4.3** for a detailed response to the BCD submission.

4.1.4 Final Land Use

Final Landform / Landuse:

Consideration of approved land uses - You are referred to Singleton Council's submission dated 7 November 2019. Please provide a detailed response to Council's concerns regarding post-mining land use, including further consideration regarding compatibility with surrounding land uses within the RU4 zone under Singleton Council's Local Environmental Plan.

Refer to **Section 4.14** for a detailed response to the Singleton Council submission.

4.1.5 Social

Singleton Council considers that the impacts on the community, particularly tourism, have not been adequately addressed. Please provide a detailed response to Council's submission, including further consideration of the how an extended period of mining and increase in disturbance footprint may impact upon the community.

Refer to **Section 4.14** for a detailed response to the Singleton Council submission.

4.1.6 Voluntary Planning Agreement

The Department notes that Council has met with Glencore regarding revising its existing Voluntary Planning Agreement. The Department requests to be kept informed of the progression of these discussions and to be advised of any revised terms prior to determination.

Noted.

Further details are provided in **Section 4.13.2**.

4.2 Environment Protection Authority

4.2.1 Air Quality

The Proponent must provide an assessment of particulate emissions from the existing approved operations at the Bulga Coal Mine and evaluate changes to air quality resulting from SSD 4960 Mod 3. This assessment is needed because the modification will result in new activities to the south of the existing project area. Incremental dispersion contour plots must be included.

The Air Quality Impact Assessment (AQIA) does not present a complete assessment of the air quality impacts from the current approved operations. Rather assumes SSD 4960 Mod 3 will not change air quality impacts. Predicted impacts above the assessment criteria are to occur to the north-east and north-west of the Bulga Coal Mine, towards Bulga. However, no particulate impacts above the EPA's assessment criteria are predicted to the south of the Bulga Coal Mine towards Broke. It is unclear how these impacts compare to the existing approved operations of Bulga Coal Mine.

The AQIA (Jacobs 2019) provides an assessment of the air quality impacts of SSD 4960 Modification 3 (open cut operations and underground operations). The AQIA has not reassessed the particulate emissions or air quality impacts of the current approved operations as these were previously assessed by Pacific Environment Limited (2013). However, the relevant estimated emissions and contour plots for both the approved operations and SSD 4960 Modification 3 are presented below for comparison in **Appendix 2**.

Appendix 2 indicates that the maximum emissions from SSD 4960 Modification 3, based on the recommendations from the consent for the approved operations, will be within the maximum emissions estimated over the life of the approved operations.

Contour plots have been prepared to provide a comparison of SSD 4960 Modification 3 to the approved operations, in terms of the contribution of the BCC to local air quality (refer to **Appendix 2**).

There are no air quality criteria for which to assess an incremental change, only those prescribed by the EPA in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA 2016). It is also important to note that SSD 4960 Modification 3 has been assessed against current, more stringent criteria than were used to assess the approved operations. As such, the modelling and conclusions of the current AQIA, which would not change as a result of the information presented in **Appendix 2**, should be used to identify the extent of impact of the Bulga Surface Operations under SSD 4960 Modification 3.

The Proponent must provide justification for the use of Properties 195, 217s and 311 for assessing the 24-hour PM_{10} impact assessment criteria as well as identifying all properties predicted to experience additional exceedance days as a result of SSD 4960 Mod 3.

The AQIA predicts for the cumulative scenario that numerous private residences will exceed the 24-hour average PM_{10} criteria of 50 µg/m^3 over all years modelled (Figure 19 and Appendix D). The AQIA examines the potential contribution of each source to cumulative concentrations at three locations. Specifically, Property 195 is predicted to experience two exceedance days with a significant project only contribution of 24 µg/m^3. Property 311 is also predicted to experience two exceedance days (9 µg/m^3) and Property 217s is predicted to experience one exceedance day (6 µg/m^3).

Figure 19 of the AQIA showed that maximum 24-hour average PM_{10} concentrations may exceed the EPA's 50 µg/m^3 criterion at various private properties, due to contributions from Bulga Surface Operations under SSD 4960 Modification 3, Mt Thorley Warkworth mine and background (other) sources of particulate matter. Three of the closest properties within the extent of predicted impact, in various directions from the BCC, were selected for further, contemporaneous data analysis. Representative properties meeting this criteria were identified as 195, 217s and 311. **Figure 4.3** shows the locations of properties 195, 217s and 311 along with the predicted maximum 24-hour average PM_{10} concentrations due to all sources.

There are no private residences predicted to have additional exceedance days resulting from SSD 4960 Modification 3 in isolation when compared to approved operations (refer to Appendix D of the AQIA).

As discussed in **Appendix 2**, there is no known guidance or standard for defining what constitutes a significant project only contribution. The AQIA has used historical monitoring data to identify existing conditions and used dispersion modelling to forecast the potential future conditions. This process led to the following conclusions:

> *Maximum 24-hour average PM_{10} concentrations may continue to exceed the EPA's 50 µg/m^3 criterion at various locations in the vicinity of the Bulga Coal Complex (including private properties), due to contributions from the Bulga Coal Complex (as modified), Mt Thorley Warkworth mine and background (other) sources of particulate matter. Specifically, the model predictions indicated that there may be up to two days each year when the Bulga Coal Complex (as modified) would contribute to an exceedance of 50 µg/m^3 at the nearest locations to the west of the Bulga Coal Complex. These predictions did not highlight any significant change in air quality as they were within the range of historical measured conditions. It is concluded that 24-hour average PM_{10} concentrations will continue to be variable from day-to-day, due to existing conditions and sources, and that operations will need to be managed in a way which minimises the contribution to off-site PM_{10} levels, as is done under the existing approved operation.*

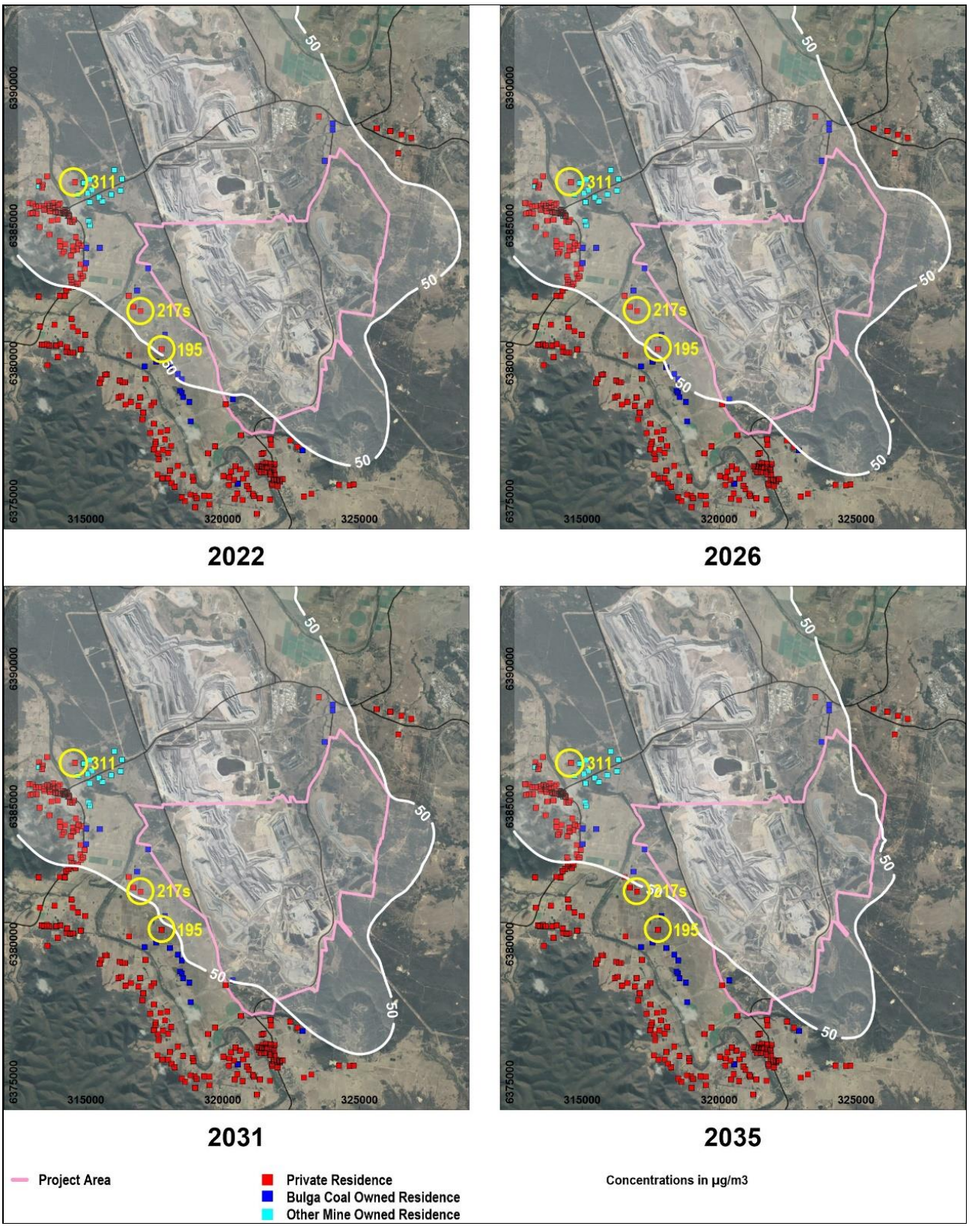


Figure 4.3 Predicted Maximum 24-hour average PM_{10} concentrations due to all sources

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The Proponent must provide an assessment of annual PM_{10} incremental emissions and evaluate changes to air quality impacts solely as a result of the proposed SSD 4960 Mod 3.

The AQIA and Figure 25 predict that Property 1A will exceed the annual PM10 criteria of 25 µg/m^3 on three of the four years modelled. Property 1A also exceeds the Voluntary Land Acquisition and Mitigation Policy criteria and is entitled to voluntary mitigation and acquisition.

Appendix 2 identifies that there are no criteria for which to assess an incremental change in emissions, or incremental change in impacts. Discussion of the change in emissions and contributions of the BCC to local air quality has however been provided in **Appendix 2** which indicates that the maximum emissions from SSD 4960 Modification 3, based on the recommendations from the consent for the approved operations, will be within the maximum emissions estimated over the life of the approved operations.

It is acknowledged that Property 1A would be entitled to voluntary mitigation and acquisition rights. This is reflected in the conclusions of the AQIA, specifically:

> *There is one property (1A to the north of the Bulga Coal Complex) where annual average PM_{10} concentrations are predicted to exceed the EPA's 25 µg/m^3 criterion in one or more future years. Compliance with the EPA's annual average PM_{10} criterion is predicted at all other private sensitive receptors. The results indicate that property 1A would be entitled to voluntary mitigation and acquisition rights under the VLAMP, based on cumulative PM_{10} levels that are predicted to exceed the 25 µg/m^3 VLAMP criterion in 2022, 2026 and 2031 with approximately equal contributions from the Proposed Modification and from Mt Thorley Warkworth.*

The Proponent must provide additional information to confirm particulate emissions from haulage activities.

Information to evaluate particulate emissions from haulage activities is not provided in the AQIA. Missing information includes silt content, weight of truck, weight of load. This is required to calculate haulage emissions.

Emissions from wheel generated dust were calculated using the emission factor from *Air Pollution from Coal Mining and Related Developments* (SPCC 1983). PM_{10} and $PM_{2.5}$ emission factors were derived from the SPCC TSP emission factor by applying the PM_{10}:TSP and $PM_{2.5}$:TSP ratios that are derived from the US EPA AP-42 equation for wheel-generated dust.

As outlined by Jacobs in **Appendix 2**, this approach was adopted for the following main reasons:

- The SPCC emission factor was derived specifically from monitoring downwind of mining activities (that is, haulage) in the Hunter Valley. It represents the contribution from both wheel generated particulates and the exhaust particulates.

- The SPCC emission factor has been accepted by EPA and used extensively in air quality impact assessments including for coal mining projects in the Hunter Valley from the mid-80's until present, and with successful outcomes in terms of mining operations which can demonstrate actual impacts within their originally predicted impacts.

- The US EPA AP-42 emission factor equation for wheel-generated dust is sensitive to the prescribed road silt content. The silt content has, at least in recent times, been derived by limited spot samples. In some cases the silt content may have been measured several times over the course of a year, but in most cases only one or two samples per year are available. This low resolution is insufficient to resolve actual variations in silt content on mine haul roads. For example, the silt content can change daily depending on the environmental conditions, such as recent rainfall, or due to the application of gravel and subsequent compaction. The SPCC emission factor was originally developed to derive a long term, annual average estimate of emissions per kilometre travelled which accounts for long term variations in the silt content and is therefore considered to be a more representative input for predictive modelling.

- According to ACARP Project C22027, the use of the US EPA AP-42 PM_{10} emission factor equation or defaults in NPI are "*considered to be unrepresentative and are therefore not supported*".

A sensitivity test for the haul road emission factor has been completed, based on calculations using with the SPCC or US EPA AP-42 equation approaches (refer to **Appendix 2**). The comparisons show that use of the US EPA AP-42 equation would lead to approximately 11 per cent higher emissions for TSP, 2 per cent higher emissions for PM_{10} and 15 per cent lower emissions for $PM_{2.5}$. Jacobs have evaluated these differences and determined that the conclusions of the AQIA would not change if the US EPA AP-42 equation approach were to be adopted (refer to **Appendix 2**).

Further, it is also useful to refer to the outcomes of the model performance evaluations, which were based on the use of the SPCC emission factor. These evaluations showed that:

- predicted PM_{10} concentrations were between 3 µg/m^3 lower to 6 µg/m^3 higher than measured PM_{10} concentrations
- predicted TSP concentrations were higher than measured TSP concentrations
- predicted dust deposition was higher than measured dust deposition.

These outcomes show that the adopted methodology, including the emission estimation approach, has generally led to over-estimation of air quality impacts.

4.2.2 Waste

The Proponent must provide further details about all waste streams (classified as per the EPA's Waste Classification Guidelines) that will be generated as a result of activities associated with SSD 4960 Mod 3 and DA 376-8-2003 Mod 7, the expected quantities in tonnes and the manner in which the waste streams will be lawfully managed (recycled, reused and/or disposed of).

The BOP Environmental Impact Statement (EIS) (Umwelt, 2013) provided details on waste management at the BCC. SSD 4960 Modification 3 will not change the predicted waste streams or quantities outlined in the BOP EIS and will be consistent with the existing EPL 563.

Further details are provided below in response to the EPA's request.

Waste Management Principles and Processes

In order to provide a standardised approach to waste management across its NSW operations, Glencore has developed a Waste Management Guideline, which has been prepared in accordance with all relevant legislation and guidelines. The Waste Management Guideline outlines the measures required to be undertaken by all Glencore operations in regard to waste management. In accordance with the requirements of the Glencore Waste Management Guideline, BCM has developed and implemented a site specific Waste Management Plan.

As an existing operation, and based on its Waste Management Plan and Environment Protection Licence (EPL 563), the BCC currently has a well developed and implemented waste management program. This program is based on the following waste management principles that will continue to be applied in the management of waste materials generated by SSD 4960 Modification 3:

- waste avoidance through the minimisation of waste generation
- waste re-use

- waste recycling
- waste removal and disposal (all waste that cannot be re-used with the exception of coal washery rejects, overburden and used large tyres which are buried in controlled areas on site).

The underpinning strategies for management of waste are focused on minimisation through cleaner production and the aforementioned principles, as well as the appropriate segregation, storage and disposal of waste generated on site. The minimisation of waste will be achieved through the following processes:

- consideration of potential waste streams in procurement of materials
- identification and segregation of re-usable and recyclable materials
- education of workforce on waste avoidance, waste stream segregation and recycling
- processing materials for recycling
- considering environmental impacts for waste removal and disposal processes
- waste monitoring and inspection regimes.

Predicted Waste Streams

The waste that will be generated during the ongoing operation of the Bulga Surface Operations, including SSD 4960 Modification 3, will fall into the following waste classes (EPA 2014 Waste Classification Guidelines):

- General Solid Waste (putrescible and non-putrescible) including construction waste, general office waste and domestic waste
- Liquid Waste, of which ablution (e.g. waste water from bathhouses, sinks etc) and operational wastes (e.g. oils and coolant fluids following maintenance) are included
- Hazardous Waste, which includes aspects of construction and operational waste (e.g. coal tar or containers that have previously contained a substance of Class 1 or 5 under the definition of the *Transport of Dangerous Goods Code*) (National Transport Commission 2011)
- Special Waste, e.g. waste tyres, clinical/first aid and asbestos (potentially present in old buildings on site).

Construction Waste

The construction of new and modification of existing infrastructure as part of SSD 4960 Modification 3 will involve predominantly modular/prefabricated components, which are assembled off site and transported to the site for installation. These construction activities are therefore not expected to generate a significant amount of waste materials. The excavated material generated during the earthworks phase of construction will be re-used on site. Inert waste such as concrete will be disposed of at appropriate locations on-site.

Other waste that may be generated during the construction phase of SSD 4960 Modification 3 will include office, domestic and ablution waste, as well as a small amount of waste associated with general maintenance and workshop activities.

Operational Waste

As SSD 4960 Modification 3 is a continuation of existing mining operations and there are no proposed changes to the currently approved annual rates of production, extending the life of the mine is not expected to result in an increase in the amount of waste generated each year. **Table 4.1** provides the waste volumes generated by the Bulga Surface Operations over the 2015 to 2018 reporting periods.

Table 4.1 Waste Volumes – 2015 to 2018

Year	Waste Type (T)				
	Hazardous recycled (batteries waste oil etc.)	Non Hazardous recycled (paper, cardboard etc.)	Hazardous Disposal (oily rags hydraulic hoses etc.)	Non Hazardous Disposal (mixed solid waste)	Contained on site (tyres, effluent etc.
2018	1,599.28	1,015.31	65.30	595.27	2,001.40
2017	1,465.26	1,653.80	50.94	541.56	2,336.30
2016	1,405.55	618.50	56.18	506.04	2,475.30
2015	1,311.86	1,645.79	65.63	548.83	2,369.20

The key components of operational waste are discussed below.

Office Waste

There will be minimal office waste generated by the site. However, waste that is generated will consist of waste paper (comprising general office paper, photocopy paper), office stationary and paper from other sources. Other wastes will include cardboard and packaging, and toner cartridges from printers, photocopiers and facsimile machines. Much of this waste will be recycled in accordance with the waste management principles outlined above while the remainder will be disposed of appropriately.

Domestic Waste

Domestic waste will be generated by employees and contractors at the site and will include food scraps, aluminium and steel cans, glass, plastic and paper containers and putrescible waste. The quantity of this waste is relatively small in comparison to total waste and already largely recycled as part of current BCC operations. These wastes will continue to be recycled, where practicable, in accordance with BCC's waste management principles.

Hazardous Waste

Hazardous wastes will include those generated from workshop and equipment maintenance activities, such as rags, gloves, packing materials, machinery components, waste metal, empty drums, oils, lubricants, hydrocarbons and paints. These wastes will be recycled where practicable, otherwise disposed of via a licensed waste facility or in approved areas on site.

Sediment Dams

Sediment from some dams in the mine water management system have the potential to contain elevated levels of hydrocarbons and carbonaceous material as a result of activities carried out in the catchments for these dams. These dams are regularly cleaned of sediment to maintain their capacity to handle runoff from large rainfall events. Prior to disposal, a risk assessment is undertaken and dams with an increased risk of containing hydrocarbons or other potential environmental pollutants will be tested for these contaminants. Sediment that is not contaminated will be co-disposed with overburden in overburden emplacement areas. Any identified contaminated sediment material will be treated on site and disposed of with overburden, or will be disposed off-site at an appropriately licensed facility.

Ablution Waste

Waste from toilets, bathhouses, kitchen sinks and basins are included as ablution waste with all sewage wastewater managed using the proposed and existing treatment facilities. Effluent generated at the BCC is treated at the on-site sewage treatment plants included in the EPL before being re-used by the CHPP. Deactivated sludge from the sewage treatment plant is periodically removed from site and disposed of by a licensed contractor.

Special Waste

Special wastes are those that have unique regulatory requirements. Special wastes associated with the Bulga Surface Operations will include tyres associated with the mining equipment. Large waste mining equipment tyres are already disposed of in controlled areas on-site within the open cut pits, in accordance with relevant EPA guidelines and this practice will continue as part of the ongoing operations.

Ongoing Waste Management

To manage waste generated by SSD 4960 Modification 3, BCM will continue to implement its existing waste management program based around the BCC Waste Management Plan. Under this system, waste generation will be avoided or minimised as a first principle, then reused or recycled where possible. Wastes will continue to be separated on site to allow different waste streams to be appropriately managed. The majority of wastes that cannot be reused or recycled will be transported off site by licensed waste management contractors. Where appropriate, BCM may continue to dispose of inert waste within existing open cut voids during the construction, operational and mine closure phases of the Project.

The BCC Waste Management Plan includes details regarding:

- waste streams at BCC and their disposal requirements
- storage and treatment requirements
- re-use, recycling and waste minimisation opportunities
- mechanisms for monitoring waste volumes and performance
- training and induction requirements
- the requirement to consider waste management practices within the site Environment and Community Operational Risk Assessment
- reporting requirements
- incident and complaint management
- accountabilities for waste management.

The BCC Waste Management Plan also details the methods for monitoring waste volumes and will include measurable indicators and targets for waste reduction at the BCC.

4.3 DPIE Biodiversity Conservation Division

4.3.1 Biodiversity

1. All data for the biodiversity assessment report required by the Framework for Biodiversity Assessment should be submitted to BCD

Biodiversity impacts of the development and biodiversity values of the proposed Vere offset are being assessed in accordance with the Framework for Biodiversity Assessment (FBA). Appendix 7 of the FBA lists the data to be provided in a Biodiversity Assessment Report (BAR) and to BCD. However, not all of this data has been provided. The following information is requested so that BCD can complete its assessment:

Development footprint – Biodiversity Assessment Report

A. An assessment of the post-mine rehabilitation in the development footprint that forms part of an existing offset package in accordance with the FBA (see Recommendation 2, below)

B. Weather conditions during the species-credit flora surveys and species-credit fauna surveys

C. Landscape Tg values per vegetation zone and a note on whether any Tg value has changed due to species exclusion

D. A discussion on the indirect impacts of sedimentation and run-off from the project and measures to minimise those impacts

E. A copy of the native vegetation extent shapefile that was shown in Figure 3.1 of the BAR

A. An assessment of the post-mine rehabilitation in the development footprint that forms part of an existing offset package in accordance with the FBA (see Recommendation 2, below)

BCD has requested an assessment of the post-mine rehabilitation in the development footprint that was planted since 2015 and is intended to be part of the existing BOP offset package when it reaches its completion criteria. Further assessment has been undertaken and details are provided below in response to Recommendation 2.

B. Weather conditions during the species-credit flora surveys and species-credit fauna surveys

Temperature data was taken from Singleton (Defence) weather station (station 061430) which is approximately 7.8 km from the Project Area. Rainfall and humidity data was taken from Broke weather station (station 061100) approximately 2 km from the Project Area.

Table 4.2 provides weather conditions during the species-credit flora surveys and species-credit fauna surveys.

Table 4.2 Weather conditions during species-credit flora surveys and species-credit fauna surveys

Survey Date	Temp. Lowest – Highest °C	Total Rainfall (mm)	Mean Relative Monthly Humidity (%)
17 August 2017	8.4-22.4	0	55
18 August 2017	10.1-17.0	0	55
18 October 2017	16.1-28.1	0	52
10 November 2017	10.6-24.4	0	56

C. Landscape Tg values per vegetation zone and a note on whether any Tg value has changed due to species exclusion

The landscape Tg value refers to the threatened species offset multiplier embedded in the BioBanking Credit Calculator (BBCC) for all Plant Community Types (PCTs). The landscape Tg value is based on the range of threatened species that are predicted to occur in each PCT, and it influences the extent of ecosystem credits for each PCT.

No ecosystem credit species predicted by the calculator were excluded and therefore the default settings of the BBCC were applied. For reference, the maximum multiplier for each PCT is shown in **Table 4.3**.

Table 4.3 Maximum Tg Value for Each PCT Impacted

Plant Community Type	Threatened Species with Highest Credit Requirement	Threatened Species Offset Multiplier (Tg value)
Zone 1 HU564/PCT922 Melaleuca decora Low Forest of the Central Hunter Valley, Sydney Basin Bioregion ***Moderate to Good***	Little eagle	1.0
Zone 2 HU564/PCT922 Melaleuca decora Low Forest of the Central Hunter Valley, Sydney Basin Bioregion ***Low***	No threatened species offset multiplier (low condition)	0
Zone 3 HU817/1603 Narrow-leaved Ironbark - Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter ***Moderate to Good***	Barking owl	3.0

D. A discussion on the indirect impacts of sedimentation and run-off from the project and measures to minimise those impacts

SSD 4960 Modification 3 is not expected to result in any substantial indirect impacts on the biodiversity values of surrounding lands. The BCC has an existing water management system (WMS) which includes mine dewatering systems, water storages, sedimentation and retention basins, settling and tailings ponds, and drainage systems.

As outlined in the SEE, the WMS required for SSD 4960 Modification 3 will limit the potential impacts on the downstream environment by managing water that has the potential to cause environmental harm. In conjunction with the proposed WMS, a series of erosion and sediment control measures will be utilised during operational and rehabilitation phases to manage sedimentation and run-off.

The WMS is designed to enable BCM to manage and operate the WMS to meet licence conditions within the requirements of the *Protection of the Environment Operations Act 1997* (POEO Act).

As outlined in the SEE, some minor indirect impacts associated with habitat connectivity, fugitive light emissions, dust, noise, groundwater changes, weeds and feral animals may occur during the life of the operations. The indirect impacts will be consistent with the approved operations.

BCM will continue to manage their operations in accordance with relevant environmental management plans to minimise any indirect impacts.

E. A copy of the native vegetation extent shapefile that was shown in Figure 3.1 of the BAR

Relevant shapefiles have been provided to BCD directly, as requested.

Vere Offset – Biobank credit calculator (Management zone attribute scores)

F. The 'score with management' value of the 'native ground cover (other)' attribute in Vegetation Zone 2 (HU815_Moderate/Good_other) was kept at the current score of 2 rather than changed to the default score of 3. The reason for this change is required since all other scores went to the default value

G. The 'score with management' value of the 'exotic plant cover' attribute in Vegetation Zone 3 (HU815_Moderate/Good_ derived grassland) was kept at the current score of 2 rather than changed to the default score of 3. The reason for this change is required since all other scores went to the default value

F. The 'score with management' value of the 'native ground cover (other)' attribute in Vegetation Zone 2 (HU815_Moderate/Good_other) was kept at the current score of 2 rather than changed to the default score of 3. The reason for this change is required since all other scores went to the default value

The 'score with management' has been updated to the default increase in the 'native ground cover (other)' attribute within the credit calculator. This increased the ecosystem credits generated from Vegetation Zone 2 (HU815_Moderate/Good_other) from 81 to 82, that is a single additional credit was generated. This discrepancy has been experienced previously by Umwelt and appears to be a fault in the BioBanking Credit Calculator.

G. The 'score with management' value of the 'exotic plant cover' attribute in Vegetation Zone 3 (HU815_Moderate/Good_ derived grassland) was kept at the current score of 2 rather than changed to the default score of 3. The reason for this change is required since all other scores went to the default value

The 'score with management' has been updated to the default increase in the 'exotic plant cover' attribute within the credit calculator. This increased the ecosystem credits generated from Vegetation Zone 3 (HU815_Moderate/Good_derived grassland) from 282 to 299, that is 17 additional credits were generated. This discrepancy has been experienced previously by Umwelt and appears to be a fault in the BioBanking Credit Calculator.

Vere Offset – Biodiversity Assessment Report

H. A discussion is needed on any existing management actions required for the proposed offset land and how they may affect credit yield

I. A discussion on the vegetation communities in the Vere offset and how they were matched to Plant Community Type is required. It would help with the assessment process if this was in the same format of Section 3.2.1 of the BAR

J. Details of weather conditions during targeted surveys for threatened species is required

K. A discussion on ecosystem credits and species credits to be created at the offset site, including future site value scores for each vegetation zone at the offset site is required

L. A discussion on the change in landscape value score, and the number of ecosystem credits created for the improvement in biodiversity values for each vegetation zone at the offset site is required, and

M. Tables 7.4 and 7.5 in the BAR are difficult to relate to individual vegetation zones. Instead a revised credit-matching table is required that clearly shows how all vegetation zones in the development footprint are matched to vegetation zones in the Vere offset using both the standard FBA rules, and those applying the variation of the offset rules for ecosystem credits (Section 10.5.4.2) of the FBA. BCD recommends that the format of the new table follows the one prepared by Umwelt for the United Wambo project.

H. A discussion is needed on any existing management actions required for the proposed offset land and how they may affect credit yield

The Vere Offset is not subject to biodiversity conservation measures or management actions as part of an existing conservation obligation. Therefore the maximum number of ecosystem credits have been generated for the proposed management actions within the Vere Offset.

I. A discussion on the vegetation communities in the Vere offset and how they were matched to Plant Community Type is required. It would help with the assessment process if this was in the same format of Section 3.2.1 of the BAR

The vegetation zone descriptions are provided in **Appendix 3**.

J. Details of weather conditions during targeted surveys for threatened species is required

Temperature and rainfall data was taken from Singleton (Defence) weather station (station 061430) which is approximately 7.8 km from the Project Area. Humidity data was taken from Cessnock airport (station 061260) approximately 22.5 km from the Project Area.

Table 4.4 provides weather conditions during the targeted surveys for threatened species.

Table 4.4 Weather conditions during targeted surveys for threatened species

Survey Date	Temp. Lowest – Highest °C	Total Rainfall (mm)	Mean Relative Monthly Humidity (%)
8 August 2018	7.2-19.1	0	55
9 August 2018	11.5-20.3	0	
10 August 2018	7.2-22.5	0	
11 September 2018	7.9-24.5	0	52
12 September 2018	7.1-24.3	0	
17 May 2019	10.3-23.2	0	62

K. A discussion on ecosystem credits and species credits to be created at the offset site, including future site value scores for each vegetation zone at the offset site is required

At this stage no species credits are proposed to be created at the proposed Vere Offset. Ecosystem credits proposed to be created at the Vere Offset site and associated current and future site values scores are detailed in **Table 4.5** below. A total of 1,645 ecosystem credits will be created from the proposed Vere Offset.

Table 4.5 Ecosystem Credits Generated at the Proposed Vere Offset Site and Associated Current and Future Site Values

Veg Zone	Plant Community Type/Species Credit Species *Condition Class*	Area (ha)	Credits Generated	Current Site Value	Future Site Value
Ecosystem Credits					
1	HU815/PCT1601 Spotted Gum - Narrow-leaved Ironbark – Red Ironbark shrub - grass open forest of the central and lower Hunter *Moderate to Good*	91.6	1,041	63.02	76.56
2	HU815/PCT1601 Spotted Gum - Narrow-leaved Ironbark – Red Ironbark shrub - grass open forest of the central and lower Hunter *Moderate to Good Shrubland*	6.3	82	49.48	71.35

Veg Zone	Plant Community Type/Species Credit Species *Condition Class*	Area (ha)	Credits Generated	Current Site Value	Future Site Value
3	HU815/PCT1601 Spotted Gum - Narrow-leaved Ironbark – Red Ironbark shrub - grass open forest of the central and lower Hunter *Moderate to Good Derived Native Grassland*	28.2	299	13.02	28.56
4	HU815/PCT1601 Spotted Gum - Narrow-leaved Ironbark – Red Ironbark shrub - grass open forest of the central and lower Hunter *Moderate to Good - Previous Ground Disturbance*	8.4	104	50.52	69.79
5	HU906/PCT1692 Bull Oak grassy woodland of the central Hunter Valley *Moderate to Good*	7.0	78	53.12	67.19
6	HU812/PCT1598 Forest Red Gum grassy open forest on floodplains of the lower Hunter *Moderate to Good*	0.8	8	97.33	100.00
7	HU564/PCT922 *Melaleuca decora* Low Forest of the Central Hunter Valley, Sydney Basin Bioregion *Moderate to Good*	1.5	15	58.85	67.19
8	HU945/PCT1731 Swamp Oak – Weeping Grass grassy riparian forest of the Hunter Valley *Moderate to Good*	1.3	16	71.33	88.00
9	HU815/PCT1601 Spotted Gum - Narrow-leaved Ironbark – Red Ironbark shrub - grass open forest of the central and lower Hunter *Low Condition Exotic Grassland*	0.2	2	8.85	22.92
-	Cleared Land (including water bodies)	8.4	0	0	0
Total		**153.7**	**1,645**	**n/a**	**n/a**

L. A discussion on the change in landscape value score, and the number of ecosystem credits created for the improvement in biodiversity values for each vegetation zone at the offset site is required, and

The landscape value is calculated to be 25.80 at the proposed Vere Offset and is based on the landscape features detailed in **Table 4.6** below. The BioBanking Credit Calculator does not specify a change in the overall landscape value, however as part of the calculations for the landscape value an increase in native vegetation percent cover in both the outer and inner assessment circles occurs as a result of the establishment of the proposed Vere Offset.

Table 4.6 Landscape Features in Assessment Circles

Landscape Feature	Proposed Vere Offset
Mitchell Landscapes	Central Hunter Foothills
Rivers, Streams, Estuaries	5th order (Yellow Rock Creek)
Wetlands	None identified
Native Vegetation	Outer assessment circle 41-45% before biobanking, 46-50% after biobanking Inner assessment circle 46-50% before biobanking, 61-65% after biobanking
Patch Size	>1001 hectares

M. Tables 7.4 and 7.5 in the BAR are difficult to relate to individual vegetation zones. Instead a revised credit-matching table is required that clearly shows how all vegetation zones in the development footprint are matched to vegetation zones in the Vere offset using both the standard FBA rules, and those applying the variation of the offset rules for ecosystem credits (Section 10.5.4.2) of the FBA. BCD recommends that the format of the new table follows the one prepared by Umwelt for the United Wambo project.

Table 4.7 below provides a breakdown of the ecosystem credits required for the SSD 4960 Modification 3 and how these are matched with the credits generated at the proposed Vere Offset using the 'like for like' PCT approach and the 'CEEC for CEEC' approach. Using these approaches the proposed Vere Offset meets all the ecosystem credits required for the SSD 4960 Modification 3 Development Footprint.

