GLENCORE

Mount Owen Continued Operations Project

ENVIRONMENTAL IMPACT STATEMENT

Response to Submissions

REPORT A: NSW Agency and Community Submissions

June 2015

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GLENCORE

MOUNT OWEN CONTINUED OPERATIONS PROJECT

Response to Submissions

REPORT A:
NSW Agency and Community Submissions

FINAL

June 2015

Prepared by
Umwelt (Australia) Pty Limited

on behalf of
Glencore

Project Director:	**Barbara Crossley**
Project Manager:	**David Holmes**
Report No.	**3109/R16/V4**
Date:	**June 2015**

umwelt

Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au

Executive Summary

The Environmental Impact Statement (EIS) for the Mount Owen Continued Operations Project (the Project) was placed on public exhibition from 20 January 2015 to 6 March 2015.

The Project seeks approval for the continued operation of the Mount Owen and Ravensworth East Mines, located within the Hunter Coalfields in the Upper Hunter Valley of New South Wales (NSW), approximately 20 kilometres north-west of Singleton, 24 kilometres south-east of Muswellbrook and to the north of Camberwell Village. Mount Owen Pty Limited (Mount Owen), a subsidiary of Glencore Coal Pty Limited (Glencore), currently owns and operates the Mount Owen Complex.

During the public exhibition period 233 submissions were made on the Project. This included 12 government agency submissions and 221 community submissions (including interest group submissions). The 221 submissions received from the community and interest groups included 188 submissions in support of the Project.

Of the 221 community submissions received, 85 per cent stated support of the Project (refer to **Figure A**) with 13 per cent objecting to the Project. A further four submissions received provided comments only, neither objecting nor supporting the Project.

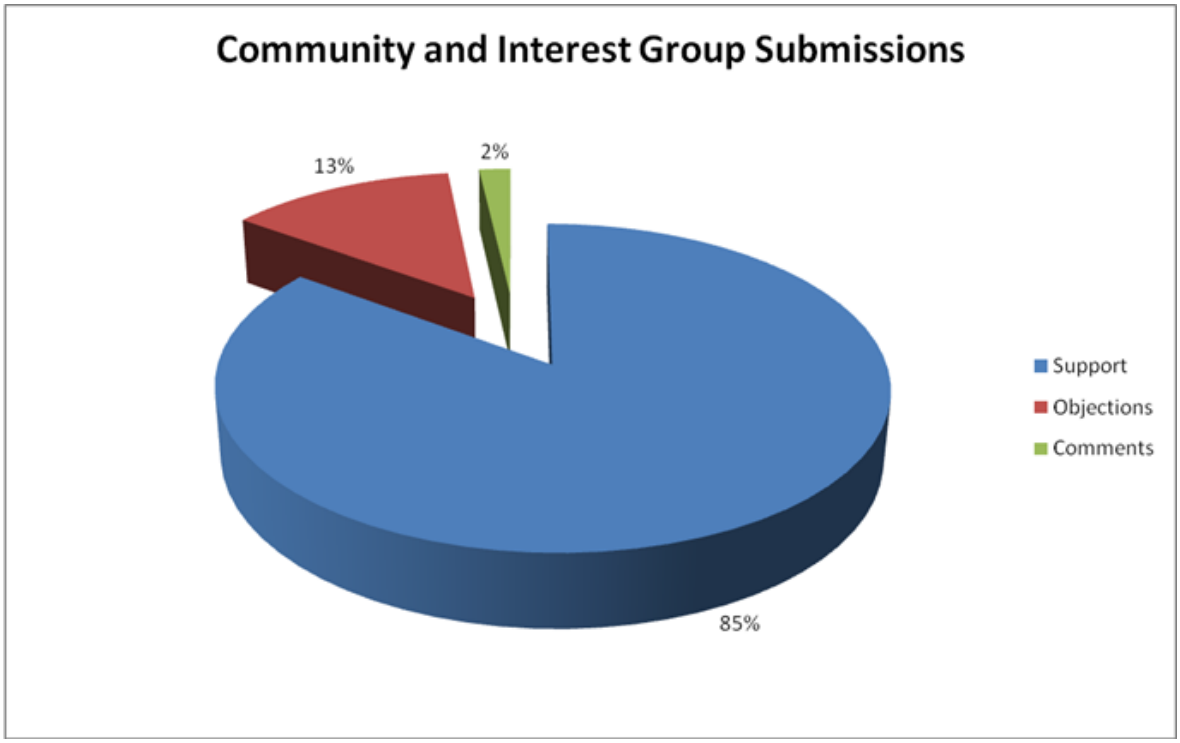

Figure A: Percentage of Supporting and Objecting Community and Interest Group Submissions.

Those in support of the Project cited current and future economic benefits directly related to the Project's operations, as the primary reason for their support. Positive views were also attributed to perceptions of good environmental management and monitoring by Mount Owen and general support for the Project (refer to **Figure B**).

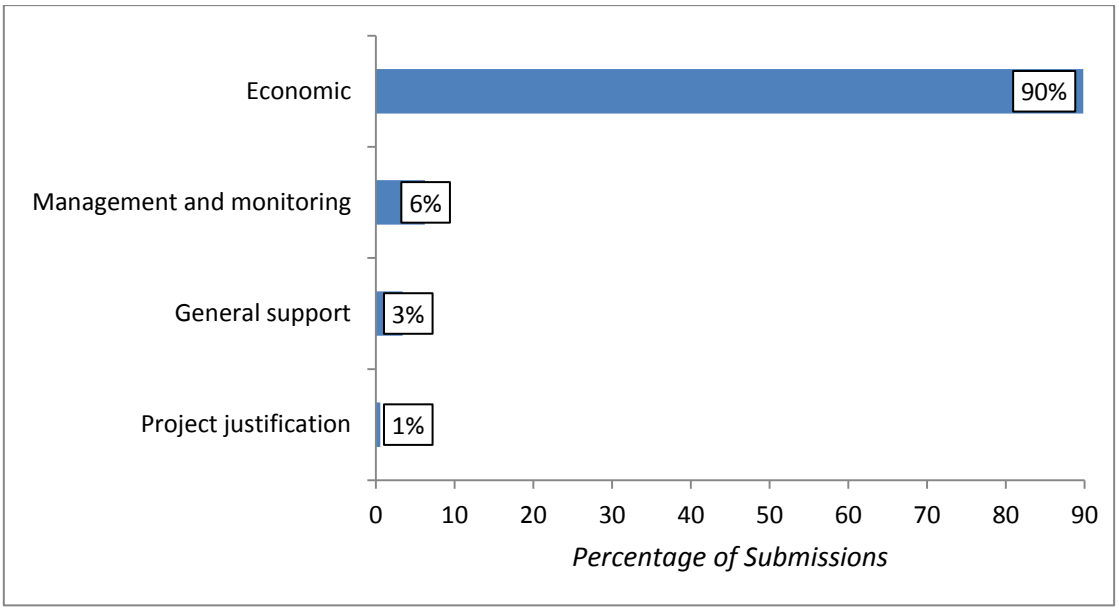

Figure B: Supporting Submission Themes.

Submissions supporting the Project highlighted the importance of the mining industry in the Hunter Valley, particularly in terms of sustainability of local business.

As can be seen in **Figure C** below, opposition responses could be categorised into 17 issue themes, those raised most frequently being impacts on local ecology, noise and air quality. The range of concerns presented aligned closely with the community issues discussed in the Social Impact and Opportunities Assessment undertaken by Umwelt for the Project in 2014.

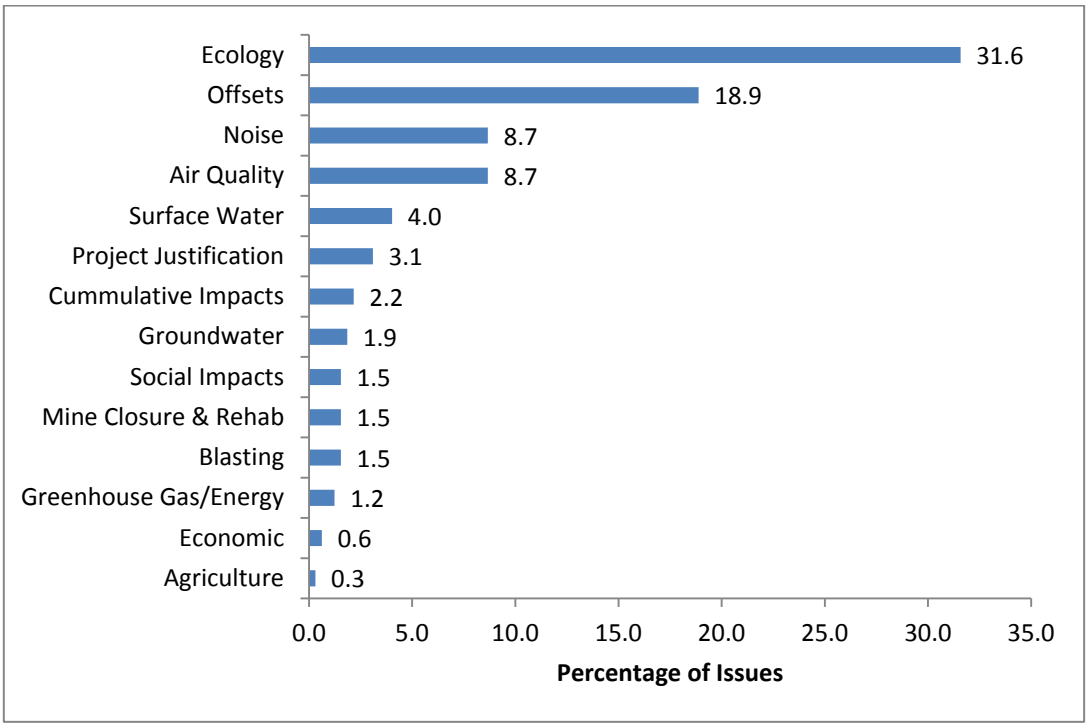

Figure C: Objecting Submissions Response Themes
(Due to rounding figure may not be equal to 100%)

Report A of the Response to Submissions (RTS) provides clarification and additional information in relation to the key issues raised in the submissions received during the public exhibition period of the EIS for the Project from the community, community groups and NSW Government agencies and Singleton Council.

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1.0 Introduction

The Environmental Impact Statement (EIS) for the Mount Owen Continued Operations Project (the Project) was placed on public exhibition from 20 January 2015 to 6 March 2015.

The Project seeks approval for the continuation of open cut mining operations at the Mount Owen Complex, located within the Hunter Coalfields in the Upper Hunter Valley of New South Wales (NSW), approximately 20 kilometres north-west of Singleton, 24 kilometres south-east of Muswellbrook and to the north of Camberwell Village (refer to **Figure 1.1**). Mount Owen Pty Limited (Mount Owen), a subsidiary of Glencore Coal Pty Limited (Glencore), currently owns and operates the Mount Owen Complex.

During the public exhibition period 233 submissions were made on the Project. This included 12 government agency submissions and 221 community and interest group submissions. The 221 submissions received from the community and interest groups included 188 submissions in support of the Project.

This Response to Submissions (RTS) has been prepared by Umwelt on behalf of Mount Owen to address the key issues raised in the submissions received during the public exhibition period of the EIS for the Project. The RTS is divided into two separate reports. This Report – (Report A), responds to the issues raised in the submissions of the Project made by the New South Wales (NSW) Government Agencies, Singleton Council and the community (including Interest Groups).

Report B will respond to specific issues raised by the Commonwealth Department of the Environment (DotE), including advice provided to the NSW Department of Planning and Environment (DP&E) by the Independent Expert Scientific Committee (IESC).

This Report (Report A) includes:

- a brief summary of the Project to provide context for the submissions made by the Government Agencies and the Community (**Section 1.1**);
- an analysis of the issues and themes raised in the community submissions (**Section 2.0**);
- Mining SEPP considerations (**Section 3.0**), including:
    - resource significance and project justification in accordance with the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP)* (**Section 3.1**);
    - assessment of private landholder impacts considering the recently released Voluntary Land Acquisition and Mitigation Policy (**Section 3.2**);
- a detailed response to all key issues raised in Government agency and community submissions (**Section 4.0**).

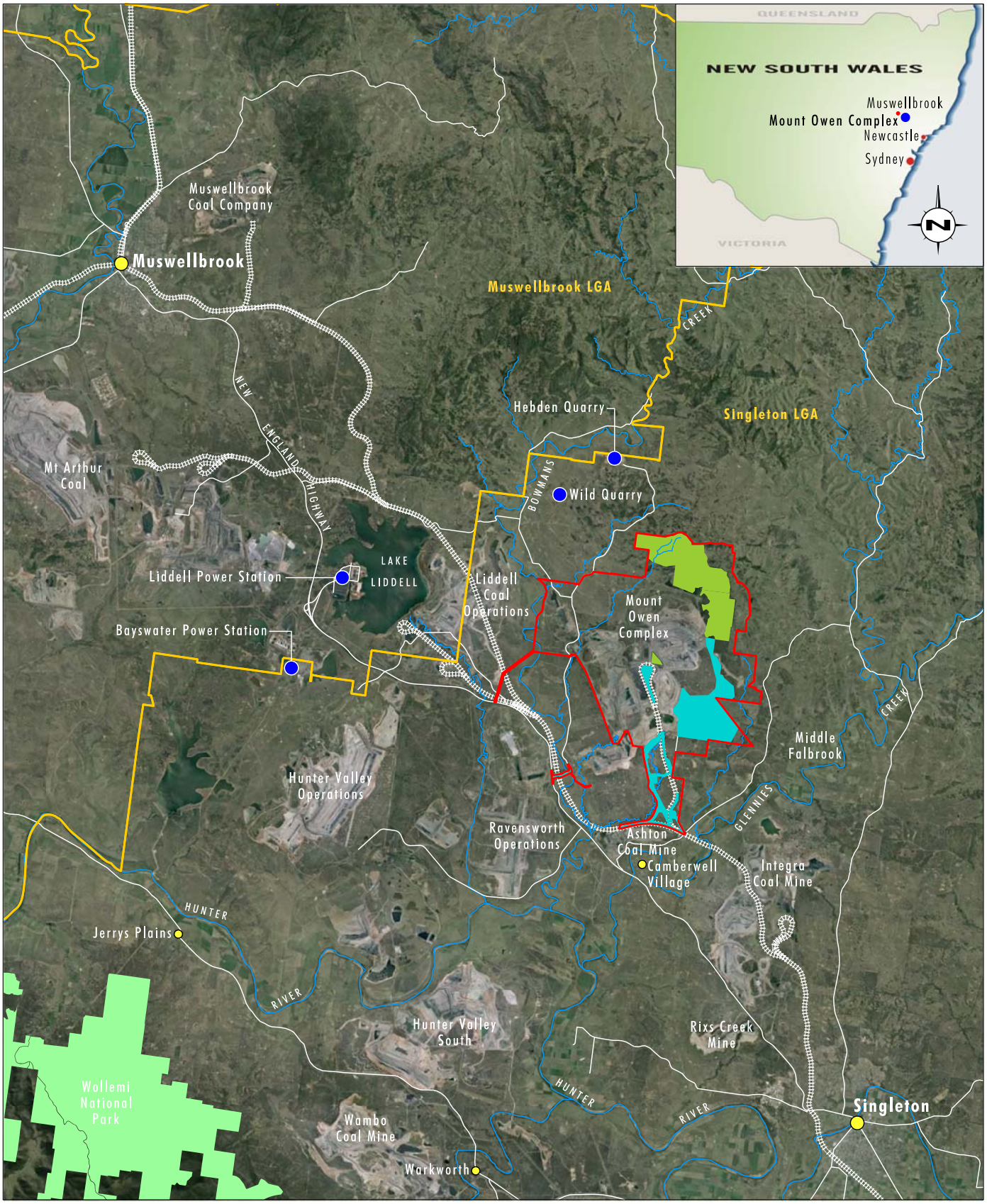


Image Source: Google Earth (2013)
Data Source: Mount Owen (2014), OEH (2013), Forest Corporation of NSW (2013)

0 2.5 5.0 10km
1:200 000

Legend

- Project Area
- Local Government Area Boundary
- Proposed Disturbance Area
- National Park
- State Forest
- Towns/Villages
- Road
- Railway

FIGURE 1.1

Upper Hunter Valley Context

File Name (A4): R16/3109_980.dgn
20150513 13.56

1.1 Current Mount Owen Mining Operations

The existing Mount Owen Complex consists of three open cut coal mining operations, Mount Owen (North Pit), Ravensworth East (West Pit and, including the Bayswater North Pit (BNP)) and Glendell (Barrett Pit). The current Mount Owen Complex includes the integrated use of the Mount Owen coal handling and preparation plant (CHPP), coal stockpiles and the rail load-out facility, (refer to **Figure 1.2**).

The existing approval for mining in the Mount Owen North Pit limits production to 10 million tonnes per annum (Mtpa) of run of mine (ROM) coal. This ROM coal along with Ravensworth East (approved 4 Mtpa) and Glendell (approved 4.5 Mtpa) ROM coal feed the Mount Owen CHPP and associated infrastructure which has an approved processing capacity of 17 Mtpa of ROM coal. Processed coal, both semi soft and thermal, are primarily transported via the Main Northern Rail Line to the Port of Newcastle for export, or by rail or conveyor for domestic consumption as required.

Mount Owen expects, subject to market conditions, that mining will be completed within the currently approved area of the Mount Owen North Pit and the Ravensworth East Mine by 2018 and 2021 respectively (refer to **Figure 1.3**).

1.2 The Mount Owen Continued Operations Project

The Project seeks to extract approximately 74 million tonnes (Mt) of ROM coal from the North Pit Continuation through open cut method, maintaining the current approved extraction rate of 10 Mtpa of ROM coal continuing the North Pit life to approximately 2030 (an additional 12 years from the existing approved mine life). Additionally, the Project seeks to maintain the current approved Ravensworth East extraction rate of 4 Mtpa of ROM coal. Subject to market conditions, mining within the BNP area would be undertaken from approximately 2015 to 2022 extracting approximately 12 Mt of ROM coal A further proposed area of mining, the Ravensworth East Resource Recovery (RERR) area, located in the eastern portion of Ravensworth East Mine, is proposed to be mined after the BNP from approximately 2022 to 2027; Mining in RERR will extract approximately 6 Mt of ROM coal. The total Project would extract approximately 92 Mt of ROM coal from its identified resources at the Mount Owen and Ravensworth East Mines.

The Project also offers the opportunity to consolidate the existing development consents for Mount Owen and Ravensworth East Mines and provide for further compliance efficiency by providing a single development consent for these continued operations.

The Project does not include any aspect of the ongoing operations at Glendell Mine covered by development consent DA 80/952.

