



NARAMA WEST MODIFICATION

ENVIRONMENTAL ASSESSMENT

for

Xstrata Coal Pty Limited

April 2013

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

NARAMA WEST MODIFICATION

ENVIRONMENTAL ASSESSMENT

Prepared by:

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April 2013

For:

XSTRATA COAL PTY LIMITED
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:	Hansen Bailey PO Box 473 SINGLETON NSW 2330
In Respect Of:	Narama West Modification
Applicant Name:	Xstrata Coal Pty Limited (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:	Minor extension to the mining operations 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:	
Name:	James Bailey Director
Date:	April 2013

EXECUTIVE SUMMARY

INTRODUCTION

Ravensworth Operations Pty Limited is a wholly owned subsidiary of Xstrata Coal Pty Limited and is comprised of the active Ravensworth North and Narama mining areas and the former Cumnock, Ravensworth West and Ravensworth South mining areas. Ravensworth Operations 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 Ravensworth Operations are carried out in accordance with Project Approval 09_0176, dated 11 February 2011, 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

Xstrata Coal Pty Limited is seeking a modification to Project Approval 09_0176 for the recovery of approximately 2.7 Million tonnes of Run of Mine coal by open cut mining methods (the Modification). This additional mining is scheduled to occur over a period of two years within the footprint of an approved overburden emplacement area, which has also previously been disturbed by mining activities (referred to as the Narama West mining area). All mining and associated activities to be conducted as part of the Modification will be undertaken in accordance with approved operations. No increase above the approved workforce limit is proposed.

Following cessation of operations in the Narama West mining area, the resultant mine void will be progressively backfilled with overburden. The broader Narama mining area, including all of the land subject to the Modification, will then be utilised as an overburden emplacement area for future mining at Ravensworth Operations Pty Limited as stipulated under Project Approval 09_0176. This area will later be shaped and rehabilitated in accordance with the approved Mining Operations Plan and final landform design.

As part of the Modification, a range of administrative amendments are also sought to Project Approval 09_0176.

REGULATORY FRAMEWORK

Xstrata Coal Pty Limited was granted Project Approval 09_0176 prior to the repeal of Part 3A of the *Environmental Planning and Assessment Act 1979*. As a result, the provisions of the former Part 3A, including section 75W, will continue to apply. In this regard, Xstrata Coal Pty Limited is seeking approval for the Modification under section 75W 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, community newsletters, meetings with the Ravensworth Operations Community Consultative Committee and the Ravensworth Operations Pty Limited website.

IMPACTS, MANAGEMENT AND MITIGATION

To determine the potential environmental and social impacts of the Modification, an assessment was undertaken in relation to air quality, greenhouse gas, noise, blasting, surface water, groundwater, ecology, visual and lighting, Aboriginal heritage, historical heritage, traffic and transport, waste, social and economics.

The impact assessments undertaken for the environmental and social issues outlined above conclude that Ravensworth Operations Pty Limited with consideration of the Modification will generally be consistent with its current operations as approved under Project Approval 09_0176 and those assessed in the Ravensworth Operations Project Environmental Assessment (Umwelt, 2010a). Given the 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 and the management plans implemented under this approval.

Further to the conditions of Project Approval 09_0176, Xstrata Coal Pty Limited commits to a range of management and mitigation measures, as stated in this Environmental Assessment, to ensure that the Modification's environmental and social impacts are minimised.

JUSTIFICATION

The Modification will provide the opportunity for the extraction of a valuable coal resource from within the footprint of an approved overburden emplacement area at Ravensworth Operations Pty Limited. The recovery of the additional coal will be achieved through the utilisation of existing infrastructure and equipment thus optimising the return for stakeholders on already expended capital without causing material environmental and social impacts.

The coal recovered by the Modification, which would otherwise be sterilised, will produce additional royalty income for the State of New South Wales in the order of approximately $12 Million that would otherwise not be received. The implementation of a range of management and mitigation measures will ensure that the identified coal resource can be recovered in an efficient and orderly fashion, whilst minimising any potential environmental and social impacts. In this regard, the Modification is consistent with the "*objects*" of the *Environmental Planning and Assessment Act 1979*.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

NARAMA WEST MODIFICATION
ENVIRONMENTAL ASSESSMENT

for

Xstrata Coal Pty Limited

1 INTRODUCTION

This section provides an introduction to the Environmental Assessment (EA) for the Narama West 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 Xstrata Coal Pty Limited (Xstrata Coal) and is comprised of the active Ravensworth North and Narama mining areas and the former Cumnock, Ravensworth West and Ravensworth South mining areas. 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 New South Wales (NSW). **Figure 1** illustrates the location of Ravensworth Operations and its approved operations boundary.

Ravensworth Operations has a long-established presence in the community with mining 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 Ravensworth Operations are carried out in accordance with Project Approval (PA) 09_0176, dated 11 February 2011, 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 for the recovery of an additional 2.7 Million tonnes (Mt) of ROM coal by open cut mining methods within the footprint of an approved overburden emplacement area (OEA) in the Narama mining area (referred to as the Narama West mining area). All mining and associated activities to be conducted as part of the Modification will be undertaken in accordance with approved operations.

NARAMA WEST MODIFICATION

Regional Locality Plan

FIGURE 1

1.2 PROPONENT

The proponent for the Modification is Xstrata Coal for which the contact details are:

Xstrata Coal Pty Limited
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 Ravensworth Operations 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** assesses the predicted environmental and social impacts and outlines the management and mitigation measures to be implemented by Xstrata Coal;
- **Section 8** provides a description of minor administrative amendments sought to PA 09_0176;
- **Section 9** presents Xstrata Coal's statement of commitments for the Modification;
- **Section 10** provides a detailed justification for the Modification;
- **Section 11** lists abbreviations used throughout the EA; and
- **Section 12** provides a list of all materials referenced throughout the EA.

1.4 DOCUMENT PURPOSE

Xstrata Coal 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 Xstrata Coal to support an application for the Modification as described in **Section 4**. The Modification disturbance boundary is illustrated in **Figure 3**. 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.

Ravensworth Operations 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, Xstrata Coal has a comprehensive record of the quantity, quality and extent of the coal resource within the approved operations boundary.

Ravensworth Operations 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

Ravensworth Operations 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 Ravensworth Operations remains private freehold land utilised for grazing, other agricultural activities and rural residential areas (see **Figure 2**).

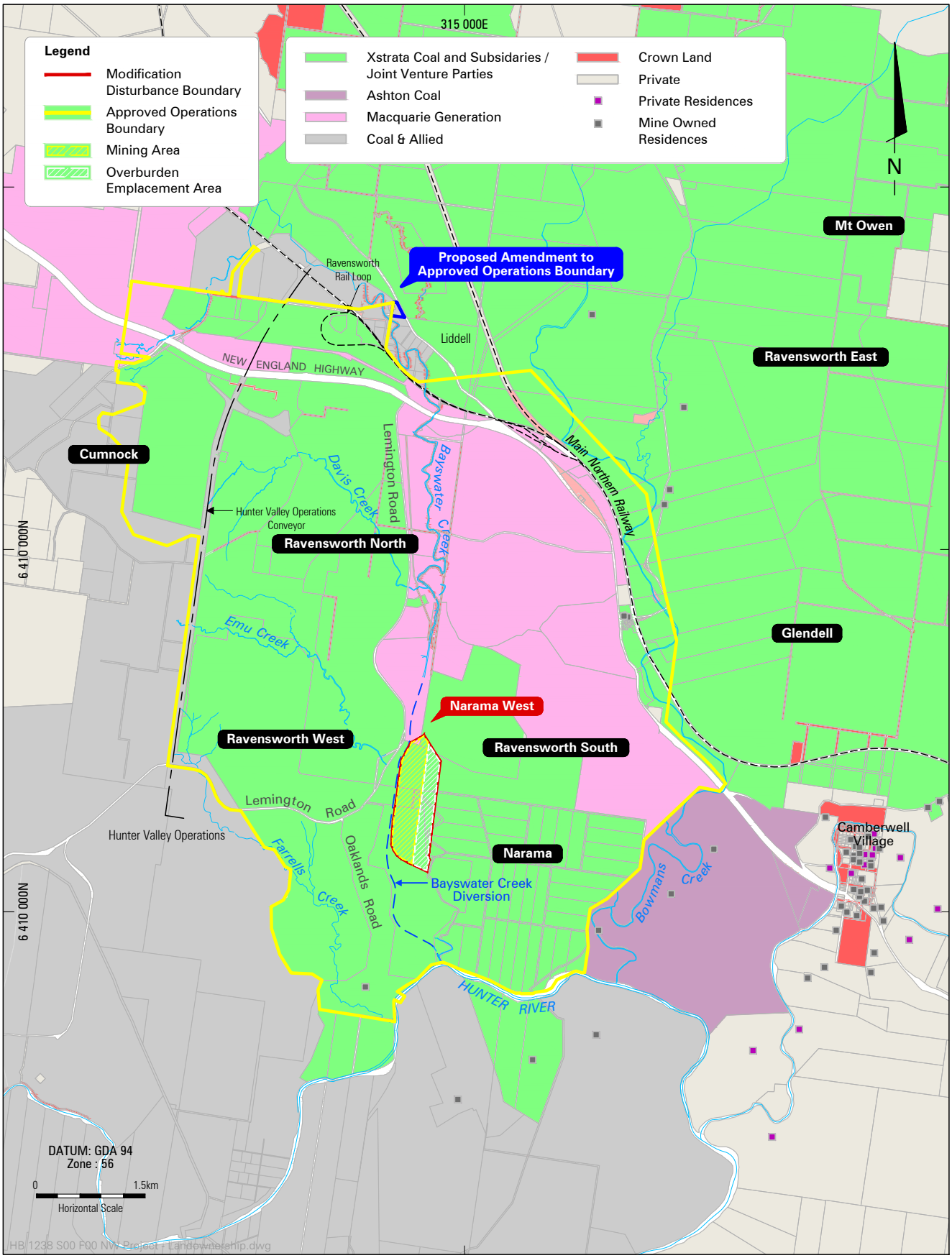
The area directly within the approved operations boundary has been extensively modified by current and former open cut mining activities and associated infrastructure. However, a

substantial portion of the land within the approved operations boundary has been 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**. Xstrata Coal 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 Macquarie Generation, Ashton Coal and Coal & Allied.

