

Ravensworth Operations

FINAL LANDFORM MODIFICATION Environmental Assessment

for

Ravensworth Operations Pty Limited

October 2014

RAVENSWORTH OPERATIONS FINAL LANDFORM MODIFICATION

ENVIRONMENTAL ASSESSMENT

Prepared by:

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SINGLETON NSW 2330

October 2014

For:

RAVENSWORTH OPERATIONS PTY LIMITED
PO Box 294
MUSWELLBROOK NSW 2333

ENVIRONMENTAL ASSESSMENT STATEMENT

Submission of Environmental Assessment

Under Section 75W of the *Environmental Planning and Assessment Act 1979*

EA Prepared by

Name:

James Bailey

Qualifications:

B. Natural Resources, MBA

Address:

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PO Box 473

SINGLETON NSW 2330

In Respect Of:

Ravensworth Operations Final Landform Modification

Applicant Name:

Ravensworth Operations Pty Limited

Applicant Address:

PO Box 294

MUSWELLBROOK NSW 2333

Land to be Developed:

Appendix 1 of Project Approval 09_0176.

Proposed Development:

Modifications to final landform design as outlined in **Section 4** of the attached Environmental Assessment.

Environmental Assessment:

An Environmental Assessment for the Modification is attached.

Certification:

I certify that I have read and am aware of the terms of the *Expert Witness Code* of the Land & Environment Court of NSW. I further certify that I have prepared the contents of this EA, and to the best of my knowledge:

- It is in accordance with Sections 75E and 75F of the *Environmental Planning and Assessment Act 1979*;
- It contains all available information that is relevant to the environmental assessment of the activity to which the statement relates; and
- The information contained in the statement is neither false nor misleading.

Signature:



James Bailey

Director

Name:

Date:

October 2014

EXECUTIVE SUMMARY

INTRODUCTION

Ravensworth Operations Pty Limited is a wholly owned subsidiary of Glencore Coal Pty Limited and manages the active Ravensworth North and Narama mining areas and the former Cumnock, Ravensworth West and Ravensworth South mining areas (the Ravensworth Operations Project). The Ravensworth Operations Project is situated within the Singleton Local Government Area and located approximately 15 kilometres north-west of Singleton and 17 kilometres south-east of Muswellbrook in the Upper Hunter Valley of New South Wales.

Currently, open cut mining activities at the Ravensworth Operations Project are carried out in accordance with Project Approval 09_0176 (as modified), to provide high quality thermal and semi-soft coking coal to export and domestic markets at a maximum of 16 Million tonnes per annum of Run of Mine coal.

MODIFICATION

Ravensworth Operations Pty Limited is seeking a modification to Project Approval 09_0176 to alter the approved final landform design so that it will more closely blend with the surrounding natural topography. As a consequence of this redesign, parts of some overburden emplacement areas are proposed to be constructed to a height greater than the levels approximated in the Ravensworth Operations Environmental Assessment (Umwelt, 2010a) whilst other areas will be constructed to a lesser height. The end result will be the incorporation of additional micro relief into the final landform creating a more undulating and diverse topography more capable of blending into the surrounding natural topography. A more natural and sustainable final landform will lead to an increased potential for greater diversity of the final ecological habitat and landform values.

No increase above the approved production levels, life of mining, areas of disturbance or workforce limit is sought as part of the Modification.

REGULATORY FRAMEWORK

Ravensworth Operations Pty Limited was granted Project Approval 09_0176 prior to the repeal of Part 3A of the *Environmental Planning and Assessment Act 1979*. Pursuant to clause 3 of Schedule 6A, this application is made under section 75W of the former Part 3A of the *Environmental Planning and Assessment Act 1979*.

STAKEHOLDER ENGAGEMENT

The stakeholder engagement program included consultation with Local and State government agencies, neighbouring land owners and industries via face-to-face and phone briefings, and meetings with the Ravensworth Operations Community Consultative Committee.

RISK ASSESSMENT

A risk assessment was completed to identify potential environmental and socio-economic issues associated with the Modification. The primary purpose of the risk assessment process was to prioritise and focus the required environmental and socio-economic impact studies required for the Environmental Assessment.

Each of the potential environmental issues was ranked as being of low, moderate, high or critical risk dependent upon the probability of the impact occurring and the potential consequences should the impact materialise.

Due to the minor nature of the Modification no environmental aspects provided a critical or high risk. Air quality and acoustics impacts were determined to be of moderate risk with all remaining environmental and socio-economic issues deemed to be low risk.

IMPACTS, MANAGEMENT AND MITIGATION

To determine the potential environmental and social impacts of the Modification, a qualitative assessment was undertaken in relation to air quality, noise, blasting, surface water, groundwater, ecology, visual and lighting, Aboriginal heritage, historical heritage, traffic and transport, waste, social, rehabilitation and final landform.

The impact assessments undertaken for the environmental and social issues outlined above have confirmed that the impacts of the mining operation will generally be consistent with those currently approved. Given this outcome the increased topographical relief that the Modification provides will result in an overall net benefit in terms of an improved post mining landform.

Given the relatively small scale and nature of the Modification, Ravensworth Operations Pty Limited will be capable of conducting the activities proposed under this Modification in accordance with the conditions of Project Approval 09_0176 (as modified) and the management plans implemented under this approval. The Ravensworth Open Cut & Ravensworth Coal Handling Preparation Plant Mining Operations Plan will be updated in consultation with the relevant agencies to incorporate the Modification, if approved.

Further to the conditions of Project Approval 09_0176, Ravensworth Operations Pty Limited notes its ongoing commitment to existing management and mitigation measures, as stated in this Environmental Assessment, to ensure that the Modification's environmental and social impacts are minimised.

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1 INTRODUCTION

This section provides an introduction to the Environmental Assessment (EA) for the Ravensworth Operations Final Landform Modification (the Modification). It describes the background and context of the Modification, introduces the proponent and explains the purpose and structure of the EA.

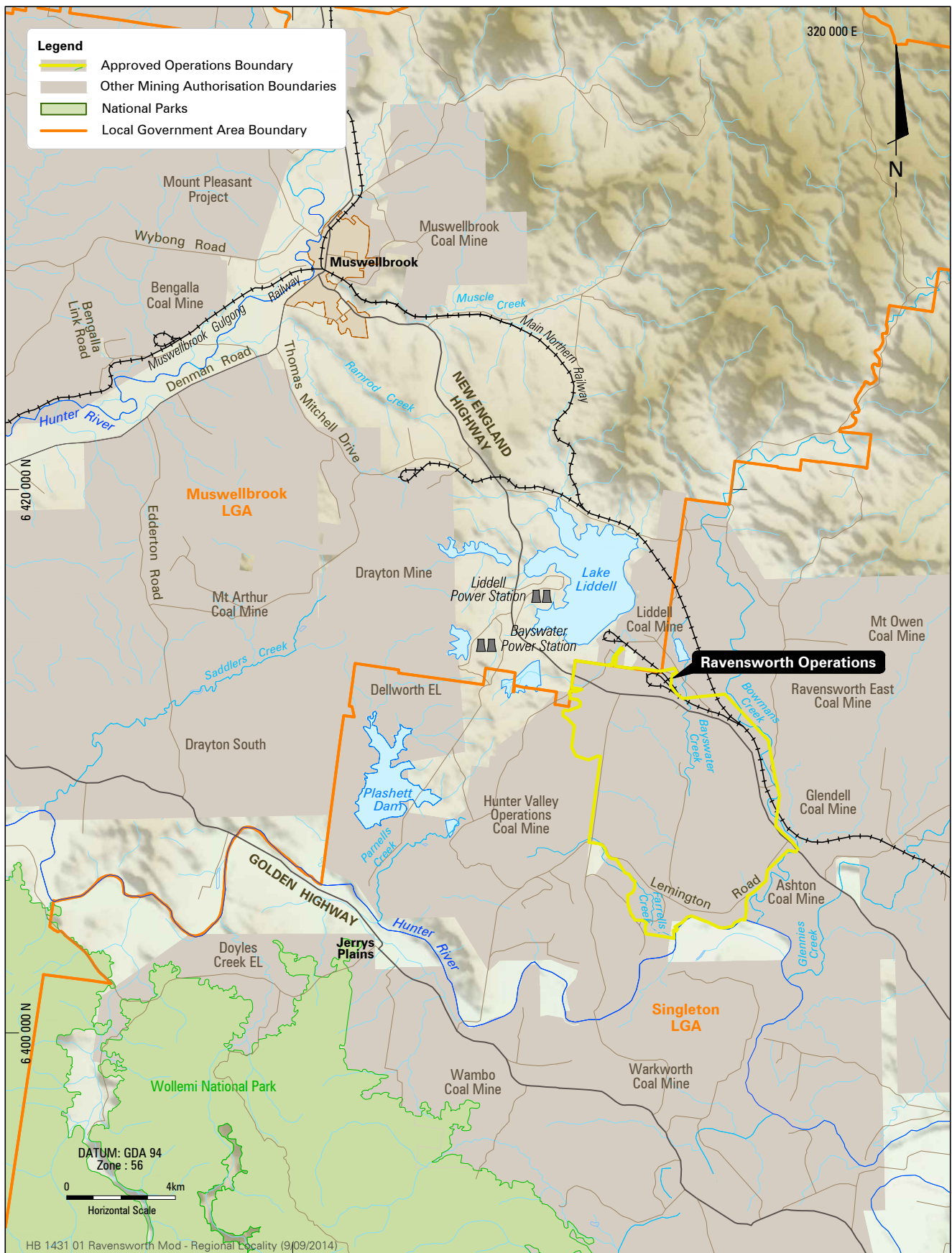
1.1 BACKGROUND

Ravensworth Operations Pty Limited (Ravensworth Operations) is a wholly owned subsidiary of Glencore Coal Pty Limited (Glencore) and manages the active Ravensworth North and Narama mining areas and the former Cumnock, Ravensworth West and Ravensworth South mining areas (the Ravensworth Operations Project). The Ravensworth Operations Project is situated within the Singleton Local Government Area (LGA) and located approximately 15 kilometres (km) north-west of Singleton and 17 km south-east of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW). **Figure 1** illustrates the location of the Ravensworth Operations Project and its approved operations boundary.

Ravensworth Operations has a long-established presence in the community with mining at the Ravensworth Operations Project commencing during the early 1970s. Since this time, Ravensworth Operations has been committed to meeting leading practice standards of health, safety, environmental and social management. Its operations have also played a significant role in contributing to the economic development of the local area, the region and more generally to the State of NSW.

Currently, open cut mining activities at the Ravensworth Operations Project are carried out in accordance with Project Approval (PA) 09_0176 (as modified), to provide high quality thermal and semi-soft coking coal to export and domestic markets at a maximum of 16 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal.

The proposed Modification will allow Ravensworth Operations to alter the approved final landform design through the implementation of micro relief so that it will more closely blend with the surrounding natural topography. As a consequence of this redesign parts of some Overburden Emplacement Areas (OEA's) are proposed to be constructed to a height greater than the levels approximated in the Ravensworth Operations Project Environmental Assessment (Umwelt, 2010a) whilst other areas will be constructed to a lesser height. The end result will be the incorporation of additional micro relief into the final landform creating a more undulating and diverse topography more capable of blending into the surrounding natural topography.



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Regional Locality Plan

FIGURE 1

1.2 PROPONENT

The proponent for the Modification is Ravensworth Operations for which the contact details are:

Ravensworth Operations Pty Limited

PO Box 294

Muswellbrook NSW 2333

Phone: (02) 6570 0700

Fax: (02) 6570 0747

<http://www.xstrataravensworth.com.au/>

1.3 DOCUMENT STRUCTURE

The EA is structured as follows:

- **Section 2** provides information relating to the existing environmental setting;
- **Section 3** provides information relating to the Ravensworth Operations Project as currently approved;
- **Section 4** provides a description of the Modification;
- **Section 5** describes the regulatory framework relevant to the Modification;
- **Section 6** details the stakeholder engagement program that has been undertaken and any issues raised during that process;
- **Section 7** presents a high level risk assessment completed for the Modification;
- **Section 8** assesses the predicted environmental impacts and outlines the management and mitigation measures to be implemented by Ravensworth Operations;
- **Section 9** presents Ravensworth Operations statement of commitments for the Modification;
- **Section 10** lists abbreviations used throughout the EA; and
- **Section 11** provides a list of all materials referenced throughout the EA.

1.4 DOCUMENT PURPOSE

Ravensworth Operations is seeking approval from the Minister for Planning and Infrastructure for a modification to PA 09_0176 under section 75W of Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This EA has been prepared by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of Ravensworth Operations to support an application for the Modification as described in **Section 4**. The Modification disturbance boundary is entirely confined within the existing approved Disturbance Boundary. The schedule of lands to which this EA applies is consistent with Appendix 1 of PA 09_0176.

2 EXISTING ENVIRONMENT

This section provides a discussion on the topography, natural features, geology, land use and land ownership within and surrounding the approved operations boundary.

2.1 TOPOGRAPHY AND NATURAL FEATURES

The topography within the approved operations boundary (see **Figure 1**) is typically undulating to hilly, extending to lower areas associated with waterways and drainage lines. Topographic elevations range from Reduced Level (RL) 160 metres (m) within the north to RL 100 m within the south of the approved operations boundary.

Major alterations to the natural topography within and surrounding the approved operations boundary have occurred as a result of progressive mining activities since the early 1970s. However, a significant ridgeline has been retained to the south-east of the approved operations boundary, which has an elevation of approximately RL 100 m. This natural feature provides a barrier between neighbouring private residences, including Camberwell Village, and mining activities.

The Ravensworth Operations Project is located within the catchments of Farrells Creek, Bowmans Creek and Bayswater Creek and its tributaries, including Davis Creek and Emu Creek. These watercourses traverse the area in a southerly direction to their confluences with the Hunter River (see **Figure 1**).

2.2 GEOLOGY

Extensive exploration activities have been conducted within the approved operations boundary since the 1960s. As such, Ravensworth Operations has a comprehensive record of the quantity, quality and extent of the coal resource within the approved operations boundary.

The Ravensworth Operations Project is situated in the Foybrook and Burnamwood Formations of the Whittingham Coal Measures. The strata dip gently to the south-east of the approved operations boundary towards the Bayswater Syncline and flatten to the south-west near the Ravensworth North Monocline. Coal resources are targeted from the Broonie seam down through to the Bayswater, Lemington, Pikes Gully, Arties, Liddell, Barrett and Hebden seams.