Table 4.7 Offset Package to Meet Credit Requirement for Ecosystem Credits

Vegetation Zone Offset Allocation	Justification	Credits Required/Available	Per cent (%) of Credit Requirement
Zone 1 HU564/PCT922 Melaleuca decora Low Forest of the Central Hunter Valley, Sydney Basin Bioregion ***Moderate to Good***		**55**	**100%**
Threatened ecological community status not relevant		**55**	**100%**
HU564/PCT922 Melaleuca decora Low Forest of the Central Hunter Valley, Sydney Basin Bioregion	Like for like rules – same PCT	15	27%
HU815/PCT1601 Spotted Gum - Narrow-leaved Ironbark – Red Ironbark shrub - grass open forest of the central and lower Hunter	Like for like rules	40	73%
Zone 2 HU564/PCT922 Melaleuca decora Low Forest of the Central Hunter Valley, Sydney Basin Bioregion ***Low***		**8**	**100%**
Threatened ecological community status not relevant		**8**	**100%**
HU815/PCT1601 Spotted Gum - Narrow-leaved Ironbark – Red Ironbark shrub - grass open forest of the central and lower Hunter	Like for like rules	8	100%

Vegetation Zone Offset Allocation	Justification	Credits Required/Available	Per cent (%) of Credit Requirement
Zone 3 HU817/1603 Narrow-leaved Ironbark - Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter ***Moderate to Good***		**868**	**100%**
Conforming to Central Hunter Valley Eucalypt Forest and Woodland CEEC under the EPBC Act		**868**	**100%**
HU815/PCT1601 Spotted Gum - Narrow-leaved Ironbark – Red Ironbark shrub - grass open forest of the central and lower Hunter	Like for like CEEC	868	100%

Recommendation 1

BCD recommends that all data requirements under the Framework for Biodiversity Assessment are met so that BCD can complete its assessment of biodiversity impacts of the project and biodiversity values of the proposed offset site.

2. Biodiversity values of the biodiversity offset land to be cleared for the project need to be assessed by the Framework for Biodiversity Assessment

Section 6.12.3 of the Statement of Environmental Effects (SEE) describes the proposed clearing of about 200 hectares of post-mine rehabilitation which would subsequently be replaced on a 1:1 ratio. At the meeting on 29 October 2019 it was said that about 50 hectares of this post-mine rehabilitation is part of the offset for the Bulga Optimisation Project. However, no assessment of the biodiversity values of the rehabilitation offset was provided in the BAR. BCD recommends that the biodiversity values of this rehabilitation offset are assessed in accordance with the FBA. This can include the use of existing BioBanking quadrats already in Bulga's post-mine rehabilitation area that have been conducted as part of an annual monitoring program. The FBA assessment of the rehabilitation offset may generate ecosystem credits or threatened species credits. If so, this would be an additional offset requirement to replacing the rehabilitation to meet existing offset requirements.

Recommendation 2

BCD recommends that the mine-rehabilitation component of the Bulga Optimisation Project's biodiversity offset package is assessed in accordance with the Framework for Biodiversity Assessment. If this assessment generates ecosystem credits or species credits that they must be offset in accordance with the FBA.

As outlined in the SEE, SSD 4960 Modification 3 involves the progressive re-disturbance of approximately 200 ha of mine rehabilitation located on the in-pit emplacement area, behind the noise and visual bund. The area of rehabilitation to be disturbed is predominantly located on the upper levels of the existing in-pit mine overburden emplacement. This action is required in order to raise the height of the in-pit emplacement area (located behind the noise and visual bund) from approximately 150 mAHD to approximately 160 mAHD with selected areas emplaced to approximately 175 mAHD to accommodate the incorporation of natural relief landform features. Raising the height of the in-pit emplacement is proposed to create additional in-pit overburden emplacement capacity as an alternative to expanding the footprint of out-of-pit overburden emplacement areas, which would require disturbance of areas not previously disturbed by mining activities. Raising the in-pit overburden area avoids the biodiversity impacts that would result from expanding the out-of-pit overburden emplacements onto undisturbed land.

SSD 4960 requires vegetation to be established, with the restoration of 2,200 ha of Central Hunter Grey Box-Ironbark Woodland EEC, 250 ha of Central Hunter Ironbark-Spotted Gum-Grey Box Forest EEC and 50 ha Central Hunter Swamp Oak Forest. The rehabilitation areas will form part of the biodiversity offset package for the approved operations. Approximately 79 ha of mine rehabilitation established in accordance with SSD 4960 will be re-disturbed as part of SSD 4960 Modification 3.

As requested by BCD, Umwelt have undertaken an assessment of the mine rehabilitation to be disturbed by SSD 4960 Modification 3 in accordance with the Framework for Biodiversity Assessment.

The rehabilitation was surveyed on 11 December 2019 and included sampling 8 plots/transects to determine the condition of the rehabilitation established in accordance with SSD 4960, totalling approximately 79 hectares (excluding access roads).

Remaining areas of rehabilitation that will be disturbed as part of SDD 4960 Modification 3, totalling approximately 118 ha, have not been assessed as this area does not form part of any pre-existing offset strategy commitments.

The 79 hectares of mine rehabilitation is in an early phase of establishment and currently has a low species richness. In order to assign a Plant Community Type (PCT)/Biometric Vegetation Type (BVT) based on limited floristic species richness an equivalent PCT/BVT to the target *Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions* EEC was selected. Additionally the PCT/BVT selected is known to occur in the locality and was identified in the nearby SSD 4960 Modification 3 Development Footprint as described in the Biodiversity Assessment Report (Umwelt 2019).

Table 4.8 details the site value scores for the mine rehabilitation, which was split into two different conditions zones based on the age and progress of the rehabilitation. The 2015 rehabilitation (Zone 1) had a more established shrub/low tree layer than the 2016/2018 rehabilitation (Zone 2). The 2016/2018 rehabilitation (Zone 2) has a site value score less than 17 and therefore does not generate any ecosystem credit requirements. The 2015 rehabilitation has a site value score of 20.31 and would generate 612 ecosystem credits.

Table 4.8 Mine Rehabilitation Site Values and Credits

Plant Community Type	Establishment Year	Site Value	Area (ha)	Number of Plots/Transects (required)	Ecosystem Credits Required
Zone 1 HU817/1603 Narrow-leaved Ironbark - Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter *Moderate to Good_Poor*	2015	20.31	29.37	4 (4)	612
Zone 2 HU817/1603 Narrow-leaved Ironbark - Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter *Moderate to Good_Other*	2016/2018	10.94	49.96	4 (4)	0 (site value score < 17)
Total			**79.33**	**8 (8)**	**612**

The areas that require re-disturbance will be progressively rehabilitated in accordance with the existing rehabilitation objectives and offset strategy requirements of SSD 4960, the existing approved Biodiversity Management Plan (BMP) and in accordance with performance criteria included in the approved Rehabilitation Management Plan (RMP). All commitments in relation to rehabilitation associated with the biodiversity offset strategy will be met. SSD 4960 Modification 3 may only result in a temporal change in meeting that commitment.

BCM propose to re-establish the 79 ha area of rehabilitation proposed to be disturbed by SSD 4960 Modification 3, in accordance with the existing BMP and to achieve the completion criteria already approved for this area in the RMP. The timing for the re-establishment of this area will be consistent with the progressive rehabilitation shown in the Stage Plans provided in the SSD 4960 Modification 3 SEE (Figures 3.1 to 3.4 in the SEE).

It is noted that the biodiversity values achieved in the 2015 rehabilitation have been achieved within four years. Re-established rehabilitation areas should be able to achieve comparable biodiversity values to the current rehabilitation areas in a reasonably short timeframe also.

4.3.2 Aboriginal Cultural Heritage

3. The four extant Aboriginal heritage sites that will be impacted by the proposed modification must be salvaged

Following review of the Statement of Environmental Effects and the Aboriginal Cultural Heritage Assessment Report, Bulga Optimisation Project Modification 3 (ACHAR) BCD notes that there are four recorded extant Aboriginal sites situated within the Assessment Boundary for the proposed modification that will be directly impacted should the modification be approved.

It is noted that there were another two Aboriginal sites recorded, that are no longer extant, as they were impacted by the construction of an approved laydown area. These sites were unintentionally destroyed, and the proponent self-reported this event to the then Office of Environment and Heritage (OEH) on 6 September 2018.

The ACHAR recommends that the four extant Aboriginal sites to be impacted, should the modification be approved, be salvaged by collection of surface artefacts under the Bulga Coal Complex Aboriginal Cultural Heritage Management Plan (OzArk 2019)

Recommendation 3

BCD recommends that the four extant Aboriginal heritage sites be salvaged under the Bulga Coal Complex Aboriginal Cultural Heritage Management Plan, should the proposed modification be approved.

BCM will salvage the four extant Aboriginal heritage sites under the BCC Aboriginal Cultural Heritage Management Plan (ACHMP), should SSD 4960 Modification 3 be approved.

4. The approved Aboriginal Cultural Heritage Management Plan must be updated

The Bulga Coal Complex Aboriginal Cultural Heritage Management Plan (ACHMP) must be revised to incorporate any impacts to the four Aboriginal sites as a result of the proposed modification and submitted to BCD for approval. Any revisions to the ACHMP must be in consultation with all the registered Aboriginal parties.

Recommendation 4

BCD recommends that the proposed salvage of the four extant Aboriginal sites be integrated into the Bulga Coal Complex Aboriginal Cultural Heritage Management Plan in consultation with all the registered Aboriginal parties and submitted to BCD for approval.

The four extant Aboriginal sites will be integrated into the BCC ACHMP in consultation with all the registered Aboriginal parties and submitted to BCD for approval, should SSD 4960 Modification 3 be approved.

5. No impacts are to occur within the Cultural Values Area to the north-east of the modification area

The Cultural Values Area as shown on Figure 6-7 of the ACHAR directly to the north-east of the proposed infrastructure area must not be impacted by the proposed modification. Management and mitigation of this area must be included in the Bulga Coal Complex ACHMP. The ACHMP must be revised to incorporate management and mitigation of the Cultural Values Area. Any revisions to the ACHMP must be undertaken in consultation with all the registered Aboriginal parties.

Recommendation 5

BCD recommends that the Aboriginal cultural heritage constraints and obligations identified for the Cultural Values Area, be integrated into the Bulga Coal Complex Aboriginal Cultural Heritage Management Plan, in consultation with all the registered Aboriginal parties and submitted to BCD for approval.

SSD 4960 Modification 3 does not propose any impacts on the Cultural Values Area.

Aboriginal cultural heritage constraints and obligations identified for the Cultural Values Area have been integrated into the BCC ACHMP, in consultation with all the registered Aboriginal parties.

4.4 Division of Resources and Geoscience

It is recommended that if time permits an independent expert examination of the proposed final landform be undertaken, focusing on whether the project case selected by the Proponent is the best option.

The design of the approved Bulga Surface Operations was developed having regard to potential environmental and social impacts associated with mining operations, with the aim of minimising project specific and cumulative impacts. During the development of the approved operations, substantial community consultation was undertaken, including a range of issue specific workshops on final landform and closure of the site. This consultation led to the development of a significant noise and visual bund (over 9 km long and up to 70 m high) as part of the final landform, providing a barrier between the existing operations and sensitive community stakeholders to the west and south-west. As a result of the consultation, commitments were also made during the approval process to develop the outside face of the noise and visual bund as soon as practicable, while also committing to working the outer face during the day only. Construction of the outer face of the bund is now complete.

When reviewing the mine plan development for SSD 4960 Modification 3, a number of key constraints led to a focus on maximising the potential for resource recovery beneath exiting mining and tailings areas and the re-use of existing disturbance and emplacement areas. These constraints included:

- keeping the outer face of the noise and visual bund general ‘as-is’ for residences to the west and south
- minimising impacts on constraints to the east having recently re-aligned a portion of Broke Road and impacting to the Loders Creek Grinding Grooves as part of the approved operations
- Yancoal’s MTW operations are located to the north of the Project Area.

The overburden emplacement strategy for SSD 4960 Modification 3 has focussed on maximising the resource recovery while minimising additional disturbance, and being cognisant of the community and environmental constraints surrounding the operation. At the same time a focus has been placed on returning catchment to Wollombi Brook and Loders Creek and minimising the catchment to the final void.

SSD 4960 Modification 3 has been designed to maintain the predicted project specific and cumulative impacts within the currently approved limits and criteria applying to the approved operations as much as practicable, while also providing significant ongoing benefits for an additional four years. Given the general acceptance of the currently approved final landform by stakeholders, including the effective visual and noise barrier performance to-date, the final landform design for SSD 4960 Modification 3 aims to minimise final landform changes as much as practicable.

SSD 4960 Modification 3 does not significantly alter the broad mine closure and rehabilitation commitments and practices currently undertaken at the Bulga Surface Operations pursuant to the current approval. Importantly, SSD 4960 Modification 3 does not alter the general rehabilitation or land use objectives for the site.

Further discussion on the approach to the mine design, including the final landform design and comparison to the approved operations is provided below.

Mine Design Approach

SSD 4960 Modification 3 has been designed to maximise resource recovery and operational efficiencies from the existing Bulga Surface Operations, whilst also aiming to minimise environmental and social impacts. SSD 4960 Modification 3 will result in the efficient recovery of approximately 63 Mt of additional ROM coal resource at the BCC with minor changes to the currently approved environmental impacts.

Detailed pre-feasibility mine design studies were completed for SSD 4960 Modification 3 to optimise the final design with consideration of the final landform. These studies identified potential mine design options and then evaluated each option to identify the preferred mine design. During these studies environmental and community impacts were key considerations that informed the mine design.

The key issues considered in assessing the viability and feasibility of various alternatives and developing the final design were as follows:

- maintaining noise and air quality impacts within the existing approved criteria
- maintaining the existing noise and visual bund along the western and south-western boundary of the operations which has established rehabilitation in place
- minimising visual impacts on the surrounding community over the life of the operations
- maximising resource recovery
- financial viability
- mining efficiency coupled with safety considerations
- minimising the disturbance footprint through utilising previously disturbed areas and minimising out-of-pit overburden emplacement areas
- minimising impacts on biodiversity and water resources
- minimising any increases to the final void size
- minimising social impacts
- establishing the future final landform.

Mine Design Options Assessed

Alternative mine designs were considered as part of the prefeasibility phases for the design of SSD 4960 Modification 3.

<u>Open Cut Mining</u>

The main alternative open cut mine design aimed to maintain overburden emplacement area heights within the Project Area. In doing so, additional out-of-pit overburden emplacement area was required which resulted in additional disturbance in the order of 180 ha (refer to **Figure 4.4**). A larger disturbance area would have additional impacts on biodiversity and the water management system as well as resulting in potential additional impact to noise, air quality, visual amenity and Aboriginal heritage.

As outlined above, a key design consideration for the proposed mine plan was to minimise additional disturbance as much as possible. As outlined in the SEE, it is proposed to increase the typical height of overburden emplacement areas from RL 150 mAHD to approximately 160 mAHD with selected areas emplaced to approximately 175 mAHD to accommodate the incorporation of micro-relief landform features.

This minor increase in the height of the emplacement areas within the current mining area increases the available volume of the in-pit emplacement areas, resulting in reduced need for external emplacement of mine spoil. This enables the layout of the emplacement areas to remain generally consistent with the currently approved emplacement area footprint.

The minor increase to the in-pit overburden emplacement heights is considered a lesser impact compared to building a new out-of-pit emplacement which would require an additional approximately 180 ha of new disturbance which would potentially impact on threatened ecological communities, require revised water management structures, and would be likely to result in new visual impacts.

The approved operations final landform includes one final void, and no additional voids are proposed as part of SSD 4960 Modification 3. In line with the existing approval, the proposed final void acts as a long term groundwater sink, as discussed in the SEE.

Final Void Backfill Review

BCM reviewed the consideration of filling the final void. The volume of overburden required to completely backfill the proposed final void is approximately 790 million loose cubic metres (Mlcm). As a comparison, the total volume of the Eastern Emplacement Area is approximately 78 Mlcm. BCM has advised that the volume of overburden required to fill the void to a self-draining landform would necessitate the movement of the entire in-pit emplacement area above approximately RL 80m and a large portion of the inside of eastern side of the noise and visual bund, resulting in the removal of approximately 805 Ha of established rehabilitation and established landform.

BCM advised that the significant re-handling of material at the end of production would prolong operations on site for approximately 14 years, along with associated environmental impacts including air quality, noise and visual impacts. Mine closure would therefore also be delayed. Establishment of vegetation from rehabilitation works would be delayed, which would then delay establishment of habitat connectivity within the final landform. Additionally, there would be an extended duration of the dirty water management system which would delay the return of runoff from rehabilitated areas to the natural landform.

On balance, the prolonged environmental impacts along with the significant additional costs associated with backfilling the void are neither feasible nor appropriate. As previously noted the approved final landform includes a final void and no additional voids are proposed as part of SSD 4960 Modification 3.

Following consideration of these aspects and associated impacts, BCM determined that backfilling of the void is not considered to be feasible or acceptable.

Underground Mining

As discussed in the SEE, underground mining was ruled out on technical grounds due to the steep dip of the seams which precludes efficient underground extraction. Accessing the coal through underground mining methods would also require a significant barrier of coal to remain unmined adjacent to the open cut mining area due to a range of safety factors including highwall stability, potential spontaneous combustion issues and mining underneath a significant existing tailings storage.

Underground mining operations would only allow access to 1 to 2 coal seams whereas open mining will allow for greater recovery of the resource within the proposed mining footprint. In addition, the relatively small size and confined shape of the additional mining area resulting from SSD 4960 Modification 3 does not allow for the establishment of a viable longwall mine layout.

Comparison to Approved Operations

The overall rehabilitation strategy for SSD 4960 Modification 3 is consistent with the currently approved operations. SSD 4960 Modification 3 will result in an extension of the South Pit Area to the south of the current approved area (refer to **Figure 1.2**). This proposed extension to mining largely impacts on areas previously impacted by past mining operations, including mining through the existing TSFs. As a result, SSD 4960 Modification 3 only results in small areas of additional disturbance totalling 20.2 ha. The key changes to the approved operations that result in changes to the final landform and rehabilitation of parts of the site are:

- expansion of the in-pit TSF
- removal of tailings from Deep Pit and Bayswater Pit TSF prior to mining through these areas
- extension of mining in South Pit Area
- changes to the sequence of mining and in-pit overburden emplacement.

SSD 4960 Modification 3 will result in the extension of the Bulga Surface Operations mine life and a modified final landform to that currently approved. SSD 4960 Modification 3 will maintain the design of the outer face of the approved noise and visual bund. SSD 4960 Modification 3 will also require an increase in emplacement heights within the in-pit emplacement areas from 150 to 160mAHD with selected areas emplaced to approximately 175m AHD to improved landform variability and assist in catchment design for the final landform. The proposed increase in the in-pit emplacement area height removes the need to seek additional out-of-pit emplacement area which would result in additional impacts associated with increased disturbance area. Visual impacts associated with the increased dumping will be largely screened by the noise and visual bund at most vantage points to the south and west of the operation.

The conceptual final landform for SSD 4960 Modification 3 will be largely consistent with existing current approved operations, and retains the existing noise and visual bund. This design will include variable terrain which is profiled to effectively manage runoff to enhance long term landform stability and to be sympathetic to the profile of the adjacent landscape (refer to **Figure 4.5**). The proposed final landform also incorporates the design controls developed for the approved operations including designing the final landform and drainage of water to natural catchments particularly in relation to Loders Creek and Wollombi Brook.

Consistent with the approved operations, a single final void will remain, however SSD 4960 Modification 3 will result in the void being located approximately 1 km to the south east of the location contemplated for the approved operations. The landform within the final void will include highwalls, benches, the floor of the working area, low walls and ramps. The highwall will consist of the unmined rock face which represents the western edge of the South Pit Area and extends down to the pit floor. It is made up of a series of semi vertical unmined rock faces with relatively level benches, designed to achieve acceptable long term geotechnical stability. The pit floor consists of unmined material beneath the mined area in the deeper parts of the pit. In areas of steeper mining such as the East Pit, the pit floor will be inclined. The low wall is the internal facing surface of emplaced overburden within the pit. The final batter angle of the low walls within the proposed final void ranges from 10° to18° which is steeper than the internal batter slope in the approved South Pit Area final void. This design has been adopted to maximise in-pit emplacement volumes, which also reduces the need to expand the out-of-pit emplacement area footprint, which would otherwise result in additional areas of disturbance being required for SSD 4960 Modification 3. Refer to **Figure 4.6** for the proposed locations of the above features.

Relative to the approved operations, the conceptual final landform for SSD 4960 Modification 3 includes the following key changes:

- retaining the existing noise and visual bund
- changes to the depth and design of the final void following extraction of additional resources
- repositioning of the final void approximately 1km to the south east of the currently approved conceptual final landform
- an increase to the conceptual final void catchment area predominantly due to deeper mining in the open cut and removal of the southern highwall from the final void layout
- additional emplacement of overburden within in-pit emplacement areas generally to 160 m AHD with areas up to maximum elevation of approximately 175 m AHD for terrain variability and catchment management purposes
- low wall batter slopes in parts of the final void landform to up to 18^{o}
- extend closure and final rehabilitation of the site by approximately four years due to the extension of mine life.

Figure 4.7 contains comparative cross sections between the conceptual final landforms contemplated for the approved operations and SSD 4960 Modification 3.

Table 4.2 details the key changes in terms of final landform for SSD 4960 Modification 3 relative to the approved operations. Rehabilitation practices for SSD4960 Modification 3 are set out in the approved Bulga Open Cut Rehabilitation Management Plan (RMP).

Final landform design changes have been developed having regard to long term experience at the BCC as well as ongoing consultation with the Resources Regulator in relation to other Glencore projects in the Hunter Valley.

Table 4.9 Comparison of Project Area rehabilitation/final landform changes: Current Operations vs. Proposed Modification

Feature	Approved Operations	Proposed Modification	Comments
Final landform shaping	Rehabilitated slopes are generally 10° except in the north-west corner of the Noise and Visual Bund to limit impacts on Warkworth Sands Woodland EEC and Charlton Road. However, to allow for the creation of local relief in topography on the top of overburden dumps as well as the creation of alternative stable slope designs (i.e. if concave profiles are utilised), slope angles may exceed this criteria subject to approval by DRE. Emplacement in Noise and Visual Bund to 150 m AHD with selected areas to 165 m AHD. Emplacement in in-pit emplacement area and Eastern Emplacement Area to approximately 150 m AHD with selected areas emplaced to 165 m AHD.	Outer slopes of in-pit emplacement areas battered to a (toe to crest) slope of up to 14°. Emplacement in in-pit emplacement area to approximately 160 m AHD with selected areas emplaced to 175 m AHD to accommodate the incorporation of micro-relief landform features. No changes to existing noise and visual bund	No change to noise and visual bund emplacement heights or slopes. Eastern Emplacement Areas to a (toe to crest) slope of up to 14°. Increases to typical overburden emplacement heights from 150 to 160 m AHD with selected areas emplaced to approximately 175 m AHD to accommodate the incorporation of micro-relief landform features. External batters of in-pit emplacement areas to a (toe to crest) slope of up to 14°. No change to objectives for slope stability.
Highwalls	Western and southern highwalls retained in final landform.	Western highwall retained in final landform. Lower sections of northern highwall to be retained in final landform below pit lake equilibrium level. Southern highwall consisting of a series of semi vertical unmined rock faces with benches replaced by reshaped in-pit emplacement slopes of around 18 degrees.	As with existing approved operations, western highwall not proposed to be battered due to proximity to approved noise and visual bund. Southern Highwall no longer retained in final landform as revised mining sequence results in in-pit emplacement against highwall as mining progresses deeper and back towards the north. Final landform highwall treatment is generally consistent with approved operations.

Feature	Approved Operations	Proposed Modification	Comments
Low wall	Low wall internal slopes battered to an average slope of 10°. Steeper slopes permitted subject to approval by Resources Regulator.	Northern and southern internal slopes of final void to be battered to (toe to crest) slopes ranging between 10° and 18°.	No change to overall objective of maintaining stable slopes. Minimising disturbance to existing areas of the final landform that are visible from the community were prioritised, however these areas are not visible from the community. Final void catchment area reduced through increased batter slope. Run-off from internal slopes able to be directed towards highwalls to reduce risk of erosion. Detailed drainage strategy to be developed over the life of the operation and included in the mine closure plan developed for the Project.

Feature	Approved Operations	Proposed Modification	Comments
Number of voids	One – Approved South Pit Area	One – South Pit Area	No change to number of voids currently approved. Final void SSD 4960 Modification 3 located approximately 1km to the south east of that contemplated for current approved operations.
Final void depth	Final pit floor approximately -260 m RL.	Final pit floor approximately -320 m RL	Increase depth due to ability to mine deeper seams through increased pit area during operations.
Modelled maximum pit lake level	Approximately 60 m AHD. Final void to operate as a long term hydraulic sink however potential for seepage though spoil at low point of pit crest anticipated to occur prior to equilibrium – seepage predicted to occur into Loders Creek Catchment. Seepage water quality predicted to be similar to long term baseflow water quality in Loders Creek.	Approximately -30 mAHD. Final void modelled to act as long term hydraulic sink with no seepage through spoil predicted.	Revised groundwater model inflows and refined final landform run-off predicts that the proposed final void will operate as a long term hydraulic sink, reaching a lower pit lake water level at equilibrium. Final void design limits the risk of spill to environment with no long term seepage through spoil predicted.
Time to equilibrium water level	Approximately 500 years.	Approximately 500 years.	No change
Pit Lake Water Quality	TDS levels increasing to 6,000 uS/cm. Pit lake pH expected to be neutral due to excess buffering capacity present in overburden material.	TDS levels increasing to approximately 9,000 mg/L at equilibrium. Pit lake pH expected to be neutral pH due to excess buffering capacity present in overburden material.	Predicted final void salinity will be moderately saline based on the Food and Agricultural Organisation of the United Nations (FAO 2013) categorisation of water salinity. The predicted final void salinity is considered suitable for some uses for a period of time, including stock watering (mature cows and sheep), recreation, industrial water use and the maintenance of aquatic ecosystems.
Pit Lake Spill risk	Pit lake to reach equilibrium at approximately 19 m below spill level.	Pit lake to reach equilibrium at approximately 100 m below spill level.	Risk of potential spill to the environment is negligible. Reduced risk of spill relative to approved operations. SSD 4960 Modification 3 also modelled to avoid risk of seepage through spoil.

Feature	Approved Operations	Proposed Modification	Comments
Number of tailings storage facilities	Four (including the now-capped Old Tailings Dam).	Two (including the now-capped Old Tailings Dam).	Bayswater Pit and Deep Pit Tailings storage facilities to be decommissioned with tailings transferred into expanded in-pit Main Pit Tailings Storage Facility.
Tailings Facility Capping Strategies	TSFs to be capped and shaped to be free draining. Capping to commence following tailings consolidation.	TSFs to be capped and shaped to be free draining. Capping to commence following tailings consolidation.	Capping will commence when Main Pit TSF is adequately consolidated and stabilised. Final landform shaping of Main Pit TSF may require rehandle and reshaping of adjacent in-pit overburden emplacement areas to provide a free draining landform. Similar requirements as anticipated for Deep Pit tailings storage facility under currently approved operations.

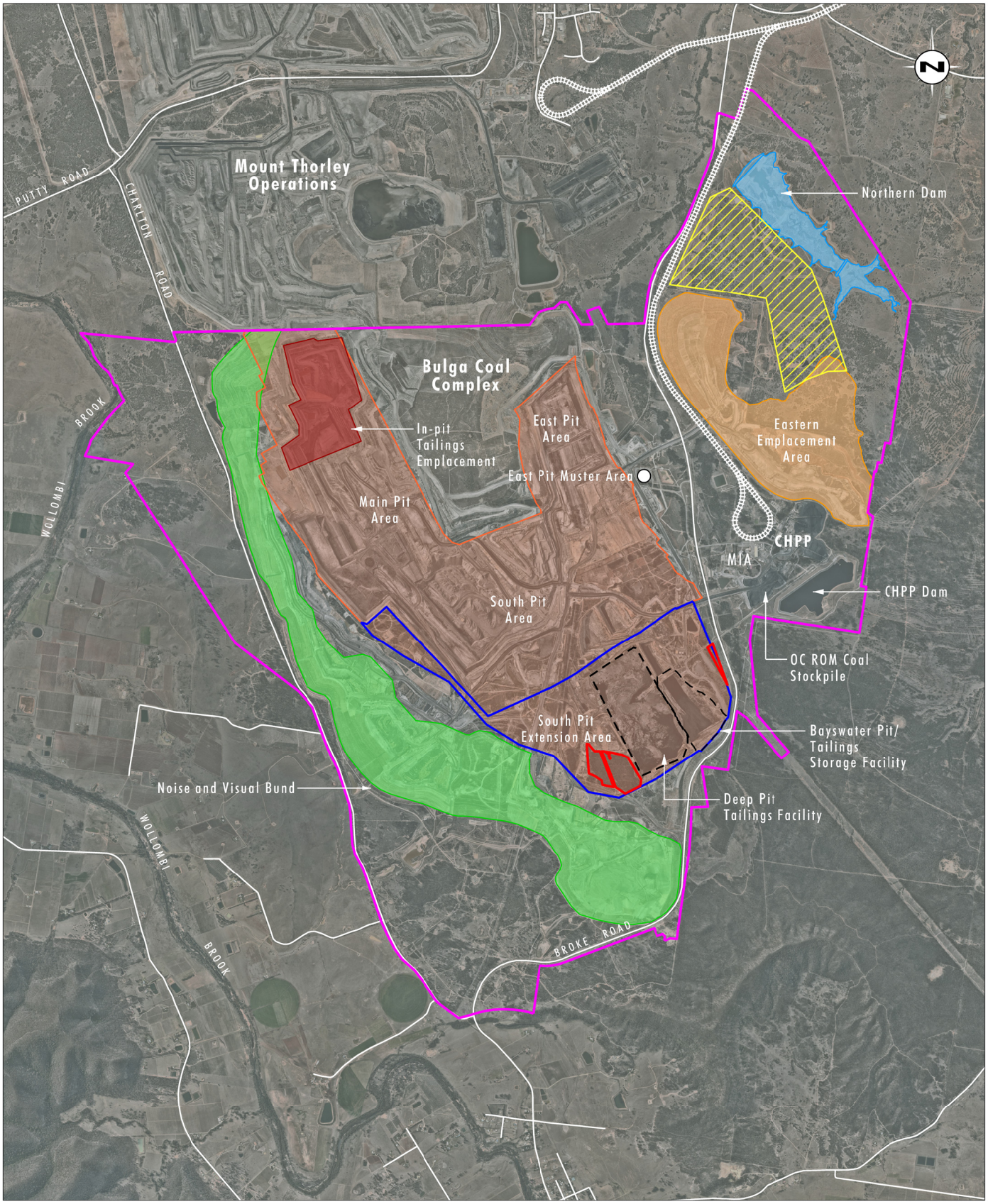


Image Source: Nearmap (Sep 2018)
Data Source: Bulga (2019)

0 1 2 3km
1:60 000

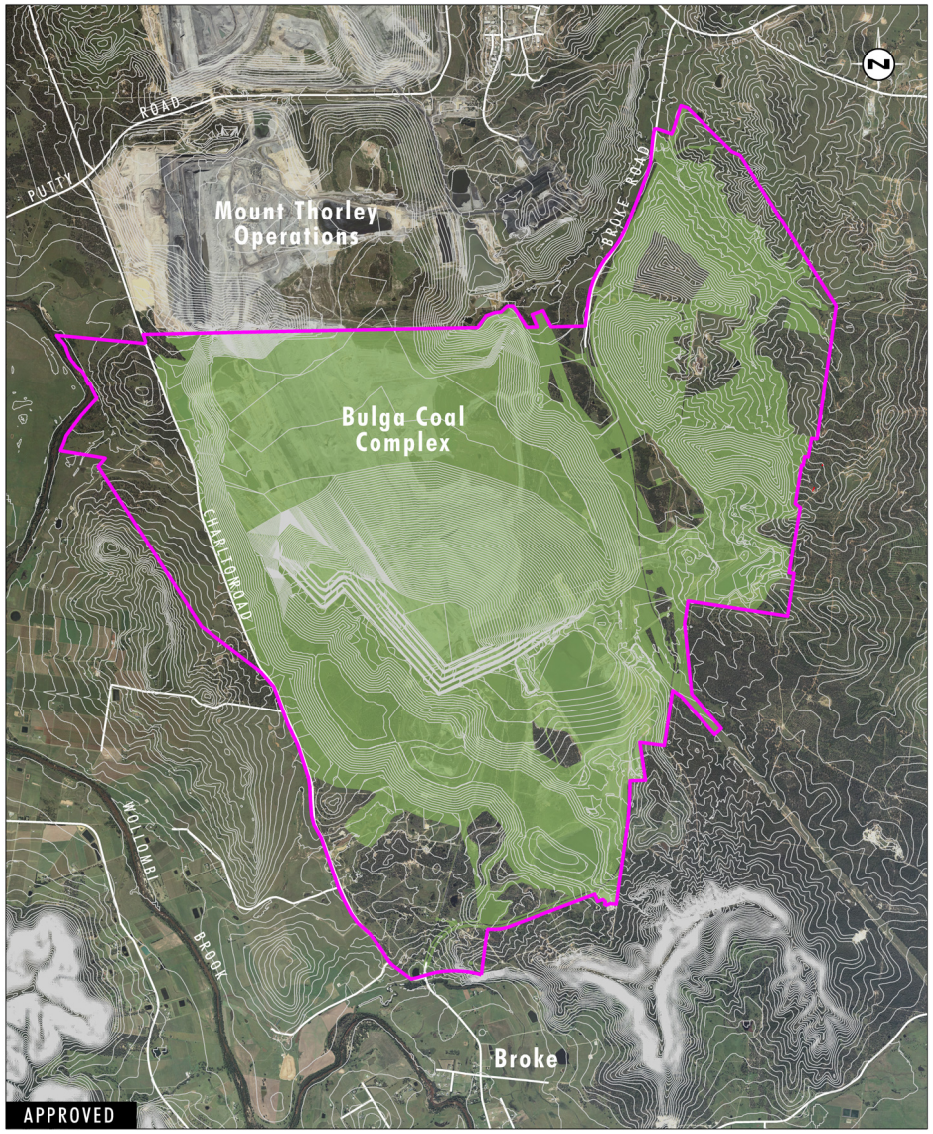
Legend

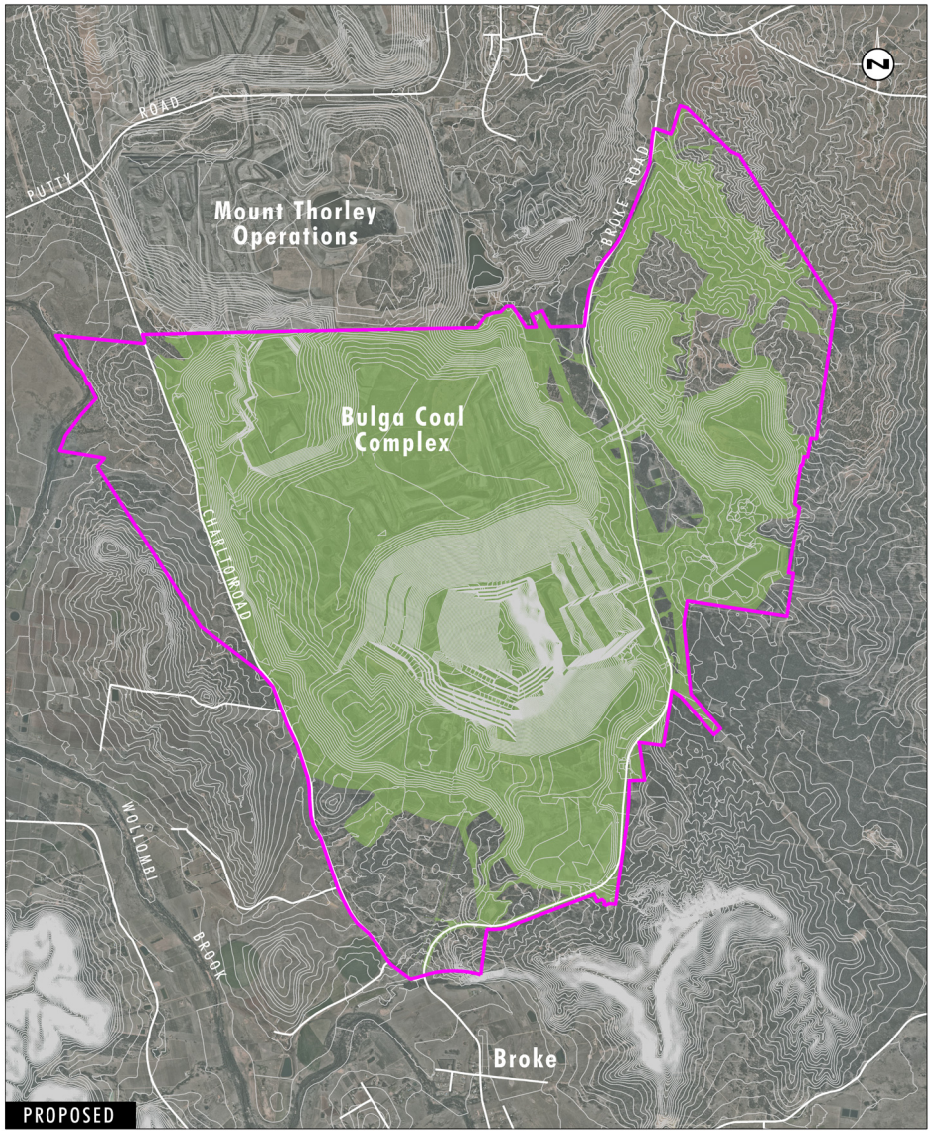
- Project Area
- Additional Disturbance Area
- South Pit Extension Area
- Mining Area
- Noise and Visual Bund
- Eastern Emplacement Area
- In-pit Tailings Emplacement
- Northern Dam
- Additional Disturbance required within Alternate Mine Plan
- Rail Line