A number of private rural residences are located to the east and south-east of Ravensworth Operations with the majority centralised at Camberwell Village, which is approximately 2 km from the approved operations boundary and 6 km from the Modification disturbance boundary (see **Figure 2**).



NARAMA WEST MODIFICATION

Land Ownership

FIGURE 2

3 APPROVED OPERATIONS

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

3.1 INTRODUCTION

Ravensworth Operations currently carries out open cut mining activities under PA 09_0176, dated 11 February 2011, to provide high quality thermal and semi-soft coking coal to export and domestic markets.

3.2 COAL MINING AND PROCESSING

Mining at Ravensworth Operations currently occurs within the Narama and Ravensworth North mining areas 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. The coal is then loaded onto trucks and transported to the coal crushing plant prior to being 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 with the OEAs while tailings are pumped via above ground pipelines to the Cumnock, Ravensworth South and Narama 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. In the calendar year for 2012, approximately 5.7 Mt of ROM coal was produced from Ravensworth Operations as mining ramped up.

3.3 SURFACE INFRASTRUCTURE

Activities undertaken at Ravensworth Operations 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 Ravensworth Operations is consistent with requirements of the Ravensworth Operations Project EA (Umwelt, 2010a) as approved under PA 09_0176. The typical mobile fleet includes draglines, shovels, excavators and loaders as described Ravensworth Operations Project EA (Umwelt 2010a). There may be variation in numbers, size and types of equipment provided relevant assessment criteria are maintained.

3.5 WORKFORCE

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

3.6 ENVIRONMENTAL MANAGEMENT SYSTEM

Xstrata Coal 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:

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

4 MODIFICATION DESCRIPTION

This section provides a description of the Modification, the need for it and the alternatives considered.

4.1 OVERVIEW

Xstrata Coal proposes to undertake additional mining within the Narama West mining area, which is located within an approved OEA for Ravensworth Operations as stipulated in the Ravensworth Operations Project EA (Umwelt, 2010a) and PA 09_0176.

As part of the Modification, a number of administrative amendments are also sought to PA 09_0176.

4.2 NARAMA WEST MINING AREA

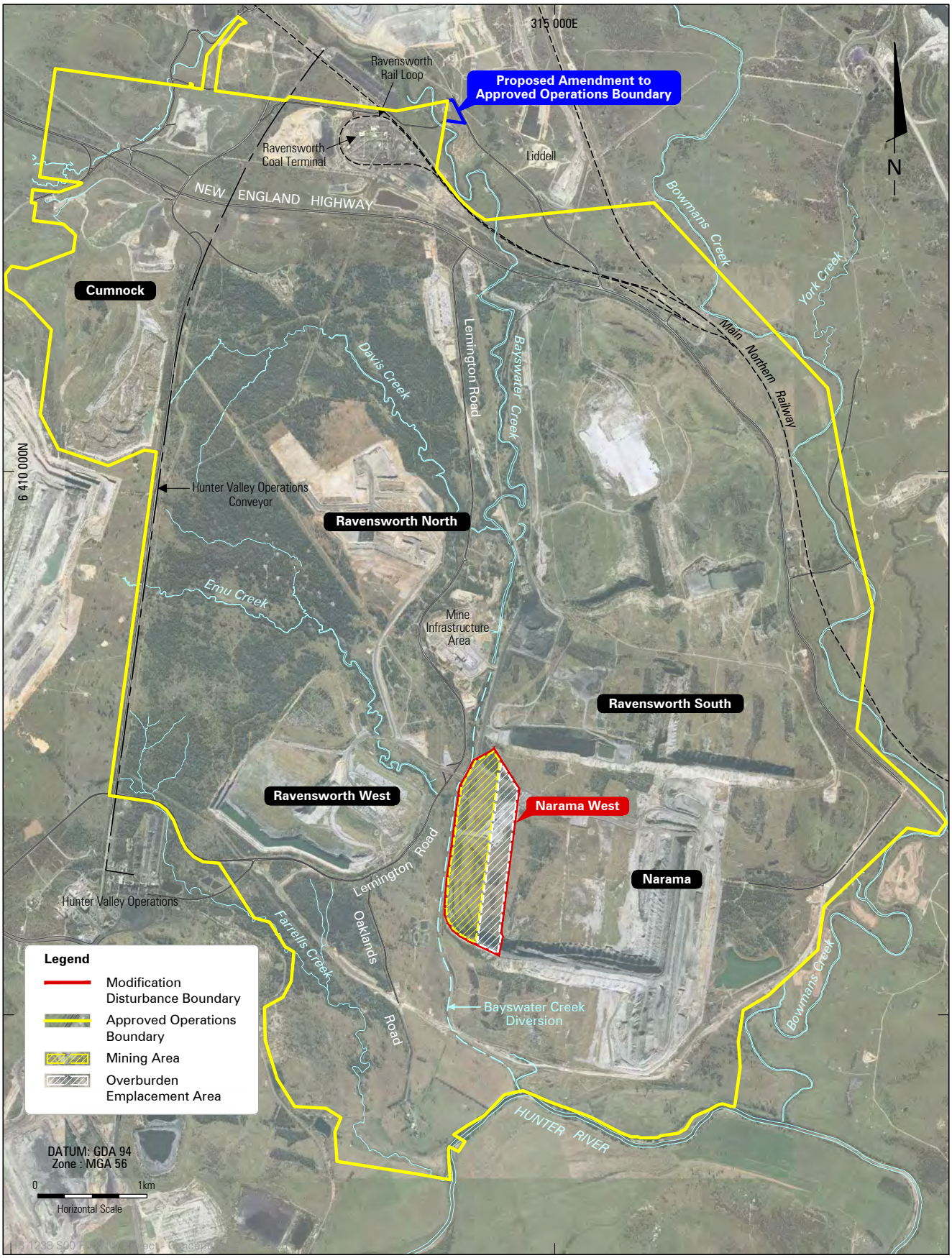
Xstrata Coal is seeking a modification to PA 09_0176 for the recovery of approximately 2.7 Mt of ROM coal by open cut mining methods over a period of two years within the Narama West mining area. The Modification disturbance boundary encompasses an area of approximately 89 hectares (ha) within the footprint of an approved OEA, which has also previously been disturbed by mining activities. The conceptual layout of the Modification is illustrated in **Figure 3**.

Mining will be undertaken via truck and shovel and/or dragline extraction. Overburden will be transferred to an existing OEA immediately adjacent to the mining area within the Modification disturbance boundary. **Figure 4** presents a cross section of the Narama West mining area as proposed and its interaction with other adjacent mining areas.

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 workforce limit is proposed.

The Modification will not extend the life of approved mining at Ravensworth Operations. Rather, it will increase the production rate of the complex for an approximate two year period with existing operations progressing as per originally scheduled. Mining operations are likely to commence in 2013 and continue through to 2014, however, may occur later pending approval, scheduling of operations and availability of equipment. Production during this period will remain within the approved maximum limit of 16 Mtpa ROM coal. That is, the Modification will not result in an increase in the maximum intensity of mining currently approved at Ravensworth Operations.