2.3 LAND USE

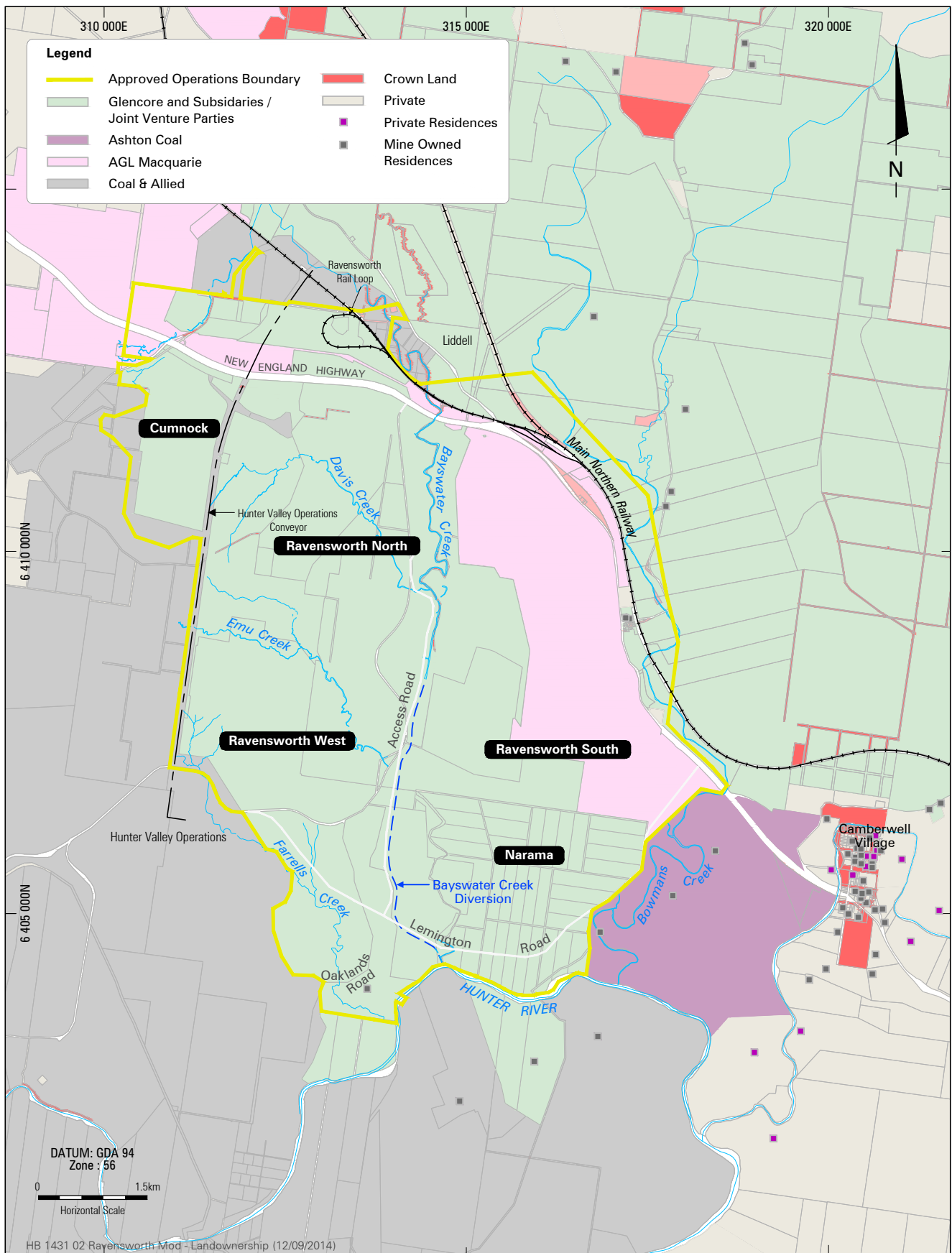
The Ravensworth Operations Project is situated predominantly in an industrial setting surrounded by numerous open cut mining and power generation activities, including Hunter Valley Operations, Mt Owen Complex, Liddell Colliery, Ashton Coal, Integra and Bayswater and Liddell Power Stations (see **Figure 1** and **Figure 2**). Further afield to the east and south-east of the Ravensworth Operations Project remains private freehold land utilised for grazing, other agricultural activities and rural residential areas (see **Figure 2**).

The area directly within the approved operations boundary has been extensively modified by current and former open cut mining activities and associated infrastructure. However, a substantial portion of the land within the approved operations boundary has been reshaped and rehabilitated to native vegetation or exotic pasture.

2.4 LAND OWNERSHIP

Land ownership within and surrounding the approved operations boundary is shown on **Figure 2**. Glencore and its subsidiaries and joint venture partners own the majority of the land within and surrounding the approved operations boundary. Other prominent adjacent land owners include AGL Macquarie, Ashton Coal and Coal & Allied.

A number of private rural residences are located to the east and south-east of the Ravensworth Operations Project with the majority centralised at Camberwell Village, which is approximately 2 km from the approved operations boundary (see **Figure 2**).



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Land Ownership

FIGURE 2

3 APPROVED OPERATIONS

This section describes the approved works at the Ravensworth Operations Project, including existing approvals, current mining activities, coal handling and processing, equipment, infrastructure, workforce and the existing Environmental Management System (EMS).

3.1 PLANNING APPROVALS

3.1.1 Original Approval

On 11 February 2011, Ravensworth Operations was granted PA 09_0176 which permits open cut mining and transportation of up to 16 Mtpa of high quality thermal and semi-soft coking coal to export and domestic markets until 31 December 2039.

PA 09_0176 was supported by the *Ravensworth Operations Project Environmental Assessment* (Ravensworth EA) (Umwelt, 2010a).

3.1.2 Modification to PA 09_0176

On 16 August 2013 PA 09_0176 (Modification 1) was granted, providing approval for the following modifications at the Ravensworth Operations Project:

- The recovery of approximately 2.7 Mt of ROM coal by open cut mining methods within the Narama West mining area;
- Various administrative amendments to PA 09_0176 including:
 - Alteration to the approved operations boundary to include the Newdell substation;
 - Inclusion of additional commitments to the blast management plan requirements;
 - Changes to blast vibration criterion applying to a set of Aboriginal grinding grooves; and
 - Removal of the specified approved archaeologist in the relevant PA conditions.

The document supporting PA 09_0176 (Modification 1) was the *Narama West Modification Environmental Assessment* (Hansen Bailey, 2013).

3.2 COAL MINING AND PROCESSING

Mining at the Ravensworth Operations Project currently occurs within in Coal Leases 380 and 580 and Mining Leases 1576, 1502, 1393 1683 and 1669. Coal resources are targeted from the Broonie seam down through to the Hebden seam by truck and shovel and/or dragline mining techniques.

Loaders/shovels, excavators and draglines are utilised for the removal of overburden. This equipment is supported by a fleet of haul trucks, which transport the overburden to an approved OEA. ROM coal is extracted by a loader and/or excavator before being loaded onto trucks and transported to the coal crushing plant. After initial processing, coal is conveyed to neighbouring power generation facilities or in the case of export coal is conveyed to the Coal Handling and Preparation Plant (CHPP) for further processing prior to being railed to the Port of Newcastle.

Rejects from the CHPP are transported to and blended within the OEAs while tailings are pumped via above ground pipelines to the Cumnock, Ravensworth South and Narama mine voids. Water is decanted during the transfer and recycled in the Ravensworth Operations water management system.

PA 09_0176 facilitates the extraction of ROM coal at a rate of up to 16 Mtpa.

3.3 SURFACE INFRASTRUCTURE

Activities undertaken at the Ravensworth Operations Project are supported by a range of surface infrastructure, including:

- Raw coal stockpiles;
- Coal crushing plant and CHPP;
- Administration facilities, including offices and bath house;
- Workshop and maintenance facilities;
- Fuel and lubricant storage and dispensing facilities;
- Heavy and light vehicle wash stations;
- Water management infrastructure;
- Waste management systems;
- Power reticulation infrastructure;
- Telecommunication facilities; and
- Roads, parking and dispatch areas.

3.4 EQUIPMENT FLEET

The typical mobile equipment fleet utilised to facilitate mining at the Ravensworth Operations Project includes draglines, shovels, excavators and loaders as described in the Ravensworth EA (Umwelt 2010a). There may be variation in numbers, size and types of equipment provided relevant assessment criteria are maintained.

3.5 WORKFORCE

Ravensworth Operations has approval to employ a workforce of up to approximately 550 full time equivalent personnel at the Ravensworth Operations Project.

3.6 ENVIRONMENTAL MANAGEMENT SYSTEM

Ravensworth Operations is committed to its operations being undertaken in an environmentally responsible manner. As such, Ravensworth Operations currently undertakes activities in accordance with its existing EMS. The EMS provides for the management and monitoring of a range of environmental aspects, including air quality, noise, water and blasting.

A key component of the EMS is Ravensworth Operations' environmental monitoring network, which includes:

- One meteorology monitoring station;
- 20 air quality monitoring stations, consisting of:
 - 12 dust deposition gauges;
 - Two Tapered Element Oscillating Microbalance (TEOM) (Particulate Matter less than 10 and 2.5 microns in diameter (PM₁₀ and PM_{2.5})); and
 - Six High Volume Air Samplers (Total Suspended Particulates (TSP) and PM₁₀).
- 60 surface water monitoring stations;
- 29 groundwater monitoring stations;
- 12 real time blast monitoring stations;
- Five noise monitoring stations; and
- Six visual monitoring locations.

4 MODIFICATION DESCRIPTION

This section provides a description of the Modification. Consideration of the justification for the Modification and interactions with approved operations is also included.

4.1 OVERVIEW

The Modification entails altering the approved final landform design so that it will improve integration with the surrounding natural topography. As a consequence of this redesign parts of some OEAs are proposed to be constructed to a height greater than the levels approximated in the Ravensworth EA (Umwelt, 2010a) whilst other areas will be constructed to a lesser height. The end result will be the incorporation of additional micro relief into the final landform creating a more undulating and diverse topography more capable of blending into the surrounding natural topography.

Section 2.5.7 of the Ravensworth EA (Umwelt, 2010a) stated that the OEAs will be progressively developed over the life of the mine to a maximum height of approximately 200 m RL and 160 m RL for the western and eastern emplacement areas respectively. The proposed changes to the OEA design would increase the maximum height of the western emplacement area to approximately 230 m RL (increase of 30 m RL) and the eastern emplacement area to approximately 190 m RL (increase of 30 m RL).

A summary of the proposed changes to the final landform associated with the Modification is provided in **Table 1** and presented conceptually on **Figure 3**.

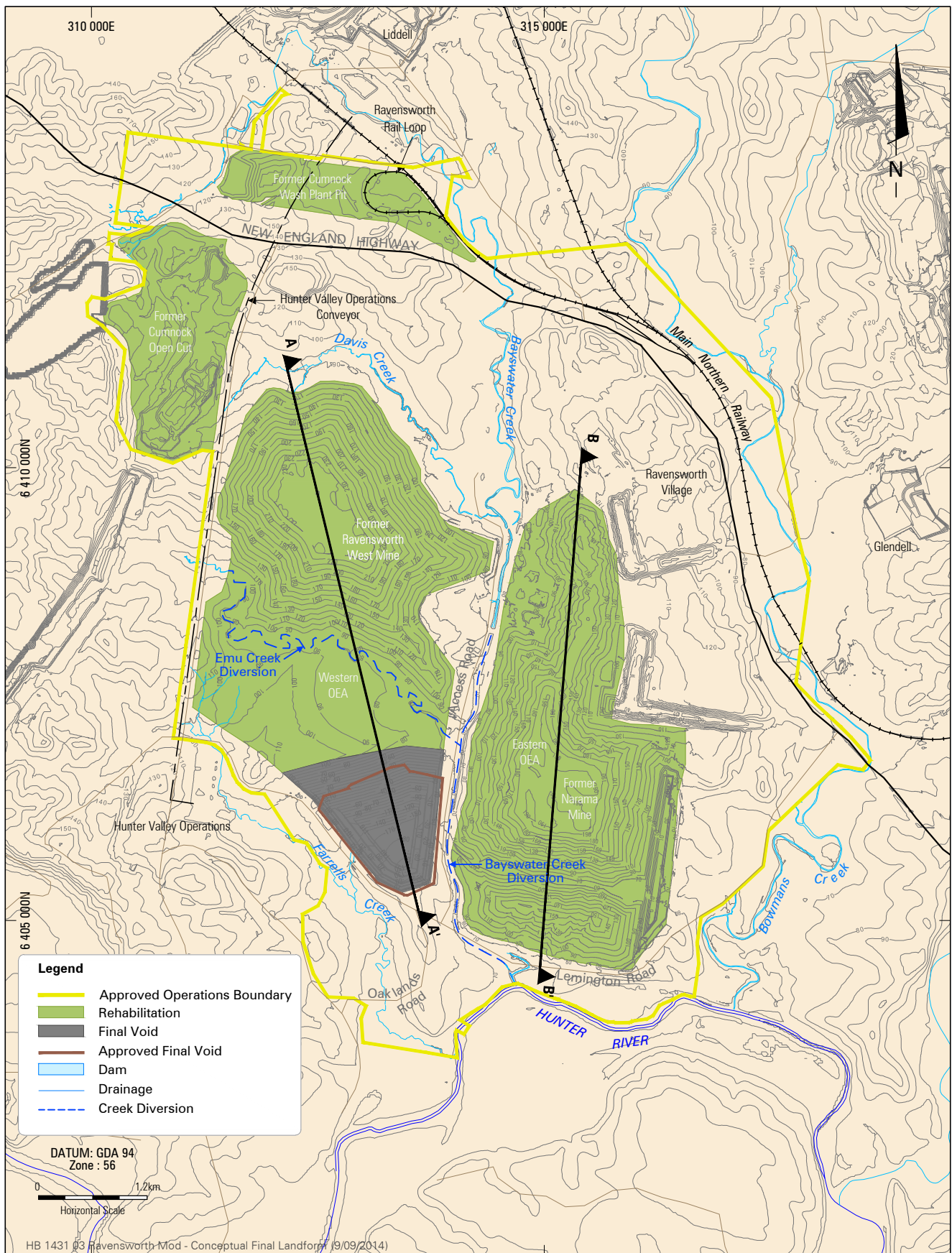
4.2 INTERACTIONS WITH APPROVED OPERATIONS

Mining will continue to be undertaken via truck and shovel and/or dragline extraction. Overburden will be transferred to the appropriate OEA adjacent to the mining area within the currently approved disturbance boundary. The Modification will not require the handling of any additional quantity of overburden material to that assessed in the Ravensworth EA.

All mining and associated activities to be conducted as part of the Modification will be consistent with the approved operations described in **Section 3**. No increase above the approved production levels, life of mining, areas of disturbance or workforce limit is proposed as part of the Modification.

Table 1
Emplacement Strategies

Overburden Emplacement Area	Approved Approximate Height of OEA (m RL)	The Modification (m RL)	Total Increase (m RL)
Western Emplacement Area	200	230	30
Eastern Emplacement Area	160	190	30



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Revised Conceptual Final Landform

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FIGURE 3

4.3 MODIFICATION JUSTIFICATION

Ravensworth Operations have reviewed the completion criteria and final landform presented in the Ravensworth EA (Umwelt, 2010a) and have identified areas where improved landscape outcomes can be achieved through the implementation of the final landform strategies described in this Modification. This Modification will provide stakeholders with a final landform that more appropriately blends with the surrounding natural topography.

This Modification has been instigated by Ravensworth Operations (beyond existing obligations and statutory requirements) to demonstrate Glencore's and Ravensworth Operations' ongoing commitment towards improved environmental outcomes and continual improvement associated with the development of the final landform.

5 REGULATORY FRAMEWORK

This section briefly describes the regulatory framework under which the Ravensworth Operations Project is approved as relevant to the Modification proposed. It discusses the ability of the Minister for Planning and Infrastructure to modify PA 09_0176 under section 75W of the EP&A Act and describes the approvals process.

5.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

5.1.1 Existing Development Consents

On 11 February 2011 the Minister for Planning granted PA 09_0176 for the Ravensworth Operations Project pursuant to section 75J of the EP&A Act. On 16 August 2013 Ravensworth Operations was granted approval for PA 09_0176 (Modification 1) by the delegate of the Minister for Planning and Infrastructure.

5.1.2 Power to Modify

The Ravensworth Operations Project is a “transitional Part 3A Project” for the purposes of the EP&A Act (refer to clause 2 of Schedule 6A of the EP&A Act).

Clause 3 of Schedule 6A of the EP&A Act states that *“Part 3A of this Act (as in force immediately before the repeal of that Part and as modified under this Schedule after that repeal) continues to apply to and in respect of a transitional Part 3A project.”*

Therefore, section 75W of the former Part 3A applies to facilitate modifications to PA 09_0176.

5.1.3 Landowner Consent and Notification

Under Clause 8F of the EP&A Regulation the consent of the landowner is not required for a modification application under section 75W of the EPA Act for a “ ... mining or petroleum production project... “ which (under clause 8F(4)) includes ‘... any activity that is related to mining ...’.

Notice of the development application must be given through an advertisement published in a newspaper circulating in the area of the project within 14 days after the making of the application. Ravensworth Operations will give notice to the public in accordance with clause 8F of the EP&A Regulation.

All land which is the subject of the Modification application is owned by Glencore or AGL Macquarie with whom Ravensworth Operations has arrangements in place to facilitate the use of this land.

5.1.4 Section 75W of the EP&A Act

The application for Modification is made under section 75W of the EPA Act. The relevant aspects of that section are as follows:

- (2) *The proponent may request the Minister to modify the Minister’s approval for a project. The Minister’s approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*

- (3) *The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*
- (4) *The Minister may modify the approval (with or without conditions) or disapprove of the modification.*

Section 75W(2) states that the Minister's approval is not required where the modified project would be consistent with the approved project. It is arguably the case that the Modification is not entirely consistent with the project as approved. Accordingly, Ravensworth Operations is seeking a modification to PA 09_0176 under section 75W of the EP&A Act. In the context of what is approved under the existing project approval, the activities the subject of this Modification application are minor, of low significance and of no material additional impact when compared to the approved development.

5.1.5 Environmental Assessment Requirements

Section 75W(3) states that the Director-General may notify the proponent of Environmental Assessment Requirements for the proposed modification.

The Department of Planning and Environment (DP&E) advised in May 2014 that Environmental Assessment Requirements would not be issued for the Modification.

5.1.6 Objects of the EP&A Act

The objects of the EP&A Act are stated in section 5 of the Act.