FIGURE 4.4

Additional Disturbance Required within Alternative Mine Plan

File Name (A4): R13/4100_219.dgn
20191213 15.12





Legend

- Project Area
- Rehabilitation Area

Image Source: Nearmap (Sep 2018), AAM Pty Limited (March 2012)
Data Source: Bulga (2013 and 2018)
Note: 5m Contour Interval

0 1.0 2.0 4.0km
1:90 000

FIGURE 4.5

Approved and Proposed Final Void

File Name (A4): R13/4100_217.dgn
20191217 14.03

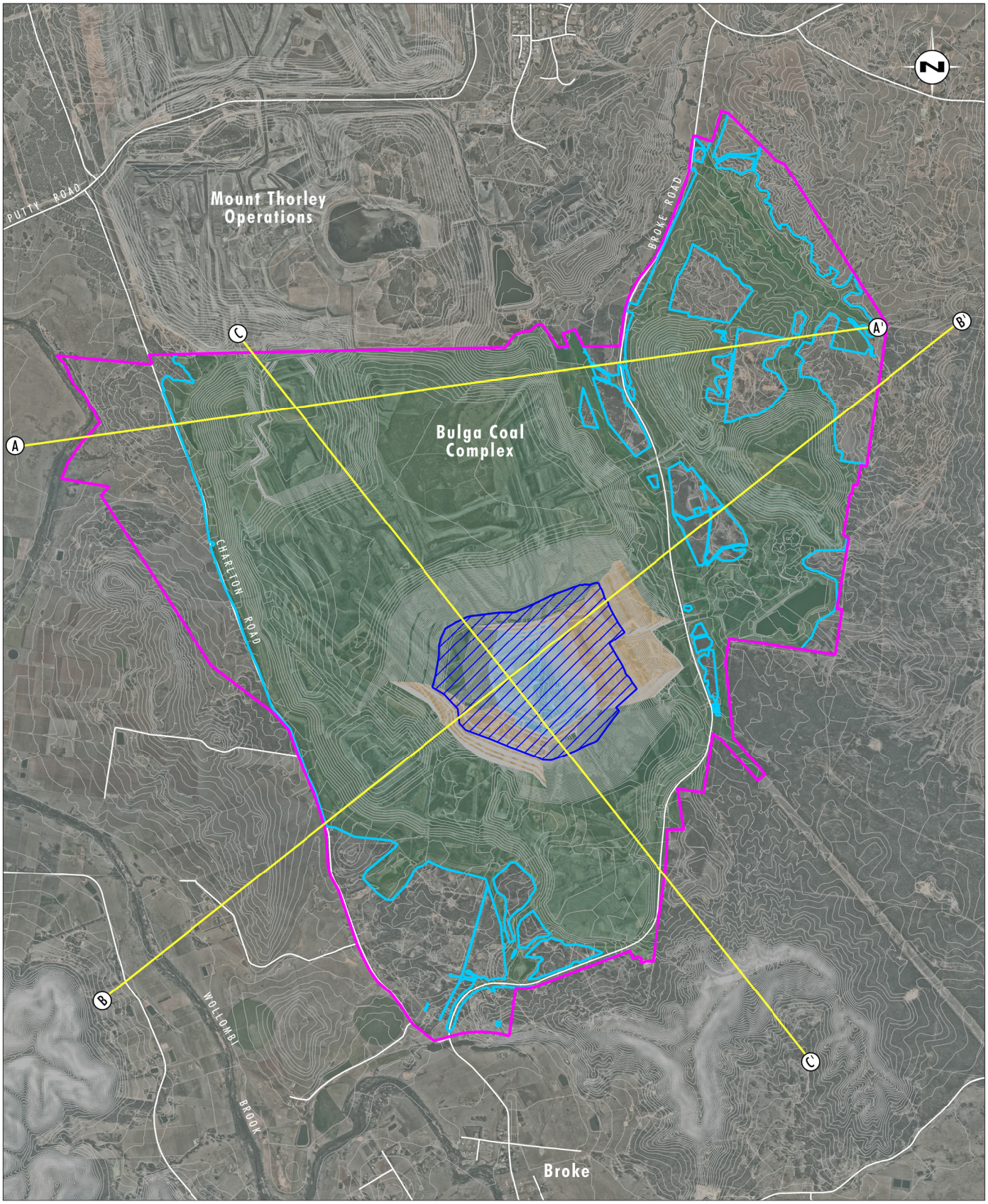


Image Source: Bulga (Jul 2017)
Data Source: Bulga (2018)

0 1.0 2.0 3.0km
1:60 000

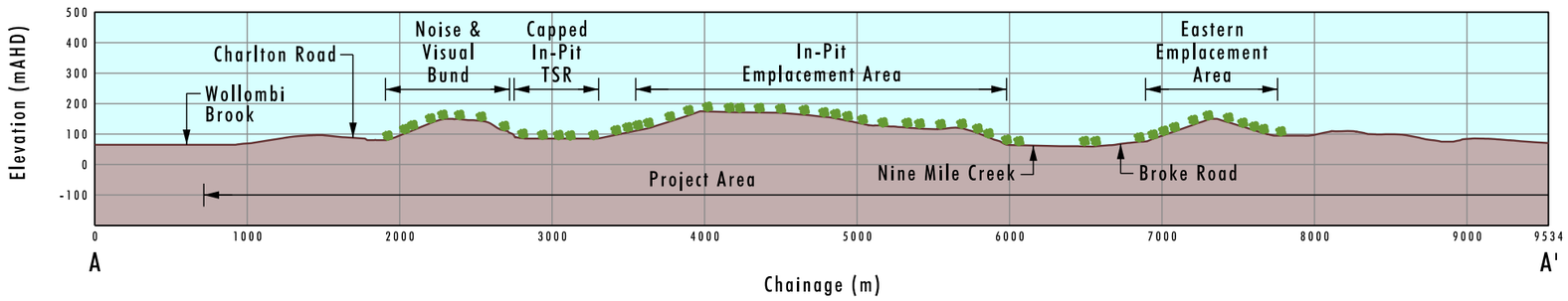
Legend

- Project Area
- Disturbance Footprint
- Transect Line
- Rehabilitation Woodland/Grassland
- Highwall/Footwall with Vegetated Benches
- Road
- Pit Lake
- Maximum Modelled Pit Lake Level

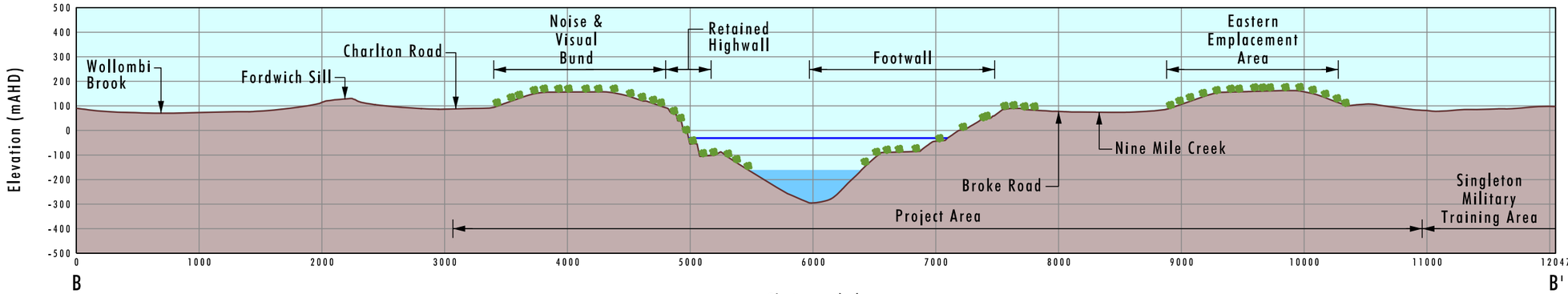
FIGURE 4.6

Conceptual Final Landform

File Name (A4): R13/4100_220.dgn
20191217 14.08



Cross Section A-A'



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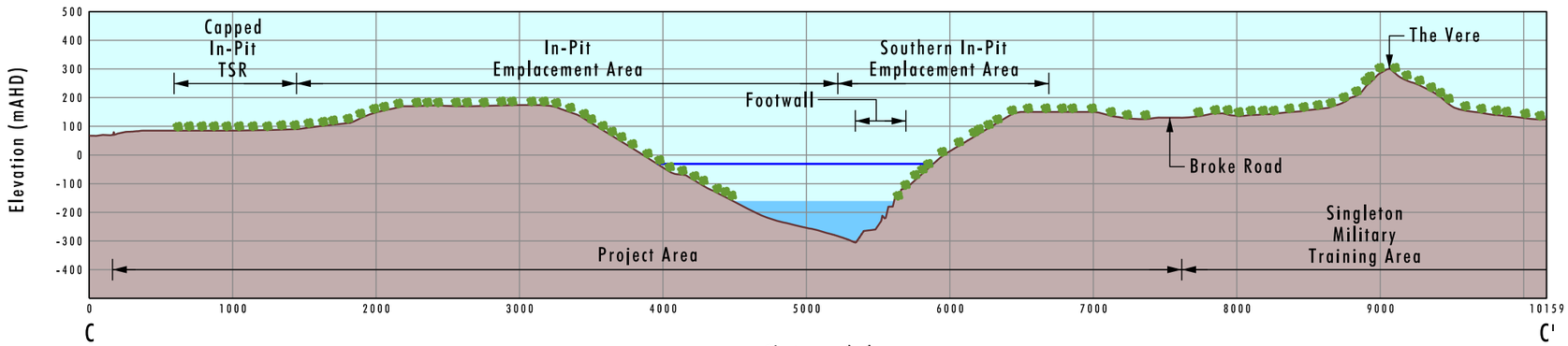
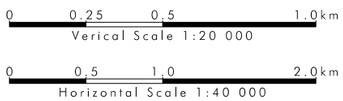


Cross Section C-C'



Legend

- Modelled Maximum Pit Lake Level
- Pit Lake

FIGURE 4.7

Conceptual Final Landform - Cross Sections

Final Landform Design

As outlined above, SSD 4960 Modification 3 is largely consistent with the current operations at the Bulga Surface Operations. The changes associated with SSD4960 Modification 3 do not have a material impact on the approved closure commitments outlined in the BOP EIS. Consistent with the MOP, the overarching objectives to the final landform design are:

- Safe – associated with safe access and egress into pits by people and animals, and in the case of specific water quality issues, related to safe access and use of that water (in the pit void).
- Stable – associated with the risk of geotechnical wall failures, slips and similar mass movement or high erosion rates.
- Non-polluting – associated with geochemical risks and water quality impacts on important aquifers, creeks or surrounding ecosystems. The baseline and existing condition of the receiving waters is to be considered when determining acceptable water quality standards.
- Sustainable – associated with the ability to remain a stable system that supports some stabilising vegetation cover (where planned) and can satisfy the desired outcomes of safety, stability or that of not polluting into the future.

Key conclusions relevant to management of rehabilitation risk were:

- steeper rehabilitation slope angles proposed within the conceptual final void may require a combination of water management structures currently used by BCM including contour drains and drop structures, along with additional slope stabilisation techniques to manage erosion and slope stability risks
- the increased tailings emplacement volume within the Main Pit TSF will maintain a final landform profile that is consistent with commitments in the existing approval.

In the development of the proposed mine plans, including preparing the final landform design, consideration was given to achieving reduced gradients on battered slopes within the final void. If implemented, lower internal void slopes would have resulted in a combination of the following:

- increase the need for additional out-of-pit emplacement areas to accommodate the overburden that cannot be placed in-pit, resulting in the need to clear more undisturbed land
- increase the area of the final void catchment by approximately 254 ha that cannot be diverted away from the void, reducing the surface flows that can be returned to surrounding surface water catchments
- increased pit lake area resulting in greater surface evaporation which would contribute to higher final pit lake salinity levels
- significant rehandling of overburden beyond practicable.

The additional works associated with battering the highwalls and/or reducing slopes would also extend the duration of earthworks associated with final void shaping site well beyond the planned cessation of mining and, under some scenarios, significantly delay the rehabilitation of the final landform. Complete backfill of the void is not considered to be feasible given the existing mine pit configuration and depth of the void. Backfilling would significantly extend the life of operations at the site and would significantly delay the establishment of woodland communities and habitat corridors across the site due to the need to re-disturb areas progressively rehabilitated during the life of the operations.

The management of drainage from the battered slopes within the proposed void remains the highest rehabilitation risk due to the length and gradient of slopes. BCM completed an assessment of control measures across varying slope gradients from the approved 10° limit to 14° and 18° during the

rehabilitation concept design phase of SSD 4960 Modification 3. This assessment identified a number of potential methodologies that can be used to manage erosion across the variable slope gradients of the proposed final void, as described below:

- Internal low-wall slopes within the final void will be battered between 10° and 18°.
- Drainage structures will be established along the top of the battered section of the internal low wall slopes to minimise the surface catchment area reporting to the final void, and maximising the surface catchment reporting to surrounding natural drainage systems.
- Low wall slopes will be established in stages. Battering and the establishment of areas of the low wall forming the final landform will occur as the stages are progressively established. Drainage across battered slopes will also be established progressively.
- The detailed design of the drainage on the low wall slopes within the final void in the final landform will be defined in the RMP to be developed and progressively reviewed and revised throughout the life of the Project. The development of the detailed drainage design for the final landform will have regard to erosion modelling and geotechnical assessments to confirm long term stability of the low wall.
- Access roads may be retained on the slopes for maintenance purposes.
- Battered slopes will be revegetated to suitable woodland species mix generally consistent with the remainder of the rehabilitated landform having regard to soil characteristics.
- Internal void slopes will be progressively topsoiled and vegetated as the final landform slopes are established (i.e. rehabilitation will commence as the final landform slopes are established). Seeding will be undertaken using safe methods appropriate for the slope conditions for both initial and infill seeding.

Additional management measures to be implemented to improve the long-term stability of the final void highwalls include:

- Geotechnical assessments of the highwalls and highwall benches will be undertaken and armouring/ highwall shaping undertaken where necessary to improve long term stability.
- A trench and /or safety berm will be established along the top of the retained section of the highwalls or the top of the battered section of overburden emplacement slopes above the highwalls. The bunds will be designed to divert surface water runoff away from the highwall and restrict inadvertent access to the highwall.
- The detailed design of the drainage on the highwalls in the final landform will be defined in the RMP developed for the mine closure process. The development of the detailed drainage design for the final landform will have regard to erosion modelling and geotechnical assessments to confirm long term stability of the high walls.
- Access along the highwalls may be retained for maintenance purposes.

Those slope gradients which remain consistent with the approved operations conceptual final landform will be manageable through application of existing drainage management practices applied by BCM. Where feasible, opportunities to direct water flows to hard rock and vegetated areas will be used to limit erosion risks and reduce long term management associated with constructed drop structures on spoil.

As with currently approved operations, it is likely that a range of different methodologies will be used to suit the different conditions, and new techniques may be investigated as improvements in technology are developed throughout the life of the mine. The approach to final landform development and slope stabilisation methodologies will be documented in the BOC RMP.

Conclusion

The development of an economically feasible mine plan for a large scale coal mine is a complex iterative process that considers a wide range of inputs including geological conditions, overburden characteristics, economics, environmental and social impacts, and planning and legislative controls. BCM developed the currently approved mine plan for the Bulga Surface Operations after a number of years of investigations and consideration of a number of different mine plan options and consultation with the community and regulators. The overall rehabilitation strategy for SSD 4960 Modification 3 is consistent with the currently approved operations. A key component of the approved final landform is the extensive noise and visual bund, which is retained in the SSD 4960 Modification 3 landform design.

Based on the outcomes of the review undertaken, it is considered that BCM has proposed a final landform that seeks to strike a balance between mine planning, economic, environmental and social outcomes.

4.5 Resource Regulator

4.5.1 Rehabilitation

The Resource Regulator advises the Department of Planning and Environment – Resource Assessments that SEARs for rehabilitation have been adequately addressed in the Statement of Environmental Effects (SEE) for Bulga Optimisation Project Modification 3 and Bulga Underground Modification 7, dated September 2019.

The Resource Regulator has determined that sustainable rehabilitation outcomes can be achieved as a result of the project and that any identified risks or opportunities can be effectively regulated through the conditions of mining authorities issued under the *Mining Act 1992*.

The Resource Regulator requests a review of the draft development consent conditions prior to finalisation and any granting of development consent.

Noted.

4.6 Department of Primary Industries

I refer to your email of 30 September 2019 to the Department of Primary Industries (DPI) regarding the above. DPI has reviewed the project and modification and has no comment.

Noted.

4.7 DPIE Crown Lands

1. **All Crown Land and Crown Roads within a Mining Lease must be subject to a Compensation Agreement issued under Section 265 of the Mining Act 1992, to be agreed and executed prior to any mining activity taking place and within 12 months of Project/ Modification Approval. The Compensation Agreement may include conditions requiring the Mining Lease Holder to purchase Crown land impacted on by mining activity.**
2. **All Crown Land and Crown Roads located within an Exploration Licence, where subject to exploration activity, must be subject to an Access Arrangement issued under Section 141 of the Mining Act 1992, to be agreed and executed prior to any exploration activity taking place.**

There is no Crown Land or Crown Roads to be impacted by SSD 4960 Modification 3.

BCM will meet all obligations in relation to compensation agreements under the *Mining Act 1992* (Mining Act) for impacts to Crown Land or Crown Roads resulting from mining activities.

4.8 Heritage Council

The subject site is not listed on the State Heritage Register (SHR), nor is it in the vicinity of any SHR items. The site also does not contain any known historical archaeological sites. Therefore, no further heritage comments are required. The Department does not need to refer subsequent stages of this proposal to the Heritage Council of NSW.

Noted.

4.9 Roads and Maritime Services

Transport for NSW and Roads and Maritime's primary interests are in the road network, traffic and broader transport issues. In particular, the efficiency and safety of the classified road network, the security of property assets and the integration of land use and transport.

Roads and Maritime has reviewed the information provided and raises no objection to or requirements for the proposed modification.

Roads and Maritime has no proposal that requires any part of the property.

Noted.

4.10 Transport for NSW

It is understood that the subject proposal involves coal train transportation on railway which is managed by Australian Rail Track Corporation (ARTC). ARTC should be given the opportunity to review this proposal.

Noted. ARTC has not provided any comment on SSD 4960 Modification 3. BCM have approached ARTC directly to provide an update on SSD 4960 Modification 3.

Glencore undertakes regular consultation with ARTC, including discussions in relation to the BCC.

4.11 WaterNSW

The proposal is not located near any WaterNSW land, assets or infrastructure, therefore we have no particular comments or requirements regarding the proposal.

Noted.

4.12 NSW Health

4.12.1 Air Quality

HNELHD notes that a property is predicted to experience exceedances of the annual average PM_{10} criteria of 25 µg/m^3, with a prediction of 27 µg/m^3 in both 2022 and 2026.

There is no evidence of a threshold below which PM is not associated with health effects and so HNELHD strongly supports the implementation of proactive and reactive dust control strategies as mentioned in the SEE, along with all best-practice interventions to minimise PM emissions.

As noted by NSW Health, one property (1A) is predicted to experience exceedances of the annual average PM_{10} concentration criterion of 25 µg/m^3, with a prediction of 27 µg/m^3 in both 2022 and 2026. The contribution of the BCC to annual average PM_{10} concentrations at property 1A is predicted to be up to, and in the order of 7 µg/m^3 (in 2022). It is noted that the annual average PM_{10} contribution from BCC at property 1A is not predicted to significantly increase as a result of SSD 4960 Modification 3, however given the change in criteria from 30 µg/m^3 currently approved under SSD 4690 to 25 µg/m^3 applied to SSD 4960 Modification 3, the exceedance at property 1A is now predicted to occur due to the reduced criteria.

It is anticipated that property 1A will be afforded voluntary acquisition rights under the VLAMP if SSD 4960 Modification 3 is approved.

The SEE summarises the range of proactive and reactive emission management measures, currently implemented as part of the existing approved Air Quality Management Plan, which will continue to be adopted as part of SSD 4960 Modification 3. The current Air Quality Management Plan will be reviewed and revised where necessary should SSD 4960 Modification 3 be approved.

4.12.2 Noise

The Noise Impact Assessment in the SEE predicts that noise levels will meet the currently approved noise criteria at all surrounding private residences.

HNELHD supports the management of noise impacts via the implementation of the ongoing real-time monitoring program combined with proactive and reactive noise management measures as discussed in the SEE. It is important that this includes a complaints mechanism for residents which enables both rapid assessment and corrective measures (if required) to be implemented.

Noted.

4.13 Subsidence Advisory NSW

Subsidence Advisory understands the proposed modification involves changes to the open cut operations and surface infrastructure. In the Statement of Environmental Effects, Bulga Coal identifies any development within a Mine Subsidence District requires Subsidence Advisory NSW approval. As such, no further comment is considered necessary.

Noted.

4.14 Singleton Council

4.14.1 Social

Council considers that the impacts of the proposed modification are significant in that the impacts borne by the community will be felt over a greater area and for a longer period of time than that approved under the Bulga Optimisation Project.

As outlined in the SEE, the design of the approved operations was developed having regard to potential environmental and social impacts associated with mining operations, with the aim of minimising project specific and cumulative impacts. Key design elements associated with the approved operations, include:

- development of a noise and visual bund along the western and southern edges of the open cut pit to manage noise and visual impacts

- Charlton Road not being impacted resulting in heritage values associated with the alignment of the road being preserved and no disruption to local traffic
- changes to the design of the Eastern Emplacement Area resulting in the Stage 1 Mushroom Composting facility no longer requiring relocation
- no direct impact on the Warkworth Sands Woodland Endangered Ecological Community (EEC)
- avoiding impact on two stands of the Weeping Myall in the Hunter Catchment endangered population, one of which also forms the Hunter Valley Weeping Myall Woodland EEC.

A comprehensive stakeholder engagement strategy was implemented during the design and environmental assessment phases of the approved operations to assist in refining the project design and to identify appropriate management and mitigation measures. Similarly, the design of SSD 4960 Modification 3 was informed by the identification of potential environmental and social impacts through stakeholder engagement mechanisms. The SSD 4960 Modification 3 design was prepared and refined with the objective of ensuring that SSD 4960 Modification 3 could be undertaken in compliance with existing approved environmental impact criteria, so that that there is minimal incremental impact resulting from the modification.

A key feature of the approved operations design was the development of a noise and visual bund along the western and southern edges of the open cut pit to manage noise and visual impacts. The noise and visual bund creates a landform between the open cut operations, including the SSD 4960 Modification 3 operations, and the Bulga, Milbrodale and Broke areas which assists in reducing noise impacts and visual impacts.

While SSD 4960 Modification 3 will increase the duration of mining at the Bulga Surface Operations by approximately 4 years, there will be no change to approved annual production limits. Therefore, it is considered that SSD 4960 Modification 3 will not increase the scale of operations or the nature of impacts other than the proposed 4 year life extension. The impacts of SSD 4960 Modification 3 have been kept to a minimum through:

- obtaining a detailed understanding of the issues and impacts by scientific evaluation and stakeholder engagement
- designing the mine around the mitigation of potential amenity impacts, particularly noise, air quality and visual impacts as these are recognised as key stakeholder concerns
- commitment to proactive and appropriate strategies to avoid, minimise, mitigate, offset or manage a range of potential environmental impacts (refer to Sections 6.0 and 7.0 of the SEE).

The SIA has identified that social impacts from SSD 4960 Modification 3 are primarily consistent with the approved operations. Given BCM's proactive mine plan design to avoid and minimise impacts, the social impacts of SSD 4960 Modification 3 have been minimised where possible through project design and the proposed management and enhancement approaches.

The project is located within an internationally recognised viticultural and tourism region, which is continuing to grow. The impact of the proposed modification on this region, the potential for impacts to viticultural and tourism values, and the future growth of the wine and tourism area of Broke-Fordwich has not been adequately considered in the Statement of Environmental Effects.

The BCC is located in an area historically characterised by coal mining and includes a number of existing mining operations. Mining operations at BCC have coexisted with viticulture for over 30 years. The approved operations have been designed to coexist with surrounding land uses, including the viticulture and tourism industries.

An assessment of impacts to viticultural and tourism values was undertaken as part of the BOP EIS. Given that SSD 4960 Modification 3 is a continuation of the existing approved operations for a further 4 years with no predicted increase to amenity impacts, the findings from the BOP assessment are considered relevant for SSD 4960 Modification 3.

The area to the immediate south-west of the Project Area forms part of the Broke-Fordwich Wine Sub-Region which is based around the Wollombi Brook alluvial floodplain and the Fordwich Sill between Bulga and Broke. Viticulture, wine-making and associated tourism are the key industries in the area.

In the past 10 to 20 years the viticulture industry in the area has expanded significantly. As viticulture expanded in the area, cellar door and other associated agri-tourism and accommodation operations also developed. This expansion of the viticulture and associated tourism industries all occurred during the operational life of the BCC. Open cut coal mining has been carried out at the BCC for over 30 years. During this period, the BCC has coexisted with agriculture and other industries in the area.

The development of the noise and visual bund as part of the approved operations minimised the impacts of the BCC on the surrounding community. The noise and visual bund operates as a successful noise and visual screen for the Bulga Surface Operations. This has a corresponding benefit for the local tourism industry, which benefits from the scenic value and rural nature of the area, by screening off the existing and future mining operations from the tourism focus areas.

Since the approval of BOP, two new cellar doors and a distillery have been established on Milbrodale Road with an application for another cellar door with Singleton Council for approval. BCM is the largest vineyard owner in the region and leases to Margan Family Wines, who are a prominent winery, cellar door and restaurant in the Broke Fordwich region.

BCC has provided significant investment into the community such as supporting the Broke Fordwich Wine and Tourism Association (BFWTA). BCM has supported the BFWTA since the late 1990's. It is important to BCM that the Broke Fordwich community has a successful, healthy industries outside of mining. With over 40 businesses represented in the BFWTA, it is a large part of the local community. BCM's investment helps support the tourism industry in the area. The prolonged life of the Bulga Surface Operations will enable the continuation of this support into the future.

BCM have been a major sponsor of a number of events, including:

- BCM have been the main sponsor of A Little Bit of Italy since its inception in 2006, where visitor numbers have increased from 300 to around 2,500.
- BCM have supported Spirit of the Vine / Meet the Maker for approximately 15 years (since before 2000 to 2015).
- BCM have been the main sponsor of the Broke Village Fair for over 30 years.

In response to the BOP community consultation in 2011 about where the community would like to be in 25 years and how BCM can be a constructive part of this, the BFWTA responded with their request to engage an events and marketing consultancy to help their local businesses become more sustainable alongside the BCC operations. Based on the request, BCM funded a 3 year partnership of $50,000 per year from 2013 to 2015.

BCM support for local events was also included in the 2014 VPA and will continue. BCM also meet formally with BFTWA at least once a year to understand their goals for the region and to canvas their ideas on how they can assist. At the end of the 3 year partnership mentioned above, BCM have continued to support the BFWTA (in addition to sponsoring local events) by providing funding to update their strategic marketing plan and most recently, for the Broke Wine Trail.

BCM include the BFWTA in consultation programs for development approvals and modifications.

SSD 4960 Modification 3 is unlikely to impact on the grape growing/wine making industries of the region any more than the existing operations which have been demonstrated to be able to operate without significantly impacting on this industry.

BCM has been the biggest single supporter to the BFWTA. BCM is of the view that the adjacent wine and tourism business have enjoyed a benefit from coexisting with BCM and that this benefit will continue for the life of the operation.

Additionally, the proposed modification application does not consider the long term socio-economic impacts resulting from the loss of an additional 20 hectares of land, for which no single long term detailed final land use has been proposed.

A Social Impact Assessment (SIA) and Economic Impact Assessment were both undertaken for SSD 4960 Mod 3 (refer to Appendix 14 and Appendix 15 of the SEE, respectively).

The SIA has identified that social impacts from SSD 4960 Modification 3 are primarily consistent with the approved operations, with impacts largely rated as low or moderate. Given the limited life of additional mining (approximately four years) and BCM's pre-emptive mine plan design to avoid and minimise impacts, the social impacts of SSD 4960 Modification 3 have been minimised where possible through project design and the proposed management and enhancement approaches.

The SIA concluded that it would be reasonable to consider, that with the continued implementation of the management and mitigation strategies already in place by BCM, and the ongoing commitment by the BCM team to build on the strong existing relationships it already has within the respective proximal communities – of Broke, Milbrodale and Bulga – there will be minimal additional social impacts to the local or the wider Singleton communities as a result of SSD 4960 Modification 3.

The Economic Assessment describes a range of positive benefits from SSD 4960 Modification 3 that will result at a local, regional and State level. These benefits include:

- continued employment of approximately 700 full time equivalent employees
- SSD 4960 Modification 3 is estimated to provide a net benefit of $410.6 M to NSW, in net present value terms
- SSD 4960 Modification 3 is estimated to generate $231.6 M (in net present value terms) in corporate taxes, of which $74.5 M is attributed to NSW
- SSD 4960 Modification 3 is estimated to generate $104.5 M in royalties
- SSD 4960 Modification 3 is estimated to provide a net benefit of $81.3 M to the region in net present value terms.

The additional disturbance area of 20.2 ha is relatively minor in the context of the currently approved BCC disturbance area of 3,786 ha. The additional disturbance area generally consists of land with lower land capability which is surrounded by land being used for mining or mining purposes. In terms of land use, it

would be reasonable to determine that mining is the preferred land use for the site for the duration of the BCC operations. Post mining, the area will be rehabilitated and the predominant post mining land use is proposed as native vegetation.

4.14.2 Voluntary Planning Agreement

The modification application does not consider whether a new or revised Voluntary Planning Agreement (VPA) should be negotiated with Singleton Council. In 2016 Council entered into a VPA with Bulga Coal on the basis that the approved project, and its associated impacts, would not result in any greater impact to the community than that approved under SSD 4960. With this modification application, the impacts of the proposed modification are greater in scale and duration than those originally approved in SSD 4960. The proposed modification will increase the duration of mining, reduce the availability of land for other land uses for a longer period of time and result in a significantly larger void, for which a detailed final land use has not been discussed.

The SEE recognised the need for an ongoing VPA associated with SSD 4960 Modification 3. Accordingly, BCM made the following commitment (refer to Section 8.0 of the SEE):

> *BCM proposes to continue its existing VPA commitments, for the duration of the Proposed Modification, to facilitate continued and ongoing support for a range of community and environmental projects within the communities of Broke, Bulga and Milbrodale and the wider Singleton LGA community.*

As noted by Singleton Council, BCM has an existing VPA with Singleton Council on the basis of the approved operations. In recognition of the additional 4 years of mining associated with SSD 4960 Modification 3, BCM has actively engaged with Singleton Council on negotiating a revised VPA.

While SSD 4960 Modification 3 will increase the duration of mining at the Bulga Surface Operations by approximately four years, there will be no change to approved annual production limits or employment numbers. Therefore, it is considered that SSD 4960 Modification 3 will not increase the scale of operations or the nature of impacts other than the proposed 4 year life extension.

Singleton Council's suggestion that SSD 4960 Modification 3 will result in a significantly larger void, for which a detailed final land use has not been discussed, is incorrect.

SSD 4960 Modification 3 will result in an additional 4 years of mining. Delaying future land uses for the site by 4 years is not considered a significant impact given the employment and economic benefits that will be associated with the continued mining operations during that period of time.

SSD 4960 Modification 3 will not result in a significantly larger void. Consistent with the approved operations, a single final void will remain, however SSD 4960 Modification 3 will result in it being located approximately 1 km to the south east of the location contemplated for the approved operations (refer to **Figure 4.5**). The catchment area for the final void has increased along with the depth of the void due to ability to mine deeper seams through increased pit area during operations, however the void size is not significantly larger.

As outlined in the SEE, SSD 4960 Modification 3 is not seeking to change the current approved final land use, being a combination of woodland and agricultural land with a pit lake forming in the final void. SSD 4960 Modification 3 is unlikely to have any material impact on final land use options for the site, consistent with the currently approved operations and has identified further potential opportunities such as enhancing the viability of the final void for use as a pumped hydroelectricity generation facility.

Council has spent significant time reviewing the contributions made to the Singleton community by the mining industry and in November 2017, Council resolved to apply a 1% levy on capital investment value to all future mining voluntary planning agreements. The application of this levy is consistent with the provisions of Council's existing Development Contributions Plan, section 4.10, which states:

Whether as a result of a Minister's consent or council consent, these contributions will take the form of monetary contributions or in-kind contributions and be determined through negotiation between the applicant and Council. The proposed contributions agreed between the applicant and Council will be detailed in a voluntary planning agreement in accordance with s93F of the Environmental Planning and Assessment Act 1979.

Council is currently reviewing its Development Contributions Plan.

The company has met with Council to discuss the potential to review and revise the existing Voluntary Planning Agreement. It is important to note that these discussions are preliminary and no agreement has been reached for this proposed modification. It is Council's view that the scale and duration of the proposed modification warrants consideration of a revised VPA, linked to the capital investment value of the project, as resolved by Council at the November 2017 Council Meeting. Council requests that no determination of the proposed modification be made until an in principle agreement on a revised VPA is reached with the Applicant.