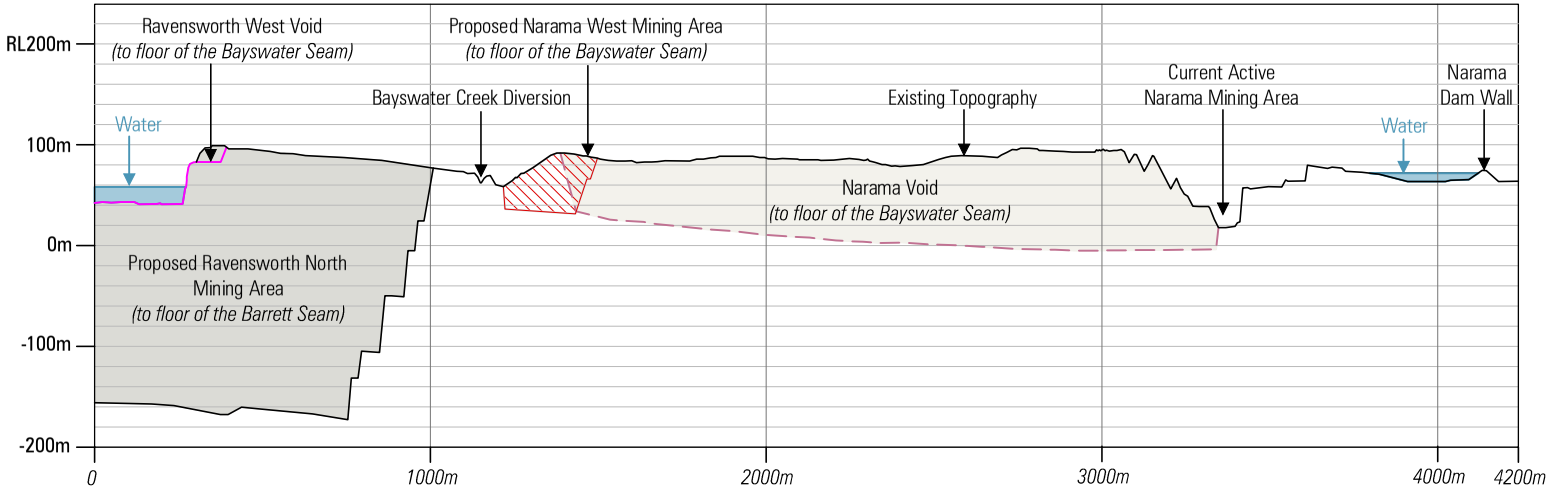
Following cessation of operations in the Narama West mining area, the resultant mine void will be progressively backfilled with overburden. The broader Narama mining area, including all of the land subject to the Modification, will then be utilised as an OEA for future mining at Ravensworth Operations as stipulated under PA 09_0176. This area will later be shaped and rehabilitated in accordance with the approved Mining Operations Plan and final landform design.



NARAMA WEST MODIFICATION

Conceptual Modification Layout

FIGURE 3



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xstrata coal ravensworth open cut

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NARAMA WEST MODIFICATION

Narama West Mining Area Cross Section

FIGURE 4

4.3 PROPOSED ADMINISTRATIVE AMENDMENTS

As part of the Modification, a range of administrative amendments are also sought to PA 09_0176.

These amendments relate to the following matters:

- Alteration to the approved operations boundary to include the Newdell substation;
- Inclusion of additional commitments to the blast management plan requirements;
- Changes to the Aboriginal grinding groove blast vibration criterion; and
- Removal of the specified approved Aboriginal archaeologist in the relevant PA conditions.

Each of the proposed administrative amendments is detailed in **Section 8** along with a brief justification as to why they are required.

4.4 MODIFICATION NEED

The Modification will facilitate the recovery of a valuable coal resource for export and domestic markets, which will ultimately contribute to meeting global and national energy demands.

Coal remains a highly sought after global energy source. Since 2000, global coal consumption has grown faster than any other fuel (WCA, 2013). In addition, this coal resource plays a vital role in electricity generation within Australia. Coal provides more than 75% of the nation's electricity requirements. In NSW alone, coal accounts for approximately 90% of the State's energy production (ACA, 2013).

The ongoing demand for export and domestic coal supports the need for the Modification and justifies further investment in the industry.

The coal mining industry is a major provider of revenue for governments and the community. The sale of product coal generated by the Modification will provide net economic benefits to Australia in the order of $31 Million (M). Royalties paid to the NSW government are expected to total $12 M (present value). These royalties are used by the State government to fund infrastructure projects and community services.

4.5 ALTERNATIVES

Xstrata Coal has considered alternatives to the Modification having regard to potential socio-economic and environmental impacts as well as the principles of Ecological Sustainable Development (ESD) and the "*objects*" of the EP&A Act. The alternatives considered are described in further detail below.

4.5.1 Alternative 1 – Sterilisation of Coal Resource

Should no development occur within the Narama West mining area, this would result in the sterilisation of a recoverable coal resource that could otherwise be extracted with minimal environmental and social impacts. It would also lead to the loss of local socio-economic

benefits in addition to royalties and other payments to both the State and Commonwealth governments.

Alternative 1 fails to maximise the recovery of an identified coal resource for the benefit of the community in an environmentally acceptable manner and by means that address the principles of ESD. Consequently, Xstrata Coal would not be appropriately addressing the objects of the EP&A Act in that it would not be promoting the orderly and economic use and development of the land for the social and economic welfare of the community.

4.5.2 Alternative 2 – The Modification

The Modification as proposed and assessed in this EA will maximise the opportunity for the extraction of an identified coal resource that would otherwise be sterilised. As the proposed additional coal extraction remains within the existing approved operations boundary in a previously disturbed area that is also approved for future overburden emplacement, it will cause minimal harm to the environment.

The recovery of the additional coal will be achieved through the utilisation of existing infrastructure and equipment at Ravensworth Operations thus optimising the return for stakeholders on already expended capital without causing material environmental and social impacts. The coal recovered from the Narama West mining area will ultimately produce additional socio-economic benefits to the local community and royalties and other payments to both the State and Commonwealth governments.

The maximisation of coal recovery through the use of existing infrastructure and equipment with minimal environmental impacts and the additional economic benefits for the community, demonstrates that this aspect of the Modification is consistent with the objects of the EP&A Act.

5 REGULATORY FRAMEWORK

This section sets out the regulatory framework as relevant to the Modification of PA 09_0176 as sought.

5.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT

Xstrata Coal was granted PA 09_0176 for Ravensworth Operations on 11 February 2011. Xstrata Coal is seeking a modification of PA 09_0176 under section 75W of the EP&A Act. This section outlines the planning assessment process under the EP&A Act.

5.1.1 Applicability of Part 3A

Part 3A of the EP&A Act was repealed on 1 October 2011. However, the savings and transitional provisions enacted under Schedule 6A of the EP&A Act declare certain projects to be "*transitional Part 3A projects*". Pursuant to Clause 2 of Schedule 6A, a project that has been approved under Part 3A is deemed to be a transitional Part 3A project.

Since Xstrata Coal was granted PA 09_0176 prior to the repeal of Part 3A, Ravensworth Operations is deemed to be a transitional Part 3A project. As a result, the provisions of the former Part 3A, including section 75W, will continue to apply to Ravensworth Operations.

5.1.2 Section 75W

Section 75W of the EP&A Act enables the proponent to request a modification to PA 09_0176 granted under Part 3A. Section 75W relevantly states:

> *(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. The proponent does not consider the Modification to be entirely consistent with the project as approved. Accordingly, Xstrata Coal is seeking a modification to PA 09_0176 under section 75W of the EP&A Act.

The case of *Barrick Australia Limited v Williams* (2009 NSWCA 275) established that there are limitations on the scope of section 75W. Justice Basten held that the Minister is obliged to form a view as to whether the proposed changes amount to "*a radical transformation of the terms of the existing development consent*". This is a question of jurisdictional fact, which determines whether the Minister can exercise the powers provided by section 75W.

Therefore, section 75W cannot be relied on where the proposed alterations are so "*radical*" that they cannot be considered a "*modification*".

The following elements of Ravensworth Operations will remain consistent with PA 09_0176:

- Total coal production from open cut operations will remain within the maximum limit of 16 Mtpa of ROM coal;
- Mining methods will remain unchanged and will utilise the existing equipment;
- Operations in the Narama West mining area will occur within the approved mine life;
- Coal will continue to be processed using the approved infrastructure;
- Coal transportation methods will remain unaltered;
- Workforce will remain within the approved limit of approximately 550 full-time equivalent personnel; and
- The Modification will disturb approximately 89 ha of land (which represents 1.6 % of the area within the approved operations boundary).

Therefore, the Modification does not constitute a radical departure from PA 09_0176, enabling the Minister to grant approval under section 75W of the EP&A Act.

5.1.3 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 Infrastructure (DP&I) advised on 31 October 2012 and 4 February 2013 that Environmental Assessment Requirements will not be issued for the Modification.

5.1.4 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, as discussed in **Section 10**.

5.2 ENVIRONMENTAL PLANNING INSTRUMENTS

5.2.1 Singleton Local Environmental Plan 1996

The Modification is located entirely within the Singleton LGA. The *Singleton Local Environmental Plan 1996* (Singleton LEP 1996) applies to all land within the Singleton LGA.

All land within the Modification disturbance boundary is designated as Zone 1(a) (Rural Zone) land. The objectives of the zone are:

(a) to protect and conserve agricultural land and to encourage continuing viable and sustainable agricultural land use,

(b) to promote the protection and preservation of natural ecological systems and processes,

(c) to allow mining where environmental impacts do not exceed acceptable limits and the land is satisfactorily rehabilitated after mining,

(d) to maintain the scenic amenity and landscape quality of the area,

(e) to provide for the proper and co-ordinated use of rivers and water catchment areas,

(f) to promote provision of roads that are compatible with the nature and intensity of development and the character of the area.

The Rural Zoning Table under the Singleton LEP 1996 provides that mining in Zone 1(a) is permissible with development consent.

5.2.2 Draft Singleton Local Environmental Plan 2013

Singleton Shire Council (SSC) has prepared the draft *Singleton Local Environmental Plan 2013* (Singleton LEP 2013) and has requested the making of this LEP by the Minister. Until

the Singleton LEP 2013 comes into force, the Singleton LEP 1996 will continue to apply to development within the Singleton LGA.

Under the Singleton LEP 2013, the Modification is located entirely on land within Zone RU1 (Primary Production). The objects of Zone RU1 are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

The Land Use Table states that open cut mining within Zone RU1 is permissible with development consent. Therefore, the forthcoming enactment of the Singleton LEP 2013 will not affect the permissibility of the Modification.