The objects of this Act are:

- (a) *to encourage:*
 - (i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
 - (ii) *the promotion and co-ordination of the orderly and economic use and development of land,*
 - (iii) *the protection, provision and co-ordination of communication and utility services,*
 - (iv) *the provision of land for public purposes,*
 - (v) *the provision and co-ordination of community services and facilities, and*
 - (vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened*

- species, populations and ecological communities, and their habitats,
and*
- (vii) ecologically sustainable development, and*
 - (viii) the provision and maintenance of affordable housing, and*
 - (b) to promote the sharing of the responsibility for environmental planning
between the different levels of government in the State, and*
 - (c) to provide increased opportunity for public involvement and participation in
environmental planning and assessment.*

The proposed Modification is consistent with the objects of the EP&A Act.

5.2 ENVIRONMENTAL PLANNING INSTRUMENTS

5.2.1 State Environmental Planning Policy (State and Regional Development) 2011 (SEPP SRD)

Clause 8 of SEPP SRD provides that development is declared to the State significant development for the purposes of the EPA Act if the development is specified in Schedule 1. Item 5 in Schedule 1 includes “*development for the purpose of mining that is coal mining ...*”. The development proposed under the modification is for the purposes of development of the Ravensworth Operations (as set out above) and accordingly, is State Significant Development.

Section 89D makes the Minister the consent authority for all State Significant Development.

The Minister has delegated the consent function for certain applications.

5.2.2 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (SEPP Mining) determines the permissibility of mining developments and the matters that must be considered by consent authorities when evaluating development applications for mining developments.

Under clause 7 of SEPP Mining the proposed development is permissible with consent under the EPA Act.

5.2.3 Gateway

The requirement for a Gateway Certificate in respect of certain modification applications for mining and petroleum development comes from clause 50A of the *Environmental Planning and Assessment Regulation 2000* and Part 4AA of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP).

Clause 17A of Part 4AA of the Mining SEPP defines “mining or petroleum, development” for the purposes of the gateway requirements. That definition excludes areas where a mining lease is not required to be issued to enable the development to be carried out because there is a current mining lease.

There is a current mining lease over the entire area proposed for the Modification.

Accordingly, there is no requirement for a gateway certificate in order to make this application for the Modification.

5.3 APPROVALS UNDER OTHER NSW LEGISLATION

5.3.1 Mining Act 1992

The mining of coal in NSW is regulated by the *Mining Act 1992* (Mining Act). Section 5 of the Mining Act provides that mining cannot be undertaken except in accordance with a valid mining authorisation. All mining associated with the Modification will be undertaken within mining authorisations currently held by Ravensworth Operations or the Cumnock Joint Venture, which is majority-owned by Glencore. Therefore, no additional authorisations under the Mining Act will be required for the Modification.

In accordance with Ravensworth Operations existing mining authorisation requirements the existing Ravensworth Open Cut & Ravensworth Coal Handling Preparation Plant Mining Operations Plan (Ravensworth MOP) will be updated for the Modification in consultation with the relevant agencies to the satisfaction of Division of Resources and Energy (DRE).

5.3.2 Protection of the Environment Operations Act 1997

Section 48 of the *Protection of the Environment Operations Act 1997* (POEO Act) provides that an Environment Protection Licence (EPL) is required for scheduled activities under the Act. Under clause 28 of Schedule 1 of the POEO Act, “*mining for coal*” is deemed to be a scheduled activity if the daily production exceeds 500 tonne, or if the disturbance area exceeds 4 ha. Ravensworth Operations currently holds EPL 2652 for the Ravensworth Operations Project.

5.3.3 Water Management Act 2000

The licensing and approvals provisions of the *Water Management Act 2000* (WM Act) apply to water sources that are the subject of a water sharing plan (WSP). Water sources that are not the subject of a WSP are regulated by the *Water Act 1912* (Water Act).

Ravensworth Operations will hold all relevant licences, share component and allocation required to comply with the WM Act and Water Act at all times water is taken, whether during or after the life of the Modification.

There are two WSPs that apply to water sources in the vicinity of Ravensworth Operations:

- *Water Sharing Plan for the Hunter Regulated River Water Source 2003* (Hunter Regulated WSP); and
- *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (Hunter Unregulated WSP).

Part 2 of Chapter 3 of the WM Act establishes that a Water Access Licence (WAL) is required for the taking of water from a water source under a WSP.

The Hunter Regulated WSP applies to all water between the banks of the Hunter River downstream of Glenbawn Dam. A WAL will therefore be required for water extracted from the Hunter River. The long term average annual extraction limit for this water source is 217,000 ML/year, which represents approximately 20% of the natural flow. Since the commencement of the WSP, water extraction has been substantially below the extraction limit.

The Hunter Unregulated WSP applies to 39 water sources in the Hunter region. The Modification is situated entirely within the Jerrys Water Source. The Hunter Unregulated WSP applies to all surface water within the Jerrys Water Source.

As outlined in **Section 8.4**, no additional impacts requiring licensing under the WM Act are predicted for the Modification.

5.3.4 Water Act 1912

The licensing regime under the Water Act continues to apply to water sources that have not been made the subject of a WSP. Neither the Hunter Regulated WSP nor the Hunter Unregulated WSP applies to groundwater contained within the Permian bedrock strata. Water is taken from the bedrock strata via groundwater inflows to mining areas. The provisions of the Water Act will therefore apply to groundwater taken from the bedrock strata.

Under section 112 of the Water Act, a licence is required for the commencement, enlargement, deepening or alteration of a bore. The definition of “*bore*” under section 105 includes any “*bore or well or any excavation or other work connected or proposed to be connected with sources of sub-surface water*”. The open cut mining areas for the constitute excavation connected with sub-surface water.

As outlined in **Section 8.4**, no additional impacts requiring licensing for groundwater interception under the Water Act are predicted for the Modification.

5.4 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (CTH)

If a proposed action is likely to have a significant impact on one or more Matter of National Environmental Significance (MNES), the action is deemed to be a “*controlled action*”. The approval of the Minister for the Environment must be obtained before a controlled action can be carried out. On 8 April 2011, the Ravensworth Operations Project received approval EPBC No 2010/5389 pursuant to sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*, (EPBC Act).

The Modification is not likely to result in any additional impacts on any threatened species or communities listed under the EPBC Act or any other MNES. As such, the Modification does not need to be referred under Section 68 of the EPBC Act.

6 STAKEHOLDER ENGAGEMENT

This section provides a summary of the stakeholder engagement undertaken for the Modification by Ravensworth Operations and Hansen Bailey.

6.1 REGULATORY ENGAGEMENT

Table 2 outlines the consultation activities undertaken with regulatory stakeholders for the Modification.

6.2 COMMUNITY ENGAGEMENT

Table 3 outlines the consultation activities undertaken with community stakeholders for the Modification.

Table 2
Regulatory Stakeholders and Consultation

Stakeholder	Consultation
DP&E	<ul style="list-style-type: none"> EA Modification briefing and EA approach letter (3 April 2014) EA Scoping correspondence (2 May and 15 May 2014) EA Modification discussion (2 September 2014)
NSW Office of Water	<ul style="list-style-type: none"> EA Modification briefing (15 September 2014)
Division of Resources and Energy	<ul style="list-style-type: none"> EA Modification briefing discussion (3 September 2014)
SSC	<ul style="list-style-type: none"> EA Modification briefing and offer of meeting (8 September 2014) EA Modification briefing (1 October 2014)

Table 3
Community Stakeholders and Consultation

Stakeholder	Consultation
Neighbouring Land Owners	<ul style="list-style-type: none"> EA Modification briefing: <ul style="list-style-type: none"> W. Bowman (8 and 9 September 2014) A. Bowman (8 September 2014)
Neighbouring Industry	<ul style="list-style-type: none"> EA Modification briefing: <ul style="list-style-type: none"> Coal & Allied (3 and 10 September 2014) Ashton Coal (3 September 2014)
Ravensworth Operations Community Consultative Committee	<ul style="list-style-type: none"> Community Consultative Committee meeting: <ul style="list-style-type: none"> Modification introduction (25 June 2014) Community Consultative Committee members individual briefings: <ul style="list-style-type: none"> P. Bestic Modification briefing (8 September 2014) I. Beal Modification briefing (8 September 2014) G. Adamthwaite Modification briefing (8 September 2014)

6.3 ONGOING STAKEHOLDER ENGAGEMENT

Various mechanisms will be implemented to ensure the effective ongoing engagement with stakeholders during the life of the Modification, including:

- Regular consultation with neighbouring land owners and industry;
- Updates to the Ravensworth Operations Community Consultative Committee;
- Distribution of regular community newsletters; and
- Preparation and distribution of Annual Review for Ravensworth Operations.

7 RISK ASSESSMENT

A risk assessment was completed to identify potential environmental and socio-economic issues associated with the Modification. The primary purpose of the risk assessment process was to prioritise and focus the required environmental and socio-economic impact studies required for the EA.

Each of the environmental and social-economic issues has been assessed and where appropriate, management and mitigation options developed. Each of the potential environmental issues was ranked as being of low, moderate, high or critical risk. The risk rating allocated to an impact is dependent upon the probability of the impact occurring and the potential consequences should the impact materialise.

Due to the minor nature of the Modification no environmental aspects provided a critical or high risk. Air quality and acoustics impacts were determined to be of moderate risk with all remaining environmental and socio-economic issues deemed to be low risk. **Table 4** summarises findings from the risk assessment.

Aspects identified as having a higher environmental impact risk ranking formed the primary focus of this EA and were more intensively assessed. Aspects which have been identified as having a low risk were also assessed however a lesser scope of works was conducted for these secondary issues, based on their lower risk rating.

Table 4
Environmental and Socio-Economic Risk Rating

Risk Rating	Aspect
Critical	None
High	None
Moderate	Air quality and acoustics
Low	Visual and lighting, surface water and groundwater, ecology, aboriginal heritage, historic heritage, traffic and transport, waste, social, rehabilitation and final landform

8 IMPACTS, MANAGEMENT AND MITIGATION

This section provides a qualitative review of the environmental and social impacts of the Modification and the measures that will be implemented to mitigate and manage these impacts.

8.1 AIR QUALITY

8.1.1 Background

An Air Quality Impact Assessment was undertaken by Pacific Environment Limited and is provided in **Appendix A**. The purpose of the assessment was to complete a qualitative review of the mine plan to determine if air quality emissions generated by the Modification were predicted to be consistent with those assessed as part of the Ravensworth EA and to recommend appropriate mitigation and management measures as required.

An air quality impact assessment was undertaken by PAEHolmes (now Pacific Environment Limited) for the Ravensworth EA (2010 AQIA) (PAEHolmes, 2010). The 2010 AQIA included an assessment of potential impacts from the Ravensworth Operations Project, including open cut mining activities by Ravensworth Operations in isolation and cumulatively with other surrounding mining and non-mining operations.

Model predictions at privately-owned residences were compared with air quality criteria established by the NSW Environment Protection Authority (EPA) and NSW DP&E (see **Table 5** and **Table 6**. These criteria are for 24-hour and annual average PM₁₀ (particulate matter less than 10 microns), annual average total suspended particulates (TSP) and annual average dust deposition.

Results from the 2010 AQIA indicated that there were exceedances of the 24-hour average PM₁₀ criterion at six private residences (in Year 3) and only one exceedances of the 24-hour average PM₁₀ criterion Years 5 through to 25. This property where 24-hour average PM₁₀ impacts are predicted for the duration of the project has recently been acquired by a related company of Ravensworth Operations. No exceedances of the annual average PM₁₀, TSP or dust deposition was predicted.

Estimates of total TSP emissions were made for each of the six modelling years in the 2010 AQIA. These totals are shown in **Table 7** however as Year 3 most closely relates to 2013, Year 5 and beyond are relevant for this qualitative assessment.

Table 5
Air Quality Particulate Matter Assessment Criteria

Pollutant	Criterion (µg/m ³)	Averaging Period	Agency
TSP	90	Annual average	National Health and Medical Research Council
PM ₁₀	50	Maximum 24-hour average	EPA
	30	Annual average	EPA

Table 6
Air Quality Dust Deposition Assessment Criteria

Pollutant	Averaging Period	Maximum Increase in Deposited Dust Levels (g/m ² /month)	Maximum Total Deposited Dust Levels (g/m ² /month)
Deposited Dust	Annual average	2	4

Table 7
Estimated Annual TSP Emissions (PAEHolmes, 2010)

Parameter	Year 5	Year 10	Year 15	Year 20	Year 25
Total TSP Emissions	8,148,986	11,629,549	11,510,757	9,526,848	5,322,272
Percentage due to waste haulage	33.8%	31.5%	31.3%	30.6%	26.7%
Percentage due to wind erosion on OEAs	18.9%	20.1%	19.6%	13.5%	21.5%

8.1.2 Impact Assessment

The qualitative review has investigated the likely effects on air quality from the proposed Modification. There are not anticipated to be any significant changes to particulate emission inventory or mine footprint due to the Modification to that described and assessed in the 2010 AQIA.

The most significant sources of dust for each year were wheel generated dust from hauling waste from the pit to the OEAs and also wind erosion from the OEAs. These two sources combine to make up approximately half of the total emissions in each of these years. The Modification will not include the development of any new haul routes, generation of additional waste to be hauled or an increase in the total OEA footprint than was originally assessed.

Based on the dispersion modelling completed for the Ravensworth EA, the assessment concluded that when considered both in isolation, and cumulatively with other sources, the Modification is unlikely to result in any exceedances of the EPA's impact assessment criteria PM₁₀ (annual average or 24-hour average), TSP or dust deposition at any private properties in the vicinity of the site.

8.1.3 Mitigation and Management

Given there are no additional air quality impacts arising from the Modification, Ravensworth Operations will continue to implement existing management and mitigation measures to comply with appropriate standards including:

- Operation of a meteorological forecasting and real-time dust monitoring network;
- Water application on active mining areas, active OEAs and haul roads that are subject to frequent vehicle movements;
- Utilisation of dust curtains on drill rigs;
- Utilisation of automatic sprays fitted to the dump hopper and crushing plant;

- Minimisation of disturbance areas by restricting vegetation clearing ahead of mining operations and progressively rehabilitating OEAs;
- Implementation of temporary rehabilitation using pasture species on OEAs;
- Topsoil stripping when there is sufficient moisture content in the soil;
- Restriction or cessation of dust-generating activities during adverse weather conditions; and
- Restriction of blasting activities to periods of acceptable wind speed and direction.

These controls will continue to be implemented for the Modification and managed in accordance with the approved Air Quality and Greenhouse Gas Management Plan.

Further to the above commitments arising from the Ravensworth Mine Complex – Coal Mine Particulate Matter Control Best Management Practice Determination (2013) will also continue to be implemented at Ravensworth Operations including:

- Periodic objective monitoring to demonstrate haul road dust control effectiveness;
- Optimise the existing reactive/predictive air quality control system (AQCS) by:
 - (i) Confirming short-term triggers and associated contingency measures;
 - (ii) Notification of dispatch in the event of trigger exceedances, with dedicated resources at dispatch to notify operations and log actions taken; and
 - (iii) Documenting the AQCS including the procedure for using dust risk forecasts for proactive dust management.
- Demonstrate that an overall haul road dust control efficiency of 80% is being achieved at the site;
- on-going, periodic identification of exposed rehabilitation areas for interim stabilisation; and
- Monitoring of rehabilitation areas subject to interim stabilisation to track the effectiveness of this measure.

8.2 ACOUSTICS

A qualitative acoustic assessment was undertaken by Bridges Acoustics and is provided in **Appendix B**. The purpose of the assessment was to describe results from a qualitative assessment of acoustic issues, including operational noise and blasting, to determine if acoustic emissions generated by the Modification were predicted to be consistent with those assessed as part of the Ravensworth EA and to recommend appropriate mitigation and management measures as required.

8.2.1 Operational Noise

Noise criteria specified in Schedule 3 Condition 2 of PA09_0176 for representative private receivers and receiver areas are shown in **Table 8**.

Noise generated by the Modification was compared to that previously modelled in the Noise Impact Assessment (2010 NIA) (Umwelt, 2010b) undertaken for the Ravensworth EA.