The Project also seeks approval to undertake infrastructure works, which include:

- upgrades to Hebden Road, including the construction of a road overpass over the Main Northern Rail Line that crosses Hebden Road and a new dual lane bridge over Bowmans Creek. These upgrades will improve road safety and minimise traffic delays on Hebden Road that are a result of the existing rail level crossing and single lane Bowmans Creek Bridge for all Hebden Road users;

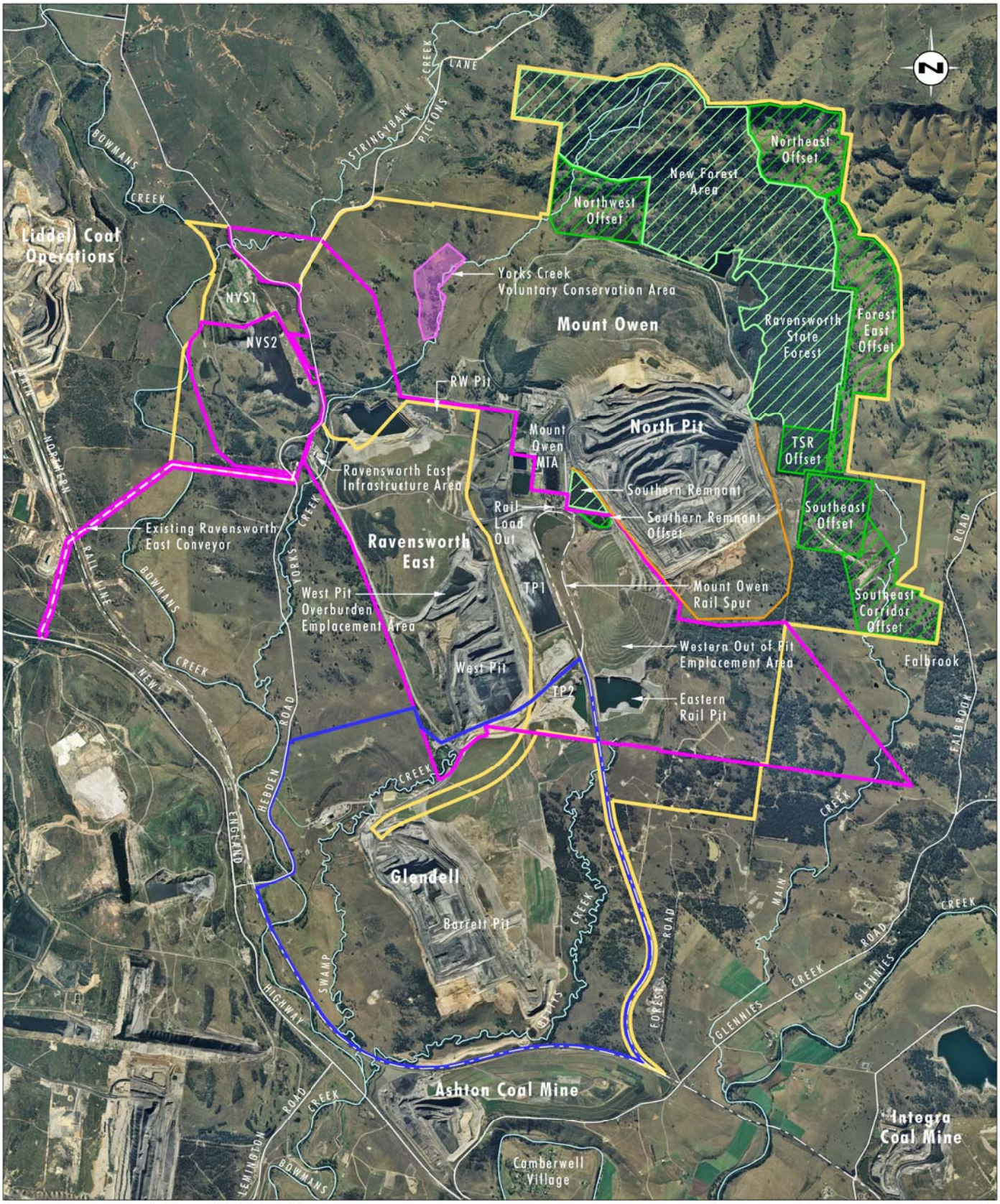


Image Source: Mount Owen (2012-2013)
Data Source: Mount Owen (2013), Department of Lands (2006)

0 1 2 3 km
1:60 000

Legend

- Ravensworth East Mine DA Boundary (DA 52-03-99)
- Glendell Mine DA Boundary (DA 80/952)
- Mount Owen Mine DA Boundary (DA 14-1-2004)
- Existing Biodiversity Offset Area
- Ravensworth State Forest
- Yorks Creek Voluntary Conservation Area
- Approved North Pit Mining Extent

FIGURE 1.2

Mount Owen Complex Current Operations

File Name (A4): R16/3109_981.dgn
20141024 15.03

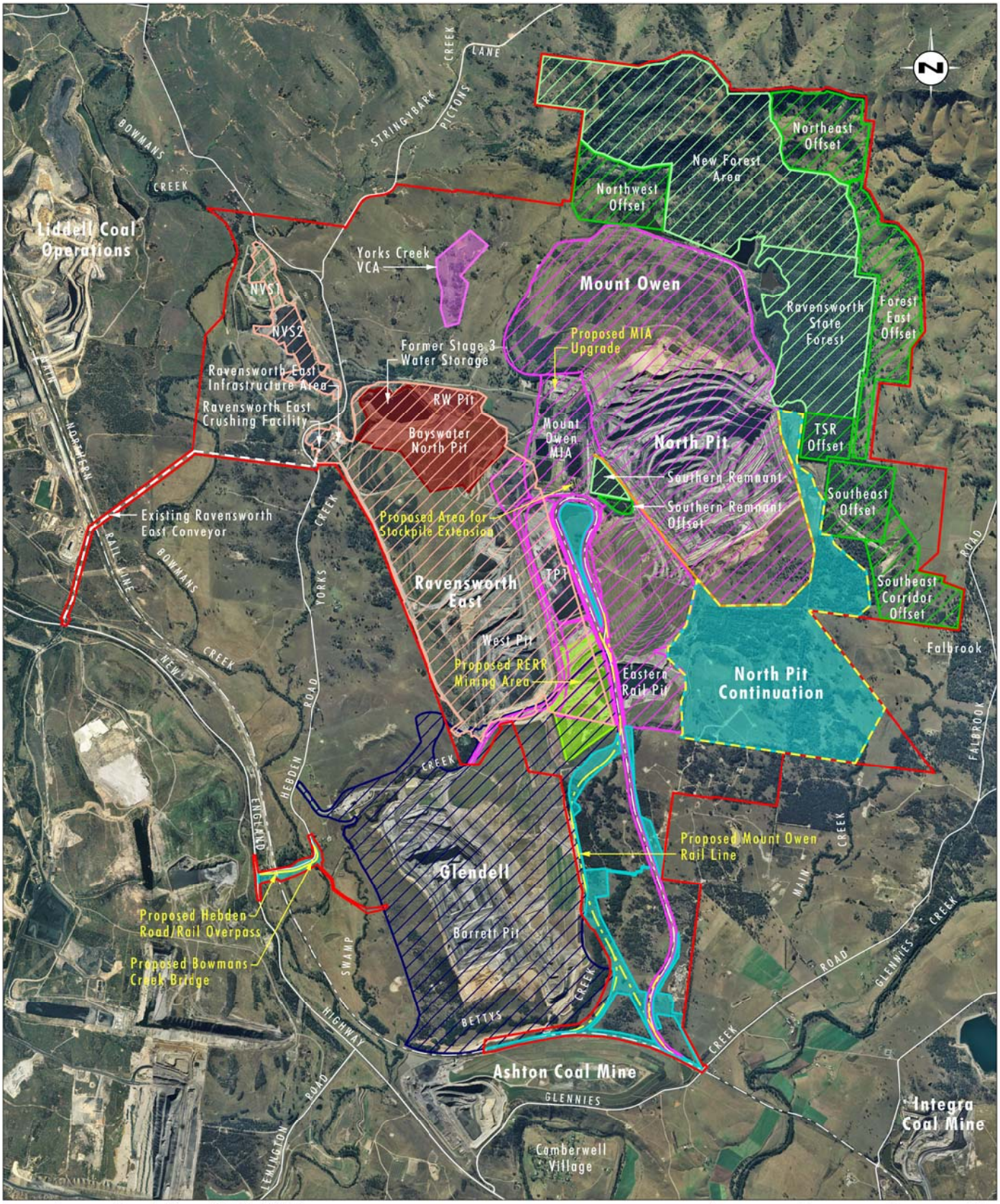


Image Source: Mount Owen (2012-2013)
Data Source: Mount Owen (2014)

0 1 2 3 km
1:60 000

Legend

- Project Area
- Approved North Pit Mining Extent
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Proposed Disturbance Area
- Proposed RERR Mining Area
- Yorks Creek VCA
- Bayswater North Pit
- Mount Owen Operational Area
- Glendell Operational Area
- Ravensworth East Operational Area
- Existing Biodiversity Offset Area
- Ravensworth State Forest

FIGURE 1.3

Proposed Mount Owen Continued Operations Project

File Name (A4): R16/3109_982.dgn
20141008 9.53

- provision for augmentation of the existing Mount Owen rail line through the construction of an additional rail line and northern turn-out west of the existing rail line. The existing Mount Owen Rail Line will be used as a siding for parking of Glencore trains when not in service and the northern turn out will allow Glencore trains the ability to turn around and return to Glencore owned mines to the west, thereby reducing unnecessary traffic flow on the Main Northern Rail Line;

- on-site infrastructure upgrades including the extension and improvements of the existing CHPP and coal stockpile facilities;

- upgrades to the Mine Infrastructure Area (MIA) including increased capacity at the existing heavy vehicle workshop and fuel farm and upgrades to ancillary services; and

- changes to the water management infrastructure associated with the proposed development.

The key features of the Project are shown on **Figure 1.3**.

2.0 Submissions analysis

2.1 Background

A total of 233 submissions were received in relation to the EIS, exhibited from 20 January to 6 March 2015. This included 12 government agency submissions (11 from NSW agencies and one submission from the Commonwealth Department of the Environment (DotE)) and 221 community and interest group submissions. The 221 submissions received from the community and interest groups included 188 submissions in support of the Project.

The 11 NSW agency submissions addressed in this Report A – Response to Submissions, were from:

- Environment Protection Authority (EPA);
- Department of Primary Industries – NSW Office of Water (NOW);
- NSW Trade and Investment, Division of Resources and Energy (DRE);
- Singleton Council (SC);
- Hunter New England Population Health;
- Office of Environment and Heritage (OEH);
- Office of Agricultural Sustainability and Food Security (OASFS);
- Roads and Maritime Services (RMS);
- Dams Safety Committee (DSC);
- NSW Rural Fire Service (RFS); and
- Transport for NSW (TfNSW).

None of these agencies identified that they oppose the Project, however several agencies made submissions seeking further clarification regarding aspects of the assessment of the Project. These submissions are discussed further in **Section 4.0**.

The DotE submission also includes advice from the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC)[1]. This submission will be addressed in Part B of the Response to Submissions to be lodged with DP&E and DotE in July 2015.

[1] The submission from DotE is covered in detail in Report B to the RTS however the following submission analysis also includes the submissions made by DotE for completeness and includes the DotE submission with government agency submissions.

2.2 Interest Group Submission Analysis

Submissions were received from 15 interest groups, with five indicating support for the Project, eight objecting to the Project and two providing comment.

2.2.1 Supporting Submissions

The submissions received in support of the Project primarily came from companies which contract labour and expertise or supply goods to Mount Owen. Strong support for the Project was also received from the Hunter Business Chamber.

All group submissions that were received in support of the Project cited economic reasons for their support.

Specific economic benefits noted included:

- Continued and increased employment opportunities;
- Local expenditure from businesses and employees, and;
- Broader economic benefits to the region, state and nation through coal production.

2.2.2 Objecting Submissions

The eight interest group submissions that objected to the Project outlined a range of issues (see **Figure 2.1**). Ecological impacts were the most frequently cited issues and associated environmental offsets, with noise and air quality impacts also raised frequently.

The issues raised in objections are discussed in detail in **Section 4** of this Report.

2.2.3 Submissions Providing Comment

Two submissions were received providing feedback on the Project, which were neither in support, nor objecting to the Project. These submissions provided comments on the Project and focused on:

- The suitability and accuracy of the Economic Assessment; and
- Suggested conditions of consent in relation to ecological monitoring and offsetting requirements.

A response to these submissions is also provided in the relevant sections within **Section 4** of this Report.

2.3 Community Submissions Analysis

A total of 206 individual submissions were received from community members. Of these, 21 submissions stated opposition to the Project while 183 were in support. Two of the submissions were characterised as being comments or enquiries as they neither objected nor opposed the Project. That is, just under 90 per cent of the submissions stated support of the Project (see **Figure 2.1**).

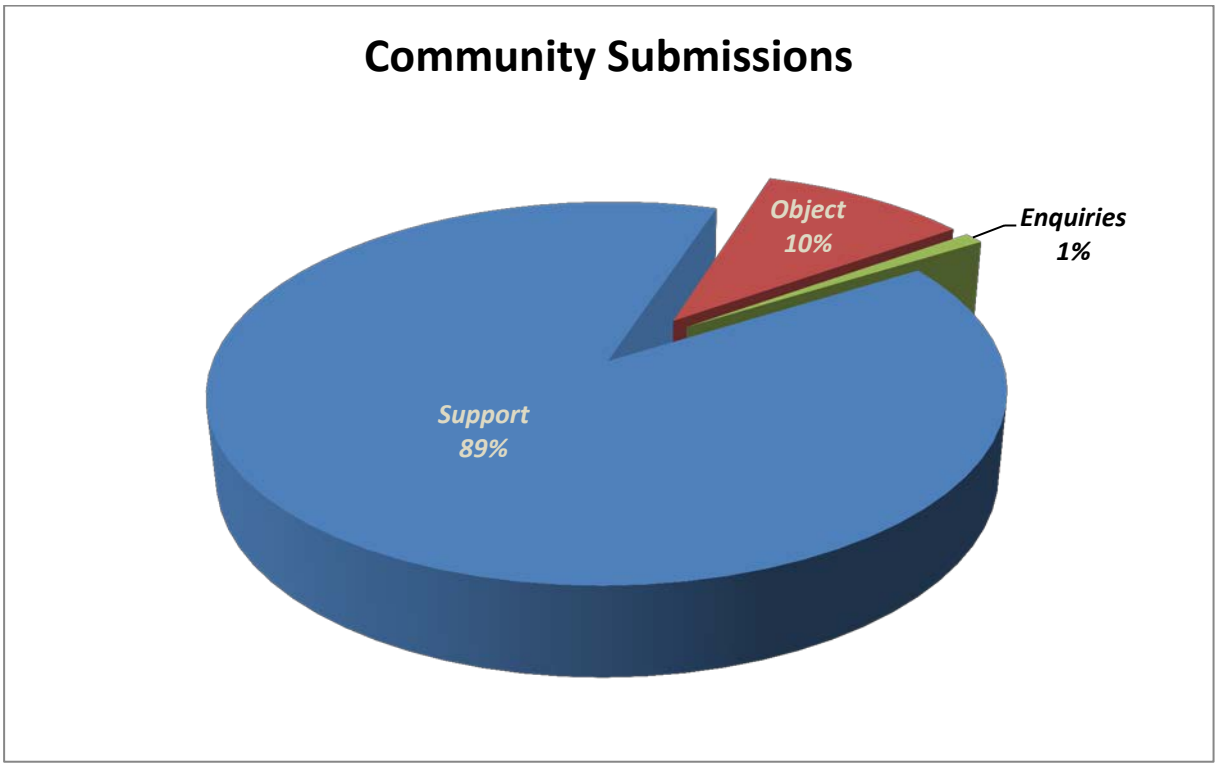


Figure 2.1 - Percentage of Supporting and Objecting Community Submissions.

A content analysis was undertaken on all community submissions in response to the Project, to understand the key issues raised by the community in relation to the Project. Support, comments and objections to the Project were analysed separately, as the themes within the submissions were distinct. Broad themes and categories were identified within the submissions, which were subsequently analysed by frequency using a multiple response analysis in SPSS (Statistical Package for Social Sciences).

2.3.1 Supporting Submissions

As shown in **Figure 2.2**, nearly all of the 183 community submissions in support of the Project related to the economic benefits (90 per cent) of the Project. The remaining 10 per cent of supporting submissions related to positive perceptions of good environmental management undertaken at Mount Owen (6 per cent), general support for the Project (3 per cent) and justification for the Project (i.e. recognising the need for the Project; 1 per cent).