Noted.

As previously stated, while SSD 4960 Modification 3 will increase the duration of mining at the Bulga Surface Operations by approximately four years, it is considered that SSD 4960 Modification 3 will not increase the scale of operations. BCM consider the continuation of the existing VPA, varied to account for SSD 4960 Modification 3, is an appropriate outcome for SSD 4960 Modification rather than a revised VPA.

It is noted that in November 2017 Singleton Council passed a motion that all future VPA contributions be equal to one percent of the Capital Investment Value (CIV) of the proposed development. Glencore does not agree that CIV should be used as the basis of determining a development contribution in a VPA, particularly as capital expenditure relating to mining equipment has no direct impact on Council's facilities or the community generally. Approximately $50 M of the $98M CIV for SSD 4960 Modification 3 relates to tailings relocation infrastructure which will only be utilised for a period of approximately 6 years and has no impact on Singleton Council's facilities. It is also noted that Singleton Council does not have a contributions plan to support a requirement for the payment of a 1% of capital cost levy, consistent with Section 7.12 of the EP&A Act.

BCM made an offer to Singleton Council to amend the existing VPA on 28 October 2019 which is currently under consideration. BCM is committed to resolving an appropriate revision to the VPA in a timely matter.

Further, Council intention is to create the Singleton Community and Economic Development Fund using VPA monies from mining and other major projects. The intent of this Fund is to preserve the capital and use investment returns to fund programs that will facilitate the future security, prosperity and wellbeing of our community. These programs would include undertaking investigations to understand the impact of mining on our community, research and development in projects that build resilience and improve liveability of Singleton during and post mining. Council believes this approach allows the provision of a longer term view on the use of VPA funds.

Glencore has been in discussions with Singleton Council regarding the establishment of a Singleton Community and Economic Development Fund for some time (over 12 months). Glencore and other mining companies are committed to having this innovative approach to the use of VPA funds established. Portions of VPA funds will be allocated to the fund by agreement between Glencore and Singleton Council. It is noted that during a meeting on 16 December 2019, Singleton Council voted to adopt the Singleton Community and Economic Development Fund Policy.

BCM is committed to resolving an appropriate amendment to the VPA with Singleton Council with some of these funds being allocated to the Singleton Community and Economic Development Fund.

4.14.3 Planning

The evaluation requirements for planning decisions are set out in section 4.15 of the Environmental Planning and Assessment Act 1979. This section requires, amongst other things, the consent authority to consider provisions of any environmental planning instrument (for which Council's Local Environmental Plan would constitute) and any document required for consultation under the Act, any Development Control Plan, any planning agreement and the public interest. Section 4.40 of the Environmental Planning and Assessment Act 1979 applies section 4.15 to the determination of State Significant Development applications.

Under section 4.55(3) of the EP&A Act in determining an application for the modification of development consent, the consent authority must take into consideration such of the matters referred to in section 4.15(1) as of relevance to the development the subject of the application. It is noted under clause 11 of the *State Environmental Planning Policy (State and Regional Development) 2011*, development control plans do not apply to State significant development.

Table 5.2 in the SEE provides the matters for consideration and a relevant document reference to where these are found in the SEE. Table 5.2 of the SEE is replicated as **Table 4.2** below.

Table 4.10 Section 4.15 Matters for Consideration

Matters for Consideration	Relevant SEE Section
(i) any environmental planning instrument	Section 5.2.2
(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and	Section 5.2.2
(iii) any development control plan,	Not Applicable based on SSD provisions
(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4	Section 6.0
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),	Not applicable
(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	Section 6.0
(c) the suitability of the site for the development,	Sections 1.4, 6.0 and 9.2
(d) any submissions made in accordance with this Act or the regulations	N/A
(e) the public interest	Sections 4.0 and 6.0

The SEE was also prepared in consideration of the factors identified in Section 4.55 of the EP&A Act and Clause 115 of the *Environmental Planning and Assessment Regulation* (EP&A Regulation).

It is considered that all relevant planning instruments have been considered in relation to SSD 4960 Modification 3.

Additionally, clause 12 of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 requires the consent authority to consider, amongst other things, the existing and approved uses of the land in the vicinity of the development, whether or not the development is likely to have a significant impact on those uses (whether current or future) and any ways that the proposed development could be incompatible with any existing, approved or likely preferred uses. The Statement of Environmental Effects does not recognise the importance of the surrounding land uses within the RU4 zone, and does not evaluate the impacts proposed by the modification against the land use objectives for adjacent zoning.

As outlined in Section 5.2.2 of the SEE and noted by Singleton Council, Clause 12 of the Mining SEPP requires the consent authority to consider the compatibility of proposed mining developments with existing land uses in the area.

BCC is situated in a rural area, primarily surrounded by rural landholdings, agriculture, mining, conservation and defence training activities. Adjoining the eastern boundary of the BCC (and forming a small part of the Project Area) is land owned by the Commonwealth of Australia which forms part of the Singleton Military Training Area (SMTA) (refer to **Figure 4.8**). This land has been licensed to BCM for open cut mining purposes since 1998.

There are several mines located around the BCC. The closest is the Mount Thorley Operations which adjoins the northern boundary of the Bulga Surface Operations; the associated Warkworth Mine is located to the immediate north of the Mount Thorley Operations. Several other mines such as Wambo, Lemington and Rixs Creek are located further north-west and north-east of the Project Area.

Land immediately to the north-east, west and south of the BCC is predominantly utilised for agricultural purposes. The Wollombi Brook alluvial flats are located approximately 2.5 kilometres to the west of the current Bulga Surface Operations. These alluvial flats and adjoining lower slopes support much of the agricultural activity of the area, including:

- fodder and lucerne crops
- viticulture
- dairying
- horse breeding.

The relatively fertile and gently graded foot slopes of the Fordwich Sill are used for similar activities to those carried out on the alluvial flats associated with Wollombi Brook. Cropping and other intensive uses are less prevalent on the higher slopes.

Beef cattle grazing is the dominant agricultural enterprise on the shallow, poorly structured and less fertile soils away from the Fordwich Sill and Wollombi Brook alluvial flats. Viticulture and horticulture, predominately olive growing, also occur on the slopes away from the Wollombi alluvial flats.

Outside of mining, defence and agriculture, the area surrounding the Project Area supports the following land uses including:

- small rural towns (Broke, Milbrodale and Bulga)
- hospitality and tourist operations including short stay accommodation, winery cellar doors, restaurants/cafes and specialist retail outlets
- conservation, with Wollemi National Park and Yengo National Park forming the broader visual context of the area.

A stage 1 mushroom composting facility is located immediately to the north east of the Eastern Emplacement Area (refer to **Figure 4.8**). Stage 1 composting involves the initial development of compost prior to secondary and tertiary treatment for mushroom growing purposes. This stage 1 operation is associated with a mushroom growing enterprise located on the Mitchell Line of Road.

Open cut coal mining has been carried out at the BCC for over 35 years with mining operations coexisting with agriculture and other industries in the area including those mentioned above. The development of the noise and visual bund as part of the approved operations is a key mitigation measure to minimise the impact of the BCC on the surrounding community.

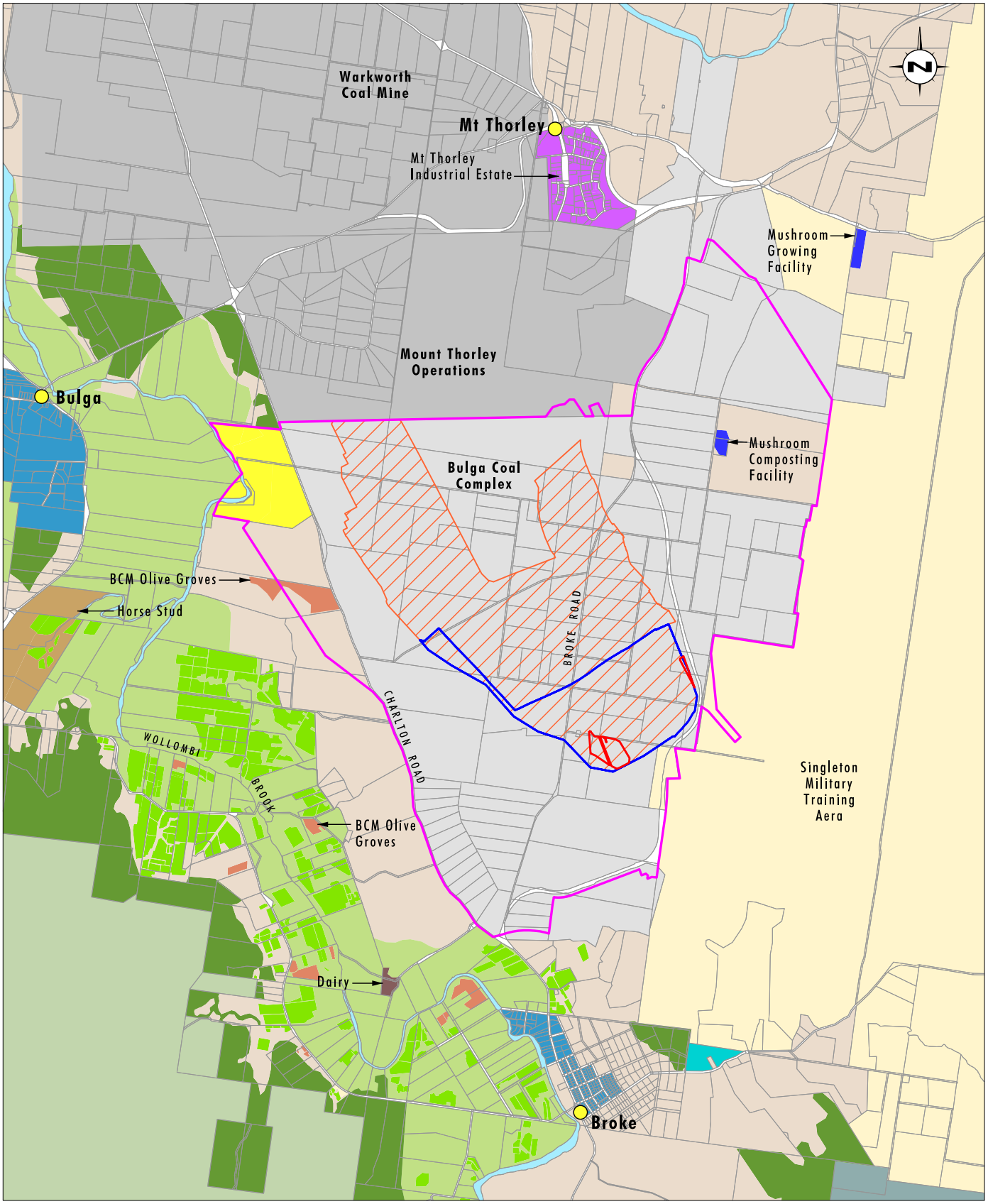
The approved and proposed operations at the BCC have minimal impact on adjacent and nearby mining operations and the SMTA.

Singleton Council specifically mentions interactions with land zoned RU4 – Primary Production Small Lots (refer to **Figure 4.9**). The objectives of this zone include:

- To enable sustainable primary industry and other compatible land uses.
- To encourage and promote diversity and employment opportunities in relation to primary industry enterprises, particularly those that require smaller lots or that are more intensive in nature.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To recognise Hunter Valley Wine Country and the adjoining environs of Broke-Fordwich as a major viticultural and tourist destination by providing additional opportunities for compatible tourist uses.

The additional disturbance area is located within the existing approved Project Area and is surrounded by land being used for mining or mining purposes. SSD 4960 Modification 3 is not anticipated to have any greater impacts than those approved.

As outlined in **Section 4.14.1**, SSD 4960 Modification 3 is unlikely to impact on the grape growing/wine making industries of the region or agricultural any more than the existing operations which have been demonstrated to be able to operate without significantly impacting on this industry.



Source: Google Earth (2010), LPMA

0 1 2 4km
1:80 000

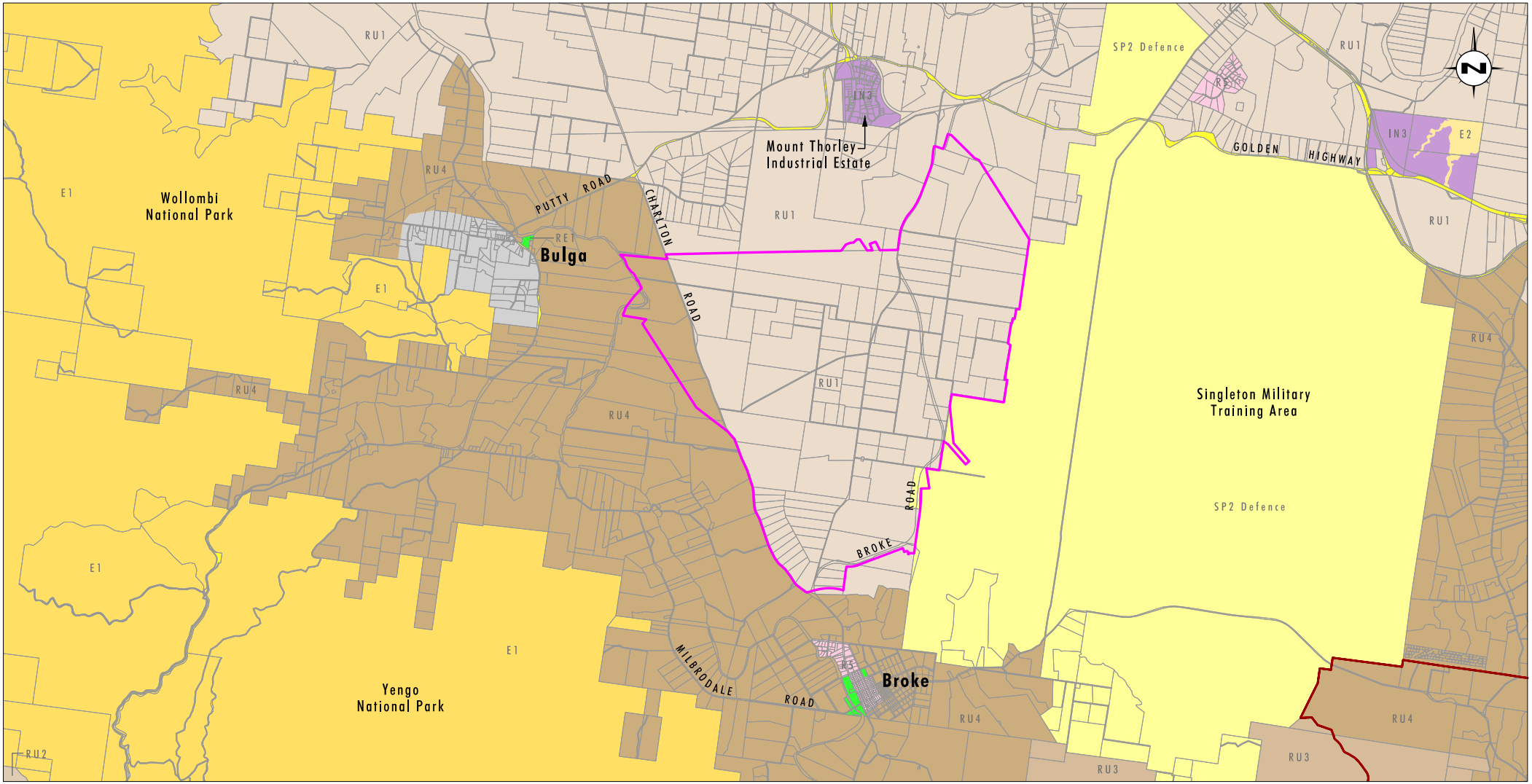
Legend

- Project Area
- Additional Disturbance Area
- South Pit Extension Area
- Mining Area
- National Park
- State Forest
- Singleton Military Training Area
- Bulga Mining and Buffer Area
- MTW Operations
- Conservation - Private
- Forest/Woodland Area - Private Management
- Olive Grove
- Vineyards
- Mixed, Grazing and Cropping Land
- Grazing
- Dairy
- Village/Small Holdings
- Town/Village Centres

FIGURE 4.8

Surrounding Land Use

File Name (A4): R13/4100_212.dgn
20191217 14.10



Data Source: Singleton LEP (2013), Cessnock LEP (2011), Department of Finance, Services & Innovation (2019)

Legend

- Project Area
- Local Government Area

Zoning

- E1 - National Parks and Nature Reserves
- E2 Environmental Conservation
- IN3 - Heavy Industrial
- R5 - Large Lot Residential
- RE1 - Public Recreation
- RU1 - Primary production
- RU2 - Rural Landscape
- RU3 - Forestry
- RU4 - Primary Production Small Lots
- SP2 - Infrastructure
- DM - Deffed Matter

FIGURE 4.9

Zoning

4.14.4 Final Land Use

Given the statutory framework for consideration of long term, off site impacts to land use planning, and the broader public interest requirements, Council considers the current final land use options identified in Table 6.21 do not provide for a high level of post mining land use certainty. Council acknowledges that the approved post mining land use of woodland/open forest will cover a significant proportion of the post mining land use (2,500 hectares). However, as a temporary land user, it is incumbent on the applicant to identify one final land use for the remaining land post mining that is consistent with the broader regional and local strategic land use planning objectives and outcomes. The remaining land is identified on Figure 6.17 as 'areas with greatest potential for alternative land uses'. It should be noted that the Applicant has not engaged with council in the development of any post mining final land use planning.

The approved conceptual final land use for current operations is a combination of woodland and agricultural land for grazing. The development of the existing conceptual final land use was undertaken throughout the development of the EIS for the approved operations. This involved 'InFocus' workshops with the local community on the design of the noise and visual bund, and to gain feedback into the designs of the final landform and closure of the site. Targeted consultation with Singleton Council was also undertaken as part of the development of the approved operations.

As outlined in the SEE, SSD 4960 Modification 3 is not seeking to change the current approved final land use, being a combination of woodland and agricultural land with a pit lake forming in the final void.

The approved and proposed final land use has been developed in consideration of the current applicable land use strategies (Hunter Strategic Plan (2016), the Upper Hunter SRLUP (2012) and the Singleton Shire Land Use Strategy (2008) in relation to land use planning applicable to mine sites (refer to Section 6.12 of the SEE).

As outlined in the SEE, the Bulga Surface Operations could provide strategic opportunities for a variety of potential final land uses, given the extensive infrastructure and accessibility to the site. These final land use options are considered as potential land uses however these will be considered closer to mine closure and will be dependent on market demand for products at the time, and technology available near to closure. Further approvals may be required for any alternative land uses, subject to planning controls that may apply at the time.

As discussed in the assessment documentation for the BOP and SSD 4960 Modification 3, the infrastructure areas associated with the approved operations have potential for being suitable for industrial or intensive agricultural use. The availability of access to rail through the rail loop and water management storages, including the final void, as well as the large separation distances from adjoining landholders, may also lend parts of the site to being suitable for industrial or intensive agricultural (e.g. poultry, piggeries, mushroom composting and farming) uses in the future, subject to future planning controls that apply at the time. The proposed conceptual final landform terrain and revegetation strategy, coupled with the site's proximity to the Singleton Military Training Area (SMTA) also provides opportunities for the site being used for military training purposes.

The additional depth of the final void resulting from SSD 4960 Modification 3 may increase the viability of some potential end uses for the void such as use as a water storage and pumped-hydroelectricity.

The Bulga Surface Operations are expected to extend to the end of 2039 and the detailed mine closure process will commence five years prior to planned cessation of mining with a detailed closure plan finalised no less than two years prior to planned cessation of mining. When the detailed mine closure planning process commences in more than 10 years from now, there will be a need for further consideration of the final land use based on State and Local Government strategic planning and Glencore strategic

requirements, the economy and the demand/need for the uses being considered at the time. Consistent with the existing mine closure planning commitments for the BCC, consultation with stakeholders, including Singleton Council, the local community and proximate landholders will commence prior to planned closure with a detailed mine closure plan being developed at least five years prior to planned closure.

BCM has consulted with Singleton Council in regard to SSD 4960 Modification 3, including BCM's commitment to the existing approved final land use.

The current final land uses proposed do not consider the strategic alignment with local and adjacent existing and future land uses, and do not provide long term certainty to the community of a sustainable post mining land use. The proposed modification cites a number of final land use options that could be considered at a point five (5) years from closure, some 15 years into the future. Council considers that this planning timeframe is too far into the future, and that detailed final land use planning should be included in the Statement of Environmental Effects. Further, the proposed modification does not include the cost-benefit to the community of the current approved operations, nor the proposed modification, and its final land uses, in the context of long term environmental and social impacts, as required by the current conditions of consent.

SSD 4960 Modification 3 represents a minor incremental increase in active mining area, and does not result in a significant change to the existing approved final land use being a combination of woodland and agricultural land for grazing.

As previously noted, the approved and proposed final land use have been developed in consideration of the current applicable land use strategies (Hunter Strategic Plan (2016), the Upper Hunter SRLUP (2012) and the Singleton Shire Land Use Strategy (2008)) in relation to land use planning applicable to mine sites (refer to Section 6.12 of the SEE).

The SEE for SSD 4960 Modification 3 identifies that the Bulga Surface Operations could provide strategic opportunities for a variety of potential final land uses, given the extensive infrastructure and accessibility. These final land use options are considered as potential land uses however these will be considered closer to mine closure and will be dependent on market demand for products at the time, and technology available near to closure. Given the strategic opportunities of the site, BCM has noted these alternative final land use options and provided for consideration of these during the detailed mine closure planning processes. This does not change the approved and proposed conceptual final land use to be a combination of woodland and agricultural land for grazing.

Glencore appreciate Singleton Council's objective to implement a strategy and policy position that provides a framework for final land use planning across the LGA. This strategy requires a collaborative approach and is not the responsibility of Glencore or BCM in isolation.

Singleton Council's submission asserts that a cost-benefit to the community of the current approved operations, or SSD 4960 Modification 3, and its final land uses, in the context of long term environmental and social impacts, as required by the current conditions is not included.

A cost benefit analysis of its approved operations was undertaken for the approved operations and subsequently approved. A detailed cost benefit analysis for SSD 4960 Modification 3 has been completed which considers the incremental change from the approved operations (refer to Appendix 15 of the SEE).

There is no current development consent condition requiring a cost benefit analysis to be completed in relation to final land uses, in the context of long term environmental and social impacts. The current conditions of consent require the Rehabilitation Management Plan to '*…provide for detailed mine closure planning, including measures to minimise socio-economic effects due to mine closure, to be conducted prior to the site being placed on care and maintenance*'. The Bulga Open Cut MOP includes the requirements of the Rehabilitation Management Plan as required by Schedule 3, Condition 51 of SSD 4960.

Council considers the development of a final land use strategy, ahead of proposed mining, is essential in ensuring that the final land use is achievable, consistent with surrounding land uses, does not compete across the LGA for land use outcomes and is adequately planned for and incorporated into the design of the mining operation. Council notes that the life of the mine is within current strategic land use planning timeframes, and, whilst there is a need for flexibility to allow for adequate consideration of a relevant final land use option, consistency with long term local and regional land use planning objectives is essential.

As discussed, the approved final land use is a combination of woodland and agricultural land for grazing. The additional 20.2 ha is proposed to be woodland. SSD 4960 Modification 3 does not propose to change the rehabilitation and mine closure objectives that are approved as part of SSD 4960. SSD 4960 Modification 3 is considered to be substantially the same development as the approved operations.

The approved final land use has been developed in consideration of current strategic land use planning objectives, as outlined in the SEE.

It is understood that Singleton Council intends to implement a strategy and policy position that provides a framework for how Council can respond to and support the management and mitigation of the impacts of mining, including final land use. This strategy and policy position is not yet available therefore it is not possible for proponents to consider at this point in time.

4.15 Muswellbrook Shire Council

4.15.1 Cumulative Impacts

1.0 The compounding impacts of multiple mining operations stretch environmental, social, human and economic capital. Multiple mining operations may demonstrate additive effects (e.g. mine impact + mine impact) and compounding effects (e.g. mine impact x mine impact). The conventional mine-by-mine approach to assessment, management and mitigation does not provide confidence for the local communities impacted.

The BCC has been operating for over 30 years and is currently approved until 2035. While SSD 4960 Modification 3 will increase the duration of mining at the Bulga Surface Operations by approximately 4 years, there will be no change to the scale of operations or the nature of impacts. All assessments for SSD 4960 Modification 3 have been undertaken in accordance with relevant guidelines and policies, including consideration of cumulative impacts where relevant.

Muswellbrook Shire Council's comments in relation to the assessment process are noted, however BCM has no control over the assessment, management or mitigation of other coal mines. BCM has a strong record of environmental performance. BCM has an existing approved environmental management system (EMS) (also available on the Bulga Coal Web site) which outlines how it manages environment and community matters, impacts and performance. It provides a framework for the standards, plans and procedures implemented to ensure operations are managed in accordance with Glencore's business principles and Sustainable Development Policy and Standards and all relevant licences and approvals held by the BCC.

Two of the main environmental impacts of the BCC are noise and dust. BCC has installed an industry best practice real time noise monitoring network. When necessary the mining operations are modified to manage the noise levels within the approved noise criteria. BCC has also implemented industry best practice air quality management by installing real time dust monitors within the adjacent communities, dust surveillance cameras within the mine and proactively reducing the disturbed area.

2.0 Impact assessments for individual mine projects flag that it is difficult to consider cumulative impacts due to factors beyond the control of the proponent. A cumulative assessment typically consists of an aggregation of the contribution of the project to the impacts of existing activities and whether the increased impacts meet regulatory standards. Such analysis is almost exclusively conducted on sink impacts such as noise, air quality and traffic. Assessments rarely assess the effect of planned and foreseeable future projects and do not employ explicit methodologies to model plausible future scenarios, understand the pathways of interaction of cumulative effects, or determine or describe thresholds and limits.

Assessment of cumulative impacts is an integral part of the environmental impact assessment and were addressed in detail throughout the SEE for relevant key issues.

Section 6.0 of the SEE contains a description of the existing environment and a comprehensive analysis and assessment of the key environmental, social and economic issues relevant to SSD 4960 Modification 3, including the cumulative impacts. Cumulative impact assessments have been undertaken for all key issues including air quality, noise, water resources and biodiversity.

A key objective of SSD 4960 Modification 3 was to continue to conduct mining in an environmentally responsible manner to minimise additional impacts above those currently approved. The SEE includes commitments by BCM to the ongoing implementation of comprehensive management, mitigation and offset measures to minimise and counterbalance the predicted impacts of the Bulga Surface Operations, including cumulative impacts.

It is noted that the SSD 4960 Modification 3 will occur within an existing mining area. SSD 4960 Modification 3 does not increase the existing total annual production of the existing BCC. The location of the mine within an existing mining area and the proposed limits on the production from the BCC (i.e. no change from existing total complex production) are considered to reduce the contribution of SSD 4960 Modification 3 to cumulative impacts.

All cumulative impact assessments for SSD 4960 Modification 3 have been undertaken in accordance with relevant guidelines and policies. It is a requirement to consider approved and proposed projects where they are on the public record in relevant cumulative assessments.

3.0 A better approach would involve investment in regional datasets, scientific modelling, scenarios and preferred futures, research into impact interactions, trends, effects pathways and areas of maximum mitigation impact, better regional planning, the establishment of thresholds and limits, joint monitoring, the collection of information on planned developments and more consistent data standards and methodologies. The Upper Hunter Cumulative Impact Study and Action Strategy 1997 needs to be updated by an independent party.

Muswellbrook Shire Council's comments on NSW assessment policy are noted however this is not in the control of BCM. All assessments have been undertaken in accordance with relevant guidelines and policies.

4.15.2 Social

4.0 Solastalgia -Albrecht et al. in 2005 published a paper on the impact of mining on individuals in the Hunter Valley of NSW. He found that people exposed to environmental change had negative reactions brought about by a sense of powerlessness over the unfolding environmental changes and uncertainty in a once predictable environment. Added to environmental change is the loss of place and communities (through properties being purchased by mines), loss of social contacts (as people move away) and feelings of differential treatment, as some are purchased and families get to move away from the stress of being a neighbour to a mine, while others have to remain. The effects of solastalgia are not overcome by Community Enhancement Contributions.

BCM and Glencore understand that their operations can impact the communities in which they operate.

A Social Impact Assessment (SIA) has also been prepared for SSD 4960 Modification 3 which builds upon the previous work. The SIA also addressed the *Social Impact Assessment Guideline for State Significant mining, petroleum production and extractive industry development* (DPE 2017).

During the development of the approved operations, the project design team considered community feedback in refining the project design, with some key elements of the approved operations being amended to address issues, including potential noise and visual impacts. The same key considerations and iterative design processes were undertaken to refine the design of SSD 4960 Modification 3 in order to limit the potential for any additional adverse impacts.

A key component of the SIA is the process of understanding, from a community perspective, community values and uses in the assessment area, and specifically the social impacts and opportunities associated with SSD 4960 Modification 3.

Engagement activities undertaken to support the SIA program had three main objectives to identify:

- perceived issues/impacts associated with SSD 4960 Modification 3
- perceived social issues/impacts associated with cumulative mining development in the region
- strategies for management and opportunities of enhancement of perceived social impacts of SSD 4960 Modification 3.

A survey of near neighbours/proximal landholders to the BCC was carried out to inform the current SIA for SSD 4960 Modification 3, with respondents asked to provide feedback on both existing operational issues and perceived positive or negative impacts associated with SSD 4960 Modification 3.

A total of 86 respondents (Bulga n=45 and Broke n=41) participated in the survey and an additional 11 stakeholders attended a Community Information Session held in April 2019. The seven closest neighbours/landholders (those most directly affected by SSD 4960 Modification 3) were offered SIA interviews, with six choosing to participate.

Regarding perceptions relating to the existing operation at BCC:

- 28 respondents (32.6 per cent) stated they did not have any concerns in relation to BCC's existing operations
- for those that did have concerns, the greatest concerns noted were associated with the impact of air quality on social amenity (n = 42 or 22 per cent of respondents)
- noise was the second highest negative concern, again in relation to the impact on social amenity (n=28 respondents or 15 per cent of respondents) and was particularly noted by Bulga respondents
- trust and engagement, rehabilitation and end land use, impacts on health and wellbeing and cumulative impacts were also raised
- both positive and negative responses were recorded regarding engagement with the company (13 positive and 5 negative).

In relation to the perceived positive or negative impacts associated with SSD 4960:

- 37 respondents (15 per cent) stated they did not have any concerns

- the highest social impact area noted was the positive economic impacts of SSD 4960 Modification 3 (N=23)

- concerns around mine life and end land use, including rehabilitation, was the highest perceived negative impact (11), followed by impacts on social amenity due to air quality (7), noise (4) and trust and engagement (4).

The SIA has identified that social impacts from SSD 4960 Modification 3 are primarily consistent with the approved operations, with impacts largely rated as low or moderate.

Given the limited life of additional mining (approximately four years) and BCM's pre-emptive mine plan design to avoid and minimise impacts, the social impacts of SSD 4960 Modification 3 have been minimised where possible through project design and the proposed management and enhancement approaches.

It would be reasonable to consider, that with the continued implementation of the management and mitigation strategies already in place by BCM, and the ongoing commitment by the BCM team to build on the strong existing relationships it already has within the respective proximal communities – of Broke, Milbrodale and Bulga - there will be minimal additional social impacts to the local or the wider Singleton communities as a result of SSD 4960 Modification 3.

BCM has actively engaged with the local community in relation to SDD 4960 Modification 3. It is noted that only two objections were received on SSD 4960 Modification 3 from community members with only one being from a local resident.

6.0 The Upper Hunter suffers amenity impacts from the mines, and these are not offset by economic benefits due to Drive In, Drive Out work and travel arrangements, and major support industries/companies building their headquarters closer to Newcastle for connectivity, workforce and lifestyle reasons.

A comprehensive Economic Impact Assessment has been undertaken by Cadence Economics for SSD 4960 Modification 3. A local effects analysis (LEA) was undertaken as part of the Economic Impact Assessment which is focussed on the net economic impacts to the local community. The LEA accounts for the economic benefits to the Lower Hunter region only and does not include any economic benefits that may accrue to the major regional centres that are located adjacent, including Maitland and Newcastle or the broader Hunter region.

It is expected SSD 4960 Modification 3 will generate additional indirect benefits to local suppliers and employees of $15.4 million and $64.7 million respectively in net present value (NPV) terms above the approved operations. SSD 4960 Modification 3 is estimated to confer a net benefit on the Lower Hunter SA3 region of $81.3 million in NPV terms.

The SIA for SSD Modification 3 indicates that approximately 25% of the workforce reside in the Singleton and Muswellbrook local government areas, with an annual estimated household expenditure of $10,608,000. The SIA also indicates that the same two local government areas receive a total of 30% of the BCC total business spend, the equivalent of $69,198,517 during 2018. The local government areas of Singleton and Muswellbrook are also the location of 25% of the suppliers used by BCC.

One of Glencore's corporate offices is also located at the BCC.

In addition to the direct and indirect economic benefits of the operations at BCC, BCM and Glencore has a comprehensive Community Investment program, supporting a range of organisations delivering services and initiatives in key investment areas of health, environment and capacity building (including education/training), enterprise development and economic diversity.

10.0 The Upper Hunter region's equine industry is a significant contributor to the regional economy with 85 per cent of all operating expenses spent within the Hunter Valley region. The equine industry suffers from reputational risks due to local coal mines and this conflict has been documented in prior coal mines applications (e.g. Bickham, Drayton South, Dartbrook). Reputational risk is also posed to the local viticulture industry. The expansion of the mining industry has claimed a number of wineries in the past, which has reduced the critical mass of the viticulture cluster in the Upper Hunter, in turn affecting the tourism market.

The Upper Hunter Strategic Regional Land Use Plan (Upper Hunter SRLUP), which was approved in September 2012 and applies to the Project Area, contains the detailed policy direction for assessing and managing strategic land use decisions in the Upper Hunter Valley. The stated objective of the Upper Hunter SRLUP is to balance the strong economic growth in Regional NSW with the protection of valuable agricultural land and the sustainable management of natural resources. In particular, the Upper Hunter SRLUP identifies the importance of minimising the land use conflicts arising from the rapid growth of coal mining activities and the recent emergence of the coal seam gas industry.

Key to the implementation of the Upper Hunter SRLUP is the assessment of impacts from mining and coal seam gas development on land identified as being strategic agricultural land. There are two types of strategic agricultural land identified in the Upper Hunter SRLUP, Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters. BSAL is land that is identified as being of high strategic importance due to the inherent characteristics of the land in terms of soil, topography and access to water which make it ideally suited to agricultural production. Critical Industry Clusters are areas in which established specialist agricultural industries are located or have the potential to be located and their continued success as an industry is related to the critical mass of the industry present in these areas. Two Critical Industry Clusters have been identified as occurring in the area covered by the Upper Hunter SRLUP, the Equine Critical Industry Cluster and the Viticulture Critical Industry Cluster.

The existing approved operations and SSD 4960 Modification 3 do not have any predicted impacts on the Equine Critical Industry Clusters.

Similarly, SSD 4960 Modification 3 is not predicted to impact on the grape growing/wine making industries of the region any more than the existing operations which have been demonstrated to be able to operate without significantly impacting on this industry. A detailed discussion on the interaction of BCC with the viticultural industry is provided in **Section 4.14.1** in response to Singleton Council's submission.