Table 8
Approved Noise Criteria (PA09_0176)

Receiver Area	Receiver	Day	Evening	Night	Night
		LA _{eq} , 15 Min	LA _{eq} , 15 Min	LA _{eq} , 15 Min	LA ₁ , 1 Min
R1	34 Stapleton*	48	48	48	49
R2	3 Bowman	35	35	35	45
	13 Bowman	38	38	38	45
R3	12 Yates, 21 Miller, 27 Chisholm	37	37	37	45
	38 Ninness	36	36	36	45
	All other privately owned land	35	35	35	45
R4	All other privately owned land	35	35	35	45
-	All other privately owned land	35	35	35	45

** Receiver 34 is now mine-owned*

As Year 3 of the Ravensworth EA most closely relates to 2013, Year 5 and beyond are relevant for this qualitative assessment. A review of the noise model inputs described in Appendix D of the 2010 NIA, with a focus on the eastern OEA which is closest to all private receivers identified:

- The Year 5 noise model included haul truck movements to the top of the eastern OEA plus a tracked dozer and a rubber tyred dozer on the top of the eastern OEA;
- The Year 10 noise model included haul truck movements to the top of the eastern OEA plus a tracked dozer on the exposed eastern side of the OEA;
- The Year 15 noise model included haul truck movements to the top of the southern section of the eastern OEA plus a rubber tyred dozer on the top of the eastern OEA;
- The Year 20 noise model did not include haul truck movements to the top of the eastern OEA as the OEA would be fully developed by this year, however a grader and rubber tyred dozer were included on the top of the southern section of the eastern OEA with a tracked dozer on the shielded western side of the eastern OEA; and
- The Year 25 noise model included a rubber tyred dozer on the top of the southern section of the eastern OEA with a tracked dozer on the shielded western side of the eastern OEA.

The noise model developed for the Ravensworth EA (Umwelt, 2010a) therefore considered dominant noise from mobile machines operating in exposed areas on top of the eastern OEA, with the majority of machines operating in shielded areas on lower ground to the west of the OEA.

An increase in maximum western OEA height from RL 200 m to RL 230 m as a result of the Modification would have the following effect on received $LA_{eq,15min}$ and $LA_{1,1min}$ noise levels:

- Noise levels from machines working on the exposed top of the western OEA would not appreciably change as the machines would remain similarly exposed to receivers; and
- All other mining machines operating on the shielded western side of the OEA would remain shielded from receivers and, in some cases, would contribute lower noise levels due to the increased height of the OEA providing improved shielding to receivers.

The proposed increase in the maximum height of the eastern OEA from RL 160 m to RL 190 m as a result of the Modification would similarly not have an appreciable effect on noise levels at any receiver, particularly as the eastern OEA is more remote from all private receivers.

8.2.2 Blasting

Blasting criteria specified in Schedule 3 Condition 10 of PA09_0176 for various receivers and receiver areas are shown in **Table 9**.

Table 9
Approved Blasting Criteria (PA09_0176)

Receiver	Airblast Overpressure dBLinPk	Ground vibration mm/s	Allowable Exceedance
Privately owned residences & Camberwell Church	120	10	0%
	115	5	5% of the total number of blasts over a 12 month period
Ravensworth Public School & Chain of Ponds Hotel	133	10	
Ravensworth Homestead	126	10	
Aboriginal axe grinding groove site (REA86)	-	175	
Narama in-pit storage dam wall and proposed dam wall	-	25	
Conveyors including the Hunter Valley Operations conveyor	-	100	
Main Northern Railway culverts and bridges	-	25	
Transmission lines	-	50	
Ashton underground mine	-	6	

An increase in maximum western OEA height from RL 200 m to RL 230 m would have no negative effect on blast impacts at any receiver, as blasting and overburden emplacement are not related activities. As overpressure is effectively low frequency noise, the Modification may, if anything, reduce airblast overpressure levels at some or all receivers as the increased eastern OEA height may provide increased acoustic shielding for all blast locations. The Modification would therefore either not influence blasting impacts or may provide a minor benefit to receivers.

The qualitative acoustic assessment of the Modification has shown the proposed increase in height of the western and eastern OEAs would:

- Not appreciably increase received noise levels and may reduce noise levels due to increased shielding of the majority of mining operations; and
- Not increase blasting impacts and may slightly reduce airblast overpressure levels due to increased shielding provided by the OEA.

As such, the operational noise and blasting levels generated by existing operations with consideration of the Modification are comparable to that currently approved with no exceedance of the current criteria predicted at any private receiver.

8.2.3 Mitigation and Management

Given there are no additional noise impacts arising from the Modification, Ravensworth Operations will continue to implement existing management and mitigation measures to comply with appropriate standards including:

- Relocation of equipment under adverse weather conditions or during certain time periods; and
- Implementation of meteorological forecasting and real-time noise monitoring to indicate when noise levels are approaching relevant criteria.

These controls will continue to be implemented for the Modification and managed in accordance with the approved Noise Management Plan and Blast Management Plan.

8.3 VISUAL AND LIGHTING

8.3.1 Background

As discussed in **Section 4.3**, Ravensworth Operations has reviewed the completion criteria and final landform presented in the Ravensworth EA and has identified areas where improved landscape outcomes can be achieved through the implementation of the final landform strategies described in this Modification. This Modification will provide stakeholders with a final landform that more naturally blends into the surrounding topography.

The Visual Impact Assessment (Umwelt, 2010c) undertaken for the Ravensworth EA characterised the local visual landscape within the vicinity of the approved operations boundary as being dominated by mining and power generation industries. To improve the local visual landscape to better reflect the wider surrounding topography Ravensworth Operations has developed an alternative conceptual final landform which includes topographical micro relief whilst still meeting the industry standards including DRE's ESG3: Mining Operations Plan (MOP) Guidelines (September 2013) design standards.

8.3.2 Impact Assessment

The staged development of the revised conceptual final landform (see **Figure 3**) will be progressed consistently with the mine plans presented in the Ravensworth EA and Narama West EA however the final landform proposed will replace the Final Conceptual Landform presented in Appendix 7 of PA 09_0176 (as modified).

The New England Highway is located approximately 3 km to the east, and 6 km to the north west of the Modification areas. Views of the OEAs as proposed in the Modification would be generally shielded from the New England Highway by natural topography and formerly rehabilitated areas associated with the Ravensworth South and Ravensworth No. 2 mining operations.

The nearest privately owned residence to the OEAs the subject of the Modification is a rural residence location approximately 5 km to the south east. Camberwell Village is also located approximately 5 km to the south east of the proposed change in landform height (see **Figure 2**).

Situated to the immediate west of the OEAs the subject of the Modification is Hunter Valley Operations West Pit (a Coal & Allied operation) with no private residences or public roads. To the east of this area are rural residences located at distances greater than 5 km away. The existing Aston Coal Mine and Glendell Mine are situated between the site of the Modification and the residences providing negligible views from these locations. As a result areas to the east and west of the site have been assessed as low impact and are not considered further.

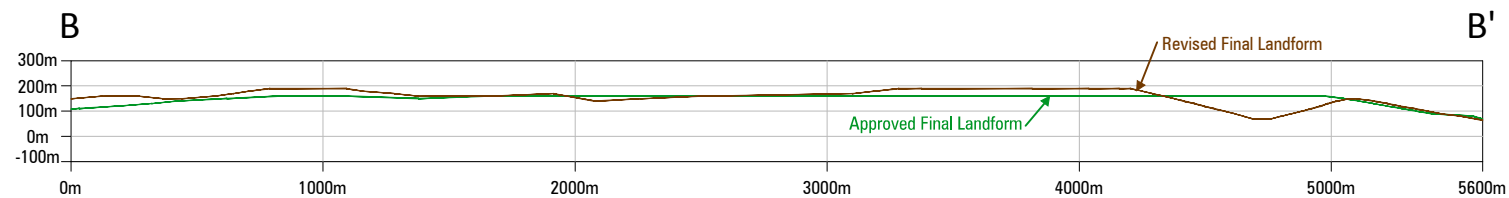
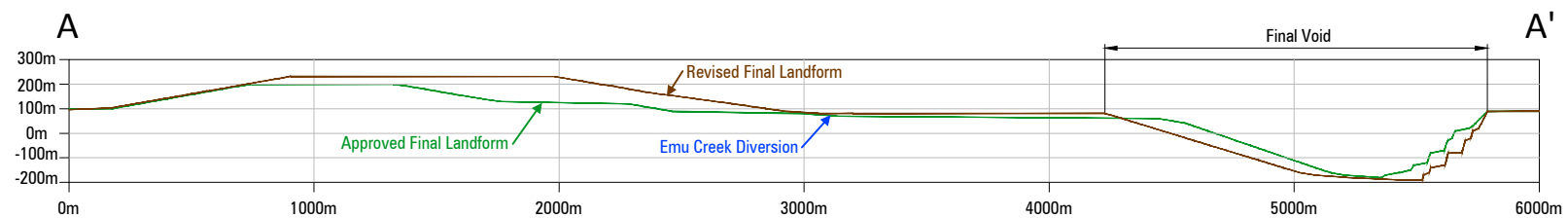
As described in the Ravensworth EA (Umwelt, 2010a) *'The overburden emplacement areas will become increasingly visible over the life of the Project as they are built up above the surrounding landscape. However these areas will also serve to block views of active mining areas, surface facilities and previously mined voids from surrounding areas.'*

If the Modification is approved, Ravensworth Operations will incorporate landscape design to shape the overburden emplacement areas with additional undulation and a more diverse topography (when compared to the approved landform) so that the revised conceptual final landform will more closely blend in with the surrounding area. Additional detail regarding rehabilitation of the revised final landform including the continued use of specialised modelling software is presented in **Section 8.11**.

The Visual Impact Assessment (Umwelt, 2010c) identified medium short term visual impacts associated with various mining operations were predicted at some elevated private receivers to the south and south-east of the approved operations boundary. This is also the case for users of the New England Highway, Lemington Road realignment and Main Northern Railway line. The majority of the views from a number of private receivers, including Camberwell Village, were assessed as being shielded by an existing ridgeline. Given the distance from nearest private receives (approximately 5 km away) and relative short term transient views from adjacent public roads no significant additional visual impacts are predicted as a result of the Modification.

Figure 4 presents sections associated with the revised conceptual final landform (see **Figure 3**). As depicted on **Figure 4** the Modification is generally consistent with the approved final landform however with the added topographical relief provides for a more undulating and natural appearance. The Modification provides for an improved final landform outcomes when compared to the approved landform.

The Ravensworth EA (Umwelt, 2010a) predicted direct lighting effects from elevated mobile lighting plants during various stages of the mine life and from infrastructure adjacent to the New England Highway. Any night lighting impacts associated with the Modification and supporting surface infrastructure will be consistent with approved operations as assessed in the Ravensworth EA (Umwelt, 2010a).



HB 1431 10 Ravensworth Mod - Landform Sections Combined (9/09/2014)

(The indicative landform indicated is to be further developed at detailed design to ensure appropriate natural looking micro relief.)

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Conceptual Final Landform Sections

FIGURE 4

8.3.3 Mitigation and Management

In addition to the improved visual outcome provided by the Modification, Ravensworth Operations will continue to implement the following visual management and mitigation measures:

- Placement of the eastern out of pit overburden emplacement area to the east, so that the overburden emplacement areas will act as a topographic shield for areas to the east, once rehabilitated;
- Positioning of infrastructure areas to maximise, to the extent practicable, shielding from natural topographical features;
- Landform design and maximisation of progressive rehabilitation to limit impacts on natural topography of the site;
- Additional screening plantings will be utilised in strategically located positions to augment existing plantings and limit views into the operations from the New England Highway and Lemington Road;
- External fixed lights which do not shine above the horizontal;
- Light shields to direct light on fixed lights;
- Communication (via toolbox talks, crew talks and the site familiarisation) of potential impacts of lighting to operators of mobile plant;
- Ensuring that all external lighting associated with the operations complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*; and
- Colouring all buildings potentially visible to the public will be coloured in suitable natural tones.

8.4 WATER RESOURCES

Comprehensive surface water and groundwater assessments have been undertaken both for the Ravensworth EA (Umwelt, 2010a) and the Narama West Modification (Hansen Bailey, 2013). Given the minimal changes to final landform drainage and catchment area reporting to site storages, (downstream flow) impacts on the receiving environment compared with the approved existing operation will be insignificant.

As identified and assessed in the Ravensworth EA (Umwelt, 2010a) the final void has been predicted to behave as a groundwater sink and the Modification, which is proposed to only increase the height of the OEAs, will not alter this. Further, the Ravensworth EA (Umwelt, 2010a) also predicted that Ravensworth Operations would not affect groundwater quality in any of the adjacent aquifers. The Modification is not anticipated to alter this finding.

The existing surface water and groundwater monitoring network and program is considered adequate to monitor the impact of the Modification and will continue to be implemented in accordance with the approved Water Management Plan.

The Ravensworth MOP will be updated for the Modification in consultation with the relevant agencies to the satisfaction of DRE to include detailed water management design associated with the revised final landform.

8.5 ECOLOGY

Comprehensive ecological impact assessments have been undertaken both for the Ravensworth EA (Umwelt, 2010a) and the Narama West Modification (Hansen Bailey, 2013). As the Modification will not result in any increase to the total disturbance footprint, no additional impacts are anticipated to occur on any flora or fauna.

8.6 ABORIGINAL HERITAGE

The Ravensworth EA (Umwelt, 2010a) identified a number of previously registered and newly recorded Aboriginal archaeological sites within and surrounding the approved operations boundary. As the Modification will not result in any increase to the total disturbance footprint no impacts are anticipated at any Aboriginal heritage site.

Should any unidentified Aboriginal archaeological sites be located during operations, the procedures of the approved Aboriginal Cultural Heritage Management Plan (ACHMP) will be implemented.

8.7 HISTORICAL HERITAGE

The Ravensworth EA (Umwelt, 2010a) identified several historic heritage items within and surrounding the approved operations boundary. As the Modification will not result in any increase to the total disturbance footprint no impacts are anticipated at any historic heritage site.

Ravensworth Operations will continue to comply with PA 09_0176 (as modified) to ensure blast vibration and overpressure generated by Ravensworth Operations will remain within relevant criteria at each listed historic heritage site.

8.8 TRAFFIC AND TRANSPORT

The Modification will not result in an increase above the approved workforce of approximately 550 full time equivalent personnel or service demands, road traffic regimes will remain consistent with approved operations as assessed in the Ravensworth EA (Umwelt, 2010a).

In addition, the Modification will not involve any changes to the approved maximum production limit of 16 Mtpa ROM coal, and as such rail movements will remain consistent with approved operations as assessed in the Ravensworth EA (Umwelt, 2010a).

8.9 WASTE

Ravensworth Operations conducts activities in accordance with an existing waste management system. No additional operational waste is anticipated to be generated by the Modification. All general and hazardous materials, rejects and tailings will continue to be handled in accordance with approved operations.

8.10 SOCIAL

The Ravensworth EA (Umwelt, 2010a) identified that with an approved workforce of limit of approximately 550 full time equivalent personnel, there would be a strain on education and health facilities/services and accommodation in the local area, in particular the Singleton LGA. In this regard, Ravensworth Operations entered into a Voluntary Planning Agreement (VPA) with SSC (as at 5 December 2011) to provide in kind and monetary contributions to mitigate these social impacts and support community growth.

Given the Modification will not result in any change to the approved workforce or materially change the nature and scale of the activities at the Ravensworth Operations Project, no additional social impacts are anticipated beyond that assessed in the Ravensworth EA (Umwelt, 2010a).