5.2.3 Hunter Regional Environmental Plan 1989 (Heritage)

The *Hunter Regional Environmental Plan 1989* (Hunter REP) aims to conserve the environmental heritage of the Hunter Region. Clause 13 of the Hunter REP states that development consent cannot be granted for a development in the vicinity of heritage items unless the impact of the development on the heritage significance of the items has been assessed.

Items of state, regional and local heritage significance are listed under Schedules 1, 2 and 3 of the Hunter REP, respectively. There are no listed heritage items under the Hunter REP in the vicinity of the Modification.

5.2.4 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.

Clause 7 of SEPP Mining states that mining is permissible (with development consent) on any land where agriculture or industry is permissible. The Singleton LEP 1996 provides that agriculture is permitted on Zone 1(a) land. Agriculture will also be permitted within Zone RU1 under the Singleton LEP 2013. Therefore, the Modification will be permissible with development consent.

Clause 12 of SEPP Mining provides that the Minister must consider the compatibility of the proposed development with existing and approved land uses in the vicinity of the development. Clause 13 requires the Minister to consider the compatibility of the proposed development with surrounding mines, petroleum production facilities and extractive

industries. The interactions between the Modification and other land uses are discussed in **Section 2**. Further the respective public benefits of the Modification and whether the Modification is likely to have any significant impact on the adjoining land's preferred land uses and any potential incompatibility therewith are examined and analysed in **Section 7** and **Section 10** of this EA.

The Modification sought will meet the objects of SEPP Mining.

5.2.5 State Environmental Planning Policy 33 – Hazardous & Offensive Development

State Environmental Planning Policy 33 – Hazardous & Offensive Development (SEPP 33) governs the assessment of developments for the purposes of a "*potentially hazardous industry*" or "*potentially offensive industry*".

Under clause 4 of SEPP 33, a potentially hazardous industry is defined as a development that would pose a significant risk to human health or the biophysical environment if mitigation measures were not implemented.

The Ravensworth Operations Project EA (Umwelt, 2010a) identified activities within the approved operations boundary to be neither hazardous nor offensive development under SEPP 33.

5.2.6 State Environmental Planning Policy 44 – Koala Habitat Protection

State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44) encourages the conservation and management of natural vegetation areas to ensure that there is ongoing protection of koalas and their habitat. Singleton LGA is listed under Schedule 1 as an area to which SEPP 44 applies.

Clause 9 of SEPP 44 requires the preparation of a plan of management for developments located on land that constitutes "*core koala habitat*". The ecological impact assessment has determined that the land within the Modification disturbance boundary does not constitute core koala habitat. Therefore, a plan of management is not required.

5.2.7 State Environmental Planning Policy 55 – Remediation of Land

State Environmental Planning Policy 55 – Remediation of Land (SEPP 55) aims to promote the remediation of contaminated land. Clause 7 imposes the following obligations on a consent authority:

> *(1) A consent authority must not consent to the carrying out of any development on land unless:*
>
> *(a) it has considered whether the land is contaminated and*
>
> *(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out and*
>
> *(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied*

that the land will be remediated before the land is used for that purpose.

Clause 7(3) of SEPP 55 provides that a preliminary contamination investigation must be undertaken for developments that involve a change to the use of the land. The land within the Modification disturbance boundary is currently approved and used for mining purposes. Since the Modification will not result in a change in land use, a preliminary investigation into land contamination is not required.

5.3 APPROVALS UNDER OTHER NSW LEGISLATION

5.3.1 Exemptions

As a transitional Part 3A project, Ravensworth Operations will continue to benefit from section 75U of the EP&A Act (now repealed). Section 75U states that the following authorisations and approvals are not required for projects that have been approved under Part 3A of the EP&A Act:

(a) the concurrence under Part 3 of the Coastal Protection Act 1979 of the Minister administering that Part of the Act,

(b) a permit under section 201, 205 or 219 of the Fisheries Management Act 1994,

(c) an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977,

(d) an Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974,

(e) an authorisation referred to in section 12 of the Native Vegetation Act 2003 (or under any Act to be repealed by that Act) to clear native vegetation or State protected land,

(f) a permit under Part 3A of the Rivers and Foreshores Improvement Act 1948,

(g) a bush fire safety authority under section 100B of the Rural Fires Act 1997,

(h) a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the Water Management Act 2000.

5.3.2 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 Coal Lease 380 and 580, which is currently held by Xstrata Coal. Therefore, no additional authorisations under the Mining Act will be required for the Modification.

5.3.3 Coal Mine Health and Safety Act 2002

The *Coal Mine Health and Safety Act 2002* (CMHS Act) aims to manage the risks associated with the mining of coal. Under section 100 of the CMHS Act, the Minister's approval is required for the establishment of emplacement areas. The CMHS Act defines "*emplacement area*" as any pile, heap, hole, excavation or place in which rejects are placed. Fine tailings will continue to be disposed of in the voids at Cumnock, Ravensworth South and Narama. These voids fall within the definition of emplacement area and will therefore require approval under section 100 of the CMHS Act. Xstrata Coal currently holds approval 12/5473 and 04/0904, which authorises tailings emplacement in the Cumnock and Ravensworth South voids, respectively.

Ravensworth Operations' existing approval under Section 100 of the CMHS Act will be reviewed in respect of this Modification and updated as required.

5.3.4 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.

Xstrata Coal currently holds EPL 2652 for Ravensworth Operations. It is not anticipated that an amendment will be required to the EPL for the Modification as proposed.

5.3.5 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).

Water Access Licences

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. Therefore, a WAL will be required for water taken from the catchments of the creeks within the approved operations boundary. The Jerrys Water Source has a total share component of 2,573 units for unregulated river access licences.

Other Approvals

Water taken from a water source can only be used in accordance with a water use approval issued under section 89 of the WM Act.

Water management works approvals, issued under section 90 of the WM Act, are required for the construction and operation of any water supply works, drainage works or flood works.

Section 91 of the WM Act provides that an activity approval is required for any "*controlled activities*" or "*aquifer interference activities*".

Pursuant to section 75U of the EP&A Act, projects approved under Part 3A are exempt from the approvals requirements under sections 89, 90 and 91 of the WM Act.

As outlined in **Section 7.7**, it has been assessed that no additional licensing for groundwater interception under the WM Act and relevant water sharing plan is required.

5.3.6 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 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 7.7**, it has been assessed that no additional licensing for groundwater interception under the Water Act is required.

5.4 COMMONWEALTH LEGISLATION

5.4.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas of national significance. The EPBC Act is administered by the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) and provides protection for listed Matters of National Environmental Significance (MNES). There are eight MNES in total:

- Listed threatened species and ecological communities;
- World heritage properties;
- National heritage places;
- Wetlands of international importance;
- Migratory species;
- Commonwealth marine areas;
- The Great Barrier Reef Marine Park; and
- Nuclear actions.

If a proposed action is likely to have a significant effect on one or more MNES, the action is deemed to be a "*controlled action*". The approval of the Minister for Sustainability, Environment, Water, Population and Communities must be obtained before a controlled action can be carried out.

Under section 68 of the EPBC Act, a proposed action must be referred to the Minister if the proponent thinks that the action is or may be a controlled action. If the Minister declares that the proposed action is a controlled action, the action must be the subject of an impact assessment under Part 8 of the EPBC Act. A controlled action cannot be carried out unless the Minister has granted approval under Section 133 of the EPBC Act.

The Modification is not likely to result in any significant impacts on any threatened species or communities, or any MNES. As such, the Modification does not require referral to SEWPaC.

5.5 PLANS AND POLICIES

5.5.1 Upper Hunter Strategic Regional Land Use Plan

The Strategic Regional Land Use Plan (SRLUP) for the Upper Hunter region was released in September 2012 with the objective of introducing additional approvals requirements for mining developments located on "*Strategic Agricultural Land*" (SAL). Proposed mining developments that are located on SAL are subject to an independent preliminary assessment process known as the "*Gateway Process*". The scientific panel administering the Gateway Process must award a "*Gateway Certificate*" before the proposal will be allowed to proceed to the planning approvals process under the EP&A Act.

Chapter 11 of the SRLUP states that the Gateway Process will apply to all new mines, as well as expansions of existing mines to areas outside of existing mining leases. However, the Gateway Process will not apply to any mine expansions that occur entirely within the boundaries of existing mining leases. The Modification is located entirely within CL 380 and 580. As a result, the Modification will not be subject to the Gateway Process introduced by the SRLUP.

5.5.2 Aquifer Interference Policy

The NSW *Aquifer Interference Policy* (AIP) was released in September 2012. The AIP defines the requirements for obtaining aquifer interference approvals under the WM Act.

The AIP provides that an aquifer interference approval can only be granted if the Minister is satisfied that the activity will not cause more than minimal harm to any water source. The "*minimal harm considerations*" are listed in Table 1 of the AIP.

Groundwater sources are classified as either "*highly productive groundwater*" or "*less productive groundwater*". There are different minimal harm considerations for the two categories of groundwater sources. An assessment of the Modification's impacts against the minimal harm considerations is provided in **Appendix D**.

6 STAKEHOLDER ENGAGEMENT

This section provides a summary of the stakeholder engagement undertaken for the Modification by Xstrata Coal and Hansen Bailey. The stakeholder engagement program included consultation with Local and State government agencies, neighbouring land owners and industries.