4.15.3 Visual

5.0 Impacts on rural landscapes. Cumulatively, the various mines have impacts on the sense of place felt by the community, and attractiveness of the Upper Hunter experienced by the travelling public. Drive along the New England Highway, Golden Highway, and Denman Road and the visual landscape is definitely industrial, with open pits, overburden stockpiles, road and rail infrastructure and CHPP clearly visible. Some of these changes are temporary (maybe 50 years), others, if there aren't appropriate rehabilitation actions, will be permanent. Are the short and long-term cumulative visual impacts acceptable?

The BCC is not visible from the New England Highway or Denman Road. There are some limited, long distance views possible from the Golden Highway.

In the vicinity of the BCC the visual environment is generally comprised of mined surfaces, coal related infrastructure (conveyors, mining surface facilities, rail facilities and lines) and other built infrastructure such as high voltage power lines, with a backdrop of wooded areas to the west comprising the Singleton Military Base and the "Vere" elevated ridgeline. Outside of mining land, the local area land uses include agricultural land uses, predominately grazing, viticulture, tourism and hospitality and rural-residential buildings. The Broke/Bulga area has significant contrast in the existing visual catchment with the vegetated

elevated slopes and ridges of the Broken Back Range, and Wollemi and Yengo Escarpments framing the Wollombi Brook Valley.

As discussed in the SEE, a comprehensive Stakeholder Engagement Program was undertaken as part of the approved operations which included consultation with neighbouring landholders and residents, local community groups, businesses, government agencies and other stakeholders. Visual impacts were a key perceived issue identified during the consultation program for the approved operations. For the purposes of SSD 4960 Modification 3, further consultation supporting the SIA also identified stakeholder interest in visual impacts of the proposed changes.

BCM remains cognisant of the potential amenity impacts of its ongoing surface operations on the surrounding area. BCM committed to the noise and visual bund which creates a landform between the open cut operations and the Bulga, Milbrodale and Broke areas to mitigate visual impacts associated with the operations. The design of the final landform and noise and visual bund aims to provide a stable landform in keeping with the natural landscape, reducing the visual differentiation between the natural landform and mine-formed landform. The noise and visual bund will continue to mitigate potential visual impacts associated with mining activities undertaken SSD 4960 Modification 3.

With the exception of the eastern emplacement area, the majority of the mining infrastructure and operations are screened from views from the north and east of the site by the existing topography and vegetation.

The visual impacts of the BCC are currently managed within the context of the approved *Visual Impact Management Plan* (BCM 2018) as required under SSD 4960.

A visual assessment was completed for SSD 4960 Modification 3 (refer to Section 6.8 of the SEE). The key aspects of SSD 4960 Modification 3 that may have the potential to result in visual impacts include:

- emplacement of overburden associated with minor landform changes including raising the main central overburden emplacement 10 m above its current approved height, which may be associated with views of mobile plant and equipment, exposed surfaces, dust and night lighting
- rehabilitation, which may be associated with views of mobile plant and equipment and regenerating vegetation
- prioritising rehabilitation of the outer faces of emplacement areas which are visible to the surrounding areas.

The visual assessment indicated that views of the site from many of the public viewing locations are currently obscured by the approved noise and visual bund and there will be either no increase or only minor changes to the visibility of the active and inactive overburden areas. Over the various stages of SSD 4960 Modification 3, minor changes to overburden emplacement will occur which will result in the overburden areas being visible from some locations, although this change is minor relative to the approved operations. The design of the final landform and noise and visual bund aims to provide a stable landform in keeping with the natural landscape, reducing the visual differentiation between the natural landform and mine-formed landform. This results in a lowering of the overall level of visual amenity impact.

4.15.4 Air Quality

7.0 While the cumulative air pollution analysis assesses total concentration of air pollutants from the two MODS, being background pollutants plus project-specific contribution, the area of analysis is limited to the surroundings of the mine. The surrounding region has a total of ten coal mines, ash dams and coal-fired power stations.

The AQIA (Jacobs 2019) has followed the EPA's *Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2016) (Approved Methods), which specifies how assessments based on the use of air dispersion models should be undertaken. The Approved Methods include guidelines for the preparation of meteorological data, reporting requirements and assessment criteria to assess the significance of dispersion model predictions.

The EPA approved CALPUFF computer-based air dispersion model was used to predict ground-level particulate matter concentrations and deposition levels due to the identified emission sources, and the model predictions have been compared with relevant air quality criteria, taking into account of existing air quality conditions. The existing air quality conditions have been characterised by a review of air quality monitoring data within a 20 km by 20 km region and these data will include, to some extent, contributions from more distant sources such as other motor vehicles, agricultural activities, mining operations, ash dams, power stations and other sources.

8.0 Air quality issues in the early morning hours are very visible at any time of the year. Council is informed that this occurs as a result of a strong inversion that forms over the Muswellbrook and Singleton LGAs trapping dust and other pollutants.

A review of the existing air quality and meteorological environment was carried out as part of the AQIA (Section 5 of Jacobs 2019). Monitoring data was analysed for trends by season, time of day and by wind conditions. One of the observations from this review was that, on average, the PM_{10} concentrations are typically highest in the morning (around 9 am) and evening (around 8 pm). This pattern can be explained by poorer dispersion conditions in the morning and evening whereby any dust emissions disperse more slowly and allow higher concentrations to exist for extended periods of time.

Also, the higher average concentrations in the morning and evening will likely be associated with increased anthropogenic (human) activity at these times, for example the use of wood heaters. These observations are consistent with those mentioned by Muswellbrook Shire Council. Jacobs advises that the dispersion models take account of all key meteorological parameters that influence dispersion including the presence of temperature inversions (refer to **Appendix 2**).

9.0 Given this naturally occurring phenomenon is well known, it is Council's view that the 24 hour averaging period for air pollution monitoring has the unintended consequence of obscuring issues of elevated dust levels in the early morning hours, and that a 12 hour average would be better. Council acknowledges there may be insufficient empirical evidence as to the effect on human health of exposure to elevated levels of dust at night. In light of this, Council requests that the State Government commission a study into the effects to human health of exposure to night-time dust levels in the Upper Hunter. This research is essential to improving the understanding of the consequences to human health, particularly respiratory and cardiovascular health, of exposure to night-time dust levels generated by mining.

Council's comments and request to the State government are noted, but are unable to be resolved by BCM.

The AQIA (Jacobs 2019) has followed the requirements of the State Government including assessment against prescribed criteria. The National and State Government air quality standards and criteria for particulate matter are currently set for 24-hour and annual average periods.

4.15.5 Water Resources

11.0 Water sharing now and in the future. Each of the mines has a permanent impact on water availability in the local catchment they are located in, and the Hunter River and Goulburn River more generally. Each mine operation dismisses this by saying they hold sufficient water licences to cover this "loss of water". But the loss is permanent, and if the water sharing regime needs to change in the broader catchment for societal, ecological, or climate change reasons, or to satisfy the requirements for emerging industries, the water loss due to mines will place limitations on the ability to change the water sharing regime.

The legislative requirements put in place by the NSW Government, in particular the requirements of the *Water Management Act 2000* and the *Protection of the Environment Operations Act 1997*, have consideration of water take and impacts in their application. This includes the setting of sustainable water take levels through water licensing regimes and sustainable water quality limits through water discharge limits in an environment protection licence.

Water Access Licences (WALs) entitle licence holders:

- to specified shares in the available water within a particular water management area or water source (the share component)
- to take water at specified times, rates or circumstances from specified areas or locations (the extraction component).

Water sharing plans establish rules for sharing water between the environmental needs of the river or aquifer and water users, and between different types of water use such as domestic supply, stock watering, industry and irrigation. The water licensing system considers available water within a system and allocates licences in consideration of all users of the water system and inherently covers cumulative impacts.

All licensable water take associated with SSD 4960 Modification 3 will be licensed in accordance with the *Water Management Act 2000*.

4.15.6 Traffic

12.0 The project will add to or prolong current levels of traffic movements on the New England Highway, Golden Highway and train movements Main Northern Railway Line. Movements should be included in models held by Transport NSW and Roads and Maritime Services to understand the cumulative impacts on:

- **The level of service on State Roads and significant intersections from Muswellbrook through to the Newcastle Link Road and Pacific Highway.**
- **Passenger rail service movements, including future ability to increase frequencies of service between Muswellbrook and Newcastle.**
- **Rail noise and dust along the railway corridor from Singleton to the Newcastle Port.**

A detailed assessment of the potential impacts on the capacity, efficiency and safety of road and rail movements was undertaken for BOP.

SSD 4960 Modification 3 does not propose to increase operational employee numbers therefore it is not expected to change operating traffic volumes associated with the Bulga Surface Operations. As outlined in the SEE, SSD 4960 Modification 3 will result in continued traffic volumes for approximately an additional 4 years, however is not predicted to have any additional traffic impacts.

It is noted that RMS had no comment on SSD 4960 Modification 3 (refer to **Section 4.9**).

4.15.7 Closure

13.0 Transitioning to a Post-Coal future. Communities in the Hunter, from near the mine sites to the coast, have experienced rapid transitions associated with expansion of the coal mining industry. In the next few decades they face the prospect of the coal mine industry contracting as a result of declining global resource demand. While communities have benefited from the expansion of the coal industry through the creation of jobs and the investment in economies, an abrupt and/or unplanned transition would have resounding social and economic impacts on the Region and the State.

BCM will meet all of their mine closure obligations, as required by SSD 4960 and relevant management plans.

Further discussion on mine closure and future land uses is provided in **Section 4.14.4** in response to the Singleton Council submission.

14.0 A working party with participants from the two Councils, DPIE, Premiers and Cabinet, the Mines, local Chambers of Commerce, traditional owners and local land council members and the Hunter JO Economic Transitions Committee should be established to commence planning for the transition to a post-mining future

As discussed in **Section 4.14**, Glencore are current participants of similar forums, such as the UHMD, an initiative established in 2010 by the mining industry in coordination with the NSW Minerals Council, to address concerns in parts of the community about pressure on infrastructure and services, land rehabilitation, water, affordable housing and air quality. Participants in the UHMD also include Muswellbrook Council, government agencies and regulators, non-government agencies and environmental groups, community and business leaders, residents and many other stakeholders and industries.

Glencore will continue to engage with relevant industry forums where appropriate.

4.15.8 Final Land Use

15.0 Local communities are typically highly dependent on nearby mines for socio-economic. The impact of closure on local and even regional socio-economics can therefore be significant and should be a key consideration in closure planning processes and documents. At the close of mining operations every effort should be made to maintain the quantum of employment opportunities, in turn avoiding economic and social disruption to the local community through loss of job opportunities. Post-mining land use opportunities for rehabilitated mine land could include:

- **Recreational uses**
- **Hydropower and other renewable energy generation activities**
- **Tourism and Theme parks**
- **Wildlife habitat and conservation**
- **Water storage and irrigation**
- **Intensive Agriculture/ Aquaculture**
- **Industrial Development**

As outlined in **Section 4.14.4**, the approved operations conceptual final land use is a combination of woodland and agricultural land for grazing. SSD 4960 Modification 3 is not seeking to change the current final land use approved for the site being a combination of woodland and agricultural land with a pit lake forming in the final void.

As outlined in the SEE, the Bulga Surface Operations could provide strategic opportunities for a variety of potential final land uses, given the extensive infrastructure and accessibility. These final land use options are considered as potential land uses however these will be considered closer to mine closure and will be dependent on market demand for products at the time, technology available near to closure and will consider the options raised by Council and others. Further approvals may be required for any alternative land uses, subject to planning controls that may apply at the time.

16.0 Transition to post-mining activities should commence before mining ceases. This may require adjustments to Mining Lease conditions and the Singleton LEP to facilitate.

Glencore's mine closure planning processes requires consideration of transition to post-mining land uses options in the Mine Closure Plan to be developed in detail from 5 years prior to the cessation of mining.

BCM will continue to comply with the requirements of their mining leases. As discussed in **Section 4.14**, BCM has a mine closure process in place which commences prior to cessation of mining activities and which will include consideration of post mining land uses, Mining Lease requirements and relevant land zoning.

4.15.9 Climate Change

17.0 The applicant should be required to prepare an Export Management Plan that ensures that any coal extracted from the development that is exported from Australia; is only exported to countries that are:

a) parties to the Paris Agreement within the UN Framework Convention on Climate Change; or

b) countries that have established policies to reduce greenhouse gas emissions to a level similar to the Paris Agreement.

BCM is an approved operation servicing existing export markets. It is not considered warranted to impose such a condition on BCM as part of SSD 4960 Modification 3.

It should be noted that the NSW Government has recently introduced the *Environmental Planning and Assessment Amendment (Territorial Limits) Bill* 2019 that will provide greater policy direction and will preclude consent authorities imposing export management plan type conditions. In the Second Reading Speech for the Bill the Minister for Planning and Public Spaces outlined that a new section 4.17A would be inserted into the EP&A Act and stated the effect of this new section would be as follows:

> '*The bill principally clarifies that development consent conditions can only be imposed if they relate to impacts occurring within Australia or its external territories. It does so by inserting a new section 4.17A of the Environmental Planning and Assessment Act 1979 that identifies prohibited conditions which have no effect if they are part of a development consent granted under part 4 of the Act. This includes consent for State significant development. The prohibited conditions will include those imposed for the purpose of achieving outcomes or objectives relating to the impacts occurring outside Australia or an external territory as a result of the development, as well as the impacts occurring in the State as a result of any development carried out outside Australia or one of its external territories. This will prevent consent authorities from imposing conditions seeking to control, for example, downstream greenhouse gas emissions or other climate change impacts occurring outside Australia as a consequence of development that is carried out outside Australia.'*

The effect of the amendment if successfully passed means that it will not be appropriate to impose the suggested condition.

5.0 Response to Community Submissions

5.1 Community Submission 1

5.1.1 Climate Change

I OBJECT to this proposal.

In a time of rapidly accelerating climate change another 63 million tonnes of coal will have significant impact on global emissions.

FINALLY; it is time for Australia to act responsibly to minimise global climate change. Mining is becoming increasingly automated thus jobs and taxes cannot be relied upon. Jobs become meaningless when climate change destroys a liveable planet.

A comprehensive Greenhouse Gas and Energy Assessment (GHGEA) has been prepared for SSD 4960 Modification 3 and is contained within Appendix 7 of the SEE.

The GHGEA found that SSD 4960 Modification 3, in isolation, is unlikely to influence global emission trajectories. Future emission trajectories will largely be influenced by global scale issues such as technology, population growth and greenhouse gas policy.

Under the Paris Agreement, the Australian Government has committed to reducing greenhouse gas emissions by 26 to 28 per cent, based on 2005 levels, by 2030 (Commonwealth of Australia, 2015). SSD 4960 Modification 3's cumulative Scope 1 emissions (4,263,000 t CO2-e) will increase the required national mitigation effort. It is important to note, however, that mining associated with SSD 4960 Modification 3 ceases in 2039 (subject to timing of granting development consent) and as such will not influence national mitigation efforts after this time.

SSD 4960 Modification 3's Scope 2 and 3 emissions will be generated in international jurisdictions, and Scope 2 emissions by Australian facilities with environmental approval to generate greenhouse gas emissions.

It should be noted Glencore and its respective shareholders are already taking action to reduce GHG emissions and promote the development and deployment of low-carbon technologies. Glencore supports and invests in progressing advanced coal technologies (including high-efficiency, low-emissions (HELE) and carbon capture, use and storage (CCUS) technologies) in Australian and other countries around the world, aimed at achieving significant and material reduction of emissions from coal consumption.

5.1.2 Biodiversity

The disturbance of 20.2 ha land including 19.2ha of native vegetation amounts to further environmental vandalism at a time when Australia is leading the world in environmental destruction and loss of native species (flora and fauna) and habitat. That the destruction of this land is to be "offset" by other Glencore-owned land close to Broke is an obscenity, such "offset" does nothing to compensate for the loss of biodiversity.

A comprehensive Biodiversity Assessment Report (BAR) has been undertaken by Umwelt for the 20.2 ha of additional disturbance area associated with SSD 4960 Modification 3. The additional disturbance area is relatively minor, in the context of the currently approved BCC disturbance area of 3,786 ha.

The BAR addresses the specific requirements of the *Framework for Biodiversity Assessment – NSW Biodiversity Offsets Policy for Major Projects* (FBA) (OEH, 2014). The FBA process is a credit driven system where calculators provided by the NSW government are populated with ecological data about the site to generate 'impact credits'. SSD 4960 is then required to offset these credits through a biodiversity offset strategy.

Given the location of the additional disturbance area, being an isolated remnant area within the overall Project Area and the relatively small size, it is not possible to avoid impacts to all biodiversity values within the additional disturbance area without compromising the viability of SSD 4960 Modification 3.

BCM is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of SSD 4960 Modification 3, in consideration of the FBA and the *NSW Biodiversity Offsets Policy for Major Projects* (Offsets Policy) (OEH, 2014).

BCM has undertaken surveys of an area of Glencore owned land proximate to the Project Area (hereafter referred to as the proposed Vere Offset Site) which contains the required biodiversity credits for SSD 4960 Modification 3. Management of this site for conservation will lead to a gain in ecological value over time.

Offsetting for additional disturbance required as part of SSD 4960 Modification 3 has been undertaken in accordance with the relevant guidelines and policies.

It is also noted that the site will be rehabilitated progressively over the life of the operations. BCM has a commitment to offsets containing a minimum of 2,500 hectares of woodland / open forest.

5.1.3 Air Quality

Re-disturbing 200 ha of previously rehabilitated land is particularly hazardous in an area (Singleton Shire) where particle emissions are increasing at a rapid rate. Dust alarms are increasing in frequency and in levels. This dust pollution leads to many adverse health impacts on those who are forced to breathe it. Wind cannot be used to "excuse" such impacts, the cumulative effects of so much land disturbed for open-cut mining ensures that this land WILL, inevitably increase dust emissions. Watering haul roads or ceasing mining in certain areas in windy conditions cannot mitigate the cumulative impact of so much disturbed land associated with the steady expansion of open-cut mining in the Singleton Shire.

In addition to the proposed additional disturbance area of 20.2 ha, SSD 4960 Modification 3 will result in the re-disturbance of approximately 200 ha of existing temporary mine site rehabilitation located on the current in-pit overburden emplacement area, in order to increase the height of the existing in-pit overburden emplacement area. The rehabilitation will be disturbed in stages and progressively re-planted.

The re-disturbance of areas of rehabilitation is proposed in order to limit the need to expand the footprint of the overburden emplacement area, which would otherwise result in further areas of new disturbance.

The AQIA has assessed the proposed re-disturbance of the temporary rehabilitation. As outlined in **Section 4.2.1**, the AQIA has found that maximum emissions from SSD 4960 Modification 3, based on the recommendations from the consent for the approved operations, will be within the maximum emissions estimated over the life of the approved operations. Therefore there will be no greater impact on air quality from SSD 4960 Modification 3 beyond the approved operations.

BCM implements a range of proactive and reactive emission management measures, currently implemented as part of the existing approved Air Quality Management Plan, which will continue to be adopted as part of SSD 4960 Modification 3.

5.1.4 Social

It is unreasonable for the residents of this area be forced to live with such impacts that significantly affect health adversely. These residents see no corresponding positive impacts from this activity.

The detailed assessment of environmental aspects including air quality and noise have been undertaken in accordance with relevant legislation and guidelines, and by appropriately qualified specialists. Relevant legislation and guidelines for environmental aspects that have potential risks to public safety or human health are based on accepted safety or health based assessment criteria established by the NSW government.

As outlined in the SEE, the SSD 4960 Modification 3 design was prepared and refined with the objective of ensuring that the SSD 4960 Modification 3 could be undertaken in compliance with existing approved environmental impact criteria, to ensure that there is minimal incremental impact resulting from SSD 4960 Modification 3.

Cumulative dust levels and other air quality parameters are predicted to comply with the relevant criteria at all surrounding private residences, with the exception of a single private residence due to the change in criteria. This residence is located to the north of the BCC and has current noise acquisition rights for the adjacent Mt Thorley Warkworth mine, and may be afforded acquisition rights from SSD 4960 Modification 3, in accordance with the VLAMP due to the revised criteria.

Operational noise levels are predicted to meet the currently approved noise criteria for BCC at all surrounding private residences. Blasting activities will be managed so that relevant blast criteria are not exceeded at private residences or at blast sensitive infrastructure.

5.1.5 Economics

It is well-overdue for the adverse impacts of such projects be accounted for when assessing so-called "economic benefits" to the community and beyond. Glencore is notorious for tax-avoiding by profit shifting. The royalties from ALL mining account for less than 2% of annual State revenue. The costs of adverse health impacts are met by the same State revenue. Profits go to overseas entities not to the people forced to live with the adverse impacts.

A comprehensive Economic Impact Assessment has been undertaken by Cadence Economics for SSD 4960 Modification 3 (refer to Appendix 15 of the SEE). The Economic Impact Assessment is based on a cost benefit analysis (CBA) and LEA prepared under the framework established in the *Guidelines for the economic assessment of mining and coal seam gas proposals* (the Guidelines) released by the NSW Government in December 2015. In addition, the Guidelines require an estimate of the potential costs generated by SSD 4960 Modification 3.

The indirect costs of SSD 4960 Modification 3 are classified as:

- net public infrastructure costs
- estimated loss of surplus to other industries
- net environmental, social and transport-related costs
- net environmental costs.

As outlined in Section 6.14.1 of the SEE, SSD 4960 Modification 3 is expected to generate minor environmental, social and transport-related costs, above those generated by the approved operations.

In relation to commentary in respect of Glencore being notorious for tax-avoiding, Glencore complies with all their tax and financial reporting obligations in Australia. Glencore has paid significant taxes and royalties to Australian Federal and State Governments.

It should be noted that the economic benefits from mining operations have far more wide reaching economic influence than royalties and taxation. The indirect benefits of SSD 4960 Modification 3 are related to the linkages that it will have to the NSW economy through both the labour market and suppliers. SSD 4960 Modification 3 will also have significant benefits to suppliers and employees.

5.2 Community Submission 2

5.2.1 Mining

This Nation must first thank the mining industry and all of its workers for the incredible things they have allowed this country and this planet to achieve. Without the stuff they dig out of the ground we would not enjoy the society we have today.

Noted.

That being said, we must rapidly transition away from coal mining on the whole, and certainly in the immediate term we must move away from open cut mining.

Glencore recognises that over the next 20 years the percentage of the global primary energy mix supplied by coal is predicted to decline however global energy demand will continue to grow over the same period. The Bulga Surface Operations, including SSD 4960 Modification 3, will meet an existing and continuing demand for coal. Meeting this increased energy demand into the future will require a mix of energy sources with thermal coal expected to be a key component of this energy mix into the foreseeable future.

Bulga Surface Operations is well positioned to contribute to meeting this expected demand in the short to medium term and will maximise coal recovery from within existing mining areas, whilst optimising the use of existing infrastructure and minimising the environmental impact associated with meeting this demand.

Coal sourced from the proposed SSD 4960 Modification 3 will be contained within Glencore's stated future coal production cap.

SSD 4960 Modification 3 is estimated to provide a net benefit to NSW.

5.2.2 Closure

We must also do more than just thanking the workers in the mining industry, we must also develop just transition plans for all workers in the mining industry to be given training in the sustainable energy sector and other industries. We must also provide suitable pensions to allow them to continue to pay the bills and support their families long after coal mining ceases in this country.

In accordance with Schedule 3, Condition 55(g) of the current development consent for Bulga Surface Operations (SSD 4960), BCM will minimise the adverse socio-economic effects associated with mine closure of the BCC.

BCM will develop transition plans for its employees as appropriate.

5.2.3 Air Quality

We are seeing frequent air quality alerts in areas with open cut coal mines, including Bulga. As recently as yesterday (30th October) we saw 6 air quality alerts overnight all in the Singleton LGA for PM_{10} levels exceeding national standards at Bulga, Jerry Plains, Camberwell, Singleton, Mt Thorley & Singleton NW.

DPIE has a network of air quality monitors across NSW and data from this network can be used to identify air quality trends.

Figure 5.1 shows the rolling annual average PM_{10} concentrations from data collected at various rural and urban air quality monitoring sites since 2011. This data clearly show an increase in PM_{10} concentrations at rural and urban locations from 2017 onwards, reflecting the onset of drought conditions and increased areas of exposed land across many parts of NSW.

In their *Annual Air Quality Statement 2018*, DPIE concluded that particle levels increased across the State due to dust from the widespread, intense drought and smoke from bushfires and hazard reduction burning (OEH, 2019). Air quality conditions in the Hunter Valley have been influenced by these drought conditions, and the air quality alerts reflect the number of monitors that are present and configured to issue alerts for the Hunter Valley.

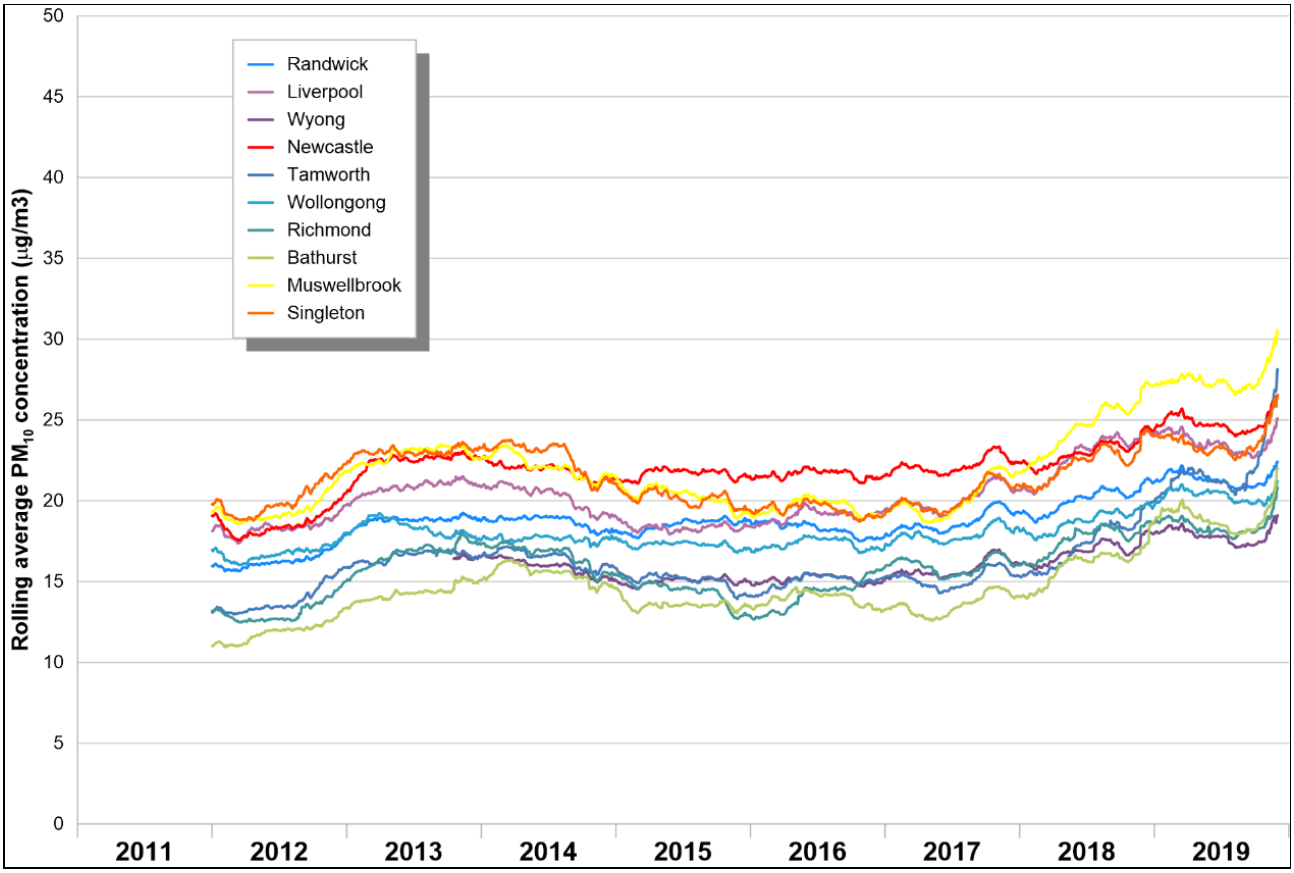


Figure 5.1 Annual average PM_{10} concentrations at various NSW air quality monitoring sites

© Jacobs, 2019

Without even considering what impact the burning of coal mined from Bulga and other mines in the area will have on the environment both here and abroad, we must also consider the localised air quality impact this mine is having on Bulga and the Singleton LGA.

The AQIA (Jacobs 2019) has followed the EPA's Approved Methods (EPA, 2016), which specifies how assessments based on the use of air dispersion models should be undertaken. The Approved Methods include guidelines for the preparation of meteorological data, reporting requirements and assessment criteria to assess the significance of dispersion model predictions. This process and assessment methodology is designed to consider the potential impacts on local air quality including nearest sensitive receptors.

From an air quality perspective alone, we should be scaling back on open cut mines, not expanding them. On this basis I object to this project, and any coal mining project in NSW.

As outlined in **Section 4.2.1**, the AQIA has found that maximum emissions from SSD 4960 Modification 3, based on the recommendations from the consent for the approved operations, will be within the maximum emissions estimated over the life of the approved operations. Therefore there will be no greater impact on air quality from SSD 4960 Modification 3 beyond the approved operations.

The SEE summarises the range of proactive and reactive emission management measures, currently implemented as part of the existing approved Air Quality Management Plan, which will continue to be adopted as part SSD 4960 Modification 3. The current Air Quality Management Plan will be review and revised where necessary should SSD 4960 Modification 3 be approved.

6.0 Updated Evaluation of Project Merits

Following consideration of the submissions received, a detailed Submission Report to address the issues raised in agency and community submissions has been prepared. This process has included undertaking some additional works, providing clarifications and, where relevant, explaining the findings of the technical studies that have been completed as part of the SEE in order to address all of the issues raised. The overall outcomes of this response to submissions process have not changed the overall assessment of the merits of SSD 4960 Modification 3, as outlined in the SEE.

In this regard, it is considered that SSD 4960 Modification 3, as proposed, is a logical continuation of the existing mine into adjacent resources within an area of 346.2 ha of additional mining area of which 326 ha has previously been or is approved for disturbance including two areas previously mined and used for tailings storage facilities. From a land use perspective, as a continuation of an existing approved land use, it is considered that while some impacts are predicted, with the application of the management and mitigation measures committed to by BCM, these impacts can be managed to a level that is consistent with currently approved impacts and can continue to coexist with surrounding land uses. BCM considers that this outcome has been demonstrated through its existing mining operations.

Not proceeding with SSD 4960 Modification 3 would likely sterilise the coal resources as it would be difficult and significantly more expensive to access these resources once approved mining operations have ceased. As the coal is a multi-seam resource, the most efficient method of extraction requires that the seams must be extracted in sequence and in parallel with the same seams located in the adjacent approved mining area, as the adjacent mining is progressed. Any separate future operations would not be considered commercially viable as the benefits of being able to continue mining within an approved mining area and utilise existing infrastructure may not be available if SSD 4960 Modification 3 does not proceed.

The SIA has identified that social impacts from SSD 4960 Modification 3 are primarily consistent with the approved operations. Given BCM's proactive mine plan design to avoid and minimise impacts, the social impacts of the Proposed Modification have been minimised where possible through project design and the proposed management and enhancement approaches.

As outlined in the SEE, SSD 4960 Modification 3 has been assessed against the principles of Ecologically Sustainable Development (ESD) as required by the EP&A Act and EP&A Regulation. This assessment has indicated that while SSD 4960 Modification 3 will have impacts, these impacts can be effectively managed, mitigated and offset and the development will result in significant economic benefits. The assessment therefore concluded that SSD 4960 Modification 3 is consistent with the principles of ESD and after consideration of the submissions made and the responses provided in this Submissions Report, there is no change to that conclusion.

The Economic Assessment (refer to Appendix 15 of the SEE) describes a range of positive benefits from SSD 4960 Modification 3 that will result at a local, regional and State level. These benefits include:

- continued employment of approximately 700 full time equivalent employees
- SSD 4960 Modification 3 is estimated to provide a net benefit of $410.6 M to NSW, in net present value terms
- SSD 4960 Modification 3 is estimated to generate $231.6 M (in net present value terms) in corporate taxes, of which $74.5 M is attributed to NSW
- SSD 4960 Modification 3 is estimated to generate $104.5 M in royalties

- SSD 4960 Modification 3 is estimated to provide a net benefit of $81.3 M to the region in net present value terms.

On this basis, it would be reasonable to consider that with the implementation of the management, mitigation and offset measures proposed by BCM, SSD 4960 Modification 3 will result in a net benefit to the NSW community.