8.11 REHABILITATION AND FINAL LANDFORM

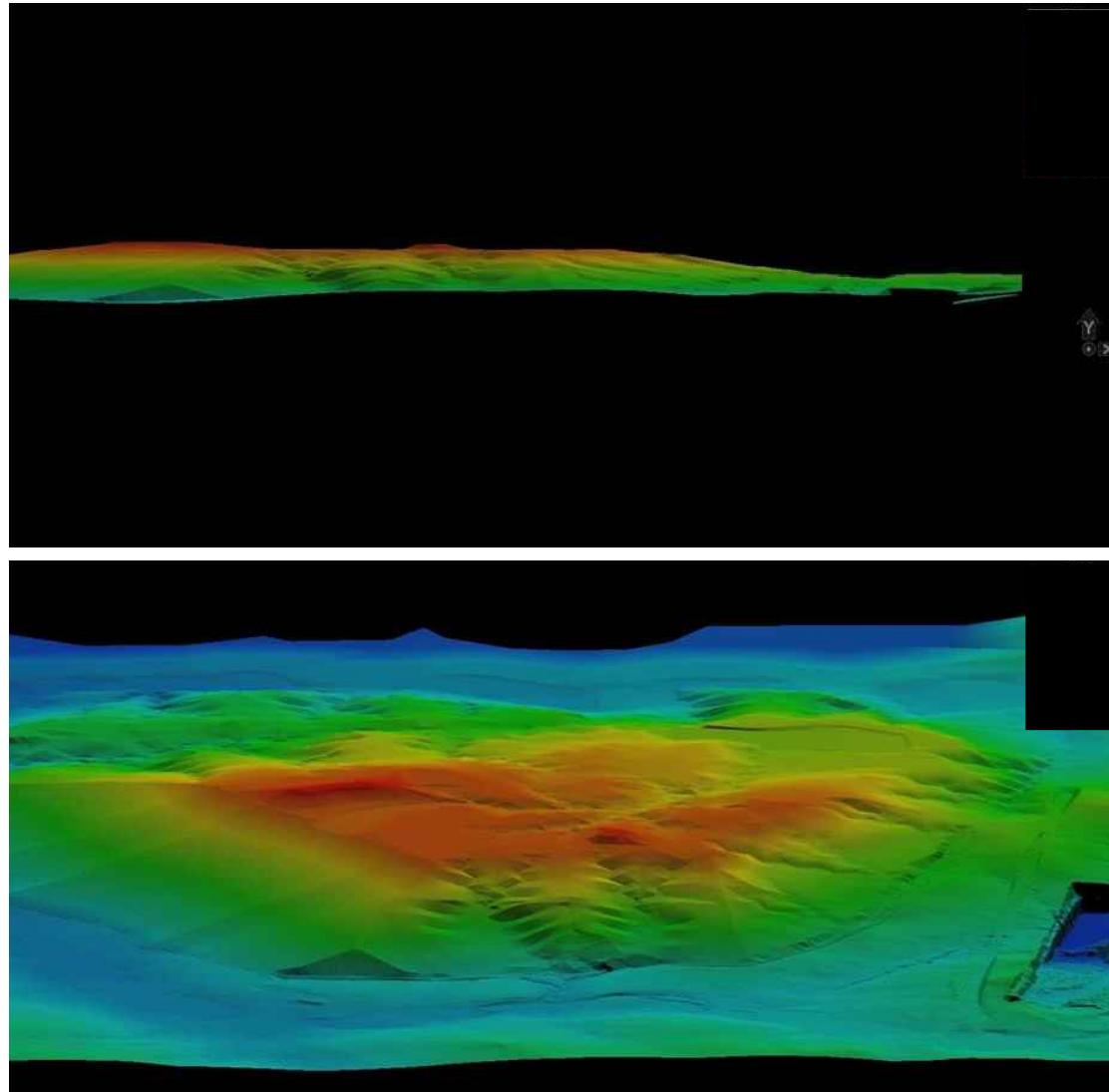
The Modification will not require any additional disturbance but rather will improve the approved final landform. This is proposed to be achieved by the application of final landform design software which effectively returns land to a more natural function and appearance through the implementation of 'micro relief'. This micro relief software has been applied to the eastern OEA on **Figure 3**.

The implementation of trials associated this new technology has already commenced at Ravensworth Operations with its successful application to the lower lying areas of the Eastern OEA. Ravensworth Operations will report on the continued refinement and success of the micro relief activities within the Annual Environmental Management Report.

Micro Relief modelling of the Western OEA is also well advanced with conceptual visualisations directly from the software are presented on **Figure 5**. Further refinement of the final landform as a result of the Modification, including detail associated with the design and implementation of micro relief modelling software, will be included within the revision to the Ravensworth MOP and as part of the on-going development of the Conceptual Rehabilitation and Mine Closure Plan (Conceptual RMCP).

All existing commitments outlined in PA 09_0176 will remain consistent with, and will continue to be maintained as a result of the Modification. PA 09_0176 Schedule 3, Condition 40 (a) notes that rehabilitation should be conducted progressively as soon as practicable following disturbance and Schedule 3, Condition 40 (b) notes that Ravensworth Operations will achieve rehabilitation objectives consistent with commitments in the Ravensworth EA (and associated Response to Submissions).

PA 09_0176 Schedule 3, Condition 32 states that as a component of the Biodiversity Offset Strategy (which constitutes a minimum area of 3,725 ha) a total of 1,767 ha of woodland vegetation will be established within the Ravensworth Operations rehabilitation area over the life of the project. These rehabilitation works will ensure that the area of native vegetation established is consistent with the pre-mining extent of native vegetation. The Modification will not result in any reduction in the total rehabilitation or existing offset commitment.



HB 1431 11 Ravensworth Mod - Micro Relief (11/09/2014)

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Conceptual Implementation of Micro Relief Software

FIGURE 5

Once rehabilitated the increased topographical relief that the Modification provides will result in an overall net benefit in terms of an improved post mining landform. In addition to the commitment to implement micro relief into the final landform existing rehabilitation objectives of the approved Rehabilitation Management Plan and Ravensworth MOP will continue to be employed as a result of the Modification which include:

- Stabilising disturbed landforms and ensuring they are free-draining;
- Revegetating landform elements in accordance with their planned final land use;
- Ongoing monitoring and maintenance of rehabilitated areas to ensure rehabilitation is progressing in accordance with the Conceptual RMCP and any approval criteria that apply to rehabilitation;
- Predominantly re-establish those vegetation communities and fauna habitats currently occurring or previously occurring at the site and connect as far as reasonably practical;
- Shaped overburden generally consists of slopes of 10 degrees, with some slopes slightly steeper up to 14 degrees;
- Contour drains and dams are installed along with toe drains and silt trap dams;
- Topsoil and or ameliorants are generally placed at an average thickness of 100 mm over shaped overburden areas;
- In areas allocated for woodland rehabilitation, deep ripping occurs along the contours over the entire area. For proposed pasture areas, the surface is ripped and rock – raked to remove any rocks at the surface;
- Where required, the ground will be selectively treated with gypsum at the rate of 10 t/ha to combat the high clay content and to prevent surface sealing, thus enabling water penetration into the overburden;
- After ameliorant application, the area is then deep ripped on the contour. Any large rocks brought to the surface are raked aside and then removed, used in spillways and drains or used to create habitat; and
- Where possible salvaged features such as logs and hollows are placed within the woodland rehabilitation areas to aid with habitat creation.

The final land use for the final void has not yet been determined, with a decision on the final land use of the final void to be made closer to mine closure. The Void Management Plan identified a number of potential final land uses. Detailed measures to manage the final void will be outlined in the detailed RMCP, which is to be prepared at least five years prior to mine closure.

As a requirement of PA 09_0176, Emu Creek will be re-established and the Bayswater Creek diversion will be remediated to provide a hydraulically and geomorphologically stable streams.

9 STATEMENT OF COMMITMENTS

Further to the conditions of PA 09_0176, the statement of commitments in **Table 10** summarises the key management and mitigation measures proposed in this EA.

The aim of the statement of commitments is to ensure that the Modification's environmental and social impacts are minimised by implementing the appropriate management, monitoring and mitigation strategies.

Table 10
Statement of Commitments

Ref.	Commitment	EA Section
1	<p>Ravensworth Operations will continue to manage its operations (including the Modification) in accordance with the conditions of PA 09_0176 (as modified) and the approved:</p> <ul style="list-style-type: none"> • Air Quality and Greenhouse Gas Management Plan; • Blast Management Plan; • Noise Management Plan; • Aboriginal Cultural Heritage Management Plan; and • Water Management Plan. 	7
2	The existing Ravensworth Open Cut & Ravensworth Coal Handling Preparation Plant Mining Operations Plan will be updated in consultation with the relevant agencies to the satisfaction of DRE to incorporate changes arising from the Modification.	7
3	The conceptual final landform indicated is to be further engineered to ensure appropriate natural looking micro relief with detail presented in the revised Ravensworth Open Cut & Ravensworth Coal Handling Preparation Plant Mining Operations Plan.	8.11

10 ABBREVIATIONS

Abbreviation	Description
CHPP	Coal Handling and Preparation Plant
CMHS Act	<i>Coal Mine Health and Safety Act 2002</i>
DP&E	NSW Department of Planning and Environment
EA	Environmental Assessment
EMS	Environmental Management System
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
Ha	Hectare
Hansen Bailey	Hansen Bailey Environmental Consultants
Hunter Regulated WSP	<i>Water Sharing Plan for the Hunter Regulated River Water Source 2003</i>
Hunter Unregulated WSP	<i>Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009</i>
LGA	Local Government Area
M	Million
ML	Megalitre
MNES	Matters of National Environmental Significance
The Modification	Ravensworth Operations Final Landform Modification
Mt	Million tonnes
Mtpa	Million tonnes per annum
NSW	New South Wales
OEA	Overburden Emplacement Area
PA	Project Approval
PM _{2.5}	Particulate Matter <2.5 microns
PM ₁₀	Particulate Matter <10 microns
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Ravensworth Operations	Ravensworth Operations Pty Limited
RL	Reduced Level
ROM	Run of Mine
SSC	Singleton Shire Council
TEOM	Tapered Element Oscillating Microbalance
Tpa	Tonners per annum
Tph	Tonnes per hour
TSP	Total Suspended Particulates
WSP	Water Sharing Plan

11 REFERENCES

- Glencore (2014) *Ravensworth Complex Annual Review - for the period of 1 January 2013 – 31 December 2013.*
- Glencore (2013) *Ravensworth Open Cut & Ravensworth Coal Handling Preparation Plant Mining Operation Plan*, covering the period December 2013 - 2018
- Glencore (2013) *Ravensworth Mine Complex – Coal Mine Particulate Matter Control Best Management Practice Determination.*
- Hansen Bailey (2013) *Narama West Modification Environmental Assessment.*
- PAEHolmes (2010) *Ravensworth Operations Project – Air Quality Impact Assessment.*
- Umwelt Pty Ltd (2010a) *Ravensworth Operations Project Environmental Assessment.*
- Umwelt Pty Ltd (2010b) *Ravensworth Operations Project Noise Impact Assessment.*
- Umwelt Pty Ltd (2010c) *Ravensworth Operations Project Visual Impact Assessment.*

APPENDIX A

Air Quality Review Report



Report

RAVENSWORTH OVERBURDEN EMPLACEMENT AREAS MODIFICATION – AIR QUALITY ASSESSMENT

HANSEN BAILEY

Job ID. 08892

16 September 2014

PROJECT NAME: Ravensworth Overburden Emplacement Areas
Modification – Air Quality Assessment

JOB ID: 08892

DOCUMENT CONTROL NUMBER AQU-NW-002-08892

PREPARED FOR: Hansen Bailey

APPROVED FOR RELEASE BY: Judith Cox

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1 INTRODUCTION

Ravensworth Operations Pty Limited (Ravensworth Operations) is a wholly owned subsidiary of Glencore Coal Limited (Glencore) and manages the active Ravensworth North and Narama mining areas, and the former Cumnock, Ravensworth West and Ravensworth South mining areas (the Ravensworth Operations Project). Ravensworth Operations is situated within the Singleton Local Government Area (LGA) and located approximately 15 kilometres (km) north-west of Singleton and 17 km south-east of Muswellbrook in the Upper Hunter Valley of NSW. **Figure 2.1** illustrates the location of Ravensworth Operations and its approved operations boundary.

Pacific Environment has been engaged by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of Glencore to complete a qualitative air quality assessment for a minor modification at Ravensworth Open Cut Operations (the Modification). The Modification relates to proposed changes to the height and design of their approved overburden emplacement areas (OEA).

Ravensworth are planning to progressively develop the OEA to a maximum height greater than levels approximated in the Ravensworth Operations Project Environmental Assessment (Ravensworth Operations EA) (**Umwelt, 2010**). New South Wales (NSW) Department of Planning and Environment (DP&E) have confirmed that a qualitative air quality assessment is sufficient for this minor modification.

2 PROPOSED MODIFICATION

The Ravensworth Operations EA stated that the OEA will be progressively developed over the life of the mine to a maximum height of approximately 200m RL and 160m RL for the northern and western emplacement areas respectively. The proposed changes to the OEA design would increase the maximum height of the northern emplacement area to 230m RL (increase of 30m RL) and the eastern emplacement area to 190m RL (increase of 30m RL). **Figure 2.2** shows the conceptual plans of the changes in OEA design.

Apart from the extension in overburden emplacement height sought, operations will continue in accordance with that described in the Ravensworth EA and stipulated in Project Approval (PA) 09_0176. There is not anticipated to be any additional material hauled to the OEA, nor is there any proposed increase in OEA footprint or run of mine (ROM) coal production compared to approved operations.