6.1 REGULATORY ENGAGEMENT

Table 1 outlines the consultation activities undertaken with regulatory stakeholders for the Modification.

Table 1
Regulatory Stakeholders and Consultation

Stakeholder	Consultation
DP&I	• EA Modification briefing and EA approach (31 October 2012) • EA Modification briefing – DP&I Singleton Compliance Officers (7 February 2013)
NSW Office of Water	• EA Modification briefing and groundwater impact assessment approach (20 November 2012)
Office of Environment and Heritage	• EA Modification briefing (7 February 2013) • Proposed amendment to incrementally increase the vibration limit at Aboriginal grinding groove site REA 86 (1, 7 and 21 February 2013)
Division of Resources and Energy	• EA Modification briefing (26 February 2013)
SSC	• EA Modification briefing (7 February 2013)

As part of the consultation process, DP&I confirmed that Director General's Environmental Assessment Requirements would not be issued for the Modification.

6.2 COMMUNITY ENGAGEMENT

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

Table 2
Community Stakeholders and Consultation

Stakeholder	Consultation
Neighbouring Land Owners	• EA Modification briefing – W Bowman (5 February 2013) – A Bowman (5 February 2013) – B & T Moxey (5 February 2013) • Community newsletter (February 2013)
Neighbouring Industry	• EA Modification briefing – Coal & Allied (5 February 2013) – Ashton Coal (6 February 2013) – Macquarie Generation (11 March 2013) • Community newsletter (February 2013)
Camberwell Village	• Community newsletter (February 2013)
Ravensworth Operations Community Consultative Committee	• EA Modification briefing – G Adamthwaite (5 February 2013) – I Beale (20 February 2013) • Community Consultative Committee meeting (13 March 2013) • Community newsletter (February 2013)
Broader Community	• Website information (February 2013)

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, including activities undertaken within the Modification disturbance boundary.

7 IMPACTS, MANAGEMENT AND MITIGATION

This section describes the environmental and social impacts of the Modification and the measures that will be implemented to mitigate and manage these impacts.

7.1 AIR QUALITY

An air quality impact assessment was undertaken by Pacific Environment Limited and is provided in **Appendix A**. The purpose of the assessment was to determine the emissions likely to be generated by the Modification, predict potential air quality impacts and to recommend measures to mitigate and manage these impacts.

Emission estimates were calculated for the worst case year of operations within the Modification disturbance boundary with respect of the two potential mining techniques (truck and shovel and dragline). The TSP emissions generated by the Modification were estimated at approximately 1,368 tonnes per annum (tpa) for the truck and shovel scenario and 1,113 tpa for the dragline scenario.

Emissions generated by the Modification were compared to those previously calculated in Year 3 of the air quality impact assessment (PAEHolmes, 2010) undertaken for the Ravensworth Operations Project EA. This modelled year is most relevant to the Modification as proposed.

Under the Modification, the majority of dust generating activities will be located approximately 2 km to the west of the currently approved operations in the Narama mining area and further from private receivers. The equipment required for the Narama West mining area will largely be sourced from the Narama mining area. In this regard, the equipment within the Narama West and Narama mining areas, when both operations are occurring concurrently, will remain consistent with that modelled for the Narama mining area alone in Year 3 of the air quality impact assessment (PAEHolmes, 2010) for the Ravensworth Operations Project EA. This will result in the intensity of operations in the Narama mining area (as modelled in Year 3) to be proportionally spread between the Narama and Narama West mining areas.

During the period that the Narama West mining area is operational, mining intensity in the Narama mining area will be proportionally reduced with operations being spread further to the west and away from sensitive receivers. As there will be a reduction in the emissions from the Narama mining area (compared to what was modelled in Year 3) to accommodate operations in the Narama West mining area, it is considered unlikely that the Modification will result in significant increases to offsite dust impacts that would lead to an exceedance of the annual PM_{10} criteria (Ravensworth Operations alone and cumulatively) at private receivers.

Under maximum 24-hour average PM_{10} concentrations, five private receivers were predicted to be affected in Year 3 of the air quality impact assessment (PAEHolmes, 2010). With consideration of the Modification and the reduction in the emissions from the Narama mining area, the 24-hour average PM_{10} concentrations at private receivers are likely to be consistent with that modelled in Year 3 of the air quality impact assessment (PAEHolmes, 2010).

In order to reduce impacts at sensitive receivers and comply with all relevant criteria, meteorological forecasting and real-time continuous dust monitoring will continue to be implemented for operations associated with the Modification. This will provide accountable personnel with information required to implement appropriate mitigation and management controls, including review of mining operations, to keep emissions to an acceptable level. It is expected that the proactive management of operations would allow effective modifications to activities so that exceedances of the relevant criteria (particularly with regard to the 24-hour average PM_{10}) will not be experienced at private receivers.

Ravensworth Operations implement a number of other controls in the mine design to minimise dust emissions, including:

- 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.

7.2 GREENHOUSE GAS

A greenhouse gas impact assessment was undertaken by Pacific Environment Limited and is provided in **Appendix A**. The purpose of the assessment was to determine the greenhouse gas emissions generated from the Modification and to recommend measures to mitigate and manage these impacts.

Greenhouse gas sources related to the Modification include:

- Fuel consumption (diesel) during mining operations (scope 1);
- Release of fugitive methane during mining operations (scope 1);
- Indirect emissions associated with onsite electricity use (scope 2);
- Indirect emissions associated with the production of transport fuels (scope 3); and
- Indirect emissions associated with the production of electricity (scope 3).

The Modification is estimated to generate an increase of less than 1% to the total scope 1, 2 and 3 greenhouse gas emissions for the life of Ravensworth Operations.

Ravensworth Operations implement a number of measures to minimise greenhouse gas emissions. Such measures will continue to be implemented for the Modification and managed in accordance with the approved air quality and greenhouse gas management plan. The effectiveness of these measures to reduce greenhouse gas emissions will also continue to be monitored in accordance with National Greenhouse and Energy Reporting and Energy Efficiency Opportunities requirements.

7.3 NOISE

A noise impact assessment was undertaken by SLR Consulting Australia Pty Ltd and is provided in **Appendix B**. The purpose of the assessment was to predict potential noise impacts and to recommend measures to mitigate and manage these impacts.

Noise estimates were calculated for the worst case year of operations within the Modification disturbance boundary with respect of the two potential mining techniques (truck and shovel and dragline).

Under the Modification, the majority of noise generating activities will be located approximately 2 km to the west of the currently approved operations in the Narama mining area and further from private receivers.

Noise generated by the Modification were compared to those previously modelled in Year 3 of the noise impact assessment (Umwelt, 2010b) undertaken for the Ravensworth Operations Project EA. This modelled year is most relevant to the Modification as proposed.

Operational noise levels in Year 3 of the noise impact assessment (Umwelt, 2010b) were predicted to meet the relevant intrusive and sleep disturbance criteria at all private receivers under various meteorological scenarios and when utilising the total approved equipment fleet. With consideration of the Modification, a portion of the equipment fleet as modelled in the Year 3 case will be redistributed from the Narama mining area to the Narama West mining area (which is located 2km further away from sensitive receivers). The intensity of noise generated from the Narama West and Narama mining area, when both operations are occurring concurrently, will not exceed that modelled in Year 3 for the Narama mining area alone. As such, the operational noise levels generated by existing operations with consideration of the Modification are comparable to that currently approved with no exceedance of the intrusive or sleep disturbance criteria at any private receiver.

Ravensworth Operations implement a number of controls in the mine design to minimise noise, 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.

7.4 BLASTING

A blasting impact assessment was undertaken by SLR Consulting Australia Pty Ltd and is provided in **Appendix B**. The purpose of the assessment was to determine the limiting factors for blast designs within the Narama West mining area with the aim of achieving the relevant criteria at all private receivers and assets.

As the Narama West mining area is located at a similar distance or further from private receivers and assets, vibration and overpressure levels from blasting are predicted to be comparable to those from adjacent approved mining areas.

Ravensworth Operations currently has a network of blast monitoring sites within and surrounding the approved operations boundary, which are used to provide feedback on vibration and overpressure levels from individual blast events. This data is used to ensure future blasts are adequately designed to avoid exceedances of the relevant criteria. Such monitoring and design processes will continue to be implemented for blasting within the Narama West mining area and managed in accordance with the approved blast management plan.

7.5 SURFACE WATER

A surface water impact assessment was undertaken by Gilbert & Associates Pty Ltd and is provided in **Appendix C**. The purpose of the assessment was to develop a water balance with consideration of the Modification, determine the impacts to surface water and recommend measures to mitigate and manage these impacts.

A computer-based simulation model was used to assess the water balance of all major components in the Ravensworth Operations water management system under varying rainfall, catchment and climatic conditions. The model works to dynamically simulate the operation of the water management system and in doing so keeps a complete account of all site water volumes over time. Although the Modification will occur over a two year period, the model was run as a dynamic forecast simulation for the approved life of Ravensworth Operations to identify potential follow-on effects.

Groundwater inflows into the Narama West mining area were estimated by Australasian Groundwater and Environmental Consultants Pty Ltd (see **Appendix D** of the EA). The assessment predicted zero effective groundwater inflow; however, this model input parameter was subject to a sensitivity analysis whereby an inflow of 0.5 ML/day was tested.