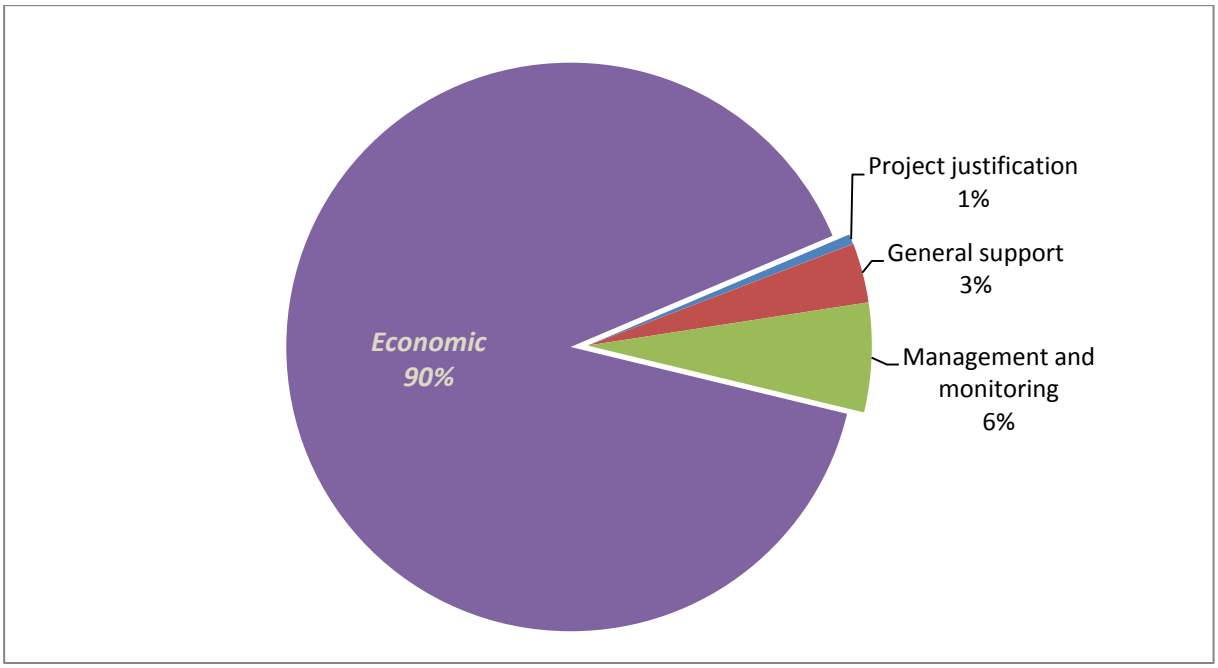
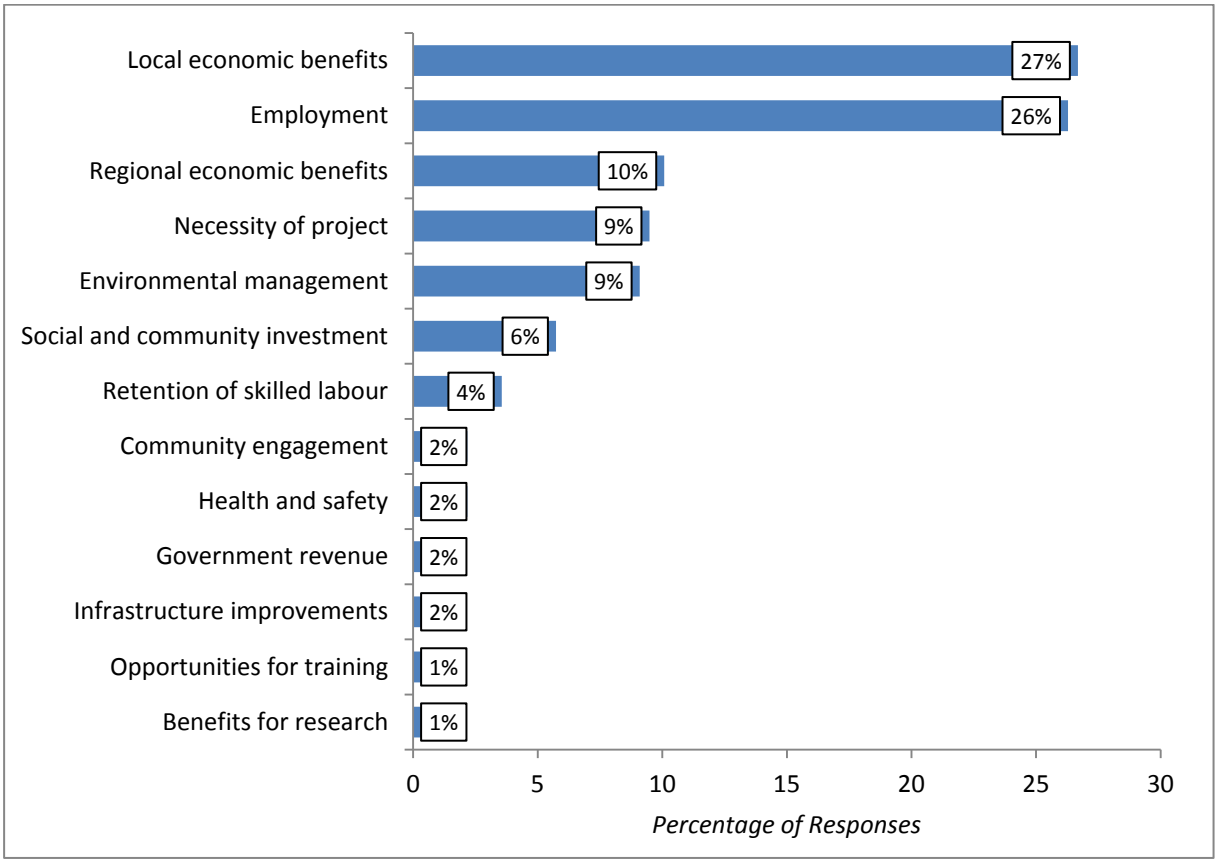


Figure 2.2 - Supporting Submission Response Themes.

The content of each of the supporting submissions was also further categorised according to various sub themes. Each of the sub themes are identified in **Figure 2.3**.



Due to rounding total percentages in figure may not be equal to 100%

Figure 2.3 - Supporting Submission Response Categories

As is illustrated in **Figure 2.3**, more than a quarter of all responses related to the employment opportunities provided by the Project, with general local and regional economic benefits commonly cited.

2.3.1.1 Economic Benefits

A total of 477 statements relating to the economic benefits of the Project were made in the supporting community submissions. Of these responses, over a quarter were specifically related to the continuation of employment opportunities afforded by the continuation of the Mount Owen operations:

> ***"If Mount Owen were to close, it would mean that 25% of my workers will be made redundant"***

A further 17 per cent of statements relating to economic benefit focused on the specific benefits of the Project to the local community, such as local expenditure by workers and their families and businesses associated with the mining operations.

> ***"We shop locally and support local business and community, we pay council rates and our children attend a local childcare"***

Economic benefits to the broader region were also cited, alongside the economic stimulus provided to local businesses as a result of the mining operations.

> ***"The coal mining industry contributes significantly to the economics of the Hunter Region, the state of NSW and the national economy"***

2.3.1.2 Management of the Operations and Environment and Community Performance

Positive perceptions regarding the existing environmental and overall management of the Mount Owen Operations were cited in six per cent of supporting submissions. An example is provided below:

> ***"The environmental team at Mount Owen is award winning and revered by many sites in the Hunter Valley and Australia"***

2.3.1.3 General Support and Project Justification

Six submissions indicated general support for the Project without specifying particular reasons for this support.

Additionally, three responses indicated that in the current sector and economic climate, having continued operations, such as the Project, were crucial to the sustainability of local communities through flow on effects such as continued employment opportunities, and contributions to local infrastructure:

> ***"Without mining the Hunter Valley would be a ghost town and there would be no future here for my child"***

2.3.2 Submissions Providing Comment on the Project

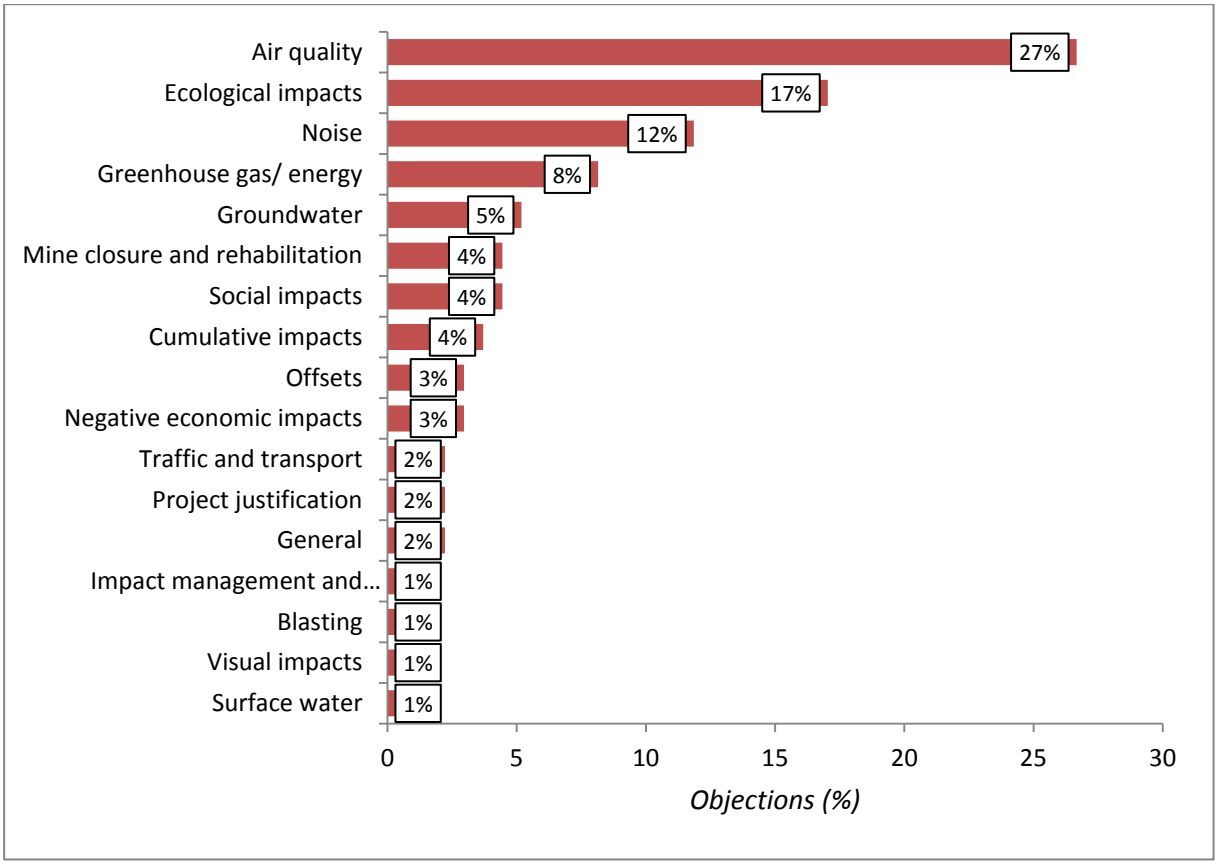
Two submissions were received providing feedback on the Project, which were neither in support, nor objecting to the Project. These submissions provided comments on the Project and focused on:

- The right for all affected properties to be acquired;
- Ensuring that the health and safety of those residents who stay; and,
- The provision of additional information to potentially affected residents.

A response to these submissions is provided in the relevant sections within **Section 4** of this report.

2.3.3 Objecting Submissions

The 21 community submissions objecting to the Project were initially grouped by 17 themes. As can be seen in **Figure 2.4**, the dominant theme of objections was around air quality impacts (27 per cent) followed by ecological impacts (17 per cent) and noise impacts (12 per cent).



Due to rounding total percentages in figure may not be equal to 100%

Figure 2.4 - Overarching Themes of Objection Submissions

A response to the issues raised in the objections is provided in detail in **Section 4** of this report.

3.0 Mining SEPP Considerations

Part 3 of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (the Mining SEPP) prescribes specific matters that must be considered by the consent authority (in this case the Minister for Planning or the Planning and Assessment Commission (PAC) under delegation of the Minister) when determining development applications for mining projects. The matters identified for consideration in Part 3 are discussed generally in Section 3.2.2.2 of the EIS with the detailed consideration of these issues included in Section 5 of the EIS. In late 2014 there were amendments to the Mining SEPP. At the time of writing the EIS, not all of the information relevant to the consideration of Project in accordance with Part 3 requirements was available.

The two key issues in Part 3 of the Mining SEPP which additional material is now available to supplement the assessment in the EIS are the considerations under clause 12AA in relation to resource significance and the assessment of the Project against the Voluntary Land Acquisition and Mitigation Policy as required by clause 12A. These issues are discussed in **Sections 3.1** and **3.2**.

3.1 Resource Significance and Project Justification

Clause 12AA of the Mining SEPP requires the consent authority to consider the significance of the resource that is the subject of the application. This assessment must have regard to the following matters:

- the economic benefits, both to the State and the region in which the development is proposed to be carried out, of developing the resource, and
- any advice by the Director-General of the Department of Trade and Investment, Regional Infrastructure and Services (DRE) as to the relative significance of the resource in comparison with other mineral resources across the State.

The advice from the Director-General of DRE was not available at the time the EIS was written but has now been provided in the submission from DRE.

Importantly, clause 12AA(4) and (5) provide:

> (4) In determining whether to grant consent to the proposed development, the significance of the resource is to be the consent authority's principal consideration under this Part.
> (5) Accordingly, the weight to be given by the consent authority to any other matter for consideration under this Part is to be proportionate to the importance of that other matter in comparison with the significance of the resource.

Sections 3.1.1 to **3.1.2** summarise the key findings of the EIS and the DRE advice in relation to the resource significance considerations under clause 12AA.

3.1.1 The economic benefits, both to the State and the region

Sub clause 12AA(2) identifies matters that are relevant to the consideration of the economic benefits to the State and the region in which the Project is proposed to be carried out:

- employment generation,
- expenditure, including capital investment, and

- the payment of royalties to the State.

A comprehensive Cost Benefit Analysis and Economic Impact Analysis of the Project (Economic Assessment) was undertaken as part of the EIS studies by Delloite Access Economics. The Economic Assessment forms Appendix 15 of the EIS. The Report found the following in relation the matters identified in sub clause 12AA(2):

Employment generation:

The Project will provide significant economic benefits to a range of stakeholders, with the key employment benefits being:

- the creation of approximately 330 additional construction jobs during the construction phase of the Project;

- continued employment of the existing workforce of up to approximately 660 full-time equivalent positions (FTEs) at the Mount Owen Mine and up to 260 at the Ravensworth East Mine; and

- directly and indirectly employing a peak of almost 1,200 (FTEs) workers. Of this, about 1,000 are estimated to be employed in the Hunter region.

Expenditure, including capital investment:

The Project will provide significant economic benefits to a range of stakeholders, with upfront Project capital investment of approximately $153 million.

The Project is also predicted to result in:

- generation of a net benefit to the Singleton community of around $306 million (in NPV terms) over the life of the Project;

- an increase the Hunter economy by just under $1.3 billion in NPV terms, over the life of the Project; and

- an increase the NSW economy by approximately $1.9 billion (NPV terms).

The payment of royalties to the State:

Royalties of an estimated $258 million in NPV terms will be paid to the NSW Government over the life of the Project.

The DRE submission on the Project independently estimated expected royalties from the Project and calculated that:

> '*in a typical full production year the State will receive around $32 million per annum, and in dollars of the day total royalty payable from the Project would be around $475 million. The net present value of this royalty stream would be around $280 million using a 7% real discount rate*.'

This estimate is slightly higher than the estimate in the Project's Economic Assessment due to different assumptions as to coal prices and exchange rates used by the DRE assessment team. In the verification review process, the Project would have even larger economic benefits for the State and region than has been identified in the Economic Assessment, if the DRE assumptions are realised.

A number of submissions were made by the Australia Institute and the community regarding economic considerations. These are discussed further in **Section 4.14** of this Report. None of the matters raised in these submissions are considered to alter the conclusions reached in the Economic Assessment and EIS regarding the economic benefits of the Project and the assessment of the Project under clause 12AA of the Mining SEPP.

3.1.2 Resource Significance

Pursuant to clause 12AA, the Director-General is, in providing advice under sub clause (1) (b), to have regard to such matters as that Director-General considers relevant, including:

- the size, quality and availability of the resource that is the subject of the application;
- the proximity and access of the land to which the application relates to existing or proposed infrastructure;
- the relationship of the resource to any existing mine; and
- whether other industries or projects are dependent on the development of the resource.

The DRE submission provides advice in relation to the Project regarding these issues. A copy of the DRE advice is provided in **Appendix A**.

The DRE assessment confirms the findings in the EIS that the Project is an appropriate development for the extraction of the coal resources present and the Project will provide significant benefits to the State and region if approved. The advice from the DRE on the dependency of other industries on the Project is also supported by the extensive number of submissions from individuals and companies who either work at the Mount Owen Complex or rely on work or flow on effects from the operations at the Mount Owen Complex.

3.2 Voluntary Land Acquisition and Mitigation Policy

The recently released Voluntary Land Acquisition and Mitigation Policy (DP&E 2014) provides a framework for a consent authority, in setting the land acquisition process where exceedance criteria apply at private land holdings, for air quality and noise impacts associated with a Project.

The Voluntary Land Acquisition and Mitigation Policy also provides specific requirements in relation to mitigation measures associated with air quality and noise impacts.

Under clause 12A of the Mining SEPP, the consent authority is to consider applicable provisions of the Voluntary Land Acquisition and Mitigation Policy prior to determining the development application. The provisions of the Voluntary Land Acquisition and Mitigation Policy relevant to the Project are discussed further below.

3.2.1 Voluntary Mitigation Rights

3.2.1.1 Mitigation measures for air quality impacts

Under the Voluntary Land Acquisition and Mitigation Policy, a consent authority should only apply voluntary mitigation rights where the residual impact is greater than the criteria set out in Table 2 of the Voluntary Land Acquisition and Mitigation Policy, as introduced below:

Table 2 – Particulate Matter Mitigation Criteria

POLLUTANT	*AVERAGING PERIOD*	*MITIGATION CRITERION*		*IMPACT TYPE*
PM10	*Annual*	*30 µg/m3**		*Human health*
PM10	*24 hour*	*50 µg/m3***		*Human health*
Total suspended particulates (TSP)	*Annual*	*90 µg/m3**		*Amenity*
Deposited dust	*Annual*	*2 g/m2/month***	*4 g/m2/month**	*Amenity*

** Cumulative impact (i.e. increase in concentrations due to the development plus background concentrations due to all other sources).*
*** Incremental impact (i.e. increase in concentrations due to the development alone), with up to 5 allowable exceedances of the criteria over the life of the development.*

Mitigation measures in these circumstances should be directed towards reducing the potential human health and amenity impacts of the development, and may include:

- *Air conditioning, including heating;*
- *Insulation;*
- *First flush water systems;*
- *Clothes dryers;*
- *Installation and regular replacement of water filters; and*
- *Regular cleaning of any residence and its related amenities, such as barbeque areas and swimming pools.*

The mitigation criteria for air quality impacts in the Voluntary Land Acquisition and Mitigation Policy is substantially the same as the criteria used in the EIS (Section 5.2) to assess air quality impacts. Accordingly, no further review of properties predicted to require mitigation measures as a result of predicted air quality impacts is required for the Project beyond that detailed in the EIS.

3.2.1.2 Mitigation measures for noise impacts

Under the Voluntary Land Acquisition and Mitigation Policy, the consent authority should only apply voluntary mitigation rights where, even with the implementation of best practice management:

- *The noise generated by the development would be equal to or greater than 3dB(A) above the INP project specific noise level at any residence on privately owned land; or*
- *The development would increase the total industrial noise level at any residence on privately owned land by more than 1dB(A) and noise levels at the residence are already above the recommended amenity criteria in Table 2.1 of the INP; or*
- *The development includes a private rail line and the use of that private rail line would cause exceedances of the recommended acceptable levels in Table 6 of Appendix 3 of the RING (see Appendix B) by greater than or equal to 3dB(A) at any residence on privately owned land.*

These are discussed further below.

The noise generated by the development would be equal to or greater than 3dB(A) above the INP project specific noise level at any residence on privately owned land

The criteria used in the EIS to identify properties expected to have rights to noise mitigation measures under a development consent should the Project be approved was *an exceedance of greater than 2dB and up to and including 5 dB above relevant PSNL*. This is a slightly more conservative approach than is contained in the Voluntary Land Acquisition and Mitigation Policy.