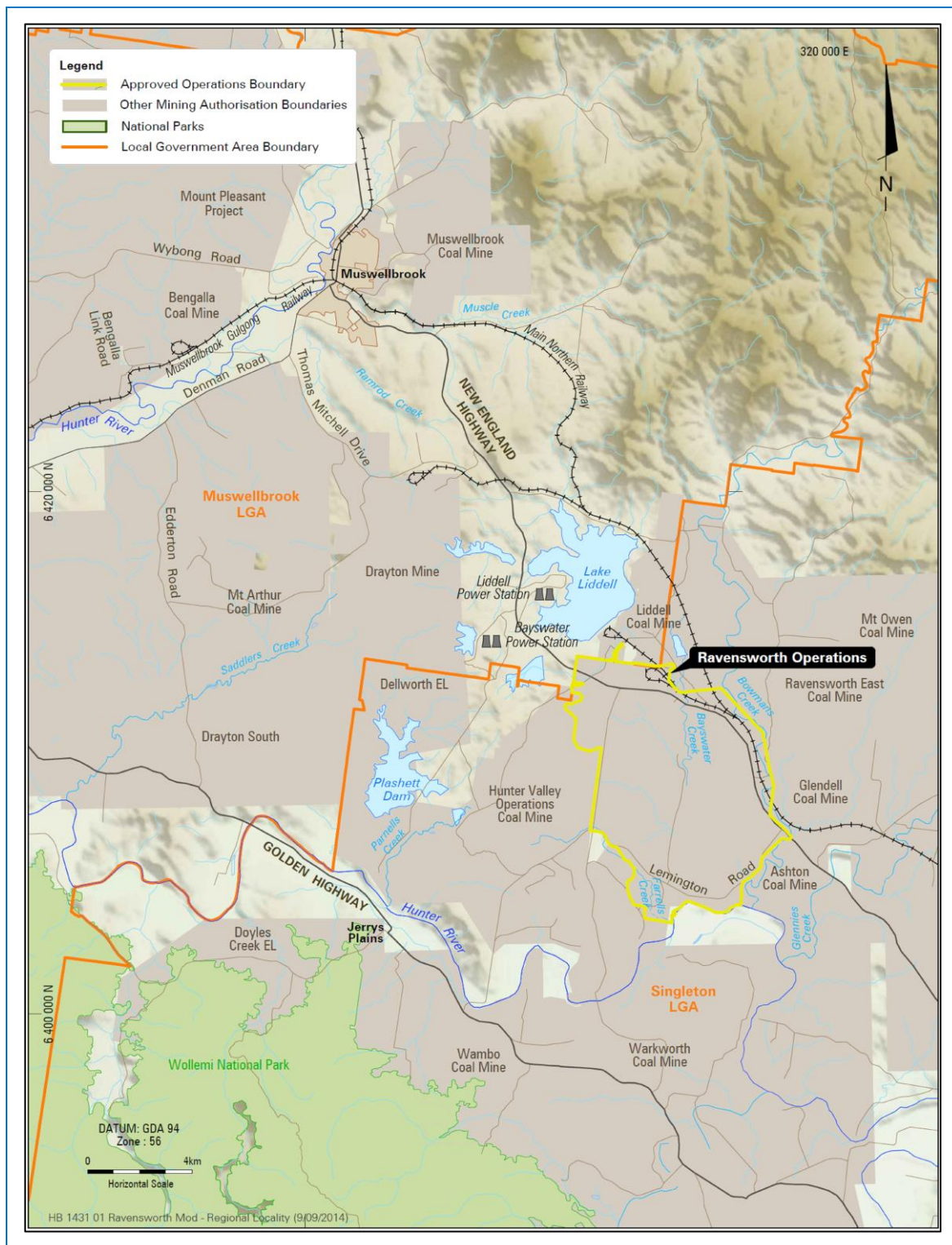


Figure 2.1: Regional Locality Plan

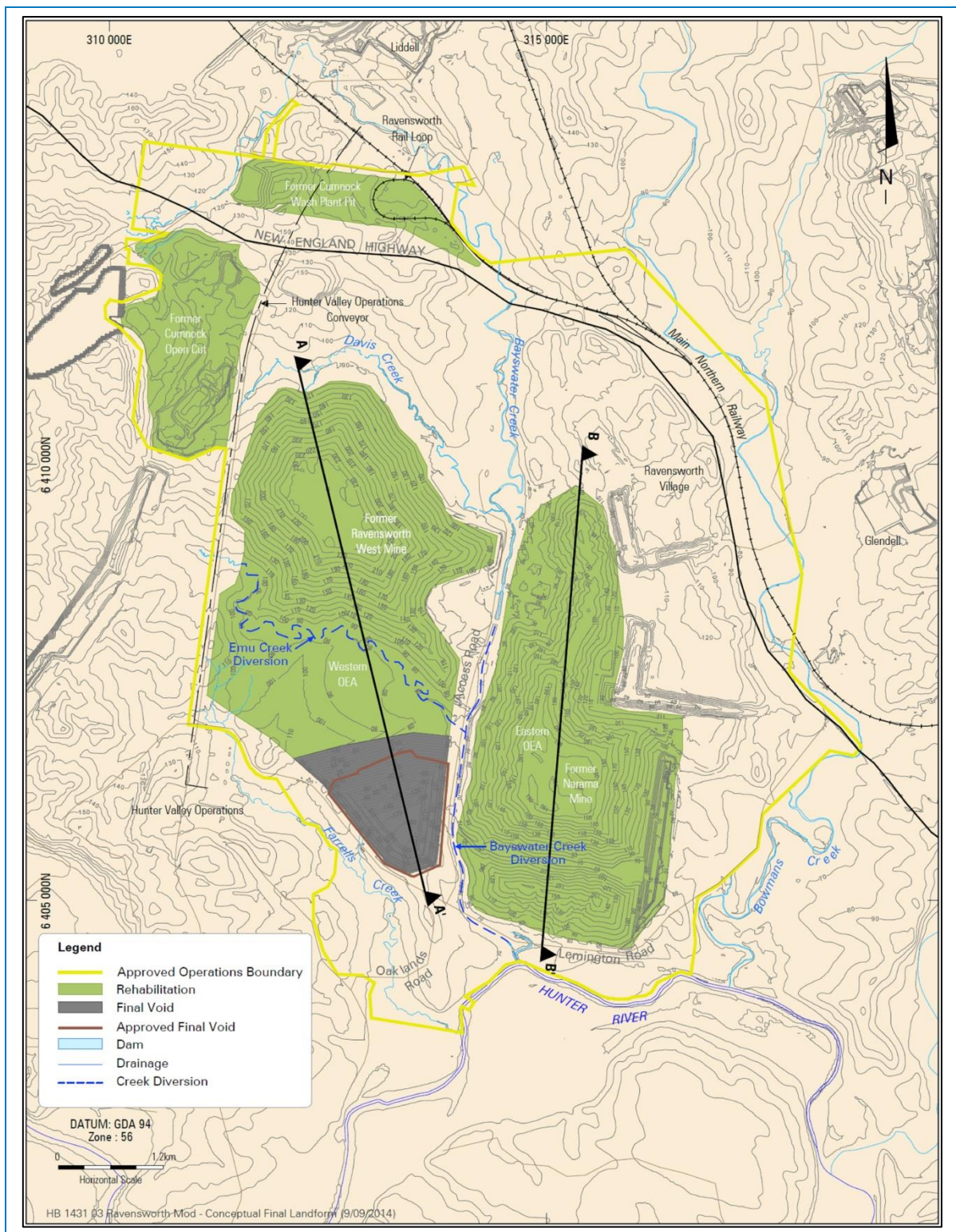


Figure 2.2: Location of Overburden Emplacement Areas

3 PREVIOUS STUDIES

In 2010, PAEHolmes (now Pacific Environment Limited) prepared an Air Quality Impact Assessment (AQIA) for the Ravensworth Operations Project (**PAEHolmes, 2010**). The AQIA included an assessment of potential impacts from Ravensworth Operations, including open cut mining within existing mining leases held by Glencore and its subsidiaries in isolation and cumulatively with other surrounding mining and non-mining operations.

Dispersion modelling was used to predict offsite dust concentrations and deposition levels from mining activities associated with the Ravensworth Operations Project. Modelling took account of local meteorology and terrain and used dust emission estimates to predict ground level concentrations (glcs) for six conceptual mining scenarios (Year 3, 5, 10, 15, 20 and 25). Year 3 most closely relates to 2013, so Year 5 and beyond are relevant for this report.

Model predictions at privately-owned residences were compared with air quality criteria established by the NSW Environment Protection Authority (EPA) and NSW DP&E. These criteria are for 24-hour and annual average PM₁₀ (particulate matter less than 10 microns), annual average TSP (total suspended particulates) and annual average dust deposition.

The dispersion modelling indicated that the Ravensworth Operations Project was likely to result in:

- exceedances of the 24-hour average PM₁₀ criterion at six private residences (in Year 3), one of which has since been acquired by Glencore. These residences are shown in **Figure 3.1** and the predicted numbers of exceedances are shown in **Table 3.1 (PAEHolmes, 2010)**.
- exceedances of the 24-hour average PM₁₀ criterion at the recently acquired Glencore property in Years 5, 10, 15, 20 and 25.
- no exceedance of the annual average PM₁₀ criterion at private residences.
- no exceedance of the annual average TSP criterion at private residences.
- no exceedance of the annual average dust deposition criterion at private residences.

The assessment of cumulative impacts (**PAEHolmes, 2010**) indicated that dust emissions from the Ravensworth Operations Project and other sources are unlikely to significantly contribute to the existing dust levels at Camberwell Village, located approximately 3 km to the east-southeast.

Table 3.1: Predicted Air Quality Exceedances (AQIA)

Residence ID	AQIA predicted no. of days exceeding the 24-hour average PM ₁₀ criteria of 50 µg/m ³					
	Year 3	Year 5	Year 10	Year 15	Year 20	Year 25
3	5	-	-	-	-	-
6A	6	-	-	-	-	-
6B	7	-	-	-	-	-
6C	5	-	-	-	-	-
13	1	-	-	-	-	-
34*	35	10	42	54	39	6

* Residence acquired by Glencore

Source: **PAEHolmes 2010** (Section 7.3.1)

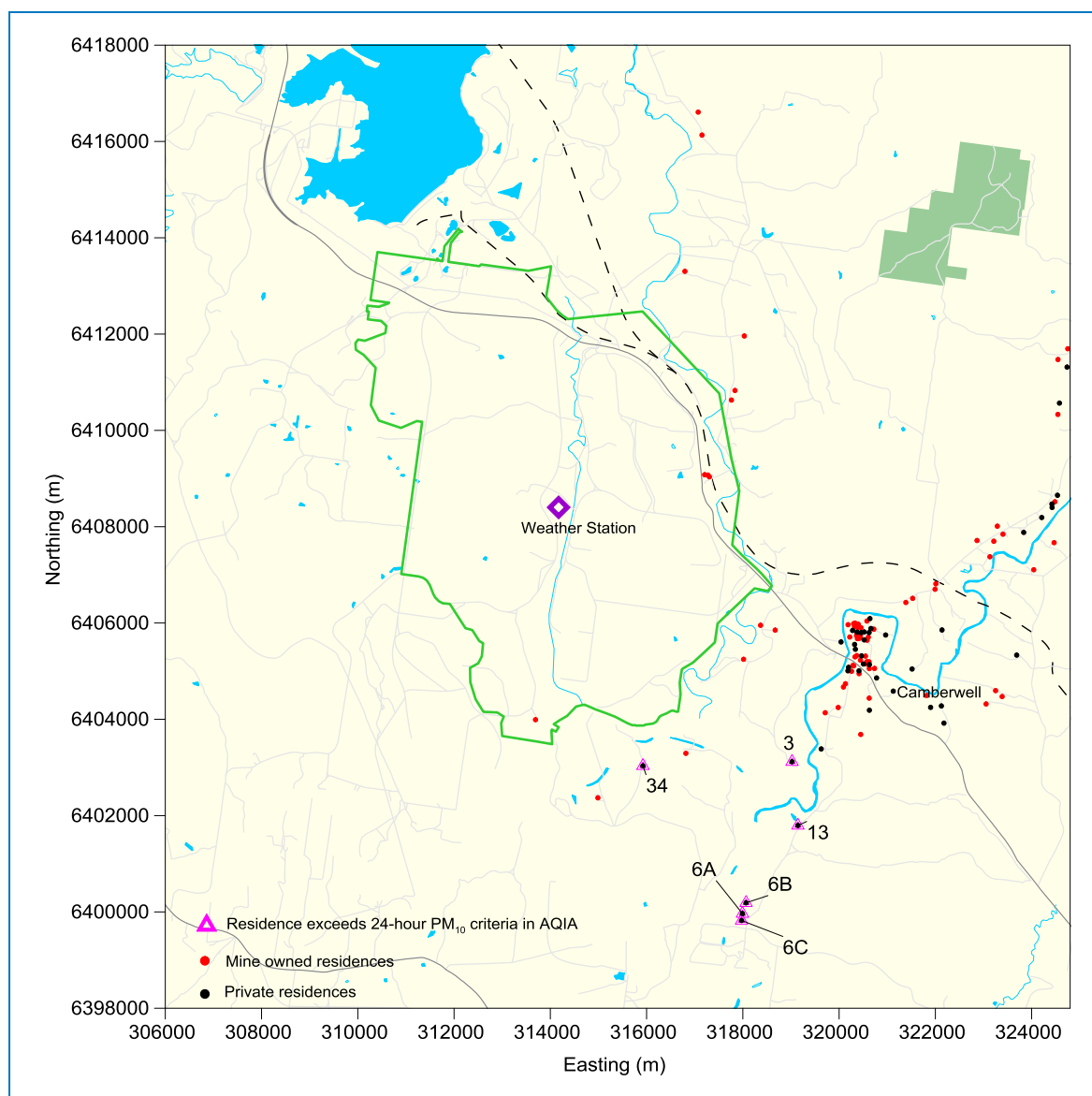


Figure 3.1: Residences Predicted to Exceed the 24-hour Average PM₁₀ Criteria (PAEHolmes 2010)

In 2013, Ravensworth Operations sought a modification to PA 09_0176 to recover 2.7 million tonnes of ROM coal in the Narama mining area (Modification 1). The air quality assessment for this modification was carried out by PAEHolmes (now Pacific Environment) (PAEHolmes, 2013). The assessment compared emissions from the approved Ravensworth Operations EA to those generated by the proposed modification. The assessment concluded that the Modification 1 would be unlikely to result in measureable differences to annual PM₁₀ concentrations at private receptors. It should be noted that Modification 1 incorporated short-term changes to locations of equipment and mining areas and was estimated to last for only 2 years. After that time, operations will return to those already assessed in the Ravensworth Operations EA. With regard to air quality, Modification 1 is not a significant modification and does not need to be included in further discussion.

It should also be noted that since both the Ravensworth Operations EA and Modification 1 assessments were completed, there have been further dust reduction requirements placed on NSW coal mines in the form of Pollution Reduction Programs (PRPs). One of the most significant PRP measures has been to ensure that an 80% control can be achieved on wheel generated dust (Condition U1.1 of EPL 2652 for Ravensworth Open Cut). This is higher than the 75% used in the emissions estimation and modelling for the Ravensworth Operations EA and as such, concentrations are likely to be lower than those

predicted in that assessment. Recent monitoring programs carried out as part of this PRP have confirmed that Ravensworth are currently achieving well above 80% control on their haul roads (Glencore, 2014).

In addition, all measures to ensure compliance with the relevant criteria (described in **Section 4**) and minimise impacts at those residences identified in **Table 3.1** are managed in accordance with the approved Air Quality and Greenhouse Gas Management Plan as required by PA 09_0176 (as modified).

4 ASSESSMENT CRITERIA

Table 4.1 summarises the air quality assessment criteria for concentrations of particulate matter that are relevant to this study.

Table 4.1: EPA air quality assessment criteria for particulate matter concentrations

Pollutant	Averaging period	Criteria	Agency
PM ₁₀	24-hour	50 µg/m ³	EPA impact assessment criteria (cumulative) Ambient Air-NEPM reporting goal, allows five exceedances per year for bushfires and dust storms
	Annual mean	30 µg/m ³	EPA impact assessment criteria (cumulative)
TSP	Annual mean	90 µg/m ³	National Health and Medical Research Council (cumulative)

Note: µg/m³ – micrograms per cubic metre

Table 4.2 shows the maximum acceptable increase in dust deposition over the existing dust levels from an amenity perspective. These criteria for dust fallout levels are set to protect against nuisance impacts.

Table 4.2: EPA criteria for dust deposition (insoluble solids)

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Note: g/m²/month – grams per square metre per month

5 EXISTING ENVIRONMENT

5.1 Dispersion Meteorology

Meteorological data are collected at the Ravensworth/Narama meteorological station operated by Ravensworth Operations. The AQIA for the Ravensworth Operations EA (PAEHolmes 2010) used meteorological data from this station for the period April 2008 to March 2009. Windroses for this period are presented in **Figure 5.1**.

On an annual basis, the most common winds are from the north-west and the south-east. Very few winds originate from the north-east and south-western quadrants. Spring and autumn winds include both north-westerlies and south-easterlies. During summer, winds are predominantly from the south-east, while in the cooler winter months winds are predominantly from the north-west. These prevailing winds are typical of seasonal patterns experienced in the central regions of the Hunter Valley. The wind conditions recorded at this meteorological station in more recent years have shown the same general characteristics in terms of wind direction.

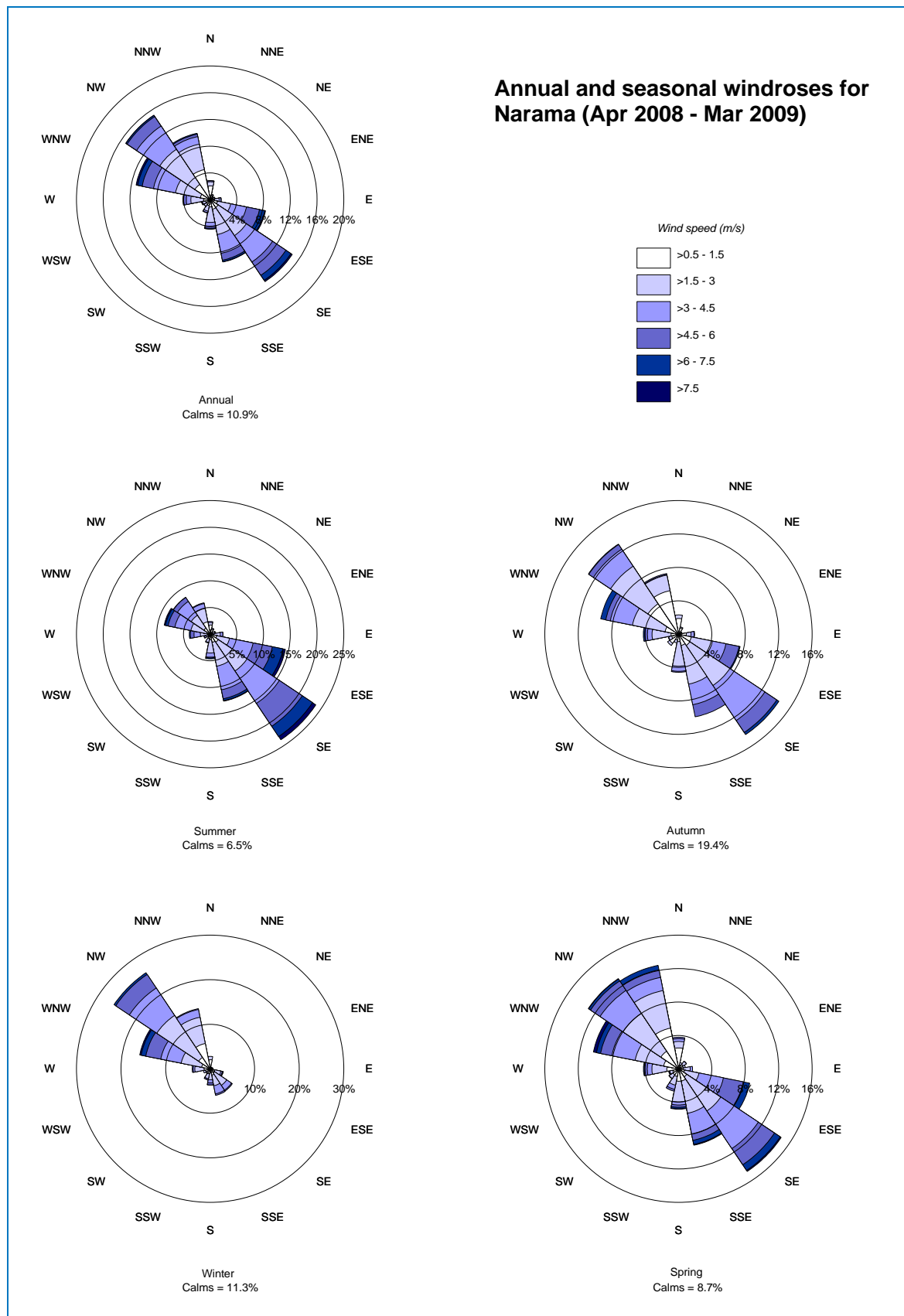


Figure 5.1: Windroses for Ravensworth/Narama 2008-2009

5.2 Existing Air Quality

Air quality monitoring data collected since 2004, in the area within and surrounding Ravensworth Operations, have been reviewed for the Modification. Insoluble solids deposition levels are monitored monthly at 18 different locations and concentrations of TSP are monitored at seven locations, every sixth day. The locations of the deposition and HVAS monitoring sites are shown in **Figure 5.2**. In conjunction with their HVAS monitors, Ravensworth Operations operate two Tapered Element Oscillating Microbalance (TEOM) stations which measure PM₁₀. PM₁₀ measurements are also made at Camberwell as part of the EPA's Upper Hunter Air Quality Monitoring Network (UHAQMN). These monitoring locations are shown in **Figure 5.2**.