7.0 References

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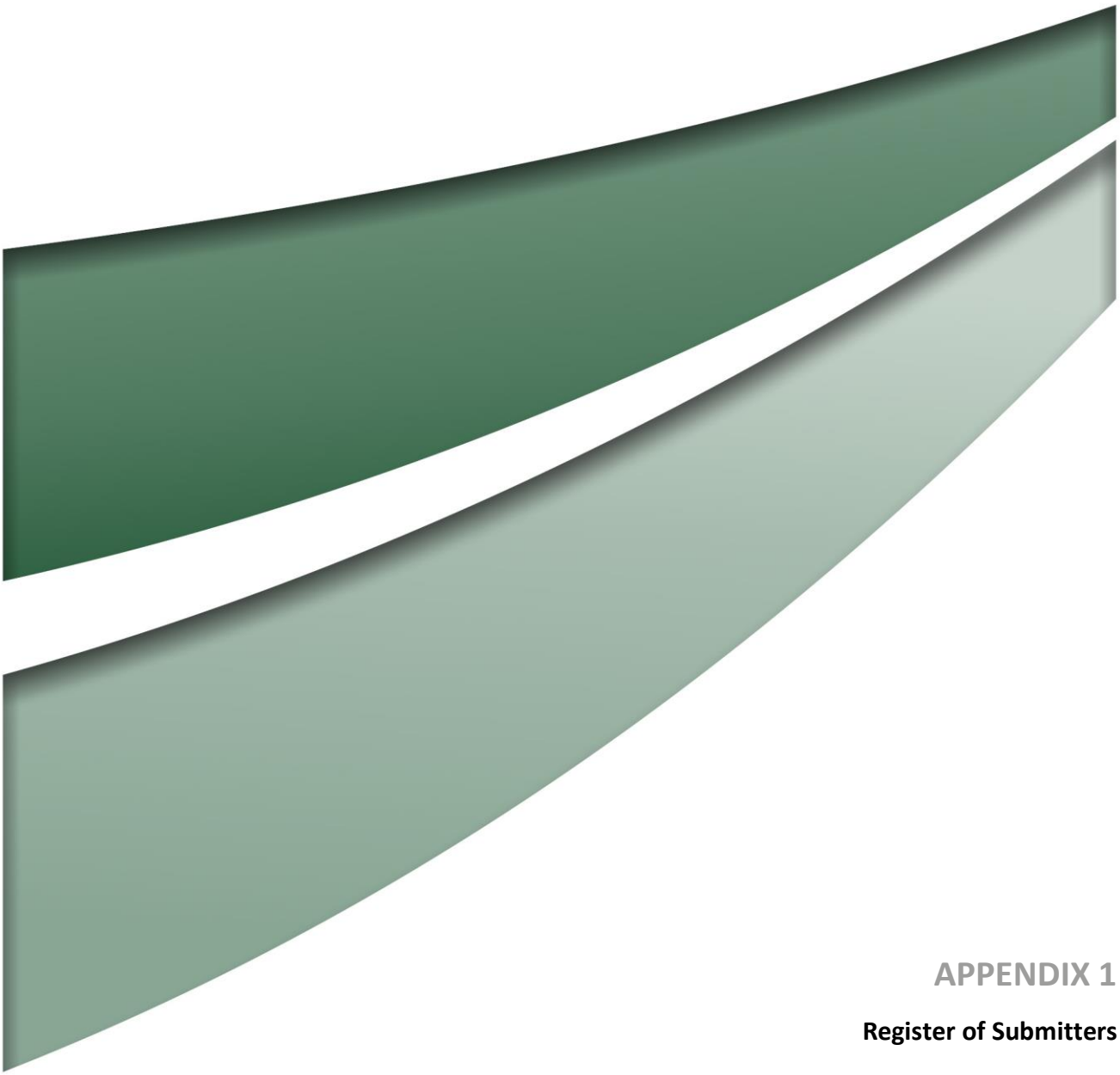
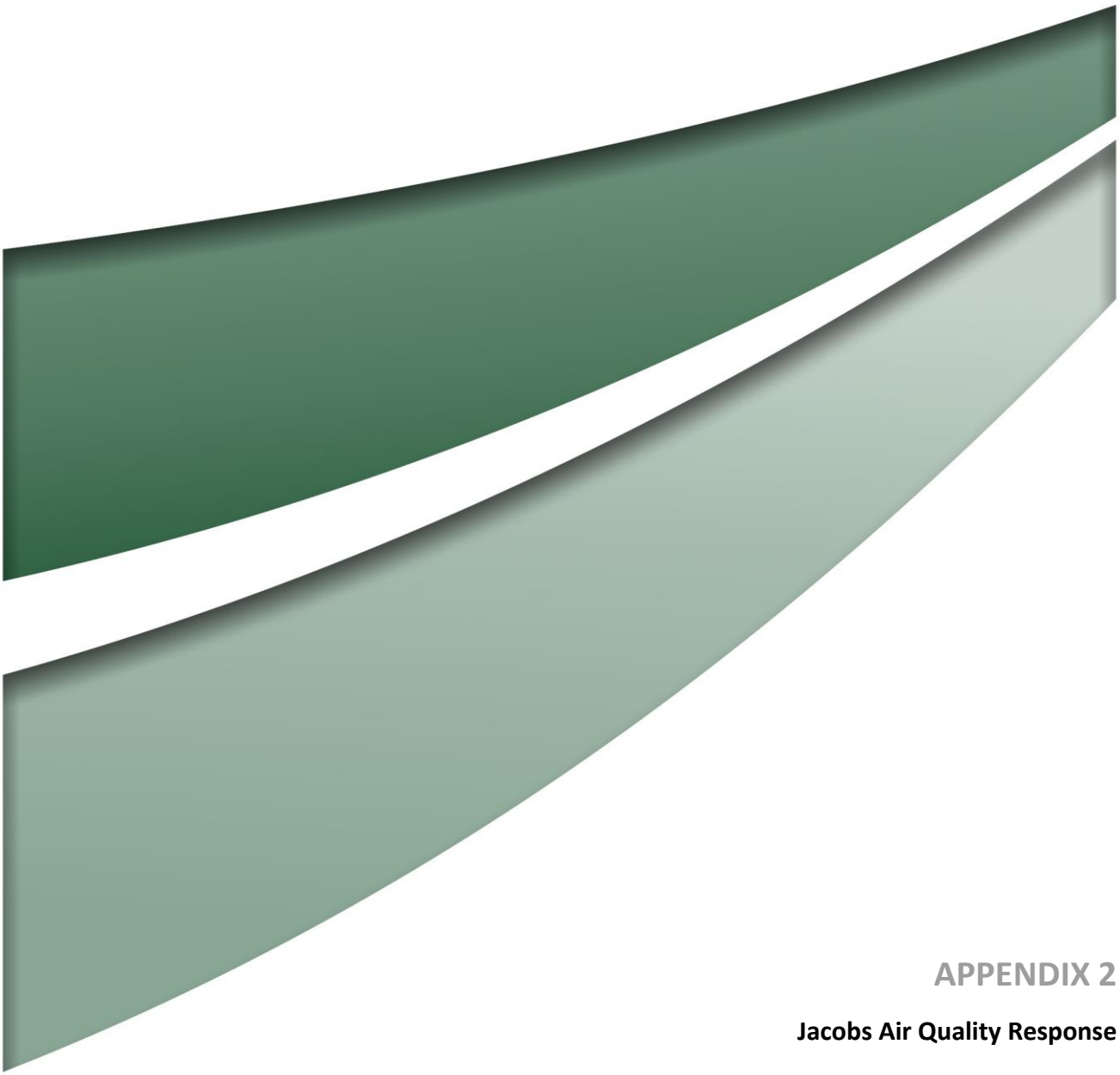


APPENDIX 1

Register of Submitters

Appendix 1 – Register of Submitters

Group	Name	SSD 4960 Modification 3	DA 376-8-2003 Modification 7	View	Section where issues have been addressed
Public Authorities	Department of Planning, Industry and Environment	✓	✓	Comments	Section 4.1
	Environment Protection Authority	✓	✓	Comments	Section 4.2
	Department of Planning, Industry and Environment – Biodiversity Conservation Division	✓	✓	Comments	Section 4.3
	Division of Resources and Geoscience	✓	✓	Comments	Section 4.4
	Resource Regulator	✓	✓	Comments	Section 4.5
	Department of Primary Industries	✓	✓	Comments	Section 4.6
	Department of Planning, Industry and Environment – Crown Lands	✓	✓	Comments	Section 4.7
	Heritage Council	✓	✓	Comments	Section 4.8
	Roads and Maritime Service	✓	✓	Comments	Section 4.9
	Transport for NSW	✓	✓	Comments	Section 4.10
	WaterNSW	✓	✓	Comments	Section 4.11
	Subsidence Advisory NSW	✓	✓	Comments	Section 4.12
Local Council	Singleton Council	✓	✓	Comment	Section 4.14
Regional Council	Muswellbrook Council	✓	✓	Comment	Section 4.15
Individual	Judith Leslie	✓	✓	Objects	Section 5.1
	Name Withheld	✓		Objects	Section 5.2



APPENDIX 2

Jacobs Air Quality Response

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19 December 2019

Attention: Kirsty Davies
Umwelt (Australia) Pty Ltd
75 York Street
Teralba NSW 2284

Project Name: Bulga Optimisation Project Modification 3
Project Number: IA225900

Dear Kirsty

Air Quality Impact Assessment Response to Submissions

Thank you for providing a copy of the EPA, Council and Community submissions relating to the Air Quality Impact Assessment (AQIA) (Jacobs 2019) for the Bulga Optimisation Project Modification 3. The submissions included:

- "Statement of Environmental Effects Exhibition – Bulga Optimisation (SSD 4960) MOD 3 and Bulga Underground (DA 376-8-2003) MOD 7". Prepared by the EPA, dated 4 November 2019, document reference DOC19/857138-11.
- "Bulga Optimisation (SSD 4960) MOD 3 and Bulga Underground (DA 376-8-2003) MOD 7 – Muswellbrook Shire Council Comment". Prepared by Muswellbrook Shire Council, dated 5 November 2019.
- Submission from anonymous (name withheld) of Concord NSW.

Please see attached for information to address the requested information or queries within the submissions.

Yours sincerely

Shane Lakmaker
Principal (Air Quality)
(02) 4979 2663
shane.lakmaker@jacobs.com

JACOBS

19 December 2019

1. Submission from EPA

The Proponent must provide an assessment of particulate emissions from the existing approved operations at the Bulga Coal Mine and evaluate changes to air quality resulting from SSD 4960 Mod 3. This assessment is needed because the modification will result in new activities to the south of the existing project area. Incremental dispersion contour plots must be included.

The Air Quality Impact Assessment (AQIA) does not present a complete assessment of the air quality impacts from the current approved operations. Rather assumes SSD 4960 Mod 3 will not change air quality impacts. Predicted impacts above the assessment criteria are to occur to the north-east and north-west of the Bulga Coal Mine, towards Bulga. However, no particulate impacts above the EPA's assessment criteria are predicted to the south of the Bulga Coal Mine towards Broke. It is unclear how these impacts compare to the existing approved operations of Bulga Coal Mine.

As stated in the Executive Summary, the AQIA (Jacobs 2019) provides an assessment of the air quality impacts of the Bulga Coal Complex (BCC) Modification 3 (open cut operations) and Modification 7 (underground operations). The AQIA is not required to assess the particulate emissions or air quality impacts of the current Approved Development as these were previously assessed by Pacific Environment Limited (2013). However, the relevant estimated emissions and contour plots for both the Approved Development and the BCC with Modification 3 (Proposed Modification) are presented below for comparison.

Annual emissions for the Proposed Modification have been compared to those previously estimated for the Approved Development (from PEL 2013). **Table 1** show the comparisons. These data indicate that the maximum emissions from the Proposed Modification, based on the recommendations from the consent for the Approved Development, will be within the maximum emissions estimated over the life of the Approved Development.

Table 1 Comparison of Approved Development and Proposed Modification emissions

Particulate matter classification	Estimated annual emissions (kg/y)	
	Approved Development (maximum of Year 1, 4, 7, and 13)	Proposed Modification (maximum of 2022, 2026, 2031, 2035)
TSP	10,302,584	7,968,717
PM_{10}	3,466,180	2,643,899
$PM_{2.5}$	445,691	435,061

There are no air quality criteria for which to assess an incremental change, only those prescribed by the EPA in the "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA 2016).

Contour plots have been prepared to provide a comparison of the Proposed Modification to the Approved Development, in terms of the contribution of the BCC to local air quality. These plots are shown in **Figure 1** to **Figure 6** and include:

- Predicted maximum 24-hour average PM_{10} concentrations due to the BCC (**Figure 1**);
- Predicted annual average PM_{10} concentrations due to the BCC (**Figure 2**);
- Predicted maximum 24-hour average $PM_{2.5}$ concentrations due to the BCC (**Figure 3**);
- Predicted annual average $PM_{2.5}$ concentrations due to the BCC (**Figure 4**);

- Predicted annual average TSP concentrations due to the BCC (**Figure 5**); and
- Predicted annual average dust deposition levels due to the BCC (**Figure 6**).

There will be inherent differences between results for the Approved Development and the results for the Proposed Modification. These differences will be largely due to a revised approach to the modelling and assessment in order to improve the correlation between measured air quality levels and model predictions (the correlations and model performance has been documented in Section 8 of the AQIA). An updated approach to the emission inventory development was adopted for the Proposed Modification in an effort to improve the simulation of existing (i.e. 2014) conditions and to take into account the recommendations for model updates that were part of the current Development Consent (SSD 4960). Once the existing conditions were simulated as accurately as possible, this same approach was carried through to the predictions for proposed future operations. Finally, an alternative meteorological year was used for the Proposed Modification simulations to make sure that the process for meteorological data selection outlined in the "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA 2016) was followed as closely as possible.

The comparisons in **Figure 1** to **Figure 6** show that the key contours representing the contribution of the Proposed Modification (i.e. BCC with SSD-4960 Mod 3) to local air quality are largely within those of the Approved Development in terms of maximum extent. Some deviations are evident, for example, annual averages show a change in contribution to the south due to proposed area mining in this area, and some of these differences are also explained by the factors outlined above.

It is also important to note that the Proposed Modification has been assessed against current, more stringent criteria than were used to assess the Approved Development. Therefore the modelling and conclusions of the current AQIA, which would not change as a result of the information presented in **Figure 1** to **Figure 6**, should be used to identify the extent of impact under the Proposed Modification.

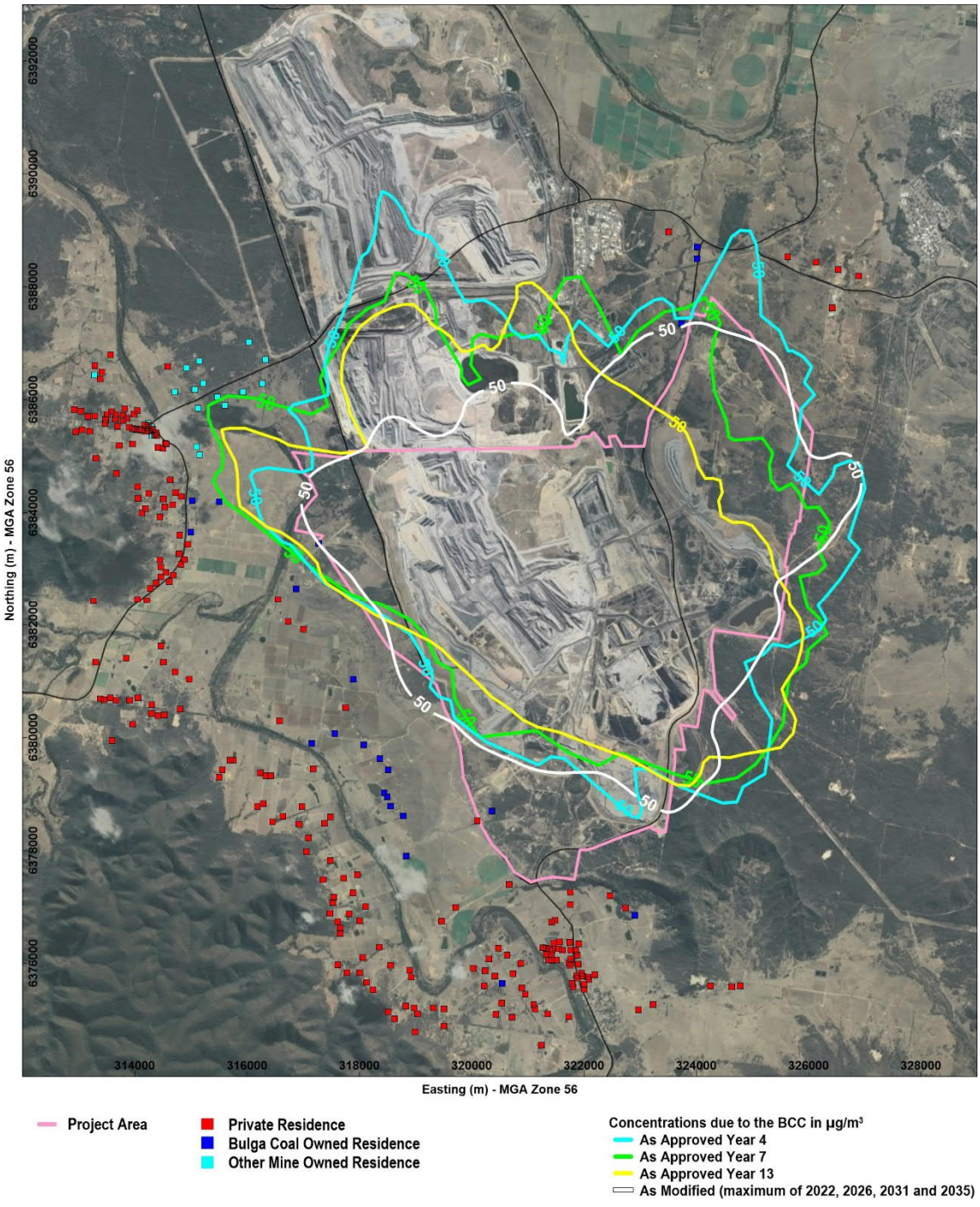


Figure 1 Predicted maximum 24-hour average PM_{10} concentrations due to the BCC

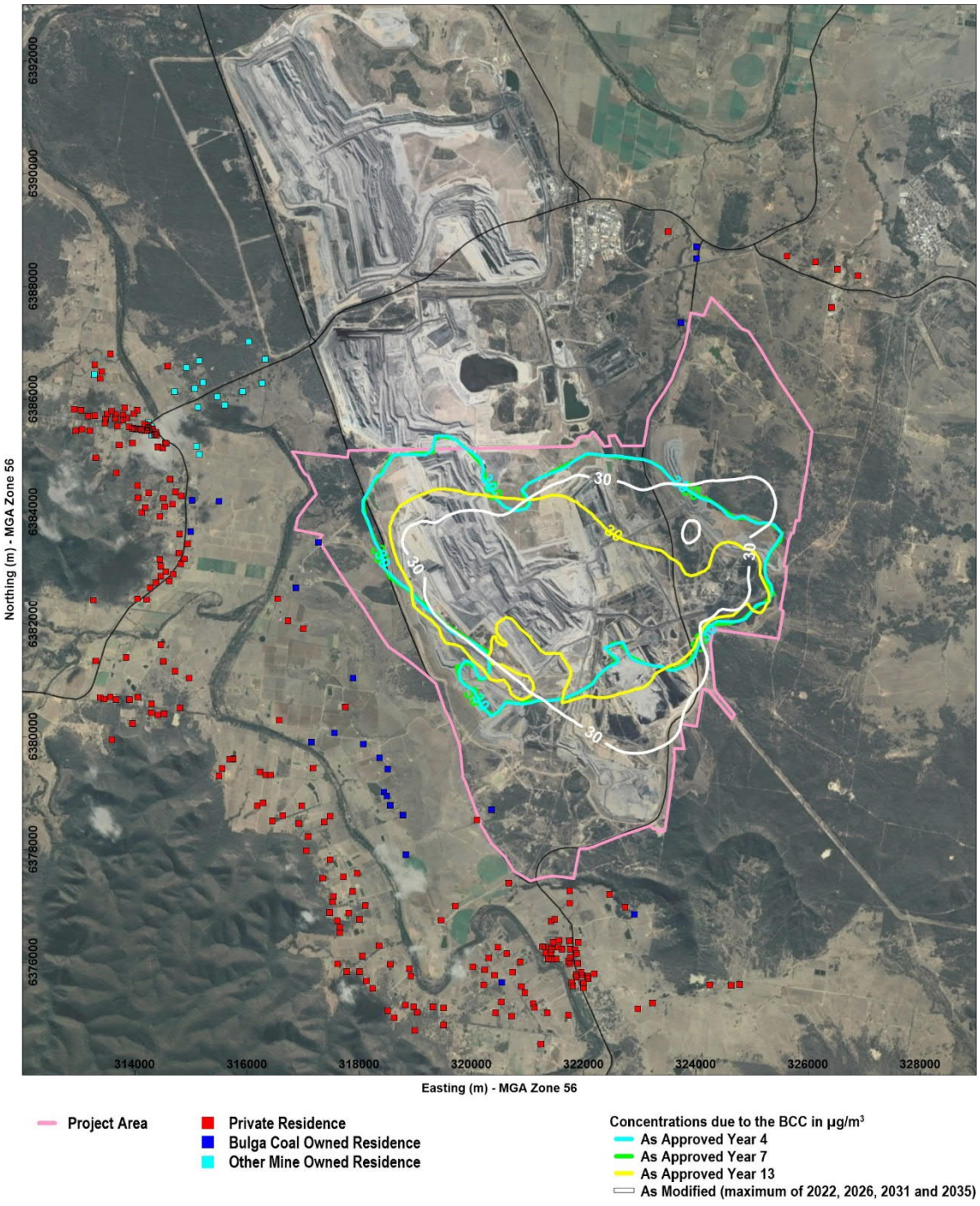


Figure 2 Predicted annual average PM_{10} concentrations due to the BCC

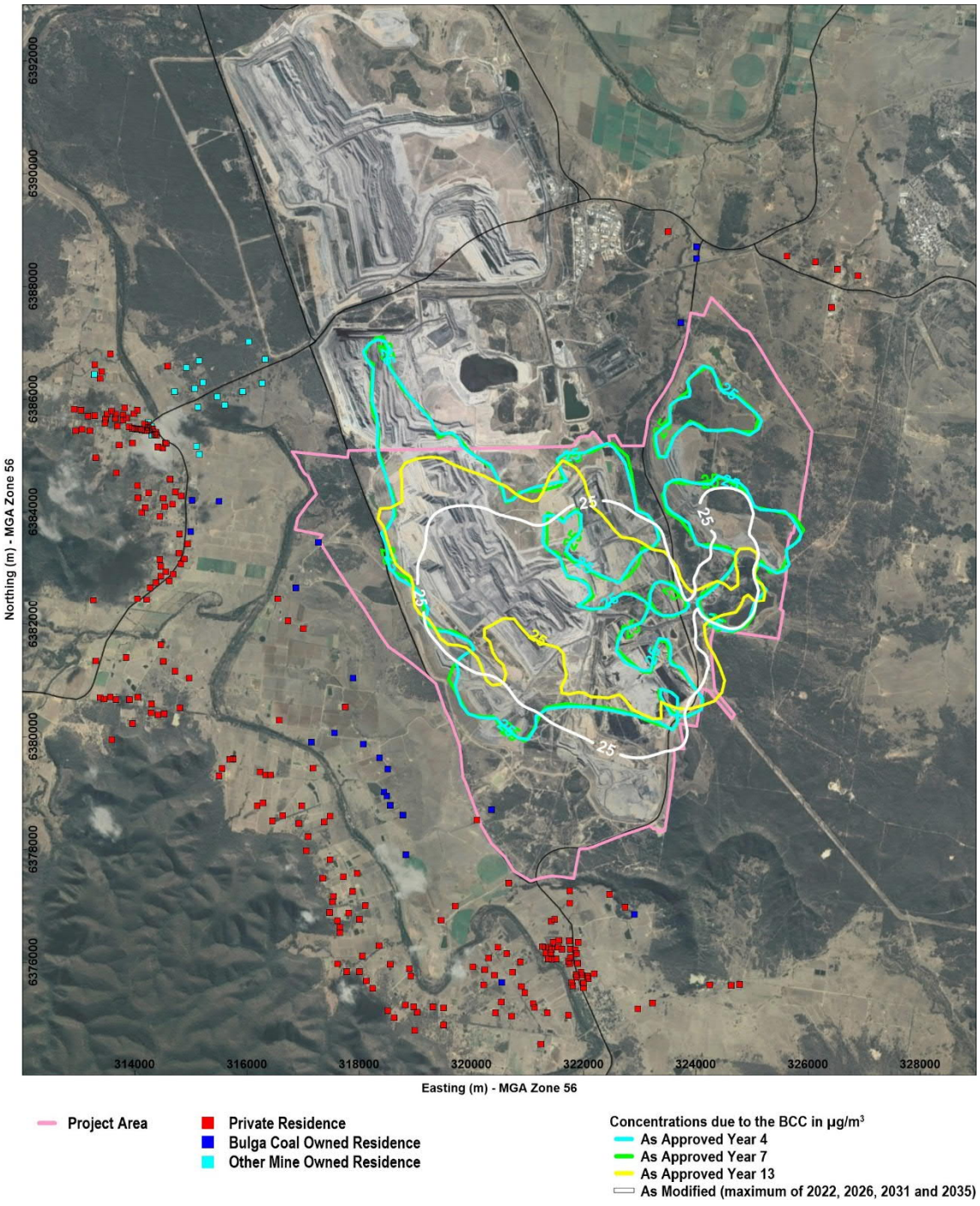


Figure 3 Predicted maximum 24-hour average $PM_{2.5}$ concentrations due to the BCC

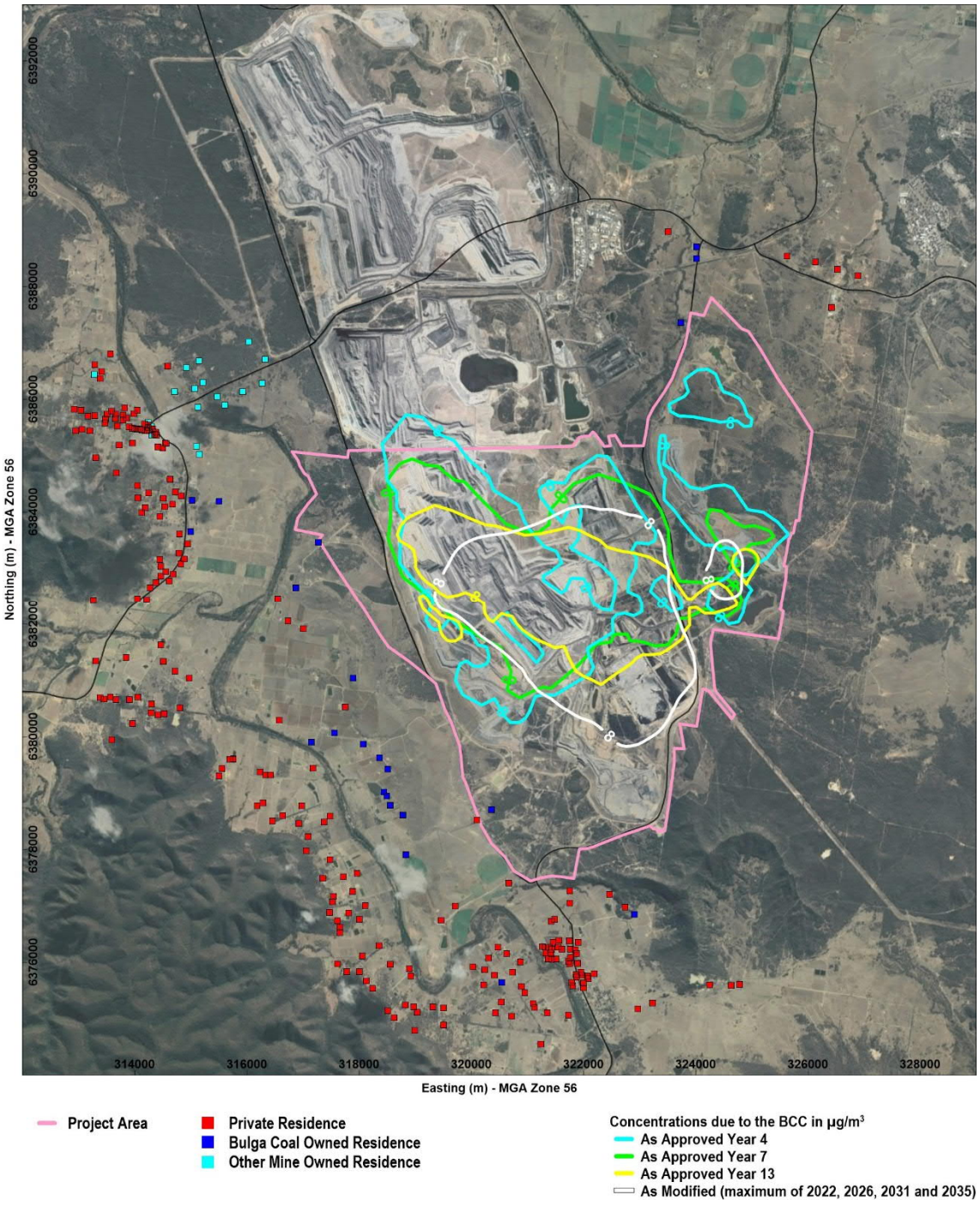


Figure 4 Predicted annual average $PM_{2.5}$ concentrations due to the BCC

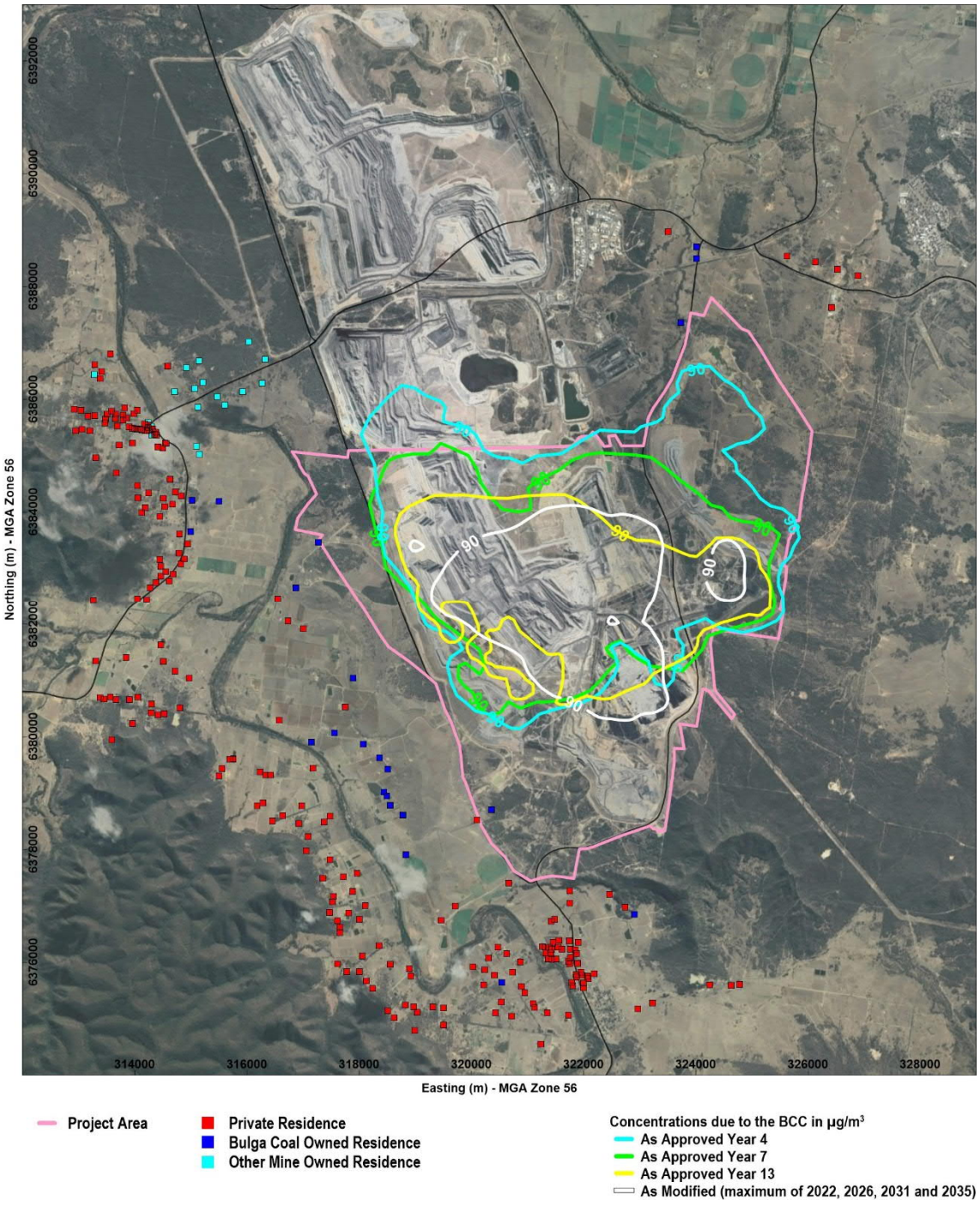


Figure 5 Predicted annual average TSP concentrations due to the BCC

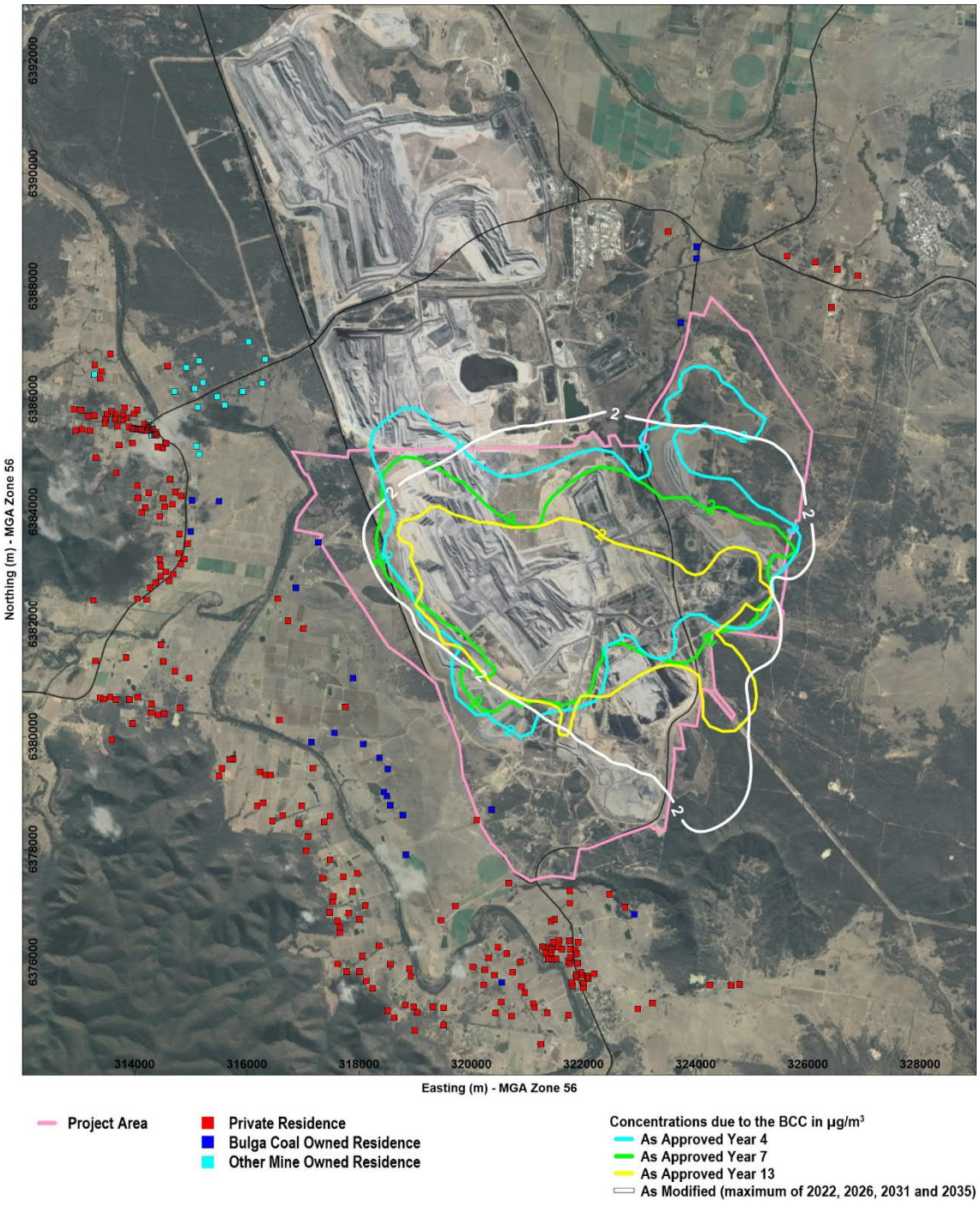


Figure 6 Predicted annual average dust deposition levels due to the BCC

The Proponent must provide justification for the use of Properties 195, 217s and 311 for assessing the 24-hour PM10 impact assessment criteria as well as identifying all properties predicted to experience additional exceedance days as a result of SSD 4960 Mod 3.