A review of the predicted noise impacts in the EIS indicates that the eight properties identified to be within the predicted Noise Management Zone in the EIS (R012, R013, R019, R093, R094, R095, R112 and R122) would also have rights to the implementation of noise mitigation measures under the Voluntary Land Acquisition and Mitigation Policy.

The development would increase the total industrial noise level at any residence on privately owned land by more than 1dB(A) and noise levels at the residence are already above the recommended amenity criteria in Table 2.1 of the INP

Table 4.7 in the NIA (Appendix 7 of the EIS) identifies the existing amenity noise levels in the area. The noise levels at all receivers do not exceed the recommended amenity criteria in Table 2.1 of the INP and therefore no residences are predicted to experience noise levels in excess of this criteria.

The development includes a private rail line and the use of that private rail line would cause exceedances of the recommended acceptable levels in Table 6 of Appendix 3 of the RING (see Appendix B) by greater than or equal to 3dB(A) at any residence on privately owned land.

As per INP requirements, noise associated with the use of the Mount Owen Rail Spur has been assessed as part of the Project and is considered in the NIA against intrusive and amenity noise criteria (see above). As the rail noise has been assessed as part of Project noise, further specific private rail noise assessment is not required.

3.2.2 Voluntary Acquisition

The Voluntary Land Acquisition and Mitigation Policy includes the following land acquisition rights in relation to air quality and noise impacts associated with major mining projects that are now applicable to the Project:

Air Quality

A consent authority should only apply voluntary acquisition rights where, even with the implementation of best practice management, the development is predicted to contribute to exceedances of the acquisition criteria in Table 3:

- *At any residence on privately owned land; or*
- *At any workplace on privately owned land where the consequences of those exceedances in the opinion of the consent authority are unreasonably deleterious to worker health or the carrying out of business at that workplace, including consideration of the following factors:*
  - *the nature of the workplace;*
  - *the potential for exposure of workers to elevated levels of particulate matter;*
  - *the likely period of exposure; and*
  - *the health and safety measures already employed in that workplace.*
- *On more than 25% of any privately owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls.*

Table 3: Particulate matter acquisition criteria [10]

POLLUTANT	***AVERAGING PERIOD***	***ACQUISITION CRITERION***		***IMPACT TYPE***
PM10	*Annual*	*30 µg/m3**		*Human health*
PM10	*24 hour*	*50 µg/m3***		*Human health*
Total suspended particulates (TSP)	*Annual*	*90 µg/m3**		*Amenity*
Deposited dust	*Annual*	*2 g/m2/month***	*4 g/m2/month**	*Amenity*

* *Cumulative impact (i.e. increase in concentrations due to the development plus background concentrations due to all other sources).*
** *Incremental impact (i.e. increase in concentrations due to the development alone), with up to 5 allowable exceedances of the criteria over the life of the development.*

Noise

A consent authority should only apply voluntary land acquisition rights where, even with the implementation of best practice management:

- *The noise generated by the development would be more than 5dB(A) above the project specific noise level at any residence on privately owned land; or*
- *The noise generated by the development would contribute to exceedances of the recommended maximum noise levels in Table 2.1 of the INP on more than 25% of any privately owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls 7 ; or*
- *The development includes a private rail line and the use of that private rail line would cause exceedances of the recommended maximum criteria in Table 6 of Appendix 3 of the RING at any residence on privately owned land.*

These new acquisition criteria differ slightly to the acquisition triggers considered in the EIS.

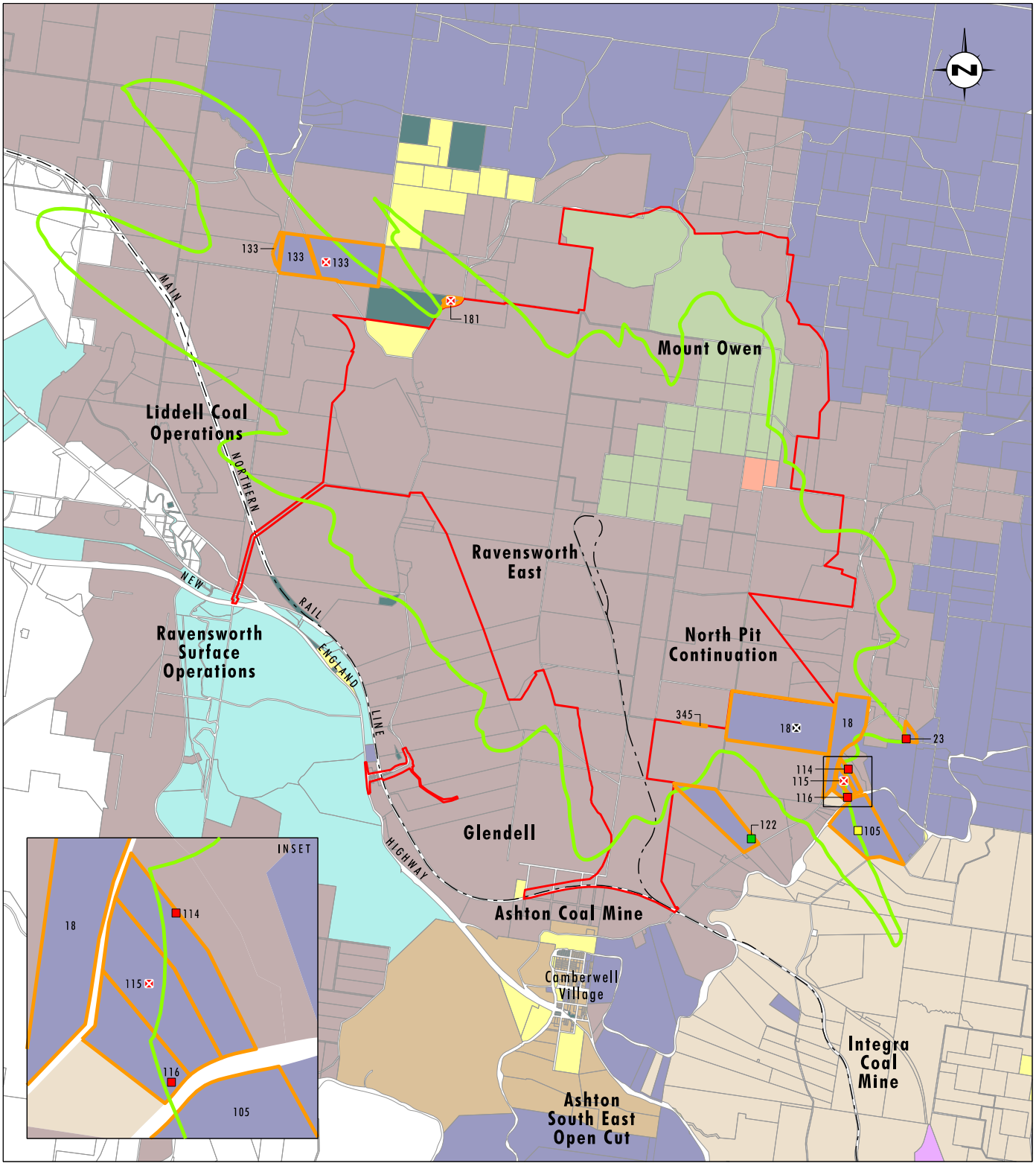
Accordingly, the assessment findings for acquisition presented in the EIS associated with air quality and noise related impacts have been reviewed against the Voluntary Land Acquisition and Mitigation Policy, as outlined below.

3.2.2.1 Air Quality

Project Specific - PM_{10} – 24 hour

The air quality modelling results presented in the EIS indicate there are no privately owned residences that are predicted to exceed the 24 hour average PM_{10} criterion (50 µg/m^3) in Year 1 or Year 5 as a result of the incremental increase in impact from the Project specifically. One privately owned residence (R023) is predicted to exceed the 24 hour average PM_{10} criteria (50 µg/m^3) by less than 1 µg/m^3 in Year 10.

Additionally, seven properties (R018, R105, R114, R115, R116, R133, and R181) were predicted to be impacted by PM_{10} levels greater than 50 µg/m^3 over more than 25 per cent of the contiguous property area. Properties R018, R115, R133, and R181 are vacant parcels of land.
The location of these properties and the predicted worst case PM_{10} 24 hour levels (50 µg/m^3) as a result of the Project are shown in **Figure 3.1**.



Data Source: Mount Owen (2014), Department of Lands (2009)

0 1 2 4km
Main Scale 1:90 000

0 150 300 600m
Inset Scale 1:15 000

Legend

- Project Area
- Air Contour 50μg/m^3
- >25% Lot/Holding within Contour
- Ashton Coal
- Crown Land
- Crown Land TSR
- Government Authority
- Integra Coal
- Macquarie Generation
- Glencore
- Private
- Rixs Creek Mine
- State Forest
- Private Residence
- Private Residence - Currently Subject to Acquisition Rights - Glencore
- Private Residence - Currently Subject to Acquisition Rights - Other Mines
- Subject to Acquisition Rights - Glencore No Dwelling
- Private No Dwelling

FIGURE 3.1

Worst Case Project
Air Quality PM10
24Hour 50μg/m^3

File Name (A4): R16/3109_983.dgn
20150506 10.09

Property R018 currently has acquisition rights under the existing Mount Owen approval. The owners of this property have recently made a written request for acquisition in accordance with the conditions of the existing approval and are currently in purchase negotiations with Mount Owen.

Under the previous policy which was used in the assessment in the EIS, landholdings having an existing dwelling only qualified for acquisition rights if relevant air quality criteria was predicted to be exceeded at the dwelling. PM_{10} levels as a result of the Project are not predicted to exceed 50µg/m^3 at the dwellings located on properties R105, R114 and R116 and, consistent with the policy at the time, these properties were not identified as qualifying for voluntary acquisition rights in the EIS. It is noted however that R105 currently has acquisition rights under Integra approvals as a result of predicted noise impacts from those operations.

Table 3.1 summarises the results of a review of the air quality impact predictions in the EIS against the acquisition criteria requirements of the Voluntary Land Acquisition and Mitigation Policy. The review identified that four properties with residential dwellings (R023, R105, R114 and R116) and three vacant land holdings (R018, R115 and R133) will be afforded voluntary acquisition rights under the consent if the Project is approved, due to predicted PM_{10} levels from the Project exceeding 50µg/m^3 (24 hours) over more than 25 per cent of the applicable land holdings at some stage during the life of the Project.

Table 3.1 – Private Properties predicted to have impacts over 50 µg/m^3 (24 hour) (including >25 per cent Contiguous Property Area)

Land ID	Lot & DP	Acquisition rights under Policy	Area of land holding (ha)	Area impacted (residence or ha)	% of Land Impacted	Years above criteria
R018*	1/851867 13/6830 5/133183	Yes - Vacant land – dwelling could be built on land under existing planning controls. Currently has acquisition rights (noise) from existing Mount Owen development consent and is currently under purchase negotiations.	184.9	184.9	100	Years 5 to 10
R023	2/626880	Yes - Privately owned land, residence located on land holding – residence impacted	3.8	Residence	NA	Year 10
R105	79/1161577	Yes - Residence located on land holding. Currently has acquisition rights (noise) with Integra	62.8	19.9	32	Year 10
R114	5/851867	Yes - Privately owned land - Residence located on land holding.	5.7	1.7	30	Year 5
R115	4/851867	Yes - Vacant land – dwelling could be built under existing planning controls	5.9	3.4	58	Year 5
R116	3/851867	Yes - Privately owned land - Residence located on land holding.	4.1	3.3	80	Years 5 to 10
R133	31/6842	Yes - Vacant land holding – dwelling could be built on land under existing planning controls.	107.5	84.9	79	Years 1 to 5
R181	10/1017435	No - Vacant land – land is owned by an extractive industry company and is therefore not privately owned as defined by the Policy	2.9	2.9	100	Years 5 to 10

* - Note R018 includes landholding R345 which is a small parcel of privately owned land (0.66ha) located to the west of R018. The property is associated with landholding R018 and both landholdings are held in joint ownership with one of the land owners associated with the ownership of both R345 and R018 (the allotments are not contiguous). Due to the size of the lot a dwelling could not be built under the relevant planning controls and the allotment would not qualify for acquisition under the Voluntary Acquisition and Mitigation Policy due to it not being contiguous with R018.

Property R105 qualifies for voluntary acquisition rights in relation to the Project, however it is noted that this property also has existing acquisition rights under the Integra Development Consent (PA 08_0101 and PA 08_0102) in relation to predicted noise impacts.

Mount Owen will continue to consult with these landholders regarding this issue and will follow the procedure specified within the Policy for communication to relevant landholders regarding acquisition and mitigation entitlements and the process for mitigation or acquisition on request. Alternatively there may be a negotiated agreement between Mount Owen and the relevant landholder.

Cumulative PM_{10} – Annual Average

An assessment of the cumulative PM_{10} annual average air quality impacts associated with the Project and neighbouring mines was undertaken as part of the air quality assessment. Three private properties (R111, R145 and R354) are identified as having predicted exceedances of the cumulative annual average criteria during the life of the Project. The location of these properties and the predicted PM_{10} annual average levels during year 1 (worst case scenario) are shown in **Figure 3.2**. The predicted cumulative impact and the contribution from the Project at these three properties are identified in **Table 3.2**.

Table 3.2 - Predicted Project Contribution to Cumulative Annual Average at Properties with Predicted Exceedance of PM_{10}

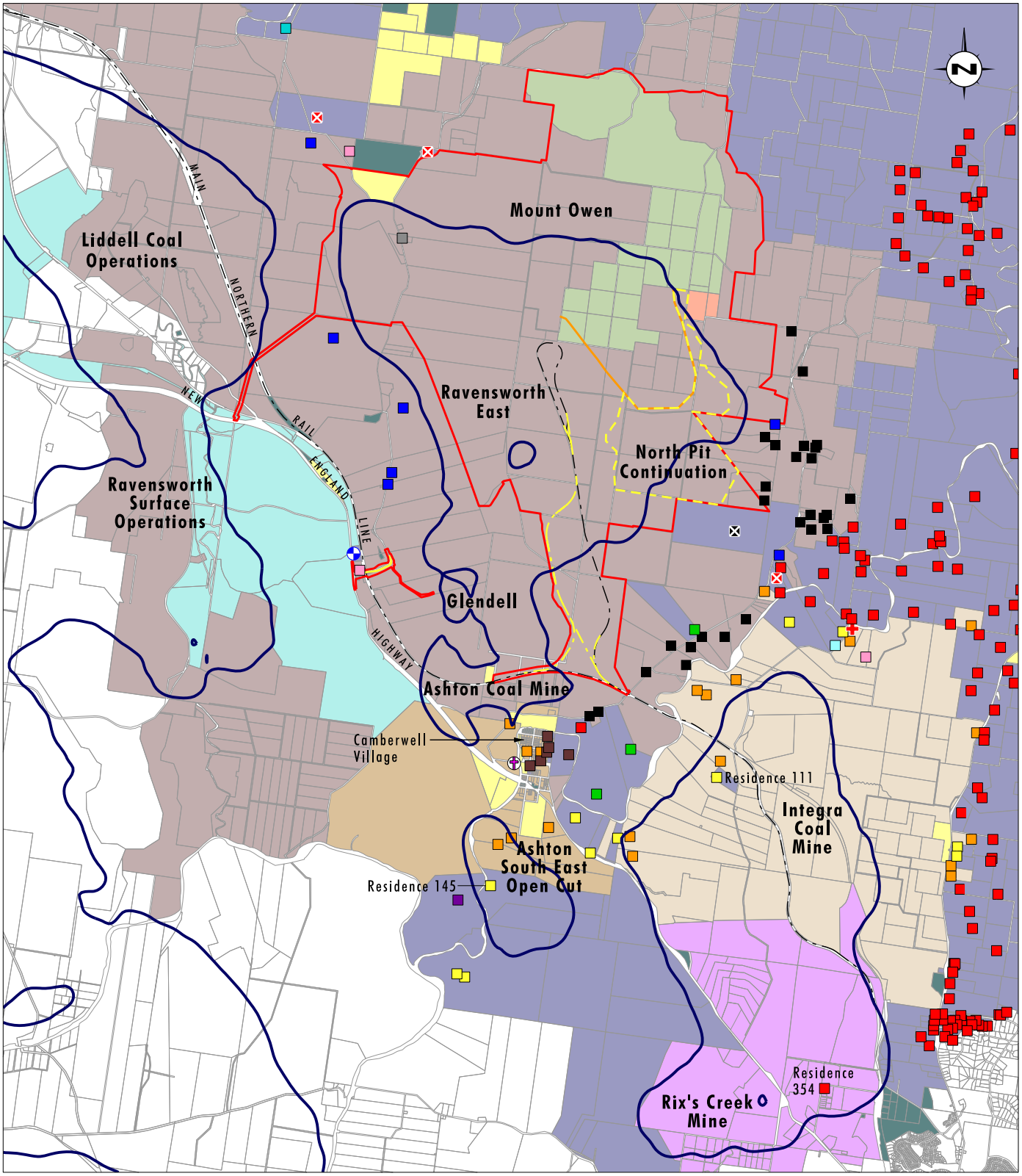
Exceeding Residence ID	Predicted Total Cumulative PM_{10}	Predicted contribution from Project ($\mu g/m^3$)
Year 1		
R111 (acquisition rights – Integra – Air and Noise)	36	3
R145 (acquisition rights – South East Open Cut – Air and Noise)	42	1
R354	35	<1
Year 5		
R111	36	3
R145	31	<1
Year 10		
No predicted exceedances at private residents		

As shown in **Table 3.2**, the contribution of the Project at these residences is very low and, in all cases, the cumulative annual average criteria would be exceeded at these residences without any contribution by the Project.

R111 is located close to the Integra Operations but is located between Integra and the Mount Owen Complex. R111 is currently identified as having acquisition rights under the Integra Open Cut project approval. The Project's predicted impact at this property during Year 1 (worst case scenario) is 3 $\mu g/m^3$ and the model indicates that this residence would exceed the applicable air quality criteria irrespective of the Project.

R145 is located to the west of the Ashton South East Open Cut. R145 is currently identified as having acquisition rights under the South East Open Cut project approval (PA 08_0182). The Project's predicted impact at this property during Year 1 and 5 (worst case scenarios) respectively are 1 $\mu g/m^3$ and <1 $\mu g/m^3$ and the model indicates that the cumulative annual average criteria would be exceeded at this residence irrespective of the Project.