The water balance model indicated a high reliability for water in the Ravensworth Operations water management system to meet all onsite demands with no identified shortfalls. Under zero effective groundwater inflows, the model indicated that operations will be managed such that, on any given day, no more than 200 ML will be stored in the Narama West mining area. This essentially reduces the potential risk of disrupting operations. When considering the sensitivity of increased groundwater inflows, the model indicated that there may be one day per year on average where more than 200 ML is stored in the Narama West mining area.

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.

Ravensworth Operations maintains a surface water monitoring network, which effectively surrounds the Narama West mining area. The existing 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.

7.6 FLOODING

A flood assessment was undertaken by Gilbert & Associates Pty Ltd and is provided in **Appendix C**. The purpose of the assessment was to determine the risk of flooding along the Bayswater Creek diversion.

The Hydrologic Engineering Centres River Analysis System hydraulic model was used to estimate design flood levels along the Bayswater Creek diversion during a 1 in 100 year and 1 in 250 year Average Recurrence Interval (ARI) flood event. The model consists of a number of cross-sections at regular 200 m intervals and at key locations (e.g. culverts, variations in channel geometry and low bank points) along the Bayswater Creek diversion.

The rainfall intensity-frequency-duration relationship developed for the Bayswater Creek diversion under flood was estimated using the recommended methodology in *Australian Rainfall and Runoff – A Guide to Flood Estimation – Volume 1* (IEA, 1998).

The model indicated that for a 1 in 100 year and 1 in 250 year ARI flood event, the predicted peak water level in the Bayswater Creek diversion will not overflow into the Narama West mining area and affect operations.

7.7 GROUNDWATER

A groundwater impact assessment was undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd and is provided in **Appendix D**. The purpose of the assessment was to characterise existing local groundwater regimes, assess the impacts of the Modification on these groundwater sources and other water users, quantify predicted inflows into the mining areas throughout the life of the Modification and recommend measures to mitigate and manage these impacts.

The geology within the Narama West mining area consists of a regular layered south-easterly dipping sedimentary sequence, which can be categorised into the following hydrogeological units:

- Hydrogeologically "*tight*" and very low yielding to essentially dry sandstone, siltstone and conglomerate that comprise the majority of the Permian interburden/overburden; and
- Low to moderately permeable coal seams, which are the prime water bearing strata within the Permian sequence.

Localised quaternary alluvial sediments occur along Bayswater Creek, however, have limited

storage capacity to retain groundwater. Activities within the Narama mining area have historically removed the southern portion of the alluvium associated with the original alignment of Bayswater Creek. As such, no alluvium or notable baseflow occurs in the immediate vicinity of the Narama West mining area.

Groundwater levels within the Narama West mining area have been inferred from measurements in surrounding bores, the structure of the coal seams and historical mining records (MER, 2012). Groundwater levels in the Bayswater seam range from approximately RL 40 m on the western margin of the Narama West mining area to RL 20 m at the south-eastern margin. Based upon the Bayswater seam floor structure, it is assessed that the coal seam is unsaturated in the eastern and southern portion and potentially partially saturated in the northern and western portion of the Narama West mining area.

A two-dimensional cross-sectional model was developed to simulate groundwater levels in the Narama West mining area. The model indicated that the existing Narama mining area has largely drained the coal seams within the Narama West mining area leaving it largely unsaturated and effectively dry. This corresponds with the groundwater levels predicted by MER (2012) and the conceptual understanding of the site hydrogeology.

The numerical modelling undertaken by MER (2009) for the Ravensworth Operations Project EA, predicted that operations at 2040 will drawdown on groundwater levels between 80 m and 170 m below pre-mining levels. Based upon this predicted drawdown, the Bayswater seam within the Narama West mining area will be fully dewatered and depressurised from the approved mining activities at Ravensworth Operations. In this regard, there will be no further impact to groundwater levels resulting from the Modification.

The groundwater seepage rate into the Narama West mining area is estimated to be less than 20 cubic metres per day (m^3/day). This relatively low volume is considered unlikely to be evident during mining and will be removed by evaporation and as bound moisture in the coal and overburden. Any groundwater seepage collected in the Narama West mining area will be absorbed under the existing water licences. As such, no additional licensing for groundwater interception under the Water Act is required.

As the Narama West mining area contains a limited volume of groundwater, there will be negligible impact on alluvial water sources and associated baseflow in the area. Any losses from the alluvium will be consistent with those predicted for existing approved operations. As such, no additional licensing for groundwater interception under the WM Act and relevant WSP is required.

No identified private boreholes are located within or near the Modification disturbance boundary. In this regard, the Modification will not impact existing groundwater users.

Ravensworth Operations maintains a groundwater monitoring network, which effectively surrounds the Narama West mining area and comprises of monitoring bores and vibrating wire piezometer arrays. The existing 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.

7.8 ECOLOGY

An ecological impact assessment was undertaken by Cumberland Ecology Pty Ltd and is provided in **Appendix E**. The purpose of the assessment was to characterise the flora and fauna within the Modification disturbance boundary and assess the impacts of the Modification on biodiversity values.

The flora and fauna within the Modification disturbance boundary were characterised using pre-existing databases, including the *NSW BioNet Atlas of NSW Wildlife* (OEH, 2012) and *EPBC Protected Matters Search Tool* (SEWPaC, 2012), and records collected during a field inspection in October 2012.

The Modification disturbance boundary is situated within an approved OEA and currently supports 71.9 ha of rehabilitated land, including 13.5 ha of rehabilitated woodland and 58.4 ha of rehabilitated exotic pasture grassland, and 16.8 ha of disturbed, unvegetated land and small dams. The rehabilitated vegetation does not conform to any Endangered or Critically Endangered community listed under the *NSW Threatened Species Conservation Act 1995* (TSC Act) or Commonwealth EPBC Act.

The rehabilitated woodland within the Modification disturbance boundary is small, fragmented and isolated from adjacent woodland habitat by exotic pasture lands and the existing operations within the Narama mining area.

No threatened flora species were recorded within the Modification disturbance boundary and none are predicted to occur given historical disturbance and isolation from adjacent vegetation communities.

The rehabilitated woodland within the Modification disturbance boundary supports habitat for local threatened fauna. Five species listed under the TSC Act and/or EPBC Act, including four bird species and one bat species, is assessed as likely to occur within the Modification disturbance boundary due to the suitability of foraging habitat. One known sighting of the Speckled Warbler, listed as Vulnerable under the TSC Act, was recorded in the Modification disturbance boundary in October 2012. This species is known to colonise and use relatively young woodland regeneration for roosting and foraging.

The Modification will disturb approximately 89 ha of land within an approved OEA, which will result in the removal of 71.9 ha of rehabilitated vegetation. This represents only a small portion of rehabilitated vegetation within the approved operations boundary. As this vegetation does not conform to any Endangered or Critically Endangered community listed under the TSC Act or EPBC Act, no offsets will be required.

The removal of rehabilitated vegetation within the Modification disturbance boundary, given its current status and condition, is unlikely to result in significant impacts on threatened fauna. All of the species considered likely or known to occur within the Modification disturbance boundary are highly mobile and are capable of seeking larger, better quality and more intact woodland and grassland habitats that occur in the wider locality.

Following cessation of operations in the Modification disturbance boundary, this area will then be utilised as an OEA for future mining at Ravensworth Operations as approved under

PA 09_0176 and rehabilitated in accordance with the approved Mining Operations Plan. Based upon improvements to rehabilitation techniques in recent years, woodland can now be re-established to a higher standard than current rehabilitation. This will result in a return to a similar or better habitat state for flora and fauna in the long term.

7.9 VISUAL AND LIGHTING

The visual impact assessment (Umwelt, 2010a) undertaken for the Ravensworth Operations Project EA characterised the local visual landscape within the vicinity of the approved operations boundary as being dominated by mining and power generation industries. 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 and 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.

The activities within the Modification disturbance boundary will remain shielded from private receivers to the south and south-east of the approved operations boundary by the existing ridgeline. Any views to surface infrastructure required to support activities within the Modification disturbance boundary will be consistent with approved operations as assessed in the Ravensworth Operations Project EA (Umwelt, 2010a).

Night lighting impacts assessed for the Ravensworth Operations Project EA (Umwelt, 2010a) predicted direct lighting effects from elevated mobile lighting plants during various stages of the mine life at private receivers and from surface infrastructure along the New England Highway to the north of the approved operations boundary.

Any night lighting impacts associated with the Modification and supporting surface infrastructure will be consistent with approved operations as assessed in the Ravensworth Operations Project EA (Umwelt, 2010a).

7.10 ABORIGINAL HERITAGE

The Aboriginal heritage and archaeological assessment (Umwelt, 2010c) undertaken for the Ravensworth Operations Project EA identified a significant number of previously registered and newly recorded Aboriginal archaeological sites within and surrounding the approved operations boundary.

Given the area within the Modification disturbance boundary has previously been subjected to mining activities and subsequently cleared for Aboriginal archaeological sites, the Modification is not anticipated to directly impact on Aboriginal heritage. Should any unidentified Aboriginal archaeological sites be located during operations, the procedures of the approved Aboriginal cultural heritage management plan will be implemented.

Xstrata Coal is also seeking an amendment to PA 09_0176 to incrementally increase the blast vibration criterion of 30 millimetres per second (mm/s) at Aboriginal grinding groove site REA 86 (REA 86) to 175 mm/s. This amendment is described further in **Section 8.3**.