The monitors measure the existing dust deposition and particulate concentrations due to emissions from all sources that contribute to dust in the air. These sources include emissions from Ravensworth Operations, emissions from neighbouring mining operations and other anthropogenic sources, as well as natural emission sources in the area. These data are discussed in **Section 5.2.1** and **Section 5.2.2**.

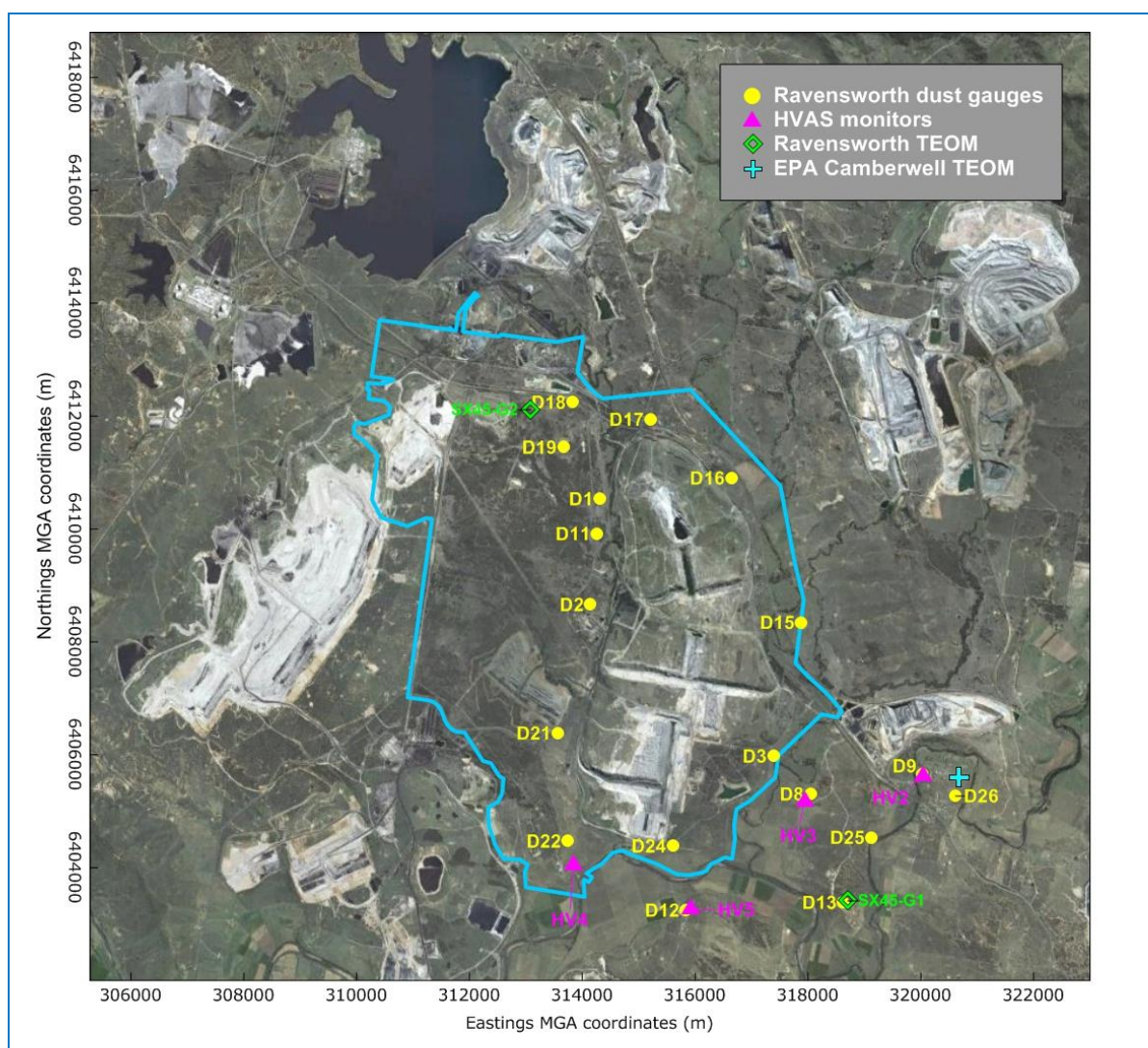


Figure 5.2: Air Quality Monitoring Network

5.2.1 PM₁₀ and TSP Concentration

TSP concentrations are monitored in four different locations near Ravensworth Operations area (see **Figure 5.2**). Measurements are made over a 24-hour period, every sixth day. The annual average TSP concentrations monitored in these locations between 2005 and 2013 are summarised in **Table 5.1**.

Table 5.1: Annual average TSP concentrations (µg/m³)

Year	HV2	HV3	HV4	HV5
2005	78	66	73	66
2006	80	70	78	75
2007	96	77	76	75
2008	73	74	61	60
2009	100	80	78	69
2010	91	68	58	56
2011	64	72	67	58
2012	65	105	73	65
2013	73	114	78	69

HV3 and HV4 monitor conditions at residences with agreements or which are owned by mining companies. HV2 is located at Camberwell Church, near Camberwell Village approximately 5 km east of the project area. HV5 is located at a private residence located approximately 1 km to the south-east of the project area and is out of the dominant northwest/southeast wind direction axis.

The annual average TSP concentrations have been below the EPA 90 µg/m³ criterion in all years for monitors HV4 and HV5. These monitors are more likely to represent conditions with less contribution from the Ravensworth Operations as they are away from the dominant wind directions. Levels at HV3 are more representative of conditions at the most affected residences (as shown in the Ravensworth Operations EA), and are generally below the criterion with the exception of 2012 and 2013 when there were significant bushfires in the area and across the state. Dust storms and bushfires in 2009 are likely to have contributed to elevated levels in 2009 also, particularly at HV2.

The 24-hour average PM₁₀ measurements are presented in **Figure 5.3**, from July 2011. It shows the seasonal variation typical of the Hunter Valley with peaks occurring in the warmer months when the area is drier and also when bushfires and dust storms can often occur. There was significant bushfire activity in the latter half of 2012 and also in October-November 2013, which are shown in the elevated PM₁₀ levels at this time. The annual average PM₁₀ values were very similar at all three locations with 22 µg/m³ and 25 µg/m³ (2012) and 24 µg/m³ and 27 µg/m³ (2013) at the two Ravensworth Operations TEOMs and 25 µg/m³ (2012) and 26 µg/m³ (2013) at the EPA's Camberwell TEOM.

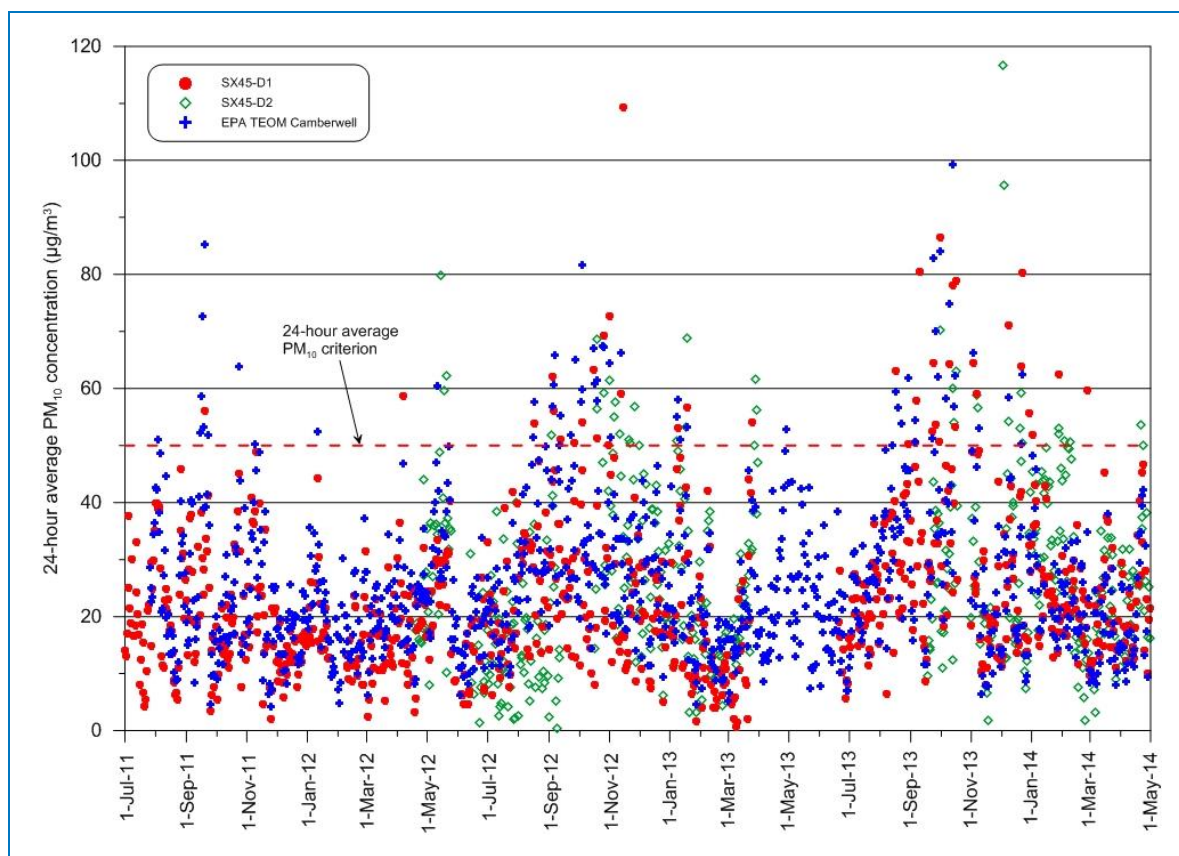


Figure 5.3: 24-hour average PM₁₀ TEOM measurements

5.2.2 Dust Deposition

Table 5.2 summarises the insoluble solids deposition levels monitored in the Ravensworth area since January 2002. Field notes that accompany the monitoring data indicate that many of the samples were contaminated with material such as bird droppings, decomposed insects or vegetable matter. This is not uncommon for this type of monitoring. Those samples affected by any of these potential contaminating influences have been excluded from the averages of the reported dust deposition.

Gauges D8, D13, and D26 (shaded in **Table 5.2**) can be considered as providing data representative of private residences nearest the Modification area. All other gauges are on agricultural land or mining land, or in areas well-removed from residences. These other gauges therefore provide diagnostic data rather than data that would be used to assess whether the EPA 4 g/m²/month (annual average) criterion is being met or not.

Gauges D8, D13 and D26 show annual average concentrations are generally less than the EPA dust deposition criteria of 4 g/m²/month. Levels at D9 have decreased significantly in recent years since the completion of operations at Ashton North East Open Cut directly to the north.

Table 5.2: Annual average (insoluble solids) deposition levels (g/m²/month)

Gauge	2005	2006	2007	2008	2007	2008	2009	2010	2011	2012	2013	Average
D1	1.9	1.8	5.9	2.8	3.0	1.8	5.9	3.9	3.4	5.0	5.3	3.7
D2	2.2	2.7	3.1	3.2	3.9	2.7	3.1	2.7	3.0	5.4	-	3.2
D3	3.3	2.2	4.7	5.8	3.9	2.2	4.7	3.4	2.7	8.2	5.2	4.2
D8	2.7	2.4	3.2	2.4	3.5	2.4	3.2	2.9	3.3	4.2	3.7	3.1
D9	3.0	3.0	5.3	4.3	6.2	3.0	5.3	5.1	2.5	3.7	2.7	4.0
D11	2.6	2.5	4.1	2.6	3.3	2.5	4.1	3.0	3.1	6.2	7.0	3.7
D12	2.1	4.0	3.0	5.6	7.4	4.0	3.0	7.2	1.8	5.1	2.0	4.1
D13	2.2	2.4	3.3	3.6	3.1	2.4	3.3	2.5	2.6	3.2	2.5	2.8
D14	-	-	-	-	-	-	-	3.7	-	-	3.4	3.6
D15	2.4	2.3	3.2	3.0	3.8	2.3	3.2	4.8	4.9	-	-	3.3
D16	1.6	2.0	2.2	2.2	7.2	2.0	2.2	4.1	3.2	3.5	3.5	3.1
D17	2.2	2.5	3.1	2.6	4.6	2.5	3.1	3.3	4.2	4.8	-	3.3
D18	1.6	2.4	3.0	2.9	3.9	2.4	3.0	3.1	2.7	-	-	2.8
D19	1.8	2.1	3.0	2.8	3.4	2.1	3.0	8.5	5.6	5.0	5.4	3.9
D20	3.5	-	-	-	-	-	-	3.0	2.0	2.4	2.8	2.7
D21	3.6	3.9	5.6	13.6	14.7	3.9	5.6	4.8	3.9	6.7	2.8	6.3
D22	1.9	2.0	3.0	4.1	2.7	2.0	3.0	3.3	2.2	4.0	3.1	2.8
D23	1.9	1.9	-	-	-	1.9	-	3.9	3.4	5.0	5.3	3.3
D24	3.5	4.6	7.2	-	-	4.6	7.2	2.7	3.0	5.4	-	4.8
D25	2.3	2.3	3.7	4.8	2.6	2.3	3.7	3.4	2.7	8.2	5.2	3.7
D26	2.1	2.0	2.9	2.8	3.0	2.0	2.9	2.9	3.3	4.2	3.7	2.9

6 QUALITATIVE ASSESSMENT

Estimates of total TSP emissions were made for each of the six modelling years in the 2010 AQIA (PAEHolmes, 2010). These totals are shown in **Table 6.1**, with the exception of Year 3, as that year is no longer relevant. The most significant sources of dust for each year were wheel generated dust from hauling waste from the pit to the OEAs and also wind erosion from the OEAs. These two sources combine to make up approximately half of the total emissions in each of these years and so any significant change to them may have an impact on the total emissions for each year. As described in **Section 2** there is not anticipated to be any additional material hauled to the OEA, nor is there any proposed increase in OEA footprint or run of mine (ROM) coal production compared to approved operations. Increasing the heights of the OEAs is therefore not anticipated to result in any significant change to total emissions for the project.

Table 6.1: Estimated annual TSP emissions (PAEHolmes, 2010)

	Year 5	Year 10	Year 15	Year 20	Year 25
Total TSP Emissions	8,148,986	11,629,549	11,510,757	9,526,848	5,322,272
Percentage due to waste haulage	33.8%	31.5%	31.3%	30.6%	26.7%
Percentage due to wind erosion on OEAs	18.9%	20.1%	19.6%	13.5%	21.5%

The original AQIA showed that no exceedances of the relevant criteria were predicted at the nearest private residences from Year 5, other than for the residence which has been subsequently acquired by Glencore. The analysis of emissions above has shown that the Modification is not likely to cause any increases in total emissions. The Modification is therefore not likely to result in any measureable changes to predicted ground level concentrations at sensitive receptors and as such is not expected to change the conclusions of the original modelling assessment. Furthermore, as discussed in **Section 3**, with the new PRP requirements now being imposed on NSW coal mines, including Ravensworth Operations, the emissions are likely to be lower than those calculated in the original AQIA.

7 CONCLUSIONS

This report has investigated the likely effects on air quality from the proposed Modification.