Property R354 is predicted to exceed the annual average cumulative PM_{10} criteria (30 $\mu g/m^3$) in Year 1 only. It is understood that this property was subdivided and the dwelling built only recently. The residence is located in excess of 10 kilometres from the Proposed Disturbance Area and amenity levels at this location are most likely to be heavily influenced by both noise and air quality impacts from the much closer mining operations of Rix's Creek and Integra (refer to **Figure 3.2**). The Project's predicted impact at this property during Year 1 (worst case scenario) are less than 1 $\mu g/m^3$ and the model indicates that this residence would exceed the applicable air quality criteria irrespective of the Project. At present, R354 is not specifically identified in either the Rix's Creek development consent or the Integra project approval as having acquisition rights, however, it is noted that the Integra Open Cut project



Data Source: Mount Owen (2014), Department of Lands (2009)

0 1.0 2.5 5.0km
1:100 000

Legend

- Project Area
- Approved North Pit Mining Extent
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Ashton Coal
- Crown Land
- Crown Land TSR
- Government Authority
- Integra Coal
- Macquarie Generation
- Glencore
- Private
- Rixs Creek Mine
- State Forest
- Church
- Daracon Site Office
- Mine Owned Residence - Glencore
- Mine Owned Residence - Other Mine
- Mine Owned Residence - Derelict
- Mine Owned Residence - Vacant
- Subject to Acquisition Rights - Glencore No Dwelling
- Private No Dwelling
- Glennies Creek Fire Brigade
- Currently Subject to Acquisition Rights - Glencore
- Currently Subject to Acquisition Rights - Other Mines
- Private Residence
- Private Residence - Derelict
- Currently Subject to Acquisition Rights - Dairy
- SEOC Acquisition
- Community Hall
- Former Hebden Public School
- 30$\mu g/m^3$ using the median

FIGURE 3.2

Predicted Cumulative Annual Average PM10 Concentrations in Year 1

approval does include an acquisition right for properties where monitored PM_{10} levels exceed the annual average criteria of 30 µg/m^3. Accordingly, based on the model's predictions of impacts from other sources (i.e. background plus other mines), it is expected that R354 would qualify for acquisition rights under the Integra Open Cut project approval.

The predicted exceedances at both R354 and R145 are almost entirely due to impacts from other existing sources of PM_{10} particulates including approved mining developments much closer to these residences. Conservative modelling indicates that the Project's impact at these locations is 1 µg/m^3 or less for the life of the Project. The Project's minor contribution to predicted air quality exceedances at these properties (less than 1 µg/m^3) and the overwhelming influence of other PM_{10} sources, should be taken into consideration when determining whether any development consent granted for the Project should include acquisition rights for these residences.

3.2.2.2 Noise

The noise modelling results presented in the EIS for the Project indicate three residential properties (R021, R022 and R023) and three private vacant land holdings (R015c, R018 and R174) would have acquisition rights due to predicted noise impacts. **Figure 3.3** shows these residence locations in relation to the worst case noise predictions (i.e. Year 10, Winter Nights)

The NIA (Appendix 7 of the EIS) considered vacant land in the assessment of properties where relevant noise criteria was exceeded over more than 25 per cent of the land holding, refer to **Table 3.3**.

Table 3.3 – Private properties predicted to exceed more than 5dB(A) above PSNL

Land ID	Lot & DP	Acquisition rights under Policy	Area of holding (ha)	Area impacted (Residence or ha)	% of Land Impacted	Years above criteria
R015c	44/752462 53/752462 54/752462 55/752462 70/752462 71/752462 72/752462 73/752462 104/752462	Yes - Vacant Land Holding – dwelling could be built under existing planning controls.	156.3	86.5	55	All
R018*	1/851867 13/6830 5/133183	Yes - Vacant land – dwelling could be built under existing planning controls, currently has acquisition rights (noise) from existing Mount Owen development consent and is currently under purchase negotiations.	184.9	177.6	96	All
R021	560/1104561	Yes - Privately owned land, residence located on land holding – residence impacted	0.67	Residence	NA	Year 10
R022	621/1097524	Yes - Residence located on land holding.	2.31	Residence	NA	Year 10

Land ID	Lot & DP	Acquisition rights under Policy	Area of holding (ha)	Area impacted (Residence or ha)	% of Land Impacted	Years above criteria
R023	2/626880	Yes - Privately owned land - Residence located on land holding.	4.34	Residence	NA	Year 10
R174	3/810452	Yes - Vacant land – dwelling could be built under existing planning controls	112.3	54.8	48.8	All

* - Note R018 includes landholding R345 which is a small parcel of privately owned land (0.66ha) located to the west of R018. The property is associated with landholding R018 and both landholdings are held in joint ownership with one of the land owners associated with the ownership of both R345 and R018 (the allotments are not contiguous). Due to the size of the lot a dwelling could not be built under the relevant planning controls and the allotment would not qualify for acquisition under the Voluntary Acquisition and Mitigation Policy due to it not being contiguous with R018.

A review of the modelling results presented in the EIS indicates there are no additional properties with existing dwellings or where a dwelling could be built under existing planning controls that would qualify for voluntary acquisition rights under the Voluntary Land Acquisition and Mitigation Policy due to predicted impacts over more than 25 per cent of the land holding.

Mount Owen will continue to consult with these landholders regarding this issue and will follow the procedure specified within the Policy for communication to relevant landholders regarding acquisition and mitigation entitlements and the process for mitigation or acquisition on request. Alternatively there may be a negotiated agreement between Mount Owen and the relevant landholder.

3.2.3 Mine Owned Properties

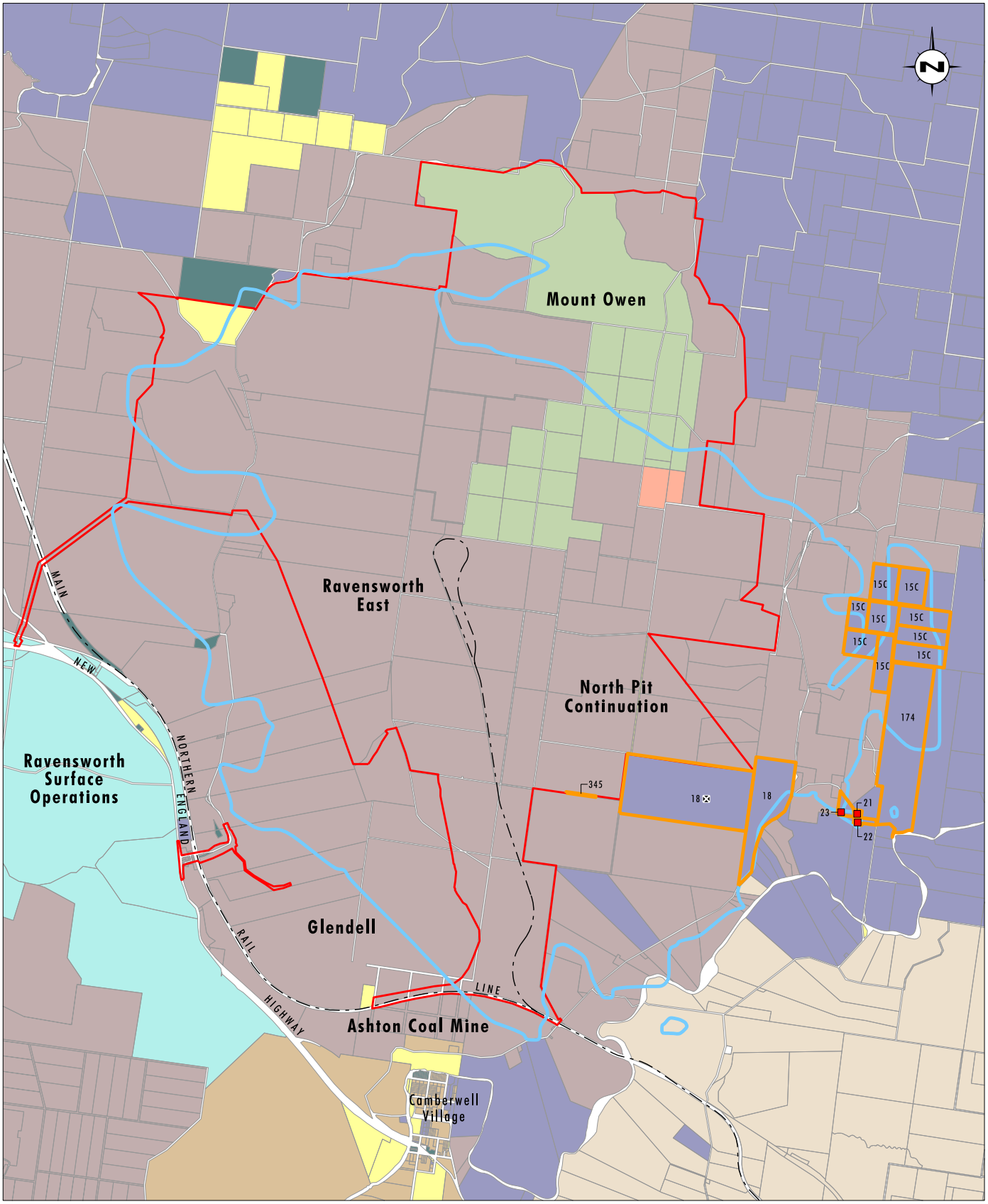
The Voluntary Land Acquisition and Mitigation Policy specifies conditions that may be imposed on a development consent which regulate rights under tenancy arrangements between occupiers of mine owned residences and the mine:

In circumstances where relevant mitigation or acquisition criteria are likely to be exceeded on land acquired by the applicant to mitigate the impacts of a development, applicants must ensure:

- *Existing, prospective and/or new tenants are properly informed of:*
  - *the scale and nature of the predicted impacts, through the provision of relevant air quality and noise impact predictions; and*
  - *the health risks, if any, of being exposed to such impacts.*
- *Tenants can terminate their lease agreement without penalty at any time during the development if the noise or particulate matter impacts are exceeding the relevant mitigation or acquisition criteria; and*
- *In the case where an existing tenant decides to move to avoid the impacts of the development, pay the reasonable costs associated with that tenant moving to alternative accommodation.*

In areas with intensive mining development, there may be an overlap between the mitigation or acquisition zone of one mining company and another. In such circumstances, each mining company should be responsible for managing the impacts of any mining development on its land.

As discussed in Section 5.2.4.1 of the EIS, the air quality modelling predicted that 12 mine owned properties (11 Glencore-owned and one Integra-owned) will be affected by air quality levels that exceed relevant impact assessment criteria at some point during the Project's mine life. Since then, Glencore has vacated one of these properties (R131).



Data Source: Mount Owen (2014), Department of Lands (2009)

0 1.0 2.0 3.0km
1:70 000

Legend

- Project Area
- 40 dB(A) 10th Percentile Exceedence Noise Contour
- >25% Lot/Holding within Contour
- Ashton Coal
- Crown Land
- Crown Land TSR
- Government Authority
- Integra Coal
- Macquarie Generation
- Glencore
- Private
- Private Residence
- Subject to Acquisition Rights - Glencore No Dwelling

FIGURE 3.3

Year 10
Winter Nights
Noise Contour

File Name (A4): R16/3109_984.dgn
20150615 8.56

Existing tenants of Glencore owned dwellings are alerted to mining related activities and possible impacts, including air quality, as part of the tenancy application process to help inform their decision to occupy the residence. In addition, tenants are provided with a copy of the NSW Public Health Unit's 'Mine Dust and You' fact sheet prior to entering into a tenancy agreement. At any time during tenancy, tenants can make a written request to Glencore if they believe that mining related impacts are unacceptable, with the option of terminating their tenancy without penalty if Mount Owen cannot resolve the issue with the tenants. This process is consistent with the Voluntary Land Acquisition and Mitigation Policy.

Should the Project be approved, where mine-owned dwellings are currently tenanted and a tenant chooses to vacate the property based on the modelled air quality predictions for the Project, they will be permitted to do so without penalty. Mount Owen will also determine if the condition of certain properties is deemed acceptable prior to and during occupation for certain periods due to predicted air quality and noise impact criteria, which will necessitate Mount Owen to request a tenant to vacate a dwelling; this would be undertaken in accordance with the conditions of the Glencore's policy regarding the occupation of company residential premises which is consistent with the requirements of the Voluntary Acquisition and Mitigation Policy in relation to air quality and noise impacts.

4.0 Responses to Submissions Received

4.1 Air Quality

Air quality impacts were identified as a key assessment issue for consideration in the Director General Requirements (DGRs) for the Project and a detailed Air Quality Impact Assessment (AQIA) was completed by Pacific Environment and is included in the EIS (Section 5.2 of the EIS and Appendix 6). As discussed in Section 5.2 of the EIS, air quality is also a key issue for the local community and this is reflected in the submissions received on the Project.

Air quality impacts were an important consideration in the design process for the Project and the identification of all reasonable and feasible air quality controls have been included in the mine design and management commitments. The air quality management and mitigation measures which will be implemented as part of the Project are detailed in Section 5.2.5 of the EIS.

This section of the Response to Submissions report includes a response to the submissions from agencies (EPA, Singleton Council and New England Health) and the community in relation to air quality issues.

This response has also been guided by further consultation with the EPA and DP&E on several issues raised in the EPA submission during a meeting held on 28 May 2015 (refer to **Section 4.1.1.1**). Following this meeting, a review of the approach to assessing cumulative PM_{10} and $PM_{2.5}$ annual average impacts was undertaken specifically addressing a number of issues identified in the EPA submission. This review is documented in correspondence prepared by Pacific Environment which is included as **Appendix B** and discussed further in the EPA response in **Section 4.1.1.1** below. Both **Appendix B** and **Section 4.1** of this Report have been independently peer reviewed throughout the drafting of these documents with a final review report completed by Jacobs on 30 June 2015 (refer to **Appendix C**).

4.1.1 Agency Submissions

4.1.1.1 EPA

The assessment predicts exceedances of the annual average particulate matter (PM) 2.5 criteria at several private residences on a cumulative basis. These results are not discussed in the assessment text, including the assessment conclusions, but are shown in the contour figures in Section 10 and Appendix E of the AQIA. The exceedances are not included in Appendix F - Predicted Exceedances of the AQIA.

The $PM_{2.5}$ values of 25 µg/m^3 (24-hour average), and 8 µg/m^3 (annual average), are currently advisory reporting standards (ARS) and are not impact assessment criteria, as discussed in Section 4.5 of the AQIA.

Notwithstanding, modelling results have been compared to these ARS, but they have not been specifically discussed or included in Appendix F as predicted exceedances of impact assessment criteria.

The cumulative $PM_{2.5}$ annual average assessment undertaken in the AQIA was modelled by adding predicted impacts from the Project with modelled impacts from other mining sources and background levels derived from the existing Camberwell $PM_{2.5}$ monitoring data (part of the Upper Hunter Air Quality Monitoring Network (UHAQMN)).

Following a review of the approach to cumulative modelling (refer to discussion below and **Appendix B**), the use of existing Camberwell $PM_{2.5}$ monitoring data for background was identified as contributing to a potentially significant over-prediction of cumulative $PM_{2.5}$ impacts as it resulted in a double counting of emissions from mining sources. **Appendix B** of this Report details the revised approach to modelling cumulative $PM_{2.5}$ annual average impacts. The revised approach uses background PM_{10} levels derived from local and regional monitoring points which are less influenced by mining operations, and applies a ratio of $PM_{2.5}$:PM_{10} determined by analysing measurements from co-located $PM_{2.5}$ and PM_{10} monitors from the EPA monitoring network. This method has been used in previous assessments in the area. This $PM_{2.5}$ background is then added to the modelled impacts from the Project and non-mining sources.

Figure 4.1 shows the results of the revised calculations of predicted annual average $PM_{2.5}$ concentrations for Year 1 (the worst case for cumulative $PM_{2.5}$ assessment). The blue contour represents the predicted annual average $PM_{2.5}$ concentrations from all sources (including the Project and all other mining and non-mining sources); all areas within the contour are predicted to have annual average levels of $PM_{2.5}$ exceeding 8 µg/m^3 (the annual average ARS) based on conservative assumptions.

The yellow contours in **Figure 4.1** illustrate the predicted Project contribution to annual average $PM_{2.5}$ levels and **Table 4.1** sets out the properties where there is a predicted exceedance of the $PM_{2.5}$ annual average ARS (8 µg/m^3) and the Project's contribution to impacts at these locations. The data in **Table 4.1** updates the $PM_{2.5}$ predictions provided in Tables E1 and E2 of the AQIA for these properties.

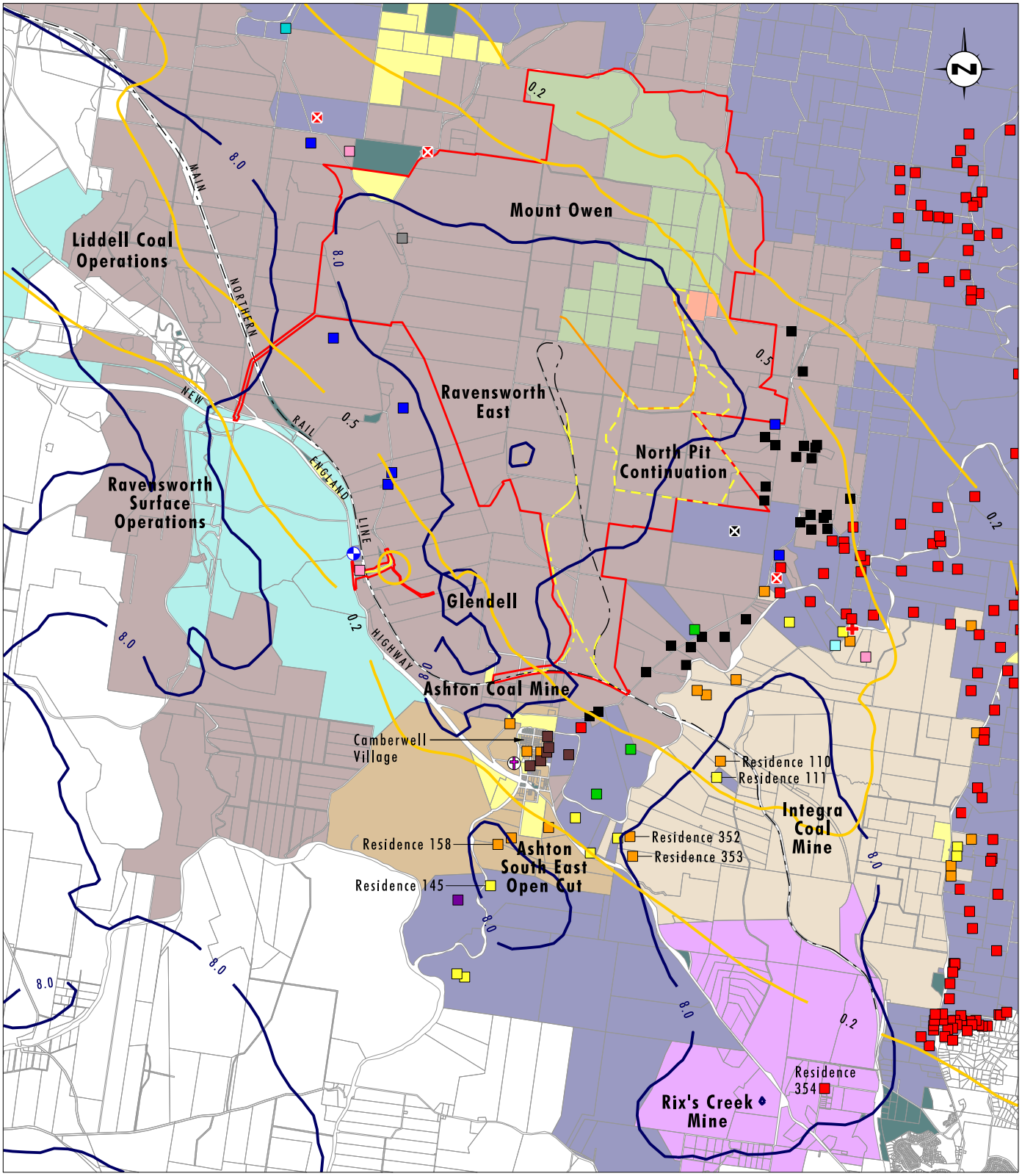
It can be seen from **Figure 4.1** and **Table 4.1** that concentrations at the levels of predicted impact from the Project alone (<1 µg/m^3 at all private residences in all modelled years) are well within the margin of error of any conventional instrumentation used to measure $PM_{2.5}$ and hence, any change in $PM_{2.5}$ levels due to the Project is likely to be undetectable.