7.11 HISTORICAL HERITAGE

The historical heritage assessment (Umwelt, 2010d) undertaken for the Ravensworth Operations Project EA identified several historic heritage items within and surrounding the approved operations boundary. No items were identified within the Modification disturbance boundary. As such, the Modification will not directly impact any identified historic heritage item.

Four listed historic heritage items have been identified within approximately 3 to 6 km of the Modification disturbance boundary, including Camberwell Church, Ravensworth Public School, Chain of Ponds Hotel and Ravensworth Homestead. Under PA 09_0176, blast vibration and overpressure generated by Ravensworth Operations must remain within relevant criteria at each of these listed historic heritage items. In order to comply, SLR Consulting Pty Ltd has calculated allowable blast design parameters (e.g. maximum instantaneous charge levels) for the Modification (see **Section 7.4**). Given blast events will be tailored to meet relevant criteria, the Modification will not indirectly impact listed heritage items through the effects of vibration or overpressure.

7.12 TRAFFIC AND TRANSPORT

The road traffic and transport impact assessment (Parsons Brickerhoff, 2009) undertaken for the Ravensworth Operations Project EA determined that key mine access routes, including the Lemington Road realignment, and associated intersections function at a satisfactory level during peak operational traffic conditions. Given 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 Operations Project EA.

The rail traffic impact assessment (Umwelt, 2010a) undertaken for the Ravensworth Operations Project EA estimated an average of six train movements per day directly associated with the transport of product coal under peak ROM coal production levels. As the Modification will not exceed the approved maximum production limit of 16 Mtpa ROM coal, rail movements will remain consistent with approved operations as assessed in the Ravensworth Operations Project EA.

7.13 WASTE

Ravensworth Operations conducts activities in accordance with an existing waste management system. Operational waste generated by the Modification, including general and hazardous materials, rejects and tailings will be handled in accordance with approved operations.

7.14 SOCIAL

The social impact assessment (Umwelt, 2010a) undertaken for the Ravensworth Operations Project EA 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, Xstrata Coal entered into a Voluntary Planning Agreement 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 an increase above the approved workforce or materially change the nature and scale of the activities at Ravensworth Operations, no additional social impacts are anticipated beyond that assessed in the Ravensworth Operations Project EA. In this regard, no further contributions to the Voluntary Planning Agreement are proposed.

7.15 ECONOMICS

An economic impact assessment was undertaken by Gillespie Economics and is provided in **Appendix F**. The assessment was primarily concerned with the determination of the following two issues:

- The economic efficiency of the Modification (i.e. consideration of economic costs and benefits); and
- The regional economic impacts of the Modification (i.e. the economic stimulus that the Modification would provide to the regional and state economy).

A Benefit Cost Analysis (BCA) was undertaken in accordance with the *Draft Guideline for Economic Effects and Evaluation in EIA* (James and Gillespie, 2002) to consider the economic efficiency of the Modification. The BCA for the Modification involved the following key steps:

- Identification of the *"with"* and *"without"* Modification scenarios;
- Identification and valuation of the incremental benefits and costs;
- Consolidation of value estimates using discounting to account for temporal differences;
- Application of decision criteria;
- Sensitivity testing; and
- Consideration of non-quantified benefits and costs.

The BCA identified the estimated net production benefits of the Modification to Australia at $31 M. Any environmental or social impacts of the Modification to Australia, after mitigation, would need to be valued at more than $31 M for the Modification to be undesirable from an economic efficiency perspective.

While Xstrata Coal would initially bear the production costs and receive the financial production benefits of the Modification, the net production benefits would be distributed between a number of stakeholders, including Xstrata Coal's shareholders in the form of net profits, the NSW government in the form of royalties (estimated at $12 M present value) and the Commonwealth government in the form of company tax (estimated at $19 M present value).

The main impacts of the Modification relate to greenhouse gas and ecology. Greenhouse gas impacts of the Modification occur globally with $0.4 M accruing to Australia. Global greenhouse gas costs will be internalised into Xstrata Coal's operating costs via the carbon tax. The impacts on ecology will be borne by those who hold values for this area of vegetation which are likely to be households at the local level. However, the values lost will be restored through subsequent rehabilitation. The value of these impacts is likely to be considerably less than $31 M.

The economic impact analysis found that the Modification will provide additional economic activity to the regional and state economy for a period of two years with existing operations progressing as per originally scheduled. The annual regional economic impact associated with the Modification (peak year of economic activity) is estimated at up to:

- $149 M in annual direct and indirect regional output or business turnover;
- $66 M in annual direct and indirect regional value added;
- $16 M in annual direct and indirect household income; and
- 184 direct and indirect jobs, which remain within the approved workforce limit of approximately 550 employees.

The NSW impacts will be larger given the ability of the larger economy to capture more of the incremental expenditure and the greater intersectoral linkages.

7.16 REHABILITATION AND FINAL LANDFORM

Following cessation of operations in the Narama West mining area, the resultant mine void will be progressively backfilled with overburden. The broader Narama mining area, including all of the land subject to the Modification, will then be utilised as an OEA for future mining at Ravensworth Operations as stipulated under PA 09_0176. This area will later be shaped and rehabilitated in accordance with the approved Mining Operations Plan and final landform design.

As a requirement of PA 09_0176, the Bayswater Creek diversion will be remediated to provide a hydraulically and geomorphically stable stream. Such activities are scheduled to occur following completion of the Narama West mining area.

8 ADMINISTRATIVE AMENDMENTS

This section provides a description of the administrative amendments sought to PA 09_0176.

8.1 AMENDMENT TO APPROVED OPERATIONS BOUNDARY

Ravensworth Operations manages and relies upon the existing Newdell substation for electricity to supply current activities on site. For completeness, this amendment seeks to adjust the '"*approved operations boundary*"' (see **Figure 1**), as defined by PA 09_0176, to include the Newdell substation on Lot 100/DP 700429 (see **Figure 3** and **Figure 5**). This extension of approximately 2 ha to the approved operations boundary will have no operational or environmental consequence and is consistent with the schedule of lands outlined in Appendix 1 of PA 09_0176.

8.2 AMENDMENT TO BLAST MANAGEMENT PLAN

Condition 17 (Schedule 3) of PA 09_0176 states:

> *The Proponent shall prepare and implement a Blast Management Plan for the project to the satisfaction of the Director-General. This plan must…*
>
> *(a) be prepared in consultation with DECCW, and be submitted to the Director-General for approval by the end of June 2011; and*
>
> *(b) described the blast mitigation measure that would be implemented to ensure compliance with the relevant conditions of this approval;*
>
> *(c) describe the measures that would be implemented to ensure that the public can get up-to-date information on the blasting schedule;*
>
> *(d) includes a road closure management plan, prepared in consultation with Council;*
>
> *(e) include a blast monitoring program for evaluating blast-related impacts…*
>
> *(f) include a protocol that has been prepared in consultation with the owners of nearby mines for minimising and managing cumulative blasting impacts of the mines.*

An amendment to Condition 17 is sought to allow the Xstrata Coal to formally incorporate the commitments of an existing agreement with Coal & Allied into the approved blast management plan. It will have no operational or environmental consequence.

The amendment to Condition 17 (Schedule 3) of PA 09_0176 is sought via the addition of sub-points (g) – (k) as follows:

> *The Proponent shall prepare and implement a Blast Management Plan for the project to the satisfaction of the Director-General. This plan must…*
>
> ***(g) specify the relevant ground vibration and air blast impact assessment criteria to be met at blast sensitive locations surrounding the Project and the processes for revision of relevant criteria in consultation with relevant stakeholders;***
>
> ***(h) ensure the continued implementation of blast management and monitoring procedures outlined in Section 5.4.4 of Volume 1 of the EA (Umwelt, 2010) for the Project Approval, including real-time vibration monitoring at Coal & Allied's Hunter Valley Operations overland conveyor;***
>
> ***(i) include a flyrock management and road closure procedure in consideration of Coal & Allied's operational needs;***
>
> ***(j) incorporate reporting requirements and procedures for identified exceedances of relevant criteria to relevant authorities; and***
>
> ***(k) Incorporate blast performance monitoring and reporting requirements, including reporting of blast monitoring results on an annual basis in the Annual Review for the Project.***

xstrata coal ravensworth open cut

Hansen Bailey ENVIRONMENTAL CONSULTANTS

NARAMA WEST MODIFICATION

Proposed Amendment to Approved Operations Boundary

FIGURE 5

8.3 AMENDMENT TO ABORIGINAL GRINDING GROOVE BLAST CRITERION

Condition 10 (Schedule 3) of PA 09_0176 states;

> *The Proponent shall ensure that blasts on site do not cause exceedances of the criteria in Table 8.*
>
> *Table 8. Blasting criteria*

Location	***Airblast overpressure (dB(L in Peak))***	***Ground vibration (mm/s)***	***Allowable exceedance***
…Aboriginal axe grinding groove site (REA 86)	*N/A*	*30*	*0%...*

This amendment is sought to allow Xstrata Coal to incrementally increase the blast vibration criterion of 30 mm/s at REA 86 to 175 mm/s. This is consistent with Condition 6.6.10 (Appendix 3) of PA 09_0176, which requires Ravensworth Operations to establish a blast vibration criterion through further geotechnical investigations for the protection of REA 86. In this regard, a strain analysis was undertaken by Terrock (2012a) to assist in determining a safe (non-damaging) blast vibration limit on the competent sandstone of REA 86 (see **Appendix G**).