The AQIA predicts for the cumulative scenario that numerous private residences will exceed the 24-hour average PM10 criteria of 50 µg/m3 over all years modelled (Figure 19 and Appendix D). The AQIA examines the potential contribution of each source to cumulative concentrations at three locations. Specifically, Property 195 is predicted to experience two exceedance days with a significant project only contribution of 24 µg/m3. Property 311 is also predicted to experience two exceedance days (9 µg/m3) and Property 217s is predicted to experience one exceedance day (6 µg/m3).

Figure 19 of the AQIA showed that maximum 24-hour average PM_{10} concentrations may exceed the EPA's 50 µg/m^3 criterion at various private properties, due to contributions from the BCC (as modified), Mt Thorley Warkworth mine and background (other) sources of particulate matter. Three of the closest properties within the extent of predicted impact, in various directions from the BCC, were selected for further, contemporaneous data analysis. Representative properties meeting this criteria were identified as 195, 217s and 311 and their locations are shown in **Figure 7**, also showing predicted maximum 24-hour average PM_{10} concentrations due to all sources. All properties predicted to experience additional exceedance days as a result of SSD 4960 Mod 3 can be identified from Appendix D of the AQIA.

There is no known guidance or standard for defining what constitutes a significant project only contribution. The AQIA has used historical monitoring data to identify existing conditions and used dispersion modelling to forecast the potential future conditions. This process led to the following conclusions:

- *"Maximum 24-hour average PM_{10} concentrations may continue to exceed the EPA's 50 µg/m^3 criterion at various locations in the vicinity of the Bulga Coal Complex (including private properties), due to contributions from the Bulga Coal Complex (as modified), Mt Thorley Warkworth mine and background (other) sources of particulate matter. Specifically, the model predictions indicated that there may be up to two days each year when the Bulga Coal Complex (as modified) would contribute to an exceedance of 50 µg/m^3 at the nearest locations to the west of the Bulga Coal Complex. These predictions did not highlight any significant change in air quality as they were within the range of historical measured conditions. It is concluded that 24-hour average PM_{10} concentrations will continue to be variable from day-to-day, due to existing conditions and sources, and that operations will need to be managed in a way which minimises the contribution to off-site PM_{10} levels, as is done under the existing approved operation."*

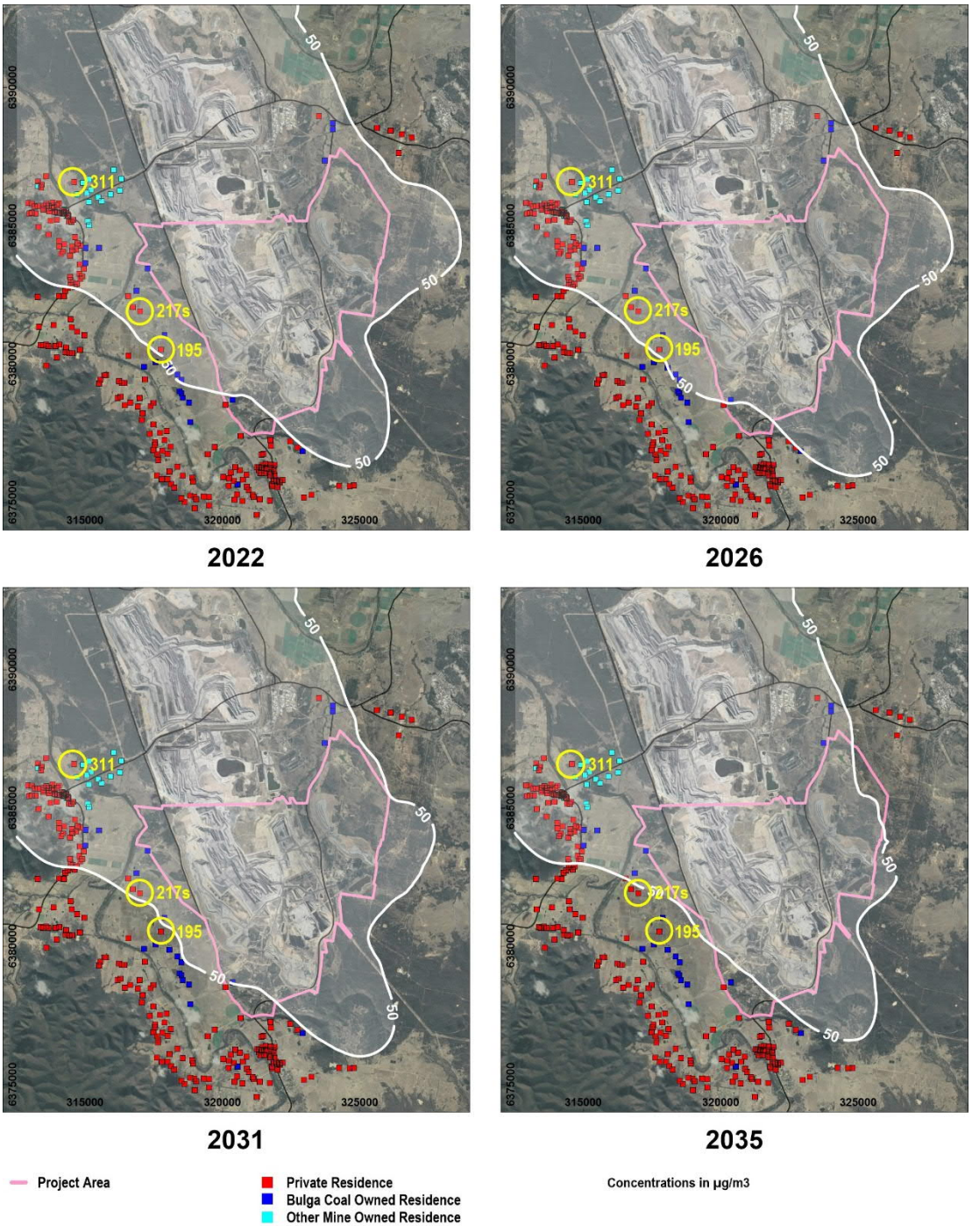


Figure 7 predicted maximum 24-hour average PM_{10} concentrations due to all sources

The Proponent must provide an assessment of annual PM10 incremental emissions and evaluate changes to air quality impacts solely as a result of the proposed SSD 4960 Mod 3.

The AQIA and Figure 25 predict that Property 1A will exceed the annual PM10 criteria of 25 µg/m3 on three of the four years modelled. Property 1A also exceeds the Voluntary Land Acquisition and Mitigation Policy criteria and is entitled to voluntary mitigation and acquisition.

There are no criteria for which to assess an incremental change in emissions, or incremental change in impacts. A discussion of the change in emissions and contributions of the BCC to local air quality has however been provided in the response to EPA query 1, on page 2.

It is acknowledged that Property 1A would be entitled to voluntary mitigation and acquisition rights. This is reflected in the conclusions of the AQIA, specifically:

- *"There is one property (1A to the north of the Bulga Coal Complex) where annual average PM_{10} concentrations are predicted to exceed the EPA's 25 µg/m^3 criterion in one or more future years. Compliance with the EPA's annual average PM_{10} criterion is predicted at all other private sensitive receptors. The results indicate that property 1A would be entitled to voluntary mitigation and acquisition rights under the VLAMP, based on cumulative PM_{10} levels that are predicted to exceed the 25 µg/m^3 VLAMP criterion in 2022, 2026 and 2031 with approximately equal contributions from the Proposed Modification and from Mt Thorley Warkworth."*

The Proponent must provide additional information to confirm particulate emissions from haulage activities.

Information to evaluate particulate emissions from haulage activities is not provided in the AQIA. Missing information includes silt content, weight of truck, weight of load. This is required to calculate haulage emissions.

Emissions from wheel generated dust were calculated using the emission factor from "Air Pollution from Coal Mining and Related Developments" (SPCC 1983). PM_{10} and $PM_{2.5}$ emission factors were derived from the SPCC TSP emission factor by applying the PM_{10}:TSP and $PM_{2.5}$:TSP ratios that are derived from the US EPA AP-42 equation for wheel-generated dust.

This approach was adopted for the following main reasons:

- The SPCC emission factor was derived specifically from monitoring downwind of mining activities (that is, haulage) in the Hunter Valley. It represents the contribution from both wheel generated particulates and the exhaust particulates.
- The SPCC emission factor has been used extensively in air quality impact assessments including for coal mining projects in the Hunter Valley since the mid-80's until present, and with successful outcomes in terms of mining operations which can demonstrate actual impacts within their originally predicted impacts.
- The US EPA AP-42 emission factor equation for wheel-generated dust is sensitive to the prescribed road silt content. The silt content has, at least in recent times, been derived by limited spot samples. In some cases the silt content may have been measured several times over the course of a year, but in most cases only one or two samples per year are available. This low resolution is insufficient to resolve actual variations in silt content on mine haul roads. For example, the silt content can change daily depending on the

environmental conditions, such as recent rainfall, or due to the application of gravel and subsequent compaction. The SPCC emission factor was originally developed to derive a long term, annual average estimate of emissions per kilometre travelled which accounts for long term variations in the silt content.

- According to ACARP Project C22027, the use of the US EPA AP-42 PM_{10} emission factor equation or defaults in NPI are "considered to be unrepresentative and are therefore not supported".

A sensitivity test for the haul road emission factor has been completed, based on calculations using with the SPCC or US EPA AP-42 equation approaches. The table below summarises the differences for the 2026 emissions inventory (i.e. the year with anticipated highest emissions of all years assessed).

Table 2 Comparison of total PM_{10} emissions based on SPCC or US EPA approaches

BCC with Modification 3	Estimated annual emissions in 2026 (kg/y)		
	TSP	PM_{10}	$PM_{2.5}$
Total site emission with haul road emission factor as per SPCC factor	7,968,717	2,643,899	435,061
Total site emission with haul road emission factor as per US EPA AP-42 equation	8,822,693	2,688,692	371,723
Difference as a percentage (%)	11% higher	2% higher	15% lower

The calculations using the US EPA AP-42 equation above assumed an average 4% silt content (i.e. from ACARP C22027). The comparisons show that use of the US EPA AP-42 equation would lead to approximately 11% higher emissions for TSP, 2% higher emissions for PM_{10} and 15% lower emissions for $PM_{2.5}$. These differences have been evaluated and the conclusions of the AQIA would not change if the US EPA AP-42 equation approach were to be adopted.

It is also useful to refer to the outcomes of the model performance evaluations, which were based on the use of the SPCC emission factor. These evaluations showed that:

- Predicted PM_{10} concentrations were between 3 $\mu g/m^3$ lower to 6 $\mu g/m^3$ higher than measured PM_{10} concentrations (Figure 23)
- Predicted TSP concentrations were higher than measured TSP concentrations (Figure 31)
- Predicted dust deposition was higher than measured dust deposition (Figure 34)

These outcomes show that the adopted methodology, including the emission estimation approach, has generally led to over-estimation of air quality levels.

Note: Cumulative impact figures (19, 25, 28, 30, 33, 36) only have impact assessment criteria contour line which limits the EPA's ability to assess cumulative particulate impacts

Contour plots with additional isopleths are provided in **Appendix A** for the nominated figures.

2. Submission from Muswellbrook Shire Council

7.0 While the cumulative air pollution analysis assesses total concentration of air pollutants from the two MODS, being background pollutants plus project-specific contribution, the area of analysis is limited to the surroundings of the mine. The surrounding region has a total of ten coal mines, ash dams and coal-fired power stations.

The air quality impact assessment (Jacobs 2019) has followed the EPA's "Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales" (EPA, 2016), which specifies how assessments based on the use of air dispersion models should be undertaken. The "Approved Methods" include guidelines for the preparation of meteorological data, reporting requirements and assessment criteria to assess the significance of dispersion model predictions.

The EPA approved CALPUFF computer-based air dispersion model was used to predict ground-level particulate matter concentrations and deposition levels due to the identified emission sources, and the model predictions have been compared with relevant air quality criteria, taking into account existing air quality conditions. The existing air quality conditions have been characterised by a review of air quality monitoring data within a 20 km by 20 km region and these data will include, to some extent, contributions from more distant sources such as other motor vehicles, agricultural activities, mining operations, ash dams, power stations and other sources.

8.0 Air quality issues in the early morning hours are very visible at any time of the year. Council is informed that this occurs as a result of a strong inversion that forms over the Muswellbrook and Singleton LGAs trapping dust and other pollutants.

A review of the existing air quality and meteorological environment was carried out as part of the air quality impact assessment (Section 5 of Jacobs 2019). Monitoring data were analysed for trends by season, time of day and by wind conditions. One of the observations from this review was that, on average, the PM_{10} concentrations are typically highest in the morning (around 9 am) and evening (around 8 pm). This pattern can be explained by poorer dispersion conditions in the morning and evening whereby any dust emissions disperse more slowly and allow higher concentrations to exist for extended periods of time. Also, the higher average concentrations in the morning and evening will likely be associated with increased anthropogenic (human) activity at these times, for example the use of wood heaters. These observations are consistent with those mentioned by Muswellbrook Shire Council. The dispersion models take account of all key meteorological parameters that influence dispersion including the presence of temperature inversions.

9.0 Given this naturally occurring phenomenon is well known, it is Council's view that the 24 hour averaging period for air pollution monitoring has the unintended consequence of obscuring issues of elevated dust levels in the early morning hours, and that a 12 hour average would be better. Council acknowledges there may be insufficient empirical evidence as to the effect on human health of exposure to elevated levels of dust at night. In light of this, Council requests that the State Government commission a study into the effects to human health of exposure to night-time dust levels in the Upper Hunter. This research is essential to improving the understanding of the consequences to human health, particularly respiratory and cardiovascular health, of exposure to night-time dust levels generated by mining.

Noted. The air quality impact assessment (Jacobs 2019) has necessarily followed the requirements of the State Government including assessment against prescribed criteria. The National and State Government air quality standards and criteria for particulate matter are currently set for 24-hour and annual average periods.

3. Submission from Anonymous, Concord NSW

We are seeing frequent air quality alerts in areas with open cut coal mines, including Bulga. As recently as yesterday (30th October) we saw 6 air quality alerts overnight all in the Singleton LGA for PM10 levels exceeding national standards at Bulga, Jerry Plains, Camberwell, Singleton, Mt Thorley & Singleton NW.

A deterioration in air quality conditions in recent years is not unique to the Hunter Valley. The Department of Planning, Industry and Environment (DPIE) has a network of air quality monitors across NSW and data from this network can be used to identify air quality trends.

Figure 8 shows the rolling annual average PM_{10} concentrations from data collected at various rural and urban air quality monitoring sites since 2011. These data clearly show an increase in PM_{10} concentrations at rural and urban locations from 2017 onwards, reflecting the onset of drought conditions and increased areas of exposed land across many parts of NSW.

In their "Annual Air Quality Statement 2018" the DPIE concluded that particle levels increased across the State due to dust from the widespread, intense drought and smoke from bushfires and hazard reduction burning (OEH 2019). Air quality conditions in the Hunter Valley have been influenced by these drought conditions, and the air quality alerts reflect the number of monitors that are present and configured to issue alerts for the Hunter Valley.

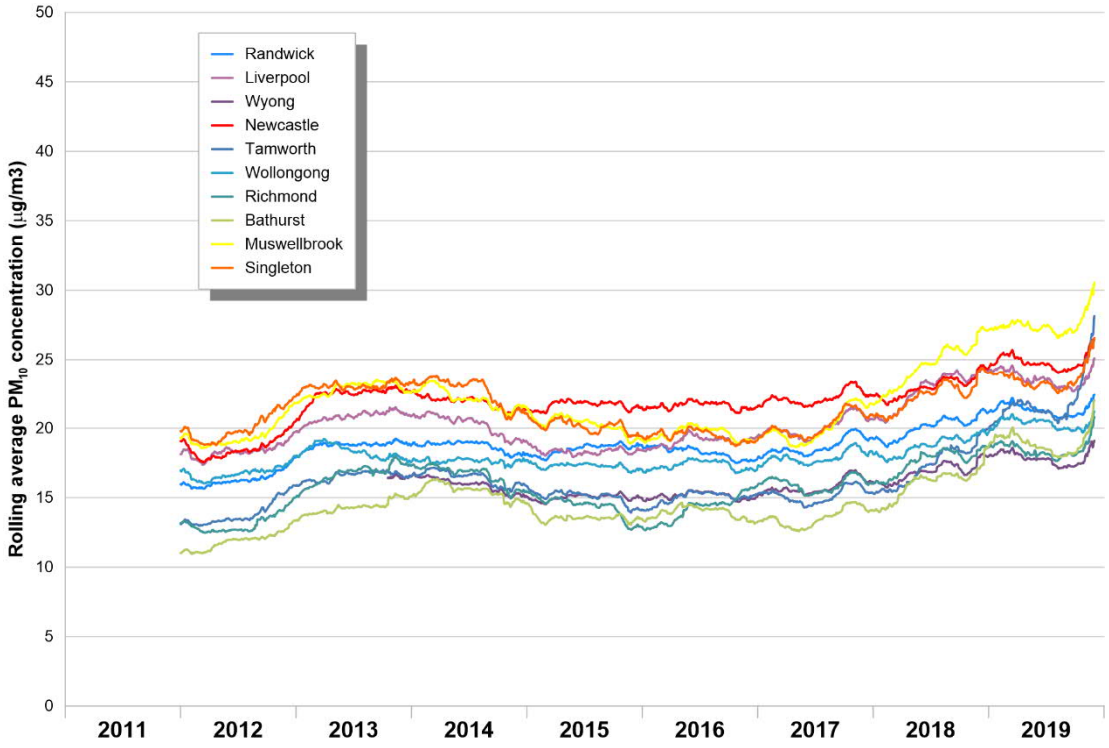


Figure 8 Annul average PM_{10} concentrations at various NSW air quality monitoring sites

Without even considering what impact the burning of coal mined from Bulga and other mines in the area will have on the environment both here and abroad, we must also consider the localised air quality impact this mine is having on Bulga and the Singleton LGA

The air quality impact assessment (Jacobs 2019) has followed the EPA's "Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales" (EPA, 2016), which specifies how assessments based on the use of air dispersion models should be undertaken. The "Approved Methods" include guidelines for the preparation of meteorological data, reporting requirements and assessment criteria to assess the significance of dispersion model predictions. This process and assessment methodology is designed to consider the potential impacts on local air quality including nearest sensitive receptors.

4. References

EPA (2016) “Approved Methods for the Modelling and Assessment of Air Pollutants in NSW”. NSW Environment Protection Authority.

Jacobs (2019) “Bulga Coal Complex Modification 3 – Air Quality Impact Assessment”. Final, Revision 1. Prepared for Bulga Coal Management Pty Ltd by Jacobs Group (Australia) Pty Ltd. Report dated 9 September 2019.

OEH (2019) “Annual Air Quality Statement 2018”.

PEL (2013) “Bulga Optimisation Project Revised Project – Air Impact Assessment”. Prepared by Pacific Environment Limited. Report dated 23 August 2013.

SPCC (1983) “Air Pollution from Coal Mining and Related Developments”.

US EPA (1985 and updates) “Compilation of Air Pollutant Emission Factors”, AP-42, Fourth Edition United States Environmental Protection Agency, Office of Air and Radiation Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711. Now a web-based document.

Appendix A Contour plots with additional isopleths

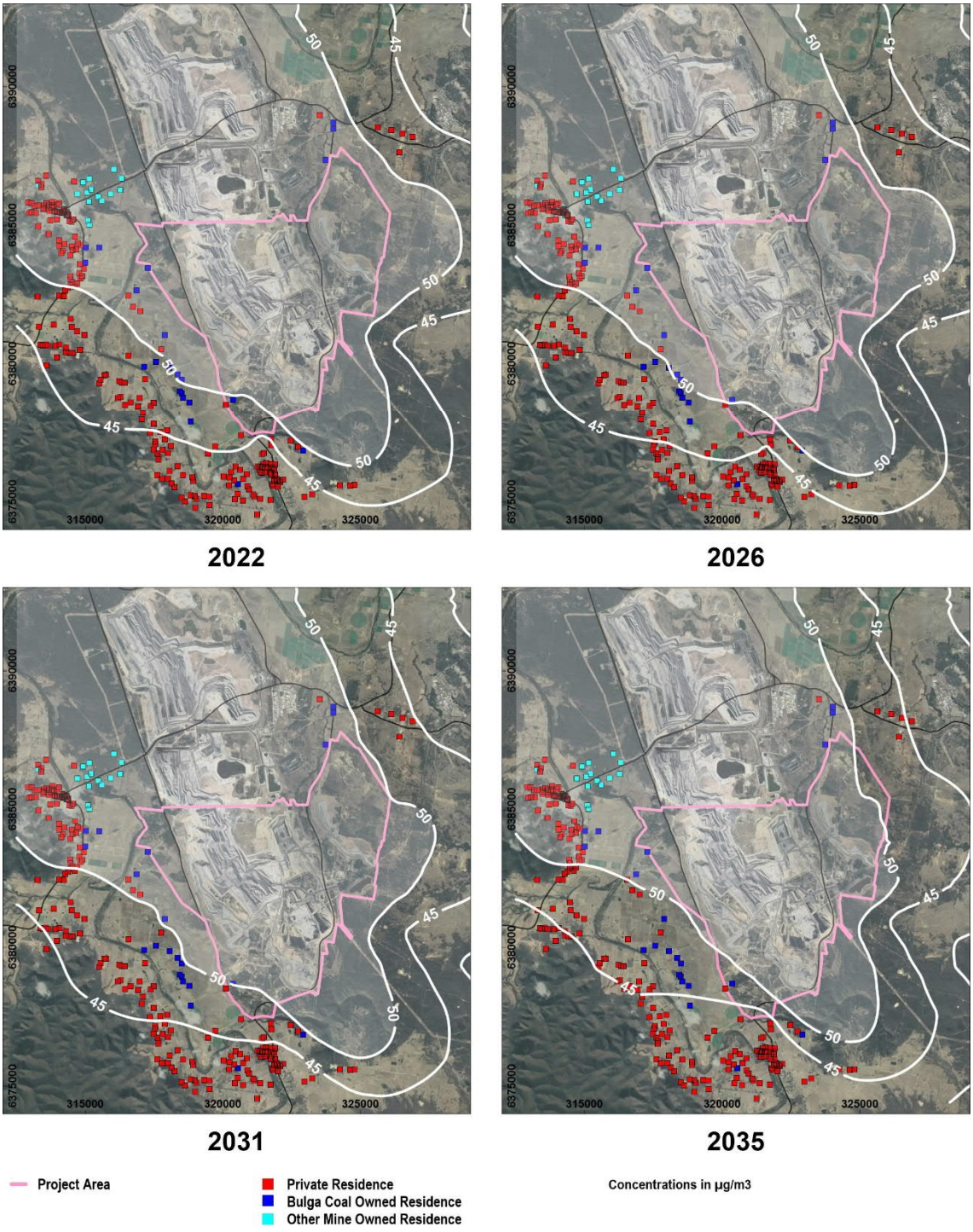


Figure A1 Predicted maximum 24-hour average PM_{10} concentrations due all sources (cumulative)

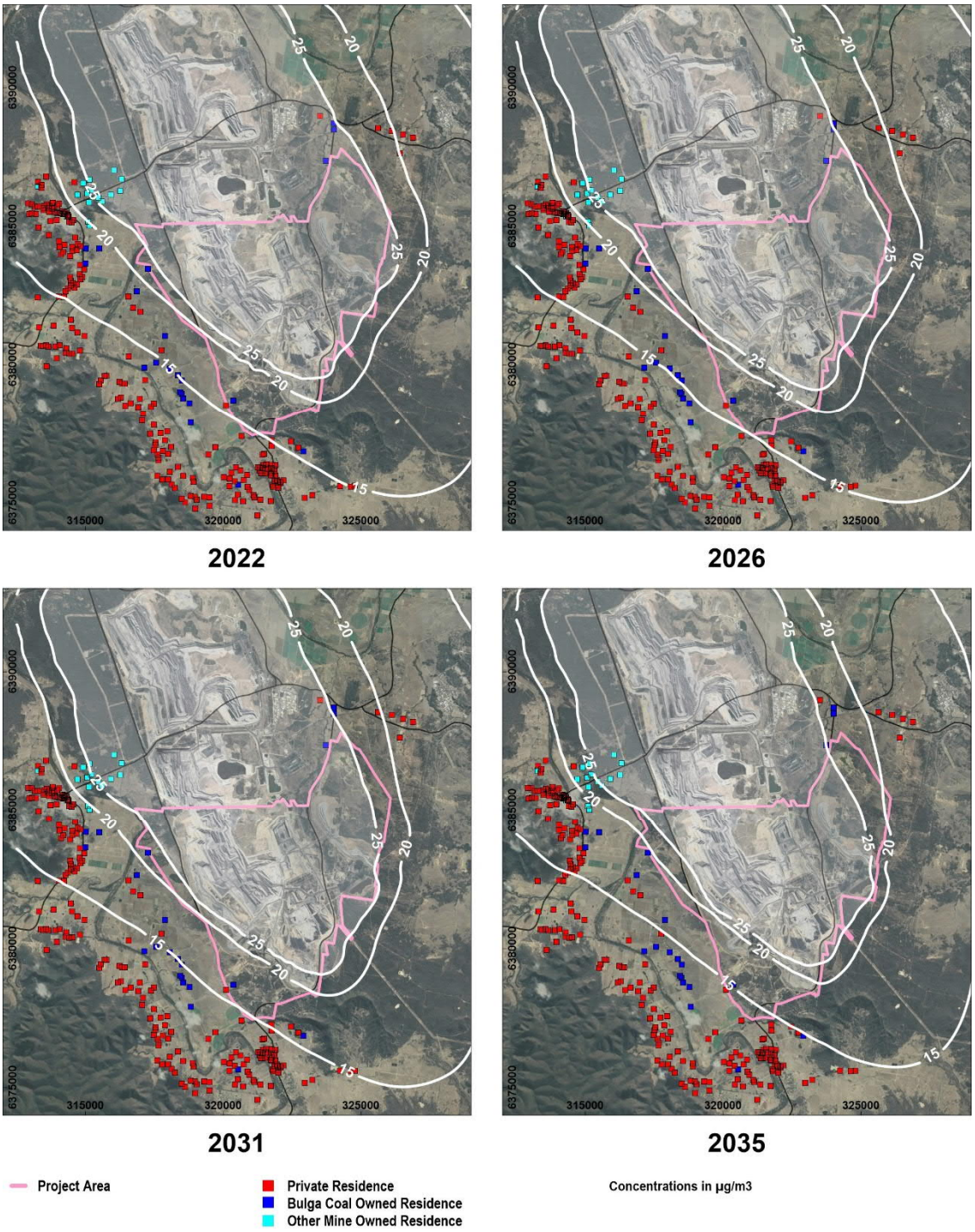


Figure A2 Predicted annual average PM_{10} concentrations due to all sources (cumulative)

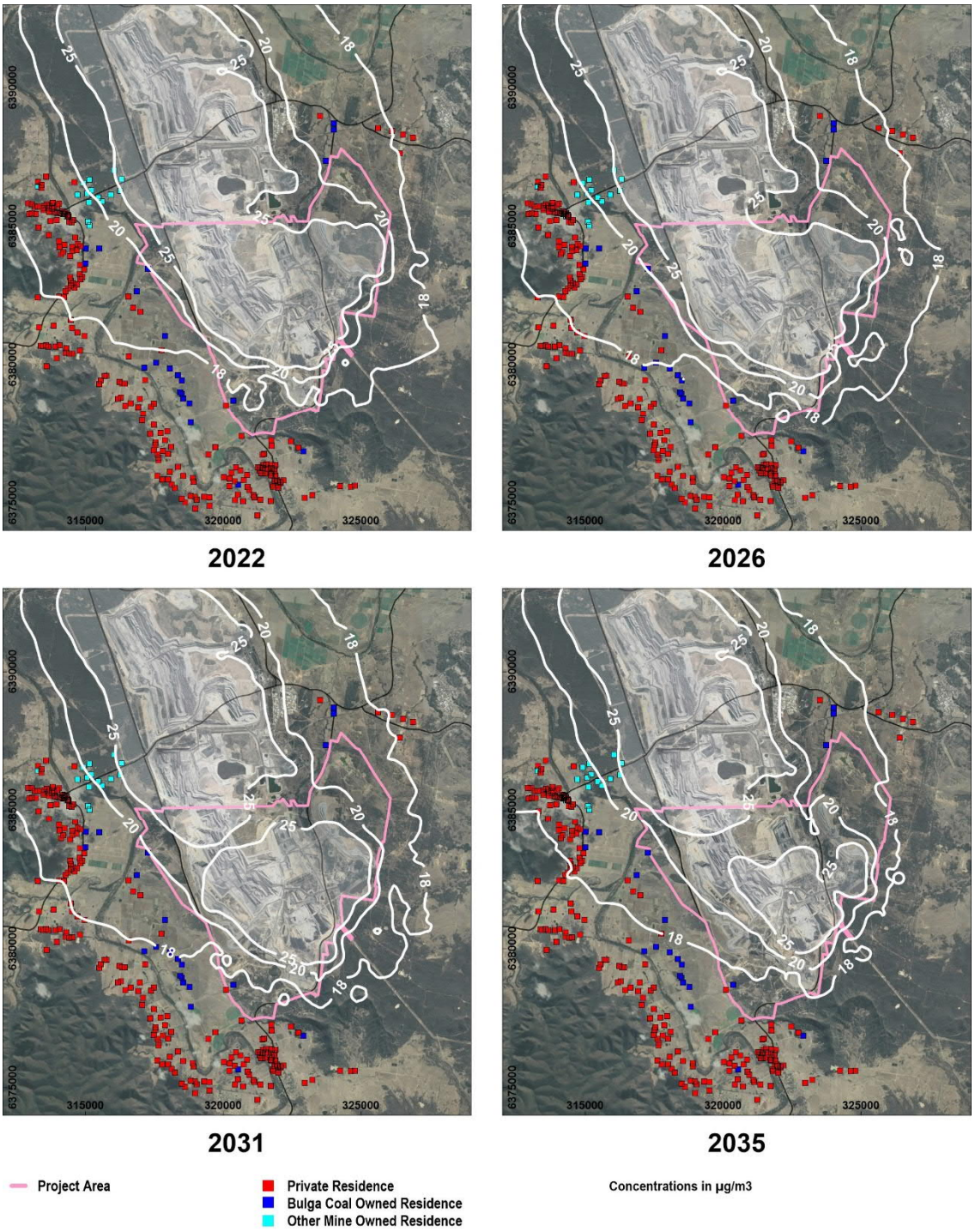


Figure A3 Predicted maximum 24-hour average $PM_{2.5}$ concentrations due to all sources (cumulative)

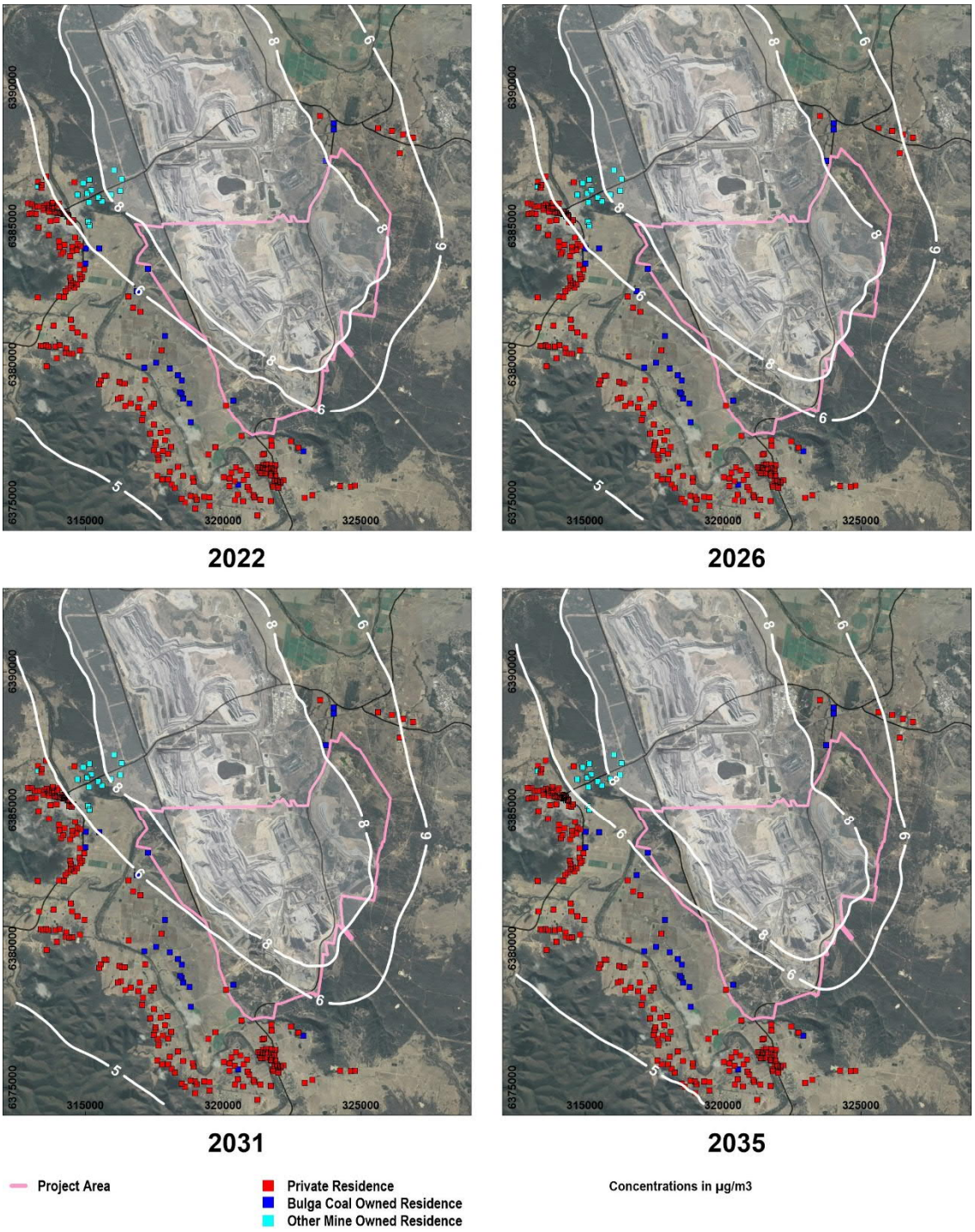


Figure A4 Predicted annual average $PM_{2.5}$ concentrations due to all sources (cumulative)