Table 4.1 sets out the properties where there is a predicted exceedance of the $PM_{2.5}$ annual average ARS (8 µg/m^3) and the Project's contribution to impacts at these locations.

Table 4.1 - Contributions to the predicted annual average cumulative $PM_{2.5}$ concentration in Year 1 and Year 5 (µg/m^3) where exceedances of ARS have been predicted*

Exceeding Residence ID	Current Ownership Status	Other Mines (calibrated)	Background	Project	Total
Year 1					
110	Other Mine Owned	2.5	5.3	0.6	8.4
111	Private - Acquisition Rights Other Mines	3.1	5.3	0.5	8.9
145	Private - Acquisition Rights Other Mines	3.9	5.3	0.1	9.3
158	Other Mine Owned	3.2	5.3	0.2	8.7
352	Other Mine Owned	2.5	5.3	0.3	8.1
353	Other Mine Owned	2.7	5.3	0.3	8.3
354	Private	3.6	5.3	0.1	9.0
Year 5					
111	Private - Acquisition Rights Other Mines	3.1	5.3	0.5	8.9

* There are no predicted exceedances of the $PM_{2.5}$ annual average ARS during Year 10 of the Project.



Data Source: Mount Owen (2014), Department of Lands (2009)

0 1.0 2.5 5.0km
1:100 000

Legend

- Project Area
- Approved North Pit Mining Extent
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Ashton Coal
- Crown Land
- Crown Land TSR
- Government Authority
- Integra Coal
- Macquarie Generation
- Glencore
- Private
- Rixs Creek Mine
- State Forest
- Church
- Daracon Site Office
- Mine Owned Residence - Glencore
- Mine Owned Residence - Other Mine
- Mine Owned Residence - Derelict
- Mine Owned Residence - Vacant
- Subject to Acquisition Rights - Glencore No Dwelling
- Private No Dwelling
- Glennies Creek Fire Brigade
- Currently Subject to Acquisition Rights - Glencore
- Currently Subject to Acquisition Rights - Other Mines
- Private Residence
- Private Residence - Derelict
- Currently Subject to Acquisition Rights - Dairy
- SEOC Acquisition
- Community Hall
- Former Hebden Public School
- 8$\mu g/m^3$ Cumulative Annual Contour
- Project Only ($\mu g/m^3$)

FIGURE 4.1

Predicted Annual Average PM2.5 Concentrations in Year 1

File Name (A4): R16/3109_995.dgn
20150612 10.00

Overall, there is a reduction in the number of properties predicted to exceed the $PM_{2.5}$ annual average ARS relative to that predicted in the EIS.

The assessment also predicts exceedances of the relevant PM_{10} impact assessment criteria at privately owned residences.

The predicted exceedances of PM_{10} impact assessment criteria are discussed in **Section 3.2**.

The adopted annual average PM_{10} background value appears low (13.2 µg/m^3), noting that this PM_{10} value is less than 50% of the adopted $PM_{2.5}$ background value in a region where ambient air quality is likely to be predominantly influenced by major PM_{10} emission sources. Further, the dataset used to devise the annual average PM_{10} background has been analysed in a manner that reduces the influence of extreme values without sufficient justification.

Air quality in the region is predominantly influenced by major PM_{10} emission sources (such as mining). A considerable amount of data analysis was therefore undertaken to estimate the non-mining contributions and this analysis, and the process of determining background PM_{10} concentrations, is discussed in Sections 5.3 and 8.5 of the AQIA.

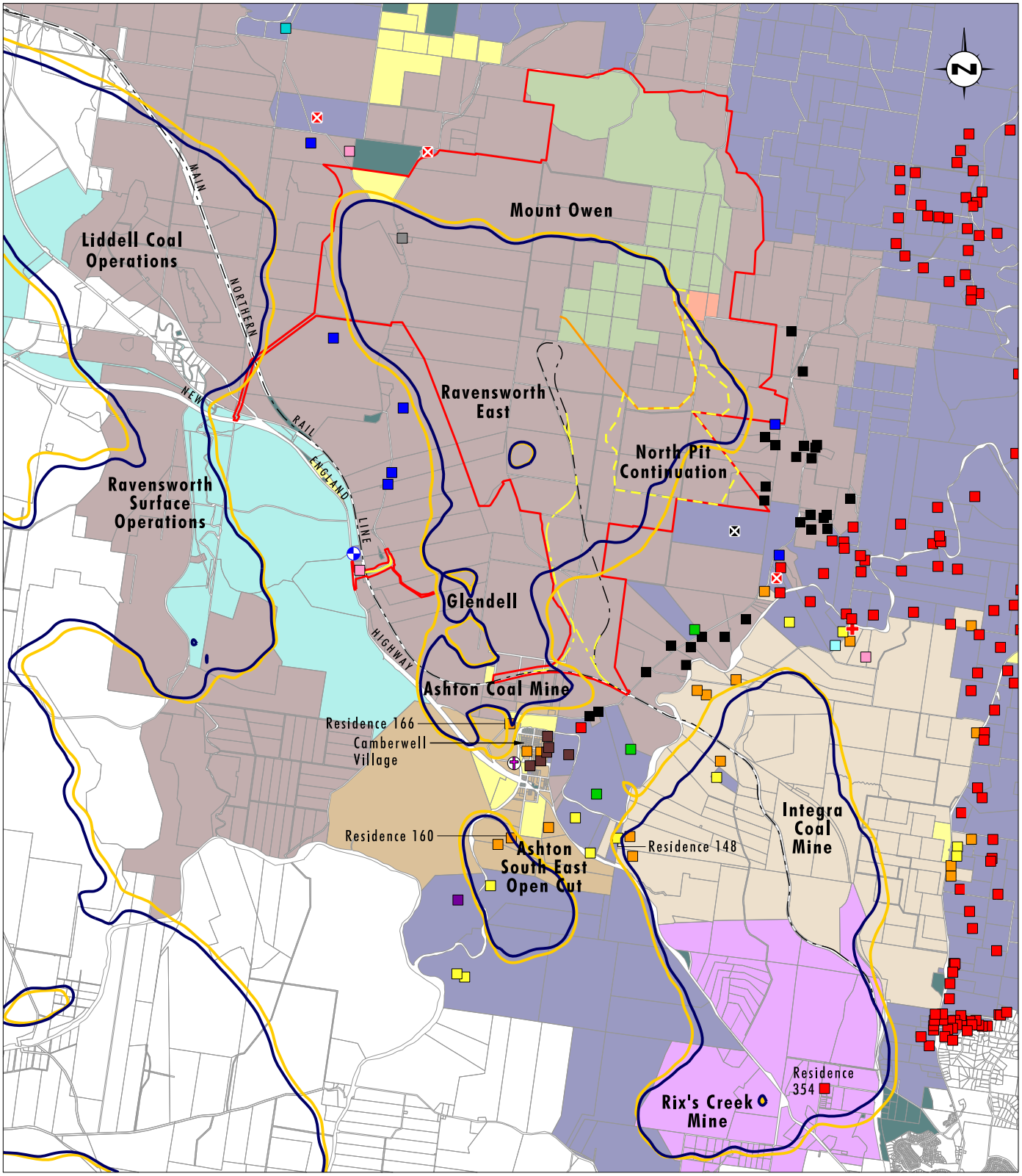
The background PM_{10} levels referred to are only used in the modelling of cumulative annual average impacts. Cumulative annual average concentrations are determined by adding together modelled impacts from the Project, modelled impacts from other mining sources and background levels. The use of background data that had minimal influence from mining sources, yet was indicative of other background contributions from other sources in the region, was therefore necessary to avoid a double counting of mining related emissions in the assessment.

In determining PM_{10} background levels, monitoring data (specifically from the UHAQMN) were analysed and those monitors which were less influenced by mining, either due to distance or relative location, were considered to be representative of what the background levels might be (in the absence of mining). Data from the Jerrys Plains, Wybong and Merriwa UHAQMN monitoring stations meet the selected criteria for background levels although it was recognised that the data from these stations would contain some contribution from mining sources. This selection process is discussed further in **Appendix B**.

The Project used the median value in the assessment process to reduce the influence of significant weather events (bushfires, dust storms etc.) which are unpredictable into the future and can potentially skew the annual mean due to the scale of the departure from 'normal' daily fluctuations in measures particulate levels during these events.

The median value of 13.2 µg/m^3 has been used in the assessment. As discussed in **Appendix B**, the annual mean for the same period is 14.9 µg/m^3. **Figures 4.2**, **4.3** and **4.4** show the extent of the annual average PM_{10} criterion contour, using both the median (dark blue line) and the mean (yellow line). In the worst case year (Year 1), three additional residences are predicted to exceed the 30 µg/m^3 criteria if the mean, rather than the median, is used. Two of these, R166 and R160, are already mine owned. The third, R148, is privately owned but has existing acquisition rights under the Integra project approval due to predicted noise impacts.

The predicted differences from the use of the mean versus the median at these residences would be undetectable with monitoring. This analysis is discussed further in **Appendix B**.



Data Source: Mount Owen (2014), Department of Lands (2009)

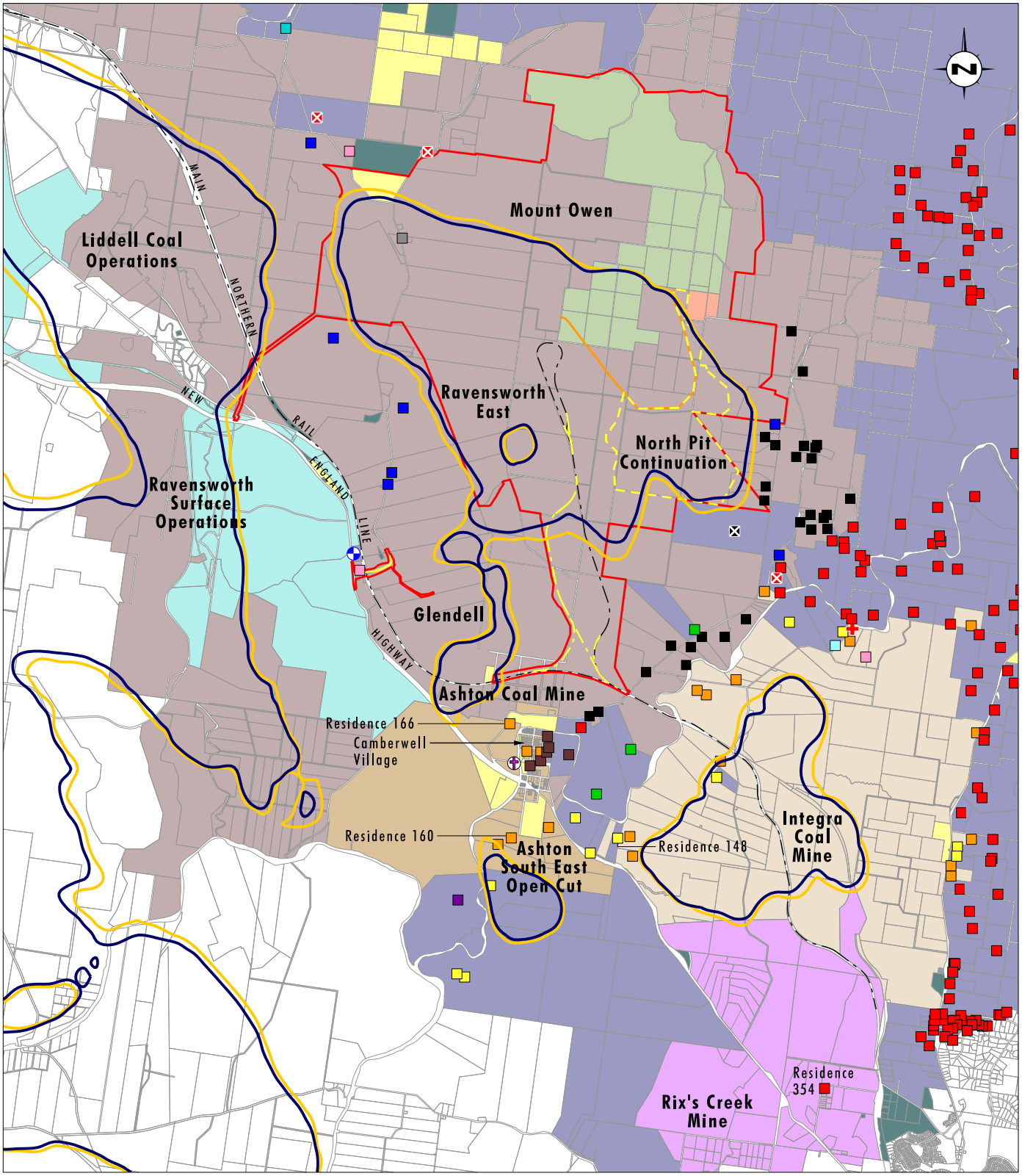
0 1.0 2.5 5.0km
1:100 000

Legend

- Project Area
- Approved North Pit Mining Extent
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Ashton Coal
- Crown Land
- Crown Land TSR
- Government Authority
- Integra Coal
- Macquarie Generation
- Glencore
- Private
- Rixs Creek Mine
- State Forest
- Church
- Daracon Site Office
- Mine Owned Residence - Glencore
- Mine Owned Residence - Other Mine
- Mine Owned Residence - Derelict
- Mine Owned Residence - Vacant
- Subject to Acquisition Rights - Glencore No Dwelling
- Private No Dwelling
- Glennies Creek Fire Brigade
- Currently Subject to Acquisition Rights - Glencore
- Currently Subject to Acquisition Rights - Other Mines
- Private Residence
- Private Residence - Derelict
- Currently Subject to Acquisition Rights - Dairy
- SEOC Acquisition
- Community Hall
- Former Hebden Public School
- 30$\mu g/m^3$ using the median
- 30$\mu g/m^3$ using the mean

FIGURE 4.2

Predicted Cumulative Annual Average PM10 Concentrations in Year 1 Median and Mean



Data Source: Mount Owen (2014), Department of Lands (2009)

0 1.0 2.5 5.0km
1:100 000

Legend

- Project Area
- Approved North Pit Mining Extent
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Ashton Coal
- Crown Land
- Crown Land TSR
- Government Authority
- Integra Coal
- Macquarie Generation
- Glencore
- Private
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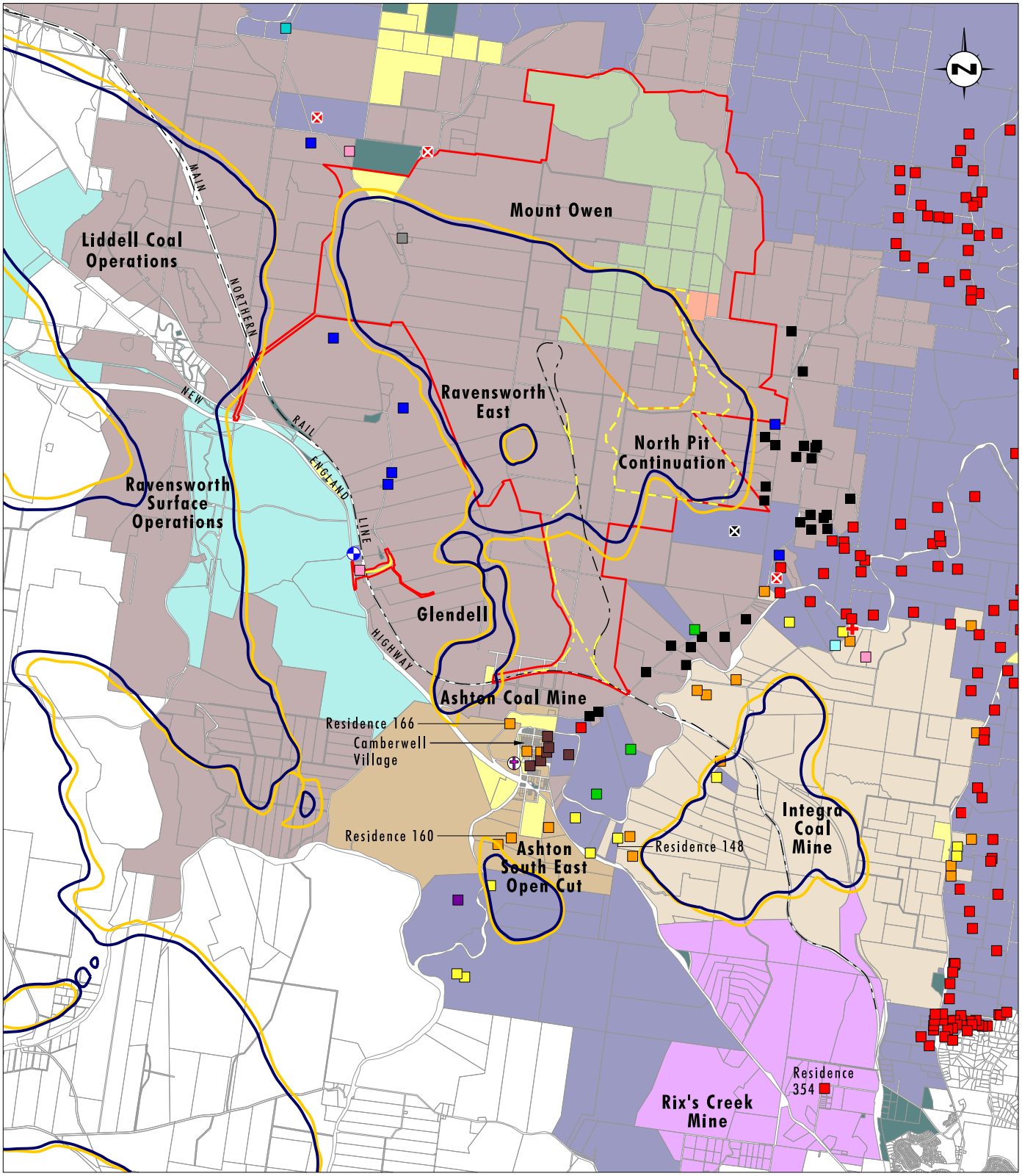
- Church
- Daracon Site Office
- Mine Owned Residence - Glencore
- Mine Owned Residence - Other Mine
- Mine Owned Residence - Derelict
- Mine Owned Residence - Vacant
- Subject to Acquisition Rights - Glencore No Dwelling
- Private No Dwelling
- Glennies Creek Fire Brigade
- Currently Subject to Acquisition Rights - Glencore
- Currently Subject to Acquisition Rights - Other Mines
- Private Residence
- Private Residence - Derelict
- Currently Subject to Acquisition Rights - Dairy
- SEOC Acquisition
- Community Hall
- Former Hebden Public School
- 30$\mu g/m^3$ using the median
- 30$\mu g/m^3$ using the mean