Hunter Valley sandstone has a tensile failure strain of 295 microstrain (με) (Lewandowski, 1999) or an equivalent peak particle velocity limit (or vibration limit) of 354 mm/s. That is, to break the sandstone, measurements must exceed 295 με or 354 mm/s. A peak shear wave strain of 146 με is predicted at REA 86 for an equivalent vibration limit of 175 mm/s generated during a blast event. This is well below the tensile failure strain value recommended by Lewandowski (1999). Given these values, the vibration limit of 175 mm/s produced by blasting is not anticipated to pose a risk to REA 86.

To determine the potential for cumulative impacts, Terrock (2012b) investigated the loading strain and elastic limit of the sandstone associated with REA 86 at the interim limit of 120 mm/s (see **Appendix G**). Given elastic nature of sandstone, repetitive blasting within the approved operations boundary is not anticipated to cause cumulative damage on REA 86.

As the increase in vibration to 175 mm/s is a substantial change from the last known ground strain measurements at 30 mm/s, Xstrata Coal has committed to adopting an incremental approach whereby an interim limit of 60 mm/s will be initially applied. If observations show no change to REA 86 and monitoring validates the predictions from the strain analysis, the blast vibration limit will be progressively increased to 120 and 175 mm/s.

Aboriginal stakeholder consultation regarding the approach to increasing the blast vibration limit at REA 86 was conducted in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). Xstrata Coal engaged

with Aboriginal stakeholders associated with the preparation of the Aboriginal heritage and archaeological assessment (Umwelt, 2010c) undertaken for the Ravensworth Operations Project EA.

The results of the analysis (Terrock, 2012a) and the approach to increasing the blast vibration limit at REA 86 were reported to Aboriginal stakeholders (see **Appendix H**). As a part of the consultation process, Xstrata Coal has committed to engaging Aboriginal stakeholders in monitoring REA 86 when the blast vibration criterion increases to 60, 120, and 175 mm/s.

In light of the findings of the analysis (Terrock, 2012a,b) and as agreed with the Aboriginal community, amendment to Condition 10 (Schedule 3) of PA 09_0176 is sought as follows:

> *The Proponent shall ensure that blasts on site do not cause exceedances of the criteria in Table 8.*
>
> *Table 8. Blasting criteria*

Location	***Airblast overpressure (dB(L in Peak))***	***Ground vibration (mm/s)***	***Allowable exceedance***
…Aboriginal axe grinding groove site (REA 86)	-	***175****	*0%...*

****The maximum ground vibration limit of 175 mm/s is conditional upon meeting the interim blast vibration limits of 60 and 120 mm/s and demonstrating no damage to REA 86 through monitoring and consultation with the Aboriginal community or relevant stakeholders.***

8.4 AMENDMENT TO APPROVED ABORIGINAL ARCHAEOLOGIST

Condition 6.10.1 (Appendix 3) of PA 09_0176 states;

> *… the Heritage Management Plan will address… outline the process of the investigation of further detailed investigation of the conservation and management of the Hillcrest Offset Area as an Aboriginal heritage and archaeological resource, including… archaeological significance assessment, conducted by Umwelt archaeologists, in accordance with government agency guidelines (NPWS, 1997)*.

An amendment is sought to allow Xstrata Coal to engage an appropriately qualified archaeologist to conduct the required works and not be restricted to a particular company. It will have no operational or environmental consequence.

The amendment to Condition 6.10.1 (Appendix 3) of PA 09_0176 is sought as follows:

> *… the Heritage Management Plan will address… outline the process of the investigation of further detailed investigation of the conservation and management of the Hillcrest Offset Area as an Aboriginal heritage and archaeological resource, including… archaeological significance assessment, conducted by* ***an appropriately qualified archaeologist****, in accordance with government agency guidelines (NPWS, 1997).*

9 STATEMENT OF COMMITMENTS

This section provides a statement of commitments to be implemented by Xstrata Coal for the Modification.

Further to the conditions of PA 09_0176, the statement of commitments in **Table 3** summarises the major aspects of the Modification and 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 3
Statement of Commitments

Ref.	Commitment	EA Section
Narama West Mining Area		
1	Xstrata Coal will continue to manage its operations (including the Modification) in accordance with the conditions of PA 09_0176 and the approved: • 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 Narama West void will be progressively backfilled with overburden and shaped to achieve the final landform as approved.	**4**
3	Rehabilitation will be undertaken in accordance with the approved Mining Operations Plan following completion of future mining operations.	**4**
Administrative Amendments		
4	An incremental approach (60, 120, and 175 mm/s) to increasing the blast vibration limit at REA 86 will be adopted.	**8.3**
5	Blast events will be monitored at REA 86 to validate the predictions from the strain analysis (Terrock, 2012a,b) when increasing the blast vibration criterion.	**8.3**
6	Aboriginal stakeholders will be engaged to monitor REA 86 when increasing the blast vibration criterion.	**8.3**

10 MODIFICATION JUSTIFICATION

This section demonstrates how the Modification is consistent with the objects of the EP&A Act and considered justifiable when comparing the predicted impacts with the social and economic benefits.

The Modification will provide the opportunity for the extraction of 2.7 Mt of ROM coal from within the footprint of an approved OEA at Ravensworth Operations with minimal environmental and social impacts. The recovery of the additional coal will be achieved through the utilisation of existing infrastructure and equipment at Ravensworth Operations thus optimising the return for stakeholders on already expended capital without causing material environmental and social impacts.

The additional coal recovered from the Modification will ultimately contribute to meeting ongoing global and national energy demands. Sale of this coal will generate net economic benefits to Australia in the order of $31 M. This will produce additional socio-economic benefits to the local community and approximately $12 M (present value) in royalties to the NSW government, which will be used to fund infrastructure projects and community services.

Given the scale and nature of the Modification, operations will remain relatively consistent with PA 09_0176 and as described in the Ravensworth Operations Project EA (Umwelt, 2010a). Ravensworth Operations, with consideration of the Modification, will be capable of conducting activities under the conditions of PA 09_0176 and the management plans implemented under this approval.

The main environmental impacts of the Modification relate to the generation of greenhouse gas and the removal of biodiversity values due to the requirement to clear an area of existing rehabilitation. In accordance with the principles for ESD, Xstrata Coal will be required to compensate for these impacts by means of 'polluter pays'. As such, expenditure associated with greenhouse gas (via the Commonwealth government's carbon tax) and the restoration of biodiversity values within the Modification disturbance boundary, following completion of future mining operations, will be internalised into Xstrata Coal's operating costs. These environmental costs are significantly outweighed by the social and economic benefits created by the Modification.

The coal recovered by the Modification, which would otherwise be sterilised, will produce additional royalty income for the State of NSW that would otherwise not be received. The implementation of the management and mitigation measures listed in **Section *7*** will ensure that the identified coal resource within the Modification disturbance boundary can be recovered in an efficient and orderly fashion, whilst minimising any potential environmental and social impacts. In this regard, the Modification is consistent with the objects of the EP&A Act.

11 ABBREVIATIONS

Abbreviation	Description
AIP	*Aquifer Interference Policy*
ARI	Average Recurrence Interval
BCA	Benefit Cost Analysis
CHPP	Coal Handling and Preparation Plant
CMHS Act	*Coal Mine Health and Safety Act 2002*
DP&I	NSW Department of Planning and Infrastructure
EA	Environmental Assessment
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
Ha	Hectare
Hansen Bailey	Hansen Bailey Environmental Consultants
Hunter REP	*Hunter Regional Environmental Plan 1989 (Heritage)*
Hunter Regulated WSP	*Water Sharing Plan for the Hunter Regulated River Water Source 2003*
Hunter Unregulated WSP	*Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*
ISO	International Standards Organisation
Km	Kilometre
LGA	Local Government Area
με	Microstrain
M	Metre
m^3/day	Cubic metre per day
M	Million
MIC	Maximum Instantaneous Charge
Mining Act	*Mining Act 1992*
ML	Megalitre
Mm	Millimetre
mm/s	Millimetre per second
MNES	Matters of National Environmental Significance
The Modification	Narama West Modification
Mt	Million tonnes
Mtpa	Million tonnes per annum

Abbreviation	Description
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	*Protection of the Environment Operations Act 1997*
Ravensworth Operations	Ravensworth Operations Pty Limited
REA 86	Aboriginal grinding groove site REA 86
RL	Reduced Level
ROM	Run of Mine
SAL	Strategic Agricultural Land
SEPP 33	*State Environmental Planning Policy 33 – Hazardous & Offensive Development*
SEPP 44	*State Environmental Planning Policy 44 – Koala Habitat Protection*
SEPP 55	*State Environmental Planning Policy 55 – Remediation of Land*
SEPP Mining	*State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
Singleton LEP 1996	*Singleton Local Environmental Plan 1996*
Singleton LEP 2013	*Singleton Local Environmental Plan 2013*
SRLUP	*Strategic Regional Land Use Plan – Upper Hunter*
SSC	Singleton Shire Council
TEOM	Tapered Element Oscillating Microbalance
Tpa	Tonners per annum
Tph	Tonnes per hour
TSC Act	*NSW Threatened Species Conservation Act 1995*
TSP	Total Suspended Particulates
Water Act	*Water Act 1912*
WM Act	*Water Management Act 2000*
WSP	Water Sharing Plan
Xstrata Coal	Xstrata Coal Pty Limited

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