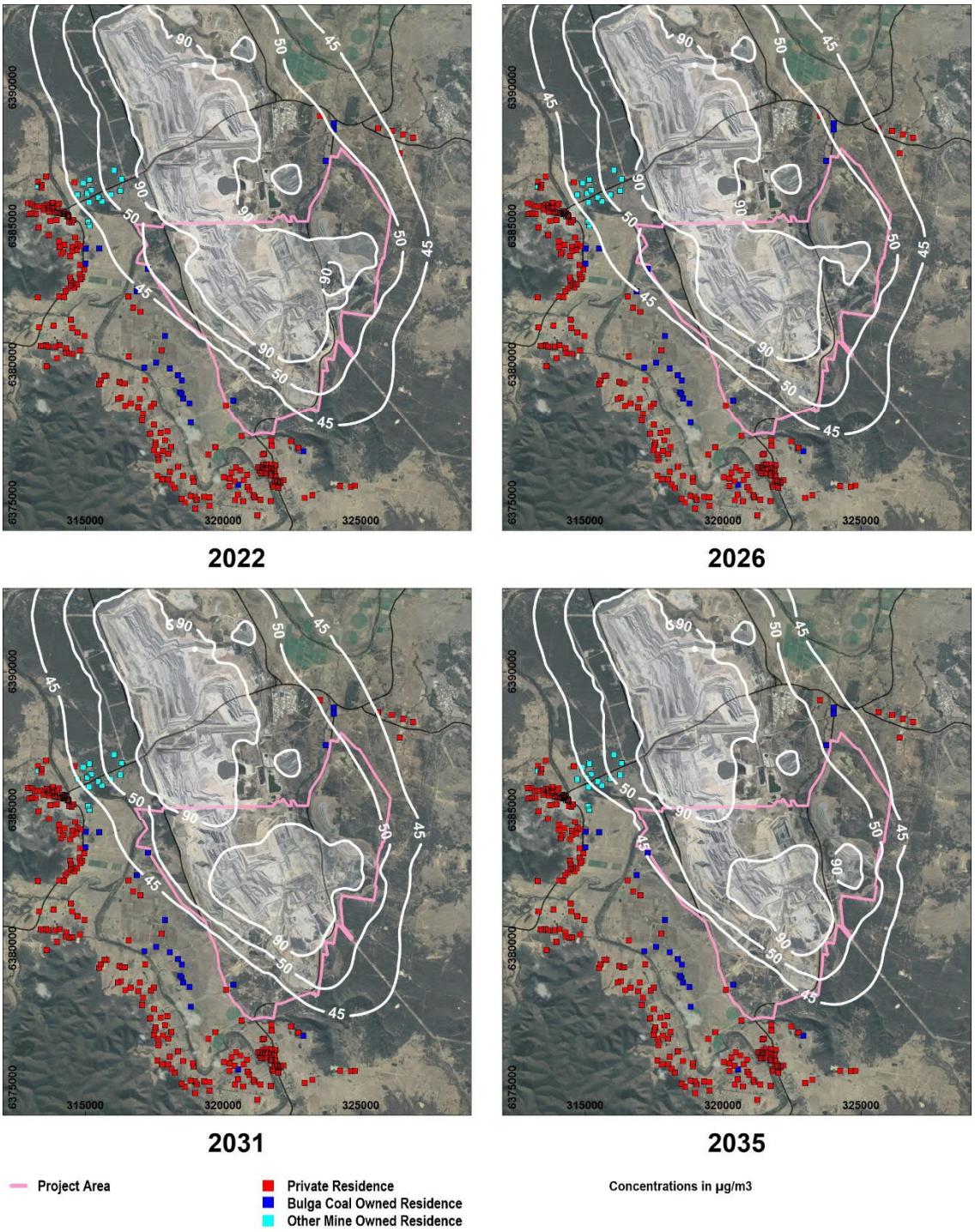


Figure A5 Predicted annual average TSP concentrations due to all sources (cumulative)

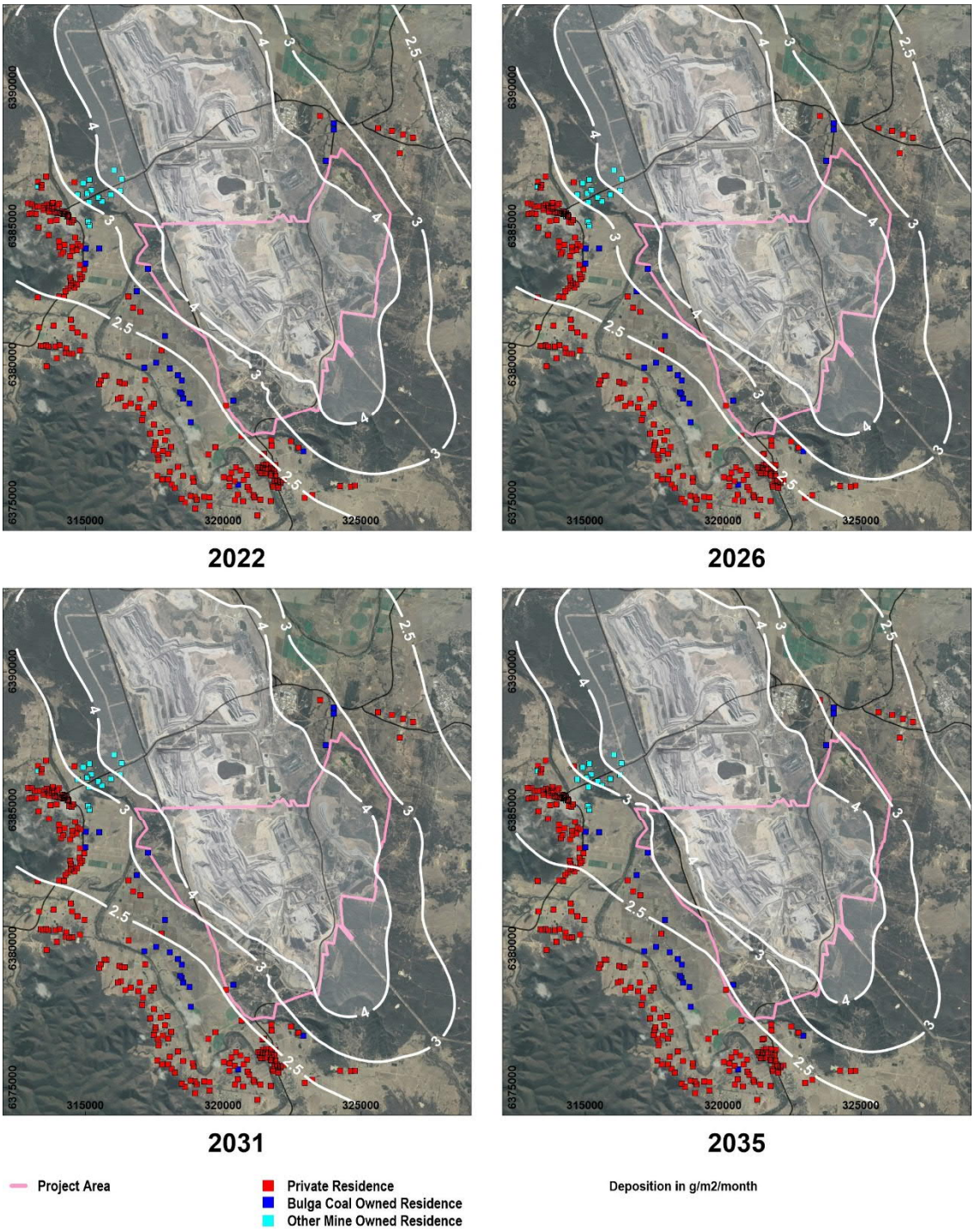
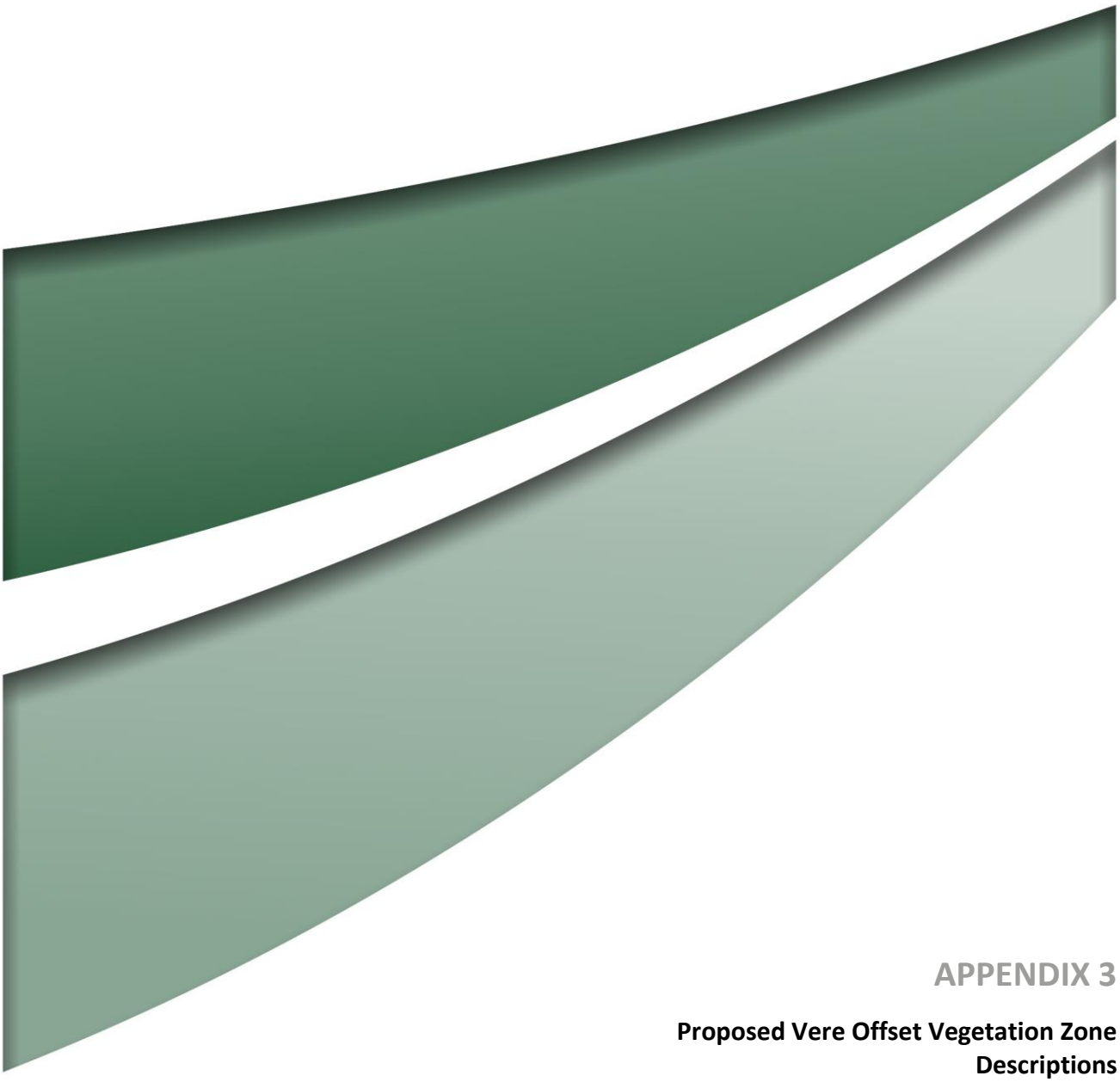


Figure A6 Predicted annual average deposited dust levels due to all sources (cumulative)



APPENDIX 3

Proposed Vere Offset Vegetation Zone Descriptions

Zone 1 – PCT1601/HU815 Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter – Moderate to Good

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
Condition	Moderate to Good
PCT/BVT Number	PCT1601/HU815
Area (ha)	91.6
Plots/Transects	7 (Q02, Q03, Q04, Q17, Q18, Q23 and Q24).
General Description	Occurs across the majority of the Offset Site.
Canopy Description	The sparse to mid-dense canopy was dominated by spotted gum (*Corymbia maculata*), narrow-leaved ironbark (*Eucalyptus crebra*) and grey box (*Eucalyptus moluccana*), with occasional occurrences, and sometimes dominance, of red ironbark (*Eucalyptus fibrosa*) and grey gum (*Eucalyptus punctata*). The height of the canopy ranged from 10-20 metres.
Mid-storey Description	A sparse mid-storey was occasionally present with dominant species being bull oak (*Allocasuarina luehmannii*) and kurrajong (*Brachychiton populneus* subsp. *populneus*). The mid-storey ranged from 2 to 8 metres in height.
Shrub Layer Description	The shrub layer ranged from sparse to dense. Species present included blackthorn (*Bursaria spinosa*), white sour bush (*Choretrum candollei*), peach heath (*Lissanthe strigosa*), coffee bush (*Breynia oblongifolia*), sticky hop-bush (*Dodonaea viscosa*), sticky daisy-bush (*Olearia elliptica*), hickory wattle (*Acacia implexa*), fan wattle (*Acacia amblygona*), *Grevillea montana* and bead bush (*Teucrium junceum*). The shrub layer generally ranged from 0.5 to 2.5 metres in height.
Ground Cover Description	This vegetation zone was characterised by a sparse to mid-dense ground layer generally less than 0.5 metres in height. Common herbs and sub-shrubs included many-flowered mat-rush (*Lomandra multiflora* subsp. *multiflora*), wattle mat-rush (*Lomandra filiformis* subsp. *filiformis*), variable saw-sedge (*Gahnia aspera*), blue trumpet flower (*Brunoniella australis*), G*lycine tabacina,* poison rock fern (*Cheilanthes sieberi* subsp. *sieberi*), trailing speedwell (*Veronica plebeia*), whiteroot *(Lobelia purpurascens*) and kidney weed (*Dichondra repens*). Native grasses included barbed wire grass (*Cymbopogon refractus*), threeawn speargrass (*Aristida vagans*), purple wiregrass (*Aristida ramosa*), speargrass (*Austrostipa scabra*), hairy panic (*Panicum effusum*) and weeping grass (*Microlaena stipoides* var. *stipoides*).
Introduced Species	Introduced species were relatively sparse in this zone, with occasional occurrences of fireweed (*Senecio madagascariensis*), lantana (*Lantana camara*) and cobblers pegs (*Bidens pilosa*) present.
PCT Allocation	Vegetation Zone 1 is aligned with PCT1601 as it supports a high proportion of the characteristic species listed in the PCT description according to the VIS Classification Database (OEH 2019). Of the 17 flora species listed in the database as characteristic for PCT1601, Vegetation Zone 1 supports 16 of them (94 per cent).

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
	This vegetation zone also displays high similarity to PCT1604 as it supports 93 per cent of the characteristic species. The main difference between these two PCTs is their vegetation formation and vegetation class. PCT1601 is categorised as a 'Dry Sclerophyll Forest (Shrub/grass sub-formation)' and PCT1604 is categorised as a 'Grassy Woodland'. As the shrub layer is generally present throughout this vegetation zone and is often relatively dense, PCT1601 was selected as the most appropriate allocation.
BC Act Status	This vegetation zone is consistent with the *Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions* EEC listed under the BC Act.
EPBC Act Status	Vegetation Zone 1 is consistent with the *Central Hunter Valley Eucalypt Forest and Woodland* CEEC listed under the EPBC Act, except where red ironbark (*Eucalyptus fibrosa*), a contraindicative species, is present.

Zone 2 – PCT1601/HU815 Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter – Moderate to Good shrubland

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
Condition	Moderate to Good shrubland
PCT/BVT Number	PCT1601/HU815
Area (ha)	6.3
Plots/Transects	3 (Q09, Q013 and Q26)
	
General Description	Occurs in the north and north-eastern portion of the site where previous disturbance has occurred.
Canopy Description	The canopy of this zone was dominated by regenerating shrub and tree species. The dominant species included hickory wattle (*Acacia falcata*), silver- stemmed wattle (*Acacia parvipinnula*) and hickory wattle (*Acacia implexa*). Regenerating grey box (*Eucalyptus moluccana*) were also occasionally present. The canopy ranged from 4-10 metres in height.
Mid-storey Description	Due to the low height of the canopy, a mid-storey stratum was largely absent except for occurrences of blackthorn (*Bursaria spinosa*).
Shrub Layer Description	The shrub layer was generally sparse and largely featured regenerating individuals of the abovementioned canopy layer. Other species present included peach heath (*Lissanthe strigosa*), small-leaf bluebush (*Maireana microphylla*), coffee bush (*Breynia oblongifolia*), sticky hop-bush (*Dodonaea viscosa*) and bead bush (*Teucrium junceum*). The shrub layer generally ranged from 0.5 to 1 metre in height.
Ground Cover Description	This vegetation zone was characterised by a sparse to mid-dense ground layer generally less than 0.5 metres in height. Common herbs and sub-shrubs include wattle mat-rush (*Lomandra filiformis* subsp. *filiformis*), many-flowered mat-rush (*Lomandra multiflora* subsp. *multiflora*), rough saw-sedge (*Gahnia aspera*), poison rock fern (*Cheilanthes sieberi* subsp. *sieberi*) and bristly cloak fern (*Cheilanthes distans*). Native grasses included barbed wire grass (*Cymbopogon refractus*), red grass (*Bothriochloa macra*), purple wiregrass (*Aristida ramosa*), tall chloris (*Chloris ventricosa*), browns lovegrass (*Eragrostis brownii*) and weeping grass (*Microlaena stipoides* var. *stipoides*).
Introduced Species	Introduced species were present and relatively common in this vegetation zone and included fireweed (*Senecio madagascariensis*), blue heliotrope (*Heliotropium amplexicaule*), paddys lucerne (*Sida rhombifolia*), galenia (*Galenia pubescens*), scarlet pimpernel (*Lysimachia arvensis*) and veined verbena (*Verbena rigida*).
PCT Allocation	Vegetation Zone 2 has been attributed to PCT1601 as it supports a reasonable proportion of the characteristic species listed in the PCT description according to the VIS Classification Database and it is located adjoining, or in proximity, to remnant woodland patches of Zone 1 - PCT1601. The vegetation in Zone 2 contains 10 of the 17 species (59 per cent) listed as diagnostic for this PCT (OEH 2019b).
BC Act Status	This vegetation zone is not yet structurally consistent with the *Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin*

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
	Bioregions EEC listed under the BC Act and therefore does not currently comprise the EEC, though it is anticipated that this zone will regenerate to be consistent with this EEC.
EPBC Act Status	Shrublands are not holistically included in the *Central Hunter Valley Eucalypt Forest and Woodland* CEEC listed under the EPBC Act, however some areas of this vegetation zone situated in gaps or between remnants of the CEEC are considered to form part of the CEEC 'patch' (DoEE 2016). In these instances, the area of Vegetation Zone 2 is mapped as the CEEC.

Zone 3 – PCT1601/HU815 Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter – Moderate to Good derived native grassland

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
Condition	Moderate to Good derived native grassland
PCT/BVT Number	PCT1601/HU815
Area (ha)	28.2
Plots/Transects	4 (Q11, Q14, Q22 and Q25).
General Description	Occurs scattered throughout the site.
Canopy Description	A canopy layer was typically absent from this vegetation zone, however scattered eucalypts occur.
Mid-storey Description	A canopy layer was typically absent from this vegetation zone, however scattered trees, such as hickory wattle (*Acacia implexa*) were occasionally present.
Shrub Layer Description	The shrub layer was very sparse, with occasional occurrences of *Acacia falcata* and small-leaf bluebush (*Maireana microphylla*). The shrub layer was generally 0.5 to 2 metres in height.
Ground Cover Description	This vegetation zone was dominated by purple wiregrass (*Aristida ramosa*), barbed wire grass (*Cymbopogon refractus*), red grass (*Bothriochloa macra*), couch grass (*Cynodon dactylon*), windmill grass (*Chloris ventricosa*), hairy panic (*Panicum effusum*), kidney weed (*Dichondra repens*), ruby saltbush (*Enchylaena tomentosa*), wattle mat-rush (*Lomandra filiformis*), poison rock fern (*Cheilanthes sieberi* subsp. *sieberi*) and native geranium (*Geranium solanderi*).
Introduced Species	Introduced species were present in this zone and included fireweed (*Senecio madagascariensis*), prickly pear (*Opuntia stricta*), galenia (*Galenia pubescens*), scarlet pimpernel (*Lysimachia arvensis*), catsear (*Hypochaeris radicata*), lambs tongues (*Plantago lanceolata*), veined verbena (*Verbena rigida*) and spear thistle (*Cirsium vulgare*).
PCT Allocation	Vegetation Zone 3 has been attributed to PCT1601 as it supports a reasonable proportion of the characteristic species listed in the PCT description according to the VIS Classification Database and it is located adjoining, or in proximity to, remnant woodland patches of Zone 1 - PCT1601. Of the 10 flora species listed in the VIS Classification Database as characteristic for the ground layer of PCT1601, Vegetation Zone 3 supports 5 of them (50 per cent) (OEH 2019b).
BC Act Status	This vegetation zone is not yet structurally consistent with the *Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions* EEC listed under the BC Act and therefore does not currently comprise the EEC, though it is anticipated that this zone will regenerate to be consistent with this EEC.
EPBC Act Status	Derived native grasslands are not holistically included in the *Central Hunter Valley Eucalypt Forest and Woodland* CEEC listed under the EPBC Act, however some areas of this

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
	vegetation zone situated in gaps or between remnants of the CEEC are considered to form part of the CEEC 'patch' (DoEE 2016). In these instances, the area of Vegetation Zone 3 is mapped as the CEEC.

Zone 4 – PCT1601/HU815 Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter – Moderate to Good previous ground disturbance

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
Condition	Moderate to Good previous ground disturbance
PCT/BVT Number	PCT1601/HU815
Area (ha)	8.4
Plots/Transects	3 (Q12, Q16 and Q21).
	
General Description	Occurs in a previously disturbed area in the south east of the site.
Canopy Description	The canopy in this zone consisted of sugar gum (*Eucalyptus cladocalyx*) (not native to NSW), spotted gum (*Corymbia maculata*), grey box (*Eucalyptus moluccana*) and narrow-leaved ironbark (*Eucalyptus crebra*). In areas where eucalypts were sparse, the canopy layer was either absent or hickory wattle (*Acacia implexa*) formed the dominant canopy. The canopy layer ranges from 7-14 metres.
Mid-storey Description	The mid-storey was sparse and largely consisted of regenerating eucalypts present in the canopy. The height of the mid-storey layer ranged from 3-9 metres.
Shrub Layer Description	The shrub layer was sparse and contained sticky daisy- bush (*Olearia elliptica*), sticky hop-bush (*Dodonaea viscosa*), white sour bush (*Choretrum candollei*), sickle wattle (*Acacia falcata*), western silver wattle (*Acacia decora*), silver-stemmed wattle (*Acacia parvipinnula*) and fan wattle (*Acacia amblygona*). The shrub layer generally ranged from 0.5-1.5 metres in height.
Ground Cover Description	The ground cover of this vegetation zone was dominated by purple wiregrass (*Aristida ramosa*), threeawn speargrass (*Aristida vagans*), barbed wire grass (*Cymbopogon refractus*), red grass (*Bothriochloa macra*), browns lovegrass (*Eragrostis brownii*), rough saw-sedge (*Gahnia aspera*), poison rock fern (*Cheilanthes sieberi* subsp. *sieberi*), kidney weed (*Dichondra repens*), fuzzweed (*Vittadinia muelleri*), whiteroot (*Lobelia purpurascens*) and large tick-trefoil (*Desmodium brachypodum*).
Introduced Species	Introduced species were present in this zone in moderate abundance and included fireweed (*Senecio madagascariensis*), lantana (*Lantana camara*), bitou bush (*Chrysanthemoides monolifera*), narrow-leaved cotton-bush (*Gomphocarpus fruticosus*) and dandelion (*Taraxacum officinale*).
PCT Allocation	Vegetation Zone 4 has been allocated to PCT1601 as it is surrounded on all sides by remnant woodland patches of Zone 1 - PCT1601 and it is therefore likely that this area would have comprised PCT1601 prior to disturbance. It also contains a reasonable proportion of the characteristic species listed in the PCT description according to the VIS Classification Database (OEH 2019b). Of the 17 flora species listed in the VIS Classification Database as characteristic of PCT1601, Vegetation Zone 4 supports 11 of them (65 per cent).

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
BC Act Status	This vegetation zone is not consistent with the *Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions* EEC listed under the BC Act, due to structural and floristic dissimilarity caused by previous vegetation clearing and ground disturbance.
EPBC Act Status	This vegetation zone is not consistent with any listed TEC under the EPBC Act.

Zone 5 – PCT1692/HU906 Bull Oak grassy woodland of the Central Hunter Valley – Moderate to Good

PCT Name	Bull Oak grassy woodland of the Central Hunter Valley	
Condition	Moderate to Good	
PCT/BVT Number	PCT1692/HU906	
Area (ha)	7.0	
Plots/Transects	3 (Q07, Q08 and Q19)	
General Description	Occurs in two patches in the centre of the site.	
Canopy Description	The canopy of this zone is dominated by bull oak (*Allocasuarina luehmannii*) with occurrences of narrow-leaved ironbark (*Eucalyptus crebra*). The canopy layer ranged from 7 – 12 metres.	
Mid-storey Description	The mid-storey is sparse and consists largely of regenerating bull oak (*Allocasuarina luehmannii*) and very occasional occurrences of *Melaleuca decora* and prickly- leaved paperbark (*Melaleuca nodosa*). The mid-storey layer ranged from 2 – 7 metres.	
Shrub Layer Description	The shrub layer was generally sparse, with peach heath (*Lissanthe strigosa*), white sour bush (*Choretrum candollei*), hickory wattle (*Acacia implexa*), fan wattle (*Acacia amblygona*), *Grevillea montana, Daviesia ulicifolia* and native blackthorn (*Bursaria spinosa*) the most commonly occurring. The shrub layer ranged from 0.5 - 2 metres.	
Ground Cover Description	This vegetation zone was dominated by purple wiregrass (*Aristida ramosa*), threeawn speargrass (*Aristida vagans*), wattle mat- rush (*Lomandra filiformis*), pale mat-rush (*Lomandra glauca*), many-flowered mat-rush (*Lomandra multiflora* subsp. *multiflora*), barbed wire grass (*Cymbopogon refractus*), poison rock fern (*Cheilanthes sieberi* subsp. *sieberi*), blueberry lily (*Dianella revoluta*) and slender wire lily (*Laxmannia gracilis*).	
Introduced Species	Introduced species were sparse in this zone and included fireweed (*Senecio madagascariensis*) and prickly pear (*Opuntia stricta*).	
PCT Allocation	Vegetation Zone 5 is aligned with PCT1692 as it dominated by bull oak (*Allocasuarina luehmannii*) and supports a reasonable proportion of the characteristic species listed in the PCT description according to the VIS Classification Database (OEH 2019b). Of the 9 flora species listed in the database as characteristic for the ground layer of PCT1692, Vegetation Zone 5 supports 6 of them (67 per cent).	
BC Act Status	This vegetation zone is not consistent with any listed TEC under the BC Act.	
EPBC Act Status	A large proportion of this vegetation zone contains sufficient numbers of characteristic eucalypts to be considered as part of the *Central Hunter Valley Eucalypt Forest and Woodland* CEEC listed under the EPBC Act, based on advice received from OEH on identifying the CEEC in bull oak-dominated vegetation (OEH 2017).	

Zone 6 – PCT1598/HU812 Forest Red Gum Grassy Open Forest on the Floodplains of the Lower Hunter

PCT Name	Forest Red Gum Grassy Open Forest on the Floodplains of the Lower Hunter
Condition	Moderate to Good
PCT/BVT Number	PCT1598/HU812
Area (ha)	0.8
Plots/Transects	1 (Q20)
General Description	Occurs in a broad drainage line adjacent to the eastern boundary of the site.
Canopy Description	The mid-dense canopy was between 14 and 20 metres in height and was dominated by forest red gum (*Eucalyptus tereticornis*).
Mid-storey Description	A mid-storey was generally absent from this vegetation zone.
Shrub Layer Description	The sparse shrub layer was dominated by white sour bush (*Choretrum candollei*), native blackthorn (*Bursaria spinosa* subsp. *spinosa*), coffee bush (*Breynia oblongifolia*), large mock-olive (*Notelaea longifolia*) and sticky daisy-bush (*Olearia elliptica*). The shrub layer was 0.5 to 4 metres in height.
Ground Cover Description	The ground cover was sparse to moderately dense and dominated by purple wiregrass (*Aristida ramosa*), barbed-wire grass (*Cymbopogon refractus*), rough saw-sedge (*Gahnia aspera*), red grass (*Bothriochloa macra*), bristly cloak fern (*Cheilanthes distans*), kidney weed (*Dichondra repens*) and Indian weed (*Sigesbeckia orientalis* subsp. *orientalis*).
Introduced Species	Introduced species were present in this zone in moderate abundance and included cobbers pegs (*Bidens pilosa*), narrow-leaved cotton bush (*Gomphocarpus fruticosus*), lantana (*Lantana camara*) and paddys lucerne (*Sida rhombifolia*).
PCT Allocation	Vegetation Zone 6 occupies a small area within the site and is ecotonal in nature. Consequently, it contains species which commonly occur in the adjoining vegetation zone, being PCT1601, and it also has a strong similarity to PCT1603 and PCT1604. This vegetation zone has been allocated to PCT1598 due to the dominance of forest red gum (*Eucalyptus tereticornis*) in the canopy and the presence of a reasonable number of characteristic species according to the VIS Classification Database (OEH 2019). Of the 15 flora species listed on the database as characteristic for PCT1598, Vegetation Zone 6 supports 5 of them (33 per cent).
BC Act Status	This vegetation zone is consistent with *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions* EEC listed under the BC Act.
EPBC Act Status	This vegetation zone is not consistent with any listed TEC under the EPBC Act.

Zone 7 – PCT922/HU564 *Melaleuca decora* Low Forest of the Central Hunter Valley, Sydney Basin Bioregion

PCT Name	*Melaleuca decora* Low Forest of the Central Hunter Valley, Sydney Basin Bioregion	
Condition	Moderate to Good	
PCT/BVT Number	PCT922/HU564	
Area (ha)	1.5	
Plots/Transects	1 (Q10)	
General Description	Occurs in two patches in the north-east of the site.	
Canopy Description	The mid-dense to dense canopy was between 6 and 14 metres in height and was dominated by *Melaleuca decora*. Canopy species from the adjoining vegetation zones were often present, including grey box (*Eucalyptus moluccana*), narrow-leaved ironbark (*Eucalyptus crebra*) and bulloak (*Allocasuarina luehmannii*).	
Mid-storey Description	A very sparse to sparse mid-storey was occasionally present and dominated by hickory wattle (*Acacia implexa*) and regenerating eucalypts.	
Shrub Layer Description	The sparse shrub layer, up to 3 metres in height, was dominated by white sour bush (*Choretrum candollei*), *Grevillea montana*, native blackthorn (*Bursaria spinosa* subsp. *spinosa*), coffee bush (*Breynia oblongifolia*), peach heath (*Lissanthe strigosa*) and sticky hop-bush (*Dodonaea viscosa*).	
Ground Cover Description	The sparse ground cover was dominated by threeawn speargrass (*Aristida vagans*), weeping grass (*Microlaena stipoides*), rough saw-sedge (*Gahnia aspera*), wattle mat-rush (*Lomandra filiformis*), pale mat-rush (*Lomandra glauca*), poison rock fern (*Cheilanthes sieberi* subsp. *sieberi*) and slender wire lily (*Laxmannia gracilis*).	
Introduced Species	Introduced species were generally present in this zone in low abundance and included narrow-leaved cotton bush (*Gomphocarpus fruticosus*), galenia (*Galenia pubescens*), lantana (*Lantana camara*) and paddys lucerne (*Sida rhombifolia*).	
PCT Allocation	Vegetation Zone 7 was allocated to PCT922 as the canopy is dominated by *Melaleuca decora* and it supports a reasonable proportion of the characteristic species listed in the PCT description according to the VIS Classification Database (OEH 2019). Of the 14 flora species listed on the database as characteristic for PCT1601, Vegetation Zone 7 supports 6 of them (43 per cent).	
BC Act Status	This vegetation zone is not consistent with any listed TEC under the BC Act.	
EPBC Act Status	This vegetation zone is not consistent with any listed TEC under the EPBC Act.	

Zone 8 – PCT1731/HU945 Swamp Oak – Weeping Grass Grassy Riparian Forest of the Hunter Valley

PCT Name	Swamp Oak – Weeping Grass Grassy Riparian Forest of the Hunter Valley
Condition	Moderate to Good
PCT/BVT Number	PCT1731/HU945
Area (ha)	1.3
Plots/Transects	1 (Q01)
General Description	Occurs along Yellow Rock Creek located adjacent to the southern boundary of the site.
Canopy Description	The dense canopy was between 7 and 16 metres in height and was dominated exclusively by swamp oak (*Casuarina glauca*).
Mid-storey Description	A native mid-storey was generally absent from this vegetation zone.
Shrub Layer Description	The sparse and low shrub layer less than 1 metre in height was dominated by small-leaf bluebush (*Maireana microphylla*).
Ground Cover Description	The sparse ground cover was dominated by slender bamboo grass (*Austrostipa verticillata*), weeping grass (*Microlaena stipoides*), creeping saltbush (*Atriplex semibaccata*) and corrugated sida (*Sida corrugata*).
Introduced Species	Introduced species were common throughout this vegetation zone and often dominated the mid-storey and ground cover. Dominant introduced mid-storey species included *Senna pendula* subsp. *glabrata*, *Opuntia* sp. and African boxthorn (*Lycium ferocissimum*). Common introduced ground cover species included galenia (*Galenia pubescens*), panic veldtgrass (*Ehrharta erecta*) and *Pavonia hastata*.
PCT Allocation	Vegetation Zone 8 is aligned with PCT1731 as the canopy is dominated by swamp oak (*Casuarina glauca*) and it supports a reasonable proportion of the characteristic species listed in the PCT description according to the VIS Classification Database (OEH 2019b). Of the 9 flora species listed on the database as characteristic for PCT1731, Vegetation Zone 7 supports 5 of them (56 per cent).
BC Act Status	This vegetation zone is not consistent with any listed TEC under the BC Act.
EPBC Act Status	This vegetation zone is not consistent with any listed TEC under the EPBC Act.

Zone 9 – PCT1601/HU815 Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter – Low Condition Exotic Grassland

PCT Name	Spotted Gum – Narrow- leaved Ironbark – Red Ironbark shrub-grass open forest of the central and lower Hunter
Condition	Low Condition Exotic Grassland
PCT/BVT Number	PCT1601/HU815
Area (ha)	0.2
Plots/Transects	1 (Q15)
General Description	Two small areas of this vegetation zone were located in the west of the site, next to an access track.
Canopy Description	A canopy stratum was absent from this vegetation zone.
Mid-storey Description	A native mid-storey was absent from this vegetation zone.
Shrub Layer Description	A native shrub layer was absent from this vegetation zone.
Ground Cover Description	The moderately dense ground cover was dominated by introduced species, however some native species were present, including couch (*Cynodon dactylon*), common everlasting (*Chrysocephalum apiculatum*), berry saltbush (*Einadia hastata*) and blue crowfoot (*Erodium crinitum*).
Introduced Species	Introduced species were dominant in this vegetation zone and included galenia (*Galenia pubescens*), kikuyu (*Cenchrus clandestinus*), purpletop (*Verbena bonariensis*), lambs tongues (*Plantago lanceolata*) and scarlet pimpernel (*Lysimachia arvensis*).
PCT Allocation	Vegetation Zone 9 was allocated to PCT1601 as it is surrounded by Vegetation Zone 3 – PCT1601 derived native grassland, and in proximity to remnant woodland patches of Zone 1 - PCT1601 and it is therefore likely that this vegetation zone would have supported PCT1601 prior to disturbance. Given the highly modified nature of this vegetation zone, which is dominated by introduced species, there is a low floristic similarity to all PCTs.
BC Act Status	This vegetation zone is not consistent with any listed TEC under the BC Act.
EPBC Act Status	This vegetation zone is not consistent with any listed TEC under the EPBC Act.

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