FIGURE 4.3

Predicted Cumulative Annual Average PM10 Concentrations in Year 5 Median and Mean

File Name (A4): R16/3109_988.dgn
20150624 10.12



Data Source: Mount Owen (2014), Department of Lands (2009)

0 1.0 2.5 5.0km
1:100 000

Legend

- Project Area
- Approved North Pit Mining Extent
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Ashton Coal
- Crown Land
- Crown Land TSR
- Government Authority
- Integra Coal
- Macquarie Generation
- Glencore
- Private
- Rixs Creek Mine
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- Church
- Daracon Site Office
- Mine Owned Residence - Glencore
- Mine Owned Residence - Other Mine
- Mine Owned Residence - Derelict
- Mine Owned Residence - Vacant
- Subject to Acquisition Rights - Glencore No Dwelling
- Private No Dwelling
- Glennies Creek Fire Brigade
- Currently Subject to Acquisition Rights - Glencore
- Currently Subject to Acquisition Rights - Other Mines
- Private Residence
- Private Residence - Derelict
- Currently Subject to Acquisition Rights - Dairy
- SEOC Acquisition
- Community Hall
- Former Hebden Public School
- 30$\mu g/m^3$ using the median
- 30$\mu g/m^3$ using the mean

FIGURE 4.4

Predicted Cumulative Annual Average PM10 Concentrations in Year 10 Median and Mean

As discussed earlier, due to the lack of $PM_{2.5}$ monitoring data in areas less influenced by mining, the assessment of cumulative $PM_{2.5}$ annual averages in the AQIA adopted a different approach to background levels and used the measured levels from the Camberwell UHAQMN monitoring station. As noted in the AQIA, the use of these data results in a significant over prediction due to the double counting of mining related impacts present in both the modelled predictions and the background data. An alternative, more realistic, approach to determining background $PM_{2.5}$ levels is presented in **Appendix B** which estimates background (i.e. with minimal mine influence) $PM_{2.5}$ levels from the assumed background PM_{10} levels. This approach removes some of the double counting present in the approach taken in the AQIA and has been used in similar recent assessments in the region.

Section 8.6 of the assessment provides a brief model evaluation and 'calibration' of model results. Project modelled (plus adopted background) values are compared to base year (2011/2012) monitored values for annual average PM_{10}. Results vary between a ratio of 0.2 and 0.8 (table 8.17). Where the ratio approaches zero, this infers that the assessment/model prediction has performed poorly against measurements (i.e., a ratio of 0.2-0.3 indicated a significant over prediction). The devised ratio is subsequently used to adjust future year model predictions by multiplying future year predictions by the devised ratio. In some cases this would lead to a five (5) fold adjustment of model predictions for future years. Adjustment of modelled values by such a large factor could significantly change the assessment results at some receptor locations and indicates a potential high level of uncertainty in the Project model results.

There will inevitably be a variation in model performance across the modelling domain relative to actual measured data. Some adjustment therefore needs to be made to account for this and the process of doing this is was described in Section 8.6 of the AQIA. Figure 8.6 in the AQIA shows the calibration grid that was developed for 'other mining sources' to account for the variation in model performance across the modelling domain. The development of this grid is discussed in further detail in **Appendix B**. It should be noted that the calibration applies only to the modelling of impacts from other mining sources; the background and Project contributions are not subject to the calibration.

It is also worth noting that there are other factors that can lead to the over-prediction that are not captured in the modelling. For example, the model does not consider rainfall and its potential effect for reducing emissions. The model assumes emissions occur all year and is not able to account for periods of significant rain which will dampen these emissions. In addition, the model does not consider the modifications to mining activities that would be made in response to adverse weather conditions. These modifications are part of the Air Quality Management Plan and are triggered under different conditions depending on the activity and can range from increased watering to a complete halt of operations. The latter would have a significant effect on emissions that is not accounted for in the modelling.

The calibration issue was discussed in detail in the meeting with the EPA and DP&E (28 May 2015). While the EPA and DP&E were generally supportive of the approach to further improve the accuracy of modelling, the following issues or areas of concern were raised in relation to the calibration approach used in the AQIA:

- The model performance was lower and was significantly over predicting concentrations in areas where other mines were the dominant source. The question was raised as to whether the model inputs were based on actual production or were derived from predictions in publically available assessment documentation.

- As noted in the EPA submission, there are areas of the model which have a calibration factor of 0.2 and modelling predictions of the contributions from other mining sources would be multiplied by 0.2 (divided by 5) in these areas. There was a concern that this level of calibration may remove the conservativeness in the modelled predictions, particularly given Camberwell Village was in an area with this 'higher' level of calibration.

Appendix B contains an analysis of the approach to cumulative PM_{10} annual average modelling in the AQIA, including a review of the data used in the modelling of other sources. The key points from this analysis are discussed below.

Data sources for 'other mining sources'

The data used for the cumulative PM_{10} annual average modelling was the 2012-13 PRP data provided by each mine and was based on actual emission calculations in those PRPs, not annual production rates. This is considered to be the most accurate data for mine sites which is publically available.

Conservativeness of modelled results

Overall, the modelled predictions are still considered to be conservative because of the factors mentioned above. The calibration only applies to other mining sources and the areas with the highest calibration factor (i.e. less than 0.5) are primarily to the southwest of the Project where other mines are the dominant source of emissions. As detailed in **Appendix B**, these calibration factors are considered to be conservative and, when the calibrated 'other mining sources' are added to background levels (which will include some contribution from mining) and predictions of the Project's contribution (which are based on conservative inputs), the cumulative PM_{10} annual average predictions are considered to retain a degree of conservativeness.

Almost all modelled privately owned residences, including those in the Middle Falbrook region, are located within areas where the model results from 'existing mining sources' (in 2011-12) have a calibration factor of between 0.5 and 1, meaning there is less calibration of the modelled results from other mines in the predictions in these areas.

Section 10.4 of the assessment includes a probabilistic assessment of cumulative impacts, as requested by the projects Director-Generals Requirements. The assessment used a Monte Carlo simulation to randomly pair predicted project increments with adjusted ambient monitoring data. The Monte Carlo method is adopted, in part, based on an underlying assumption that the modelled Project increment that occurs on a given day is independent of the measured background that occurs on the same day. However, adjusting the measured ambient data, (time paired Project increments for a base year are subtracted from the corresponding monitored value) assumes a high degree of correlation or dependence between modelled and measured values.

The Monte Carlo approach is considered to be a conservative estimate of potential PM_{10} and $PM_{2.5}$ cumulative impacts. This is because, to the extent that the underlying assumption may not be satisfied (primarily due to other mines significantly influencing 'background' levels on days when the mine's contribution is low), the effect will be an overestimation of cumulative impacts of the Project as a result of the randomisation process.

The overestimation arises from high 'background' levels (largely influenced by contributions from other mines or extreme events such as bushfires or dust storms) being added to high modelled Project emissions. In reality, high background levels driven by contributions from other mines are unlikely to occur in practice when contributions from the Project are high as the mines are located in opposite directions to the prevailing conditions, particularly in the

Middle Falbrook area; accordingly adding these together will give unrealistically high predicted impacts which will almost certainly exceed criteria. Additionally, the background levels used for each residence are determined by reference to a particular monitor (TEOM SX9 for residences in the Middle Falbrook area, TEOM SX8 for residences in the northwest and TEOM SX14 for R127c) and receptors located further away from other contributing sources of emissions than the monitor used for determining 'background' levels used in the Monte Carlo simulation will therefore have higher 'background' levels added to the Project's predicted impacts than would occur in reality. While the extent of overestimation is reduced through the process of running the randomisation process 250,000 times and then extracting probabilities of exceedance from the outcomes, this will not eliminate the over prediction inherent in the process.

A comparison of the results from the Monte Carlo process and the assessment methodology in the EPA's Approved Methods has also been carried out for the six residences with the highest number of days of predicted exceedance of the PM_{10} 24 hour criteria using the Monte Carlo approach. There are two approaches to PM_{10} 24 hour cumulative assessment identified in the Approved Methods The following tables present the results from applying each of these methods to the Project.

Table 4.2 presents the ten highest measured PM_{10} concentrations at the selected residences for Year 10 (worst case scenario), together with the predicted values on those days at each residence. The 'cumulative' values are the addition of measured plus modelled Project PM_{10} concentrations.

Table 4.2: Approved Methods – Top 10 measured concentrations approach (Predicted cumulative 24-hour average PM_{10} concentrations (µg/m^3))

Model day**	**Measured**	**R004**		**R21**		**R22**	
		Project	**Cumulative**	**Project**	**Cumulative**	**Project**	**Cumulative**
20	**92**	2	**94**	2	**94**	2	**94**
17	**66**	10	**76**	6	**72**	5	**71**
70	**57**	3	**60**	0	**58**	0	**58**
54	**52**	7	**59**	0	**52**	0	**52**
15	42	13	**55**	5	47	6	47
69	41	2	43	1	42	1	42
23	41	10	**51**	1	42	1	42
18	41	6	47	1	42	1	42
55	40	1	41	1	41	1	41
60	38	21	**59**	1	39	1	39
Model Day**	**Measured**	**R112**		**R114**		**R116**	
		Project	**Cumulative**	**Project**	**Cumulative**	**Project**	**Cumulative**
20	**92**	2	**94**	2	**94**	2	**94**
17	**66**	4	**70**	10	**76**	14	**80**
70	**57**	1	**58**	3	**60**	5	**62**
54	**52**	1	**53**	6	**58**	12	**64**
15	42	9	50	14	**55**	22	**64**
69	41	2	43	3	44	3	44
23	41	3	44	11	**52**	10	**51**
18	41	3	43	7	48	8	48
55	40	1	41	2	42	2	42
60	38	1	39	21	**59**	17	**55**

*Shaded cells indicate exceedances of criteria.

** Day in met data used for modelling (1/9/2011 to 31/8/2012)

As can be seen from the measured data, there are four days where the criterion is exceeded irrespective of the Mount Owen contribution. Using the Approved Methods approach, there are predicted to be three additional exceedances of cumulative PM_{10} (24 hour) criteria at R004, R114 and R116. The number of predicted exceedances at each of the selected residences utilising the Approved Methods approach is lower than those predicted using the Monte Carlo methodology, which estimated eight exceedances at R004, twelve at R114 and ten at R116. This indicates that the Project's assessment methodology is a more conservative approach to assessing cumulative impacts over a 24 hour period than that outlined in the Approved Methods.

Table 4.2 presents the ten highest predicted 24-hour average PM_{10} concentrations at each selected residence, combined with the measured concentration on that same day.

Table 4.2: Approved Methods – Top 10 predicted concentrations approach (Predicted cumulative 24-hour average PM_{10} concentrations (µg/m^3))

Model Day*	R4			Model Day*	R21		
	Measured	Project	Cumulative		Measured	Project	Cumulative
278	11	42	**53**	31	17	47	**64**
298	3	38	42	293	9	22	30
337	8	37	45	75	37	18	**55**
360	6	35	41	271	9	18	27
354	4	35	39	312	5	16	21
366	19	33	**52**	255	10	16	26
249	6	33	38	103	14	16	29
349	0	31	31	348	0	13	13
191	19	31	50	104	12	13	25
299	11	27	37	248	8	13	21
Model Day*	**R22**			**Model Day***	**R112**		
	Measured	**Project**	**Cumulative**		**Measured**	**Project**	**Cumulative**
31	17	48	**65**	259	4	34	38
75	9	19	28	40	21	34	**54**
271	37	19	**56**	322	6	33	40
293	9	18	28	222	9	33	42
103	5	16	21	297	1	30	31
312	10	15	24	334	3	30	32
297	14	14	27	247	6	30	35
255	0	14	14	41	32	29	**61**
348	12	13	26	255	11	28	39
21	8	13	21	348	0	24	24
Model Day*	**R114**			**Model Day***	**R116**		
	Measured	**Project**	**Cumulative**		**Measured**	**Project**	**Cumulative**
31	17	48	**65**	31	17	47	**64**
75	9	19	28	293	9	22	30
271	37	19	**56**	75	37	18	**55**
293	9	18	28	271	9	18	27
103	5	16	21	312	5	16	21
312	10	15	24	255	10	16	26

297	14	14	27	103	14	16	29
255	0	14	14	348	0	13	13
348	12	13	26	104	12	13	25
21	8	13	21	248	8	13	21

*Shaded cells indicate exceedances of criteria.
** Day in met data used for modelling (1/9/2011 to 31/8/2012)

Using this approach, there is an estimated two days at each residence where the cumulative concentrations are predicted to exceed the 50 µg/m^3 criterion. As noted above, the Monte Carlo approach used in the AQIA estimated more days of predicted exceedances at each of these residences.

From the EPA's review of the AQIA it is unclear if particle emissions, specifically fine particles as $PM_{2.5}$, have been assessed from diesel exhaust. If diesel particulate emissions have been omitted, the assessment may have under predicted fine particle impacts from the Project. Further clarification is required from the proponent on if diesel particulate emissions have been taken into account as a potential source of fine particulates in the assessment.

As discussed in Section 9.2 of the AQIA, NO_x, SO_2 and CO emissions have been considered in relation to diesel exhaust.

The US EPA AP-42 emission factors used in the particulate (PM_{10} and $PM_{2.5}$) emissions inventories include particulate matter emissions from both the mechanical processes (i.e. crustal material) and the diesel exhaust (combustion). These emission factors do not distinguish between these two sources, since the sampling method used to derive the original emission factors captured both mechanical and combustion particulate matter sources. Reference was made to Chattern Cowherd who was part of the team who undertook the sampling and analysis to determine these emission factors, and it was confirmed that the sampling method did include the capture of a large proportion of particulates from diesel exhausts.

It is further noted that the historical nature of the particulate matter emission factors referenced in the assessment means that the combustion component of the particulate matter emission would be reflective of both engines and fuels from several decades ago. Given the significant improvements in both of these aspects over this time period, the combustion particulate matter component within the aggregated emission factors may be regarded as highly conservative.

In view of the above, to estimate diesel exhaust particulate emissions separately from other fine particulate matter emissions is not necessary and would represent double counting.

The EPA recommends that the air quality assessment for the Project should be revised. The proponent should provide additional information to address the issues raised above and to confirm that:

- ***assessment methods adopted for the Project are robust, fit for purpose and suitable for predicting likely worst case impacts at all off site receptors; and***

- ***unacceptable air quality impacts are not likely to result from the Project, including demonstration that the Project is designed to achieve compliance with relevant air quality impact assessment criteria.***

The issues raised by the EPA in relation to assessment methods have been addressed in the previous responses and **Appendix B**.

Section 5.2.5 of the EIS details the management measures that will be implemented as part of the Project to minimise particulate and blast emissions. Even with all of these measures being implemented, modelling indicates that in certain meteorological conditions air quality assessment criteria may not be able to be achieved at all residences and properties. The NSW Voluntary Land Acquisition and Mitigation Policy has been developed to provide a mechanism for assessing developments that are predicted to have impacts over air quality impact assessment criteria. The application of this policy to the Project is discussed in **Section 3.2**.

An independent peer review of the AQIA was undertaken throughout the assessment process, with a final review report completed by Jacobs on 18 September 2014 (refer to Appendix A of the AQIA). This review considered the adequacy of the AQIA to address the DGRs and consistency with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*, with the review including a focus on meteorological data and methods for inclusion. This review concluded:

> *'...the air quality assessment (based on dispersion modelling) has been undertaken in a manner which is consistent with the requirements of the EPA (DEC 2005) for these types of projects. The methodology used in this assessment has been appropriate and applied in a conservative manner, in order to determine the potential air quality impacts. The conclusions of the assessment are supported by the model predictions.'*

Both **Appendix B** and **Section 4.1** of this Report have also been independently peer reviewed throughout the drafting of these documents with a final review report completed by Jacobs on 30 June 2015 (refer to **Appendix C**).

The EPA has concerns around the potential blast fume impacts from the Project, as detailed in Appendix 6 'Air Quality Impact Assessment' of the EIS. The results presented in Tables 11.1 and 11.2 of the AQIA show the number of predicted exceedances of the 1-hour average NO_2 concentrations will exceed the 1-hour average criteria of 246 µg/m^3 at two privately owned residences....

The EPA acknowledges that these predictions are modelled under conditions said to be conservative, however the EPA does not consider the number of predicted exceedances at these off-site privately owned residences as appropriate.

The blast fume assessment in the AQIA was undertaken to identify the conditions where potential exceedances may occur from worst case blasts fume events should they occur. The assessment does not identify likely predicted exceedances occurring as a result of operations but rather is a methodology to identify whether there are specific weather conditions under which blasting should not be undertaken.

Predicted NO_2 levels at residences R030 and R031 (both mine owned), and R114 and R116 (both private dwellings) were modelled assuming a Rating 3 fume event being produced from a blast located at the closest point of mining to the residences (refer to Figure 11.1 in the AQIA). The blast fume assessment identified that such a blast would only result in predicted exceedances of criteria at the nearest residences when the following conditions are combined:

- light winds (less than 3 m/s);
- winds from the north western quadrant (280 – 360 degrees);

- mixing heights dropping rapidly (below 300m); and
- increasing atmospheric stability.