There are not anticipated to be any significant changes to particulate emission inventory or mine footprint due to the Modification, to that described and assessed in the Ravensworth Operations EA air quality impact assessment (PAEHolmes, 2010).

Based on the dispersion modelling completed for the Ravensworth Operations EA, the assessment concluded that when considered both in isolation, and cumulatively with other sources, the Modification is unlikely to result in exceedances of the EPA's impact assessment criteria for annual average PM₁₀, TSP or dust deposition at any private properties in the vicinity of the site.

The Ravensworth Operations EA predicted a number of exceedances of the 24-hour average criterion at a Glencore owned property from Year 5 onwards. This is expected to remain unchanged due to the proposed Modification.

In view of the above, it is anticipated that the Modification may be managed to ensure that there are no additional adverse air quality impacts at any sensitive receptors.

8 REFERENCES

Glencore (2014), "Ravensworth Open Cut – PRP Wheel Generated Dust Report", August 2014

PAEHolmes (2010), "Air Quality Impact Assessment: Ravensworth Operations Project", prepared by PAEHolmes for Umwelt (Australia) Pty Limited, January 2010.

Umwelt (2010), "Ravensworth Operations Project Environmental Assessment", prepared by Umwelt (Australia) Pty Limited on behalf of Ravensworth Operations Pty Limited, February 2010.

APPENDIX B
Acoustic Review Report

12 September 2014
Ref: J0130-89-L1

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Attn: Mr Jason Martin

Dear Jason,

RE: RAVENSWORTH MODIFICATION - ACOUSTICS

Ravensthorpe Operations Pty Limited (Ravensthorpe Operations) is a wholly owned subsidiary of Glencore Coal Pty Limited and includes the Ravensthorpe North and Narama mining areas and the former Cummoock, Ravensthorpe West and Ravensthorpe South mining areas (the Ravensthorpe Operations Project). The Ravensthorpe Operations Project is located within the Singleton Local Government Area (LGA) approximately 15 km north west of Singleton in the Hunter Valley region of NSW.

Mining is currently undertaken as described in the *Ravensthorpe Operation Project Environmental Assessment* (Ravensthorpe EA) (Umwelt, 2010) including development of the western and eastern OEAs to maximum Reduced Levels (RLs) of 200 m and 160 m respectively.

The Modification includes development of the two OEAs to maximum heights up to 30 m greater than those considered in the Ravensthorpe EA and approved in Project Approval (PA) 09_0176. The proposed changes to the OEA design would therefore increase the maximum height of the northern emplacement area to approximately 230 m RL and the eastern emplacement area to approximately 190 m RL. The Modification would also include landscape design changes to shape the OEAs with additional undulation and diversify topography so that the final landform will more closely blend with the surrounding natural topography. A plan of the proposed Modification supplied by Hansen Bailey is attached as Appendix A.

No changes are proposed to other details such as annual production rate, area of disturbance, mining equipment, quantity of overburden handled or workforce limit.

This report describes results from a qualitative assessment of acoustic issues, including operational noise and blasting, associated with the Modification.

REFERENCES

The following documents are referred to in this assessment:

Umwelt (2010) *Ravensthorpe Operation Project Environmental Assessment*.

Department of Planning and Infrastructure (2011) *Project Approval 09_0176*.

Xtrata Coal (2013) *Ravensthorpe Complex Annual Review 2012*.

Glencore Coal (2014) *Ravensthorpe Complex Annual Review 2013*.

OPERATIONAL NOISE

Noise criteria specified in Schedule 3 Condition 2 of PA09_0176 for various receivers and receiver areas are shown in Table 1.

Table 1: PA09_0176 Noise Criteria

Receiver Area	Receiver	Day	Evening	Night	Night
		LAeq,15min	LAeq,15min	LAeq,15min	LA1,1min
R1	34 Stapleton ¹	48	48	48	49
R2	3 Bowman	35	35	35	45
	13 Bowman	38	38	38	45
R3	12 Yates, 21 Miller, 27 Chisholm	37	37	37	45
	38 Ninness	36	36	36	45
	All other privately owned land	35	35	35	45
R4	All other privately owned land	35	35	35	45
-	All other privately owned land	35	35	35	45

¹ Receiver 34 is now mine-owned

The Ravensworth Complex Annual Reviews for 2012 and 2013 showed compliance with the PA noise criteria at all noise monitoring locations.

The Ravensworth EA contained a detailed noise impact assessment (NIA) report. The NIA reported predicted noise levels derived from a software-based noise model of the project which included mining machines engaged in extracting and transporting overburden and coal. A review of the noise model inputs described in Appendix D to the NIA, with a focus on the eastern OEA which is closest to all receivers, reveals:

- The Year 3 noise model included haul truck movements to the top of the eastern OEA and a dozer and fuel cart operating on top of the eastern OEA. An additional dozer working on rehabilitation was included on top of the southern section of the eastern OEA;
- The Year 5 noise model included haul truck movements to the top of the eastern OEA plus a tracked dozer and a rubber tyred dozer on the top of the eastern OEA;
- The Year 10 noise model included haul truck movements to the top of the eastern OEA plus a tracked dozer on the exposed eastern side of the OEA;
- The Year 15 noise model included haul truck movements to the top of the southern section of the eastern OEA plus a rubber tyred dozer on the top of the eastern OEA;
- The Year 20 noise model did not include haul truck movements to the top of the eastern OEA as the OEA would be fully developed by this year, however a grader and rubber tyred dozer were included on the top of the southern section of the eastern OEA with a tracked dozer on the shielded western side of the eastern OEA; and
- The Year 25 noise model included a rubber tyred dozer on the top of the southern section of the eastern OEA with a tracked dozer on the shielded western side of the eastern OEA.

The noise model developed for the Ravensworth EA therefore considered dominant noise from mobile machines operating in exposed areas on top of the eastern OEA, with the majority of machines operating in shielded areas on lower ground to the west of the OEA.

An increase in maximum eastern OEA height from RL 200 m to RL 230 m would have the following effect on received LAeq,15min and LA1,1min noise levels:

- Noise levels from machines working on the exposed top of the eastern OEA would not appreciably change, as the machines would remain similarly exposed to receivers; and
- All other mining machines operating on the shielded western side of the OEA would remain shielded from receivers and, in some cases, would contribute lower noise levels due to the increased height of the OEA providing improved shielding to receivers.

The proposed increase in the maximum height of the northern OEA from RL 160 m to RL 190 m would similarly not have an appreciable effect on noise levels at any receiver, particularly as the northern OEA is more remote from all receivers.

BLASTING

Blasting criteria specified in Schedule 3 Condition 10 of PA09_0176 for various receivers and receiver areas are shown in Table 2.

Table 2: PA09_0176 Blasting Criteria

Receiver	Airblast overpressure dBLinPk	Ground vibration mm/s	Allowable Exceedance
Privately owned residences & Camberwell Church	120	10	0%
	115	5	5% of the total number of blasts over a 12 month period
Ravensworth Public School & Chain of Ponds Hotel	133	10	
Ravensworth Homestead	126	10	
Aboriginal axe grinding groove site (REA86)	-	175	
Narama in-pit storage dam wall and proposed dam wall	-	25	
Conveyors including the Hunter Valley Operations conveyor	-	100	
Main Northern Railway culverts and bridges	-	25	
Transmission lines	-	50	
Ashton underground mine	-	6	

The Ravensworth Complex Annual Reviews for 2012 and 2013 showed compliance with the PA noise criteria at all blast monitoring locations. Both Annual Reviews indicated occasional exceedances of the 115 dB overpressure limit occurred at closest residences and the Camberwell Church, however the number of exceedances of this criterion were less than the allowable 5% per annum and no exceedances of the 120 dB criterion occurred for any blast event.

An increase in maximum eastern OEA height from RL 200 m to RL 230 m would have no negative effect on blast impacts at any receiver, as blasting and overburden emplacement are not related activities. As overpressure is effectively low frequency noise the Modification may, if anything, reduce airblast overpressure levels at some or all receivers as the increased eastern OEA height may provide increased acoustic shielding for all blast locations. The Modification would therefore either not influence blasting impacts or may provide a minor benefit to receivers.

CONCLUSION

This assessment of the Modification has shown the proposed increase in height of the northern and eastern OEAs would:

- not appreciably increase received noise levels and may reduce noise levels due to increased shielding of the majority of mining operations; and
- not increase blasting impacts and may slightly reduce airblast overpressure levels due to increased shielding provided by the OEA.

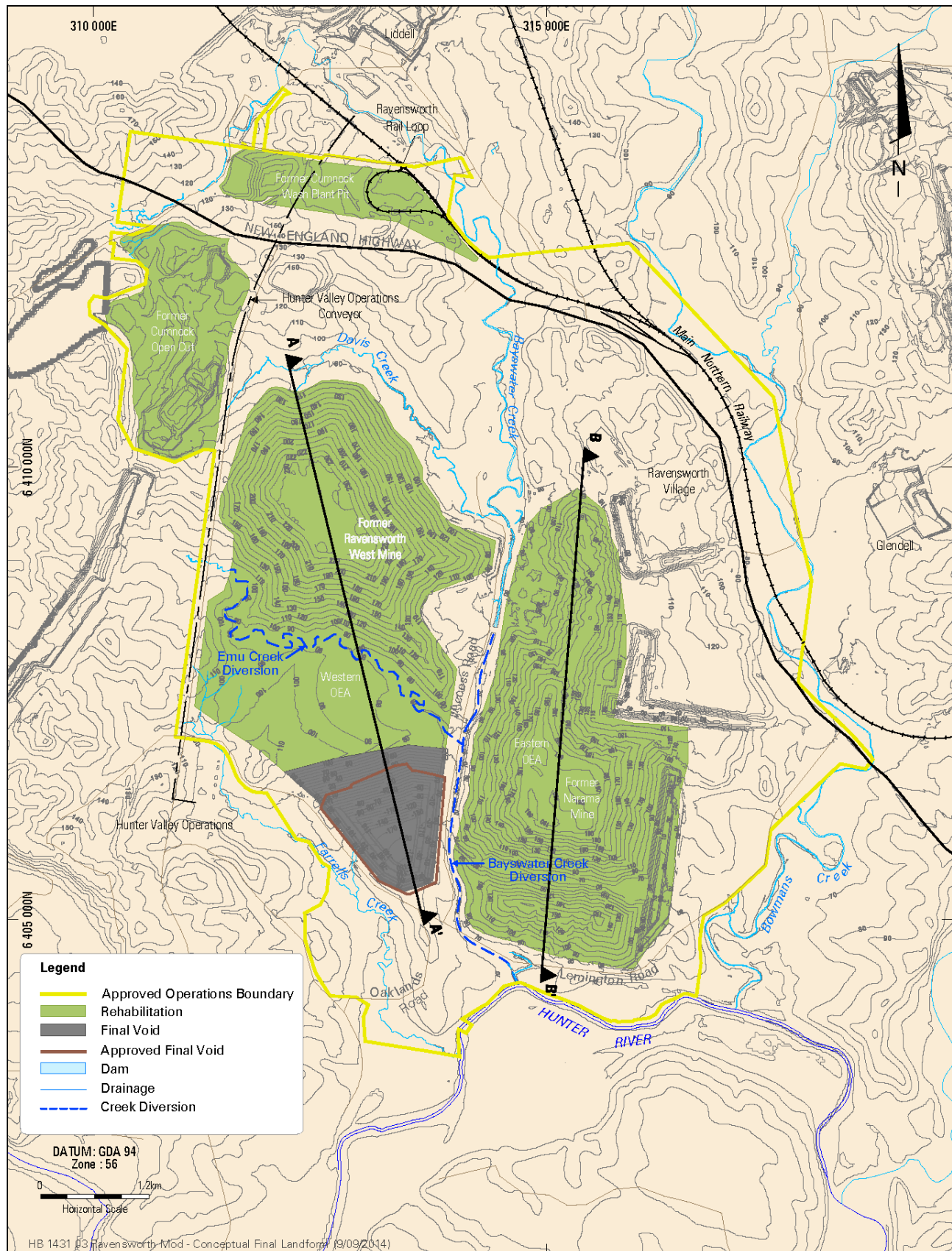
Compliance with the PA09_0176 noise and blasting conditions is therefore predicted to continue if the Modification is approved. With little or no change to predicted noise levels and blasting impacts, no change to the existing noise and blasting limits specified in PA09_0176 are recommended.

We trust this report presents sufficient information regarding acoustic issues associated with the proposed Modification. Please contact the undersigned for any further information or discussion.

Yours faithfully,



MARK BRIDGES BE (Mech) (Hons) MAAS
Principal Consultant

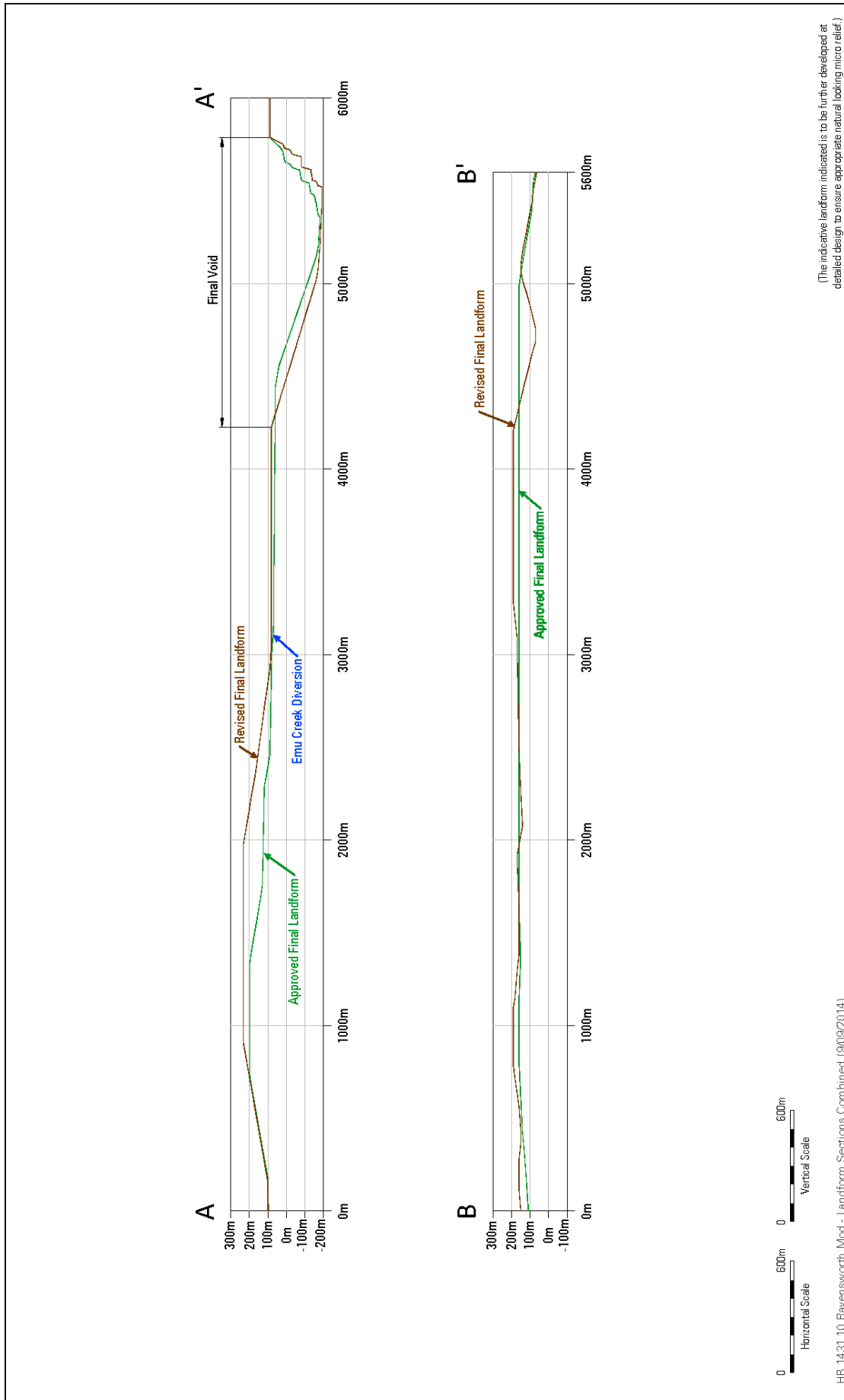


RAVENSWORTH OPERATIONS

RAVENSWORTH
OPEN CUT
GLENORE

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Revised Conceptual Final Landform



RAVENSWORTH OPERATIONS

Conceptual Final Landform Sections