These conditions generally occur around sunrise and sunset during the cooler months of the year, almost exclusively between May and August. The majority of these conditions are in June and July when sunrise can be close to 7am and sunsets beginning as early as 5pm.

As shown in Table 11.4 of the AQIA, a Rating 3 fume event has not been recorded at Mount Owen in the 2 years of blast rate data available at the time of assessment. Records indicate that blasts are predominantly (77% of the time) a Rating 0. While the occurrence of a Rating 3 blast is possible, monitoring data shows that the likelihood of a Rating 3 blast occurring is extremely low.

The assessment was also undertaken for Rating 0 fume events occurring at the same location. Table 11.5 in the AQIA shows that for Rating 0 blasts, only the mine owned residence R031 was likely to exceed the criteria. Again these predicted exceedances were limited to these conditions.

Importantly, the assessment demonstrated that the meteorological conditions that may result in exceedances are clearly definable and the inclusion and implementation of meteorological based controls in the Blast Fume Management Plan can be used to effectively manage the risks posed by blast fume events. However, given that not all blasts will be undertaken in the locations used in the assessment (and most will be located much further away and in slightly different directions from receivers) it is not appropriate to restrict all blasts at the mine during the specific conditions identified during the assessment. The Blast Fume Management Plan should have provision to identify specific conditions and controls that are applied to blasts in different mining locations.

As monitoring data has verified, Mount Owen has successfully applied the blast design and management practices currently in place and documented within the relevant Blast Fume Management Plans to reduce the likelihood of fume events occurring.

Mount Owen is committed to updating the Blast Fume Management Plans to restrict blasting to periods when meteorological conditions are not conducive to fume dispersal towards residential receivers. These conditions will be different for different mining areas. Detailed meteorological predictions for the site as well as real time meteorological data from the Mount Owen meteorological station will be used to inform this decision making process. By identifying the conditions where a worst case blast scenario in specific areas may result in exceedances of criteria at the nearest residences and including management controls which prevent blasting in these areas during these conditions, the potential for an exceedance at these residences or any residences further away is reduced to as low as reasonably practicable.

Blast design and management measures play an important role in minimising the likelihood of the occurrence of higher category blast fume events. Controls of this nature are already incorporated into the relevant Blast Fume Management Plans and will continue to be used for the Project. Additional reasonable and feasible measures may also be implemented as further knowledge and technology regarding blast fume generation becomes available.

Mount Owen also operates a notification system to advise residents of all proposed blasts. In the unlikely event that a Rating 2 or 3 fume event occurs, and where unpredicted weather conditions such as a sudden wind shift are experienced which could result in residual risk to residents, Mount Owen will implement this system as a contingency measure to notify any potentially impacted residents and advise them of any measures that should be taken to avoid harm.

Recommendation
It is recommended that the Blast Fume Management Plans be revised to include the definition of meteorological conditions for each mining area that may lead to an exceedance of NO_2 criteria at any private residence, resulting from blasting. The Management Plans should contain procedures to identify and restrict blasting from occurring under high risk meteorological conditions.

Section 13.3 of the AQIA lists a number of mitigation measures in place to reduce the risk of off-site impacts from blasting, however the EPA recommends DPE consider additional mitigation measures that could be implemented at residences R114 and R116.

As noted previously, irrespective of whether or not these residences remain occupied, the management controls that will be included in the Blast Management Plan (in particular controls on blasting during specific meteorological conditions) will reduce the risk of blast fumes exceeding relevant NO_2 criteria at these premises to as low as reasonably practicable. Accordingly, no additional mitigation measures are considered necessary.

Further, as discussed in **Section 3.2.2**, both properties R114 and R116 will now be afforded acquisition rights under the Voluntary Acquisition and Management Policy due to predicted exceedances of PM_{10} criteria over more than 25 per cent of each of these properties.

4.1.1.2 Hunter New England Population Health

There is no evidence of a threshold below which exposure to particulate matter (PM) is not associated with health effects. Therefore, it is important that all reasonable and feasible measures are taken to minimise human exposure to particulate matter, even where assessment criteria are met.

Section 7 of the AQIA contained in Appendix 6 of the EIS contains details of the mitigation and management measures that will be undertaken and implemented to reduce potential air quality impacts associated with the Project which includes the following key measures:

- Continued use of the Mount Owen Complex proactive air quality control system to inform operational dust management.

- Continued use of visual triggers and associated procedures and training for wheel generated dust from unpaved haul roads, bulldozer operations, overburden emplacement, loading trucks and windblown erosion.

- Continued monitoring to demonstrate haul road dust control efficiency achieves the target of 85 per cent.

- Continued implementation of current PRP commitments to monitor and manage dust generation. Control practices may include treatment of permanent unpaved roads, by for example increased watering, application of dust suppressants, or use of select materials for haul road topping.

- Temporarily treat disturbed areas if prompt rehabilitation is not feasible, for example on some topsoil stockpiles.

- Blast management practices will continue to be employed to mitigate exceedances of the NO_2 1-hour average criterion.

- Managing the risk of spontaneous combustion in accordance with the Mount Owen Spontaneous Combustion Procedure.

It is considered that all reasonable and feasible measures are proposed to be implemented.

While the EIS uses an annual PM_{10} goal of 30 µg/m^3 for defining annual PM_{10} exceedances, this standard is currently under review and may not be applicable in the lifetime of this mine. On 29 April 2014, Environment Ministers signalled their intent to vary the Ambient Air Quality NEPM based on the latest scientific understanding of the health risks arising from airborne particle pollution. The preferred options for the draft annual average standards, that have been the subject of public consultation by the National Environment Protection Council, are 8 µg/m^3 for $PM_{2.5}$ and for PM_{10} consideration is being given to maintaining the status quo (no PM_{10} annual average standard) or adopting a new national standard of 20 µg/m^3. It would be useful to consider the implications of these standards in planning for this Project.

Figure 10.20 'Predicted annual average $PM_{2.5}$ concentrations in Year 1 – Cumulative', on page 103, of Appendix 6 - Air Quality Assessment, identifies that many properties will be subject to annual average $PM_{2.5}$ levels above the proposed NEPM standard of 8 µg/m^3 however, the modelling suggests most of this impact will come from existing mines. Figure 10.21 'Predicted annual average PM_{10} concentrations in Year 1 – Cumulative', page 104, identifies that many private residences will be subject to annual average PM_{10} levels above 20 µg/m^3. In excess of 30 residences in Wattle Ponds and to the north of Wattle Ponds (not mine owned or subject to acquisition will experience annual PM_{10} levels above 20 µg/m^3.

In summary, this Project will add further particulate emissions into an intensively mined area. In the light of the proposed changes to the NEPM standards, and in recognition that health impacts are reduced with lower exposure to particulate matter, it would be prudent for the Project to explore all reasonable and feasible measures to minimise human exposure.

The Project has been assessed against the currently adopted air quality criteria and, in the case of $PM_{2.5}$, the current ARS (which is the same as the proposed standard under the Draft NEPM).

As discussed in **Section 4.1.1**, the cumulative $PM_{2.5}$ annual average impacts have been remodelled to avoid a double counting of mining related emissions. The results of this assessment are discussed in **Appendix B** and **Section 4.1.1**. The revised modelling indicates that three private residences (R111, R145 and R354) are likely to experience cumulative $PM_{2.5}$ impacts in excess of the current ARS. In each case, the ARS is predicted to be exceeded without any contribution from the Project. It is noted that the cumulative PM_{10} annual average criteria is also predicted to be exceeded at all three of these private residences (refer to **Section 3.2**).

It should also be noted that mining operations are already occurring at Mount Owen and the Project is a continuation of those operations rather than a new source of emissions. The Project therefore represents emissions that are, for the most part, already occurring.

In February the NSW Environment Protection Authority (EPA) announced the introduction of new conditions for open cut coal mines in NSW prohibiting the emission of blast fumes that are likely to cause offence to members of the public. The new licence condition states: "offensive blast fumes must not be emitted from the premises".

Results presented in Appendix 6 on page 125 and 126 for NO_2 from blasting modelling reinforce the need to ensure blasting is subject to strict meteorological criteria to ensure no impact on surrounding residents. We emphasise the need to ensure strict control of blast conditions to protect the public from blast fume emissions.

As discussed in **Section 4.1.1**, and Section 5.2.3 of the EIS, Mount Owen will revise and update its Blast Management Plan to include pre-blast meteorological assessments and restrictions on blasting during specific weather conditions identified as having potential to result in exceedances of relevant health criteria should a worst case fume event occur. Appropriate management controls are already identified in the Blast Management Plan which limit the likelihood of such an event occurring. With the proposed management measures in place at Mount Owen, the potential for blast fume impacts exceeding relevant health criteria at any residence is as low as reasonably practicable.

It is noted in the EIS that rainwater tanks will be cleaned at privately-owned properties every three years within a 4 kilometre radius from the approved Project Area.

The peak reference document in Australia for information on rainwater tanks is Health's Guidance on use of rainwater tanks (2010). It would be appropriate to utilise this document and apply its recommendations and standards to rainwater tank systems within the vicinity of the development.

The above document states that "tanks should be inspected every 2-3 years for the presence of accumulated sediment. If the bottom of the tank is covered with sediment the tank should be cleaned". With the impact of increased dust from mining operations, it is possible that the current three year cleaning interval may be too long. Consideration should be given to decreasing the time interval for cleaning tanks at privately-owned properties, or implementing a mid-term inspection.

Mount Owen agrees to revise the commitment made in the EIS to instead require the inspection of rainwater tanks at privately owned residences within four kilometres of the approved mining limit at least every two years, with cleaning being carried out should the inspection identify that this is required.

4.1.1.3 Singleton Council

A PM_{10} and $PM_{2.5}$ monitoring and reporting system should be established in respect of the expanded operations and the Minister for Planning be requested to impose a suitable consent condition in this regard should consent be granted.

Mount Owen maintains an extensive air quality monitoring network as described in detail in Section 5.3 of the AQIA and Section 5.2.2.3 of the EIS.

Dust deposition and dust concentration (TSP and PM_{10}) are monitored in the vicinity of the Mount Owen Complex. The locations of the monitoring sites are shown in Figure 2.4 of the EIS. Airborne dust concentrations can be measured either intermittently or continuously, and both methods have been used in the area of the Mount Owen Complex.

A network of High Volume Air Samplers (HVAS) measures both TSP and PM_{10} 24-hour average concentrations on a six day cycle. Five Tapered Element Oscillating Microbalance instruments (TEOMs) measure PM_{10} concentration on a continuous basis. The Mount Owen Complex has a total of 25 dust deposition gauges which measure the monthly average of deposited dust. While monitoring $PM_{2.5}$ is not currently part of the Mount Owen network, there are measurements taken at Camberwell within 8 km of Mount Owen, as well as Singleton and Muswellbrook as part of the UHAQMN.

Mount Owen will continue to maintain this monitoring network and refine it as mining progresses. Mount Owen will continue to manage, monitor and report on air quality in accordance with the Mount Owen Air Quality and Greenhouse Gas Management Plan, which will be updated should the Project be approved.

While the EIS seeks to address environmental health impacts in relation to particulate size, it does not consider any broader possible health impacts associated with air quality. Given that the Project would continue the emission of particulate matter it is considered appropriate the proponent make a financial contribution toward a broader health impact study.

Glencore has contributed to the establishment of the UHAQMN, and actively participate in the Upper Hunter Mining Dialogue.

It should be also be noted that the Project's predicted impacts on PM_{10} levels (both incremental and cumulatively) are assessed against criteria which have been set by the NSW Government to limit health impacts associated with particulate matter.

The timely rehabilitation of exposed mined areas and over burden dumps is an ongoing issue of concern and would contribute to reducing adverse air quality impacts if carried out in a more timely manner. The extent and rate of rehabilitation on an annual basis should be prescribed through suitable conditions should consent be granted. The DPE is requested to apply and enforce appropriate rehabilitation conditions which meet best practice and community expectations.

The proposed staging of mine rehabilitation, and the use of temporary vegetation in inactive areas where prompt revegetation is not feasible, has been considered in the AQIA.

Rehabilitation practices are also further discussed in Section 5.19 of the EIS. Mine rehabilitation will be further defined through the Mining Operations Plan to be submitted and approved by DRE as part of ongoing operations.

4.1.2 Interest Group Submissions

Issues related to air quality impacts were raised by 4 interest groups. Objections relating to air quality focused on issues such as:

- Increased dust;
- Health impacts; and,
- Concern regarding potential inadequacies in impact models, particularly relating to cumulative impacts.

The issues by each of the interest groups, with the relevant responses have been summarised below.

4.1.2.1 Denman Aberdeen Muswellbrook Scone Healthy Environment Group (DAMS HEG)

Increasing the footprint of the mine by 485 hectares will inevitably result in an increased dust problem, particularly in periods of drought.

The proposed mine plan and sequences associated with the North Pit Continuation will involve approximately 381 hectares of new disturbance. This additional disturbance will occur progressively over the 12 years of the mining schedule.

Approximately 104 hectares of the proposed Disturbance Area is required for the proposed infrastructure upgrades. Disturbance in these areas will occur in the early stages of the Project (most within two years of the Project being approved) with exposed areas either being stabilised as part of the infrastructure works or vegetated following completion of the works. Not all of this 104 hectare area will be exposed at any one time.

At no stage will all of the mining disturbance footprint be exposed at any one time. New mining areas will be progressively disturbed while overburden emplacement areas are progressively rehabilitated in accordance with the Landscape Management Plan. This will maintain a balance of exposed and rehabilitated mine areas throughout the life of the proposed mining operation.

By staging the mining development in this manner over the 12 years, the exposed area is minimised and air quality impacts associated with wind erosion are managed.

Progressive rehabilitation practices that will be implemented as part of the Project are discussed in Section 5.19 of the EIS and will be managed through the Landscape Management Plan.

4.1.2.2 Hunter Communities Network (HCN)

HCN recommend that an independent review be conducted on the modelling produced to predict the air quality impacts

An independent peer review of the AQIA was completed by Jacobs Group (Australia) Pty Limited (Jacobs) throughout the preparation of the AQIA, with a final review completed and documented on 18 September 2014 (refer to Appendix A of the AQIA). This review considered the adequacy of the AQIA to address the DGRs and consistency with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*, with the review including a focus on model selection and approach. This review concluded:

> *'...the air quality assessment (based on dispersion modelling) has been undertaken in a manner which is consistent with the requirements of the EPA (DEC 2005) for these types of projects. The methodology used in this assessment has been appropriate and applied in a conservative manner, in order to determine the potential air quality impacts. The conclusions of the assessment are supported by the model predictions.'*

Both **Appendix B** and **Section 4.1** of this Report have been independently peer reviewed throughout the drafting of these documents with a final review report completed by Jacobs on 30 June 2015 (refer to **Appendix C**).

The key issue of cumulative air pollution in this part of the Hunter is identified in the Pacific Environment Ltd Air Quality Impact Assessment (the assessment report). Due to existing mining operations in the area "Annual average PM_{10} concentrations are predicted to be above the criteria even without the Project contribution."

The issue of the cumulative load of dust due to open cut mining and the inherent impact on human health is not adequately considered by the mining industry or the NSW Government planning process.

The assessment report and the EIS downplay these impacts by emphasising the conservative assessment using worst case scenarios and that the major impacts will be on mine owned properties. HCN strongly objects to these conclusions. Particularly in light of the above quote.

The quotation "*Annual average PM_{10} concentrations are predicted to be above the criteria even without the Project contribution*", is only part of a sentence and is taken out of context. This statement was made regarding cumulative results and is only part of a specific statement made in reference to a single residence (R354) located a considerable distance from the Project (12 km). This misquoted part of a sentence is not referring to the wider valley region as the submission suggests.

Given that the Integra mine and Rix's Creek Mine, (which was also included in the modelling) lies between the Project and that residence, it is not the Project that is driving the elevated levels of PM_{10} predicted at that location. The annual average contribution from the Project is predicted to be very low (less than 1 µg/m^3) and unlikely to be detectable.

The issue of the cumulative dust load, especially in the Hunter Valley, is considered thoroughly in the air quality assessment process and considerable investigation has been conducted to understand the issues in the context of existing and approved mining operations and to predict concentrations as realistically as possible. The assessment of cumulative impacts is discussed further in **Section 4.1.1** and **Appendix B**.

HCN has major concerns about the quality of the data used to predict air quality impacts of the project and the way this information is used. These concerns include:

a. The data inputs used in the air dispersion model

b. Information from the Bureau of Meteorology station at Jerry's Plains, 19 kms from the mine site.

c. Existing activities already contribute to exceedances of PM10 concentrations

d. The inadequate cumulative impact analysis

e. The conclusion that other mines are responsible for increased dust

Data inputs used in the air dispersion model

HCN does not specify which particular inputs they are concerned about so this is difficult to address. In terms of modelling inputs, the following is noted:

- Meteorological data have been sourced both from mine owned and public (Bureau of Meteorology) monitoring stations. These data were quality checked prior to use in the dispersion model. Climatic data from Jerrys Plains were used only for describing the existing environment, and these data were not used for modelling.

- Emissions inventories for each modelling scenario have been developed using the US EPA AP-42 emission factors which are considered to be industry standard for such applications.

- Detailed mine plan and production schedule information is provided for use in determining the relative quantities of material extracted / moved / produced in each year.

- Modelling software approved by the regulatory authorities is used to determine both the meteorological and dispersion characteristics within the modelling domain.

Use of Bureau of Meteorology station at Jerrys Plains

The information from Jerrys Plains is presented as an indication of historical climatic data for the area (as required by the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, 2005*). It is not used for modelling purposes or any other type of analysis in the assessment. It is presented for information only.

Existing activities already contribute to exceedances of PM_{10} concentrations

That existing activities contribute to exceedances is true of both mining and non-mining sources including agriculture and domestic wood burning[2].

This is the reason the AQIA has taken considerable effort to identify what the non-mining contribution is, to appropriately assess cumulative impacts.

As discussed previously (see **Section 4.1.1.1**), where exceedances of the annual average criterion are predicted south of Integra, the Project's contribution in that location is anticipated to be undetectable.

The inadequate cumulative impact analysis

Section 4.1.1 and **Appendix B** include a detailed discussion of the assessment of cumulative air quality impacts.

The conclusion that other mines are responsible for increased dust

As discussed above, this is not the conclusion of the assessment.

Section 4.1.1 and **Appendix B** include a detailed discussion of the assessment of cumulative air quality impacts.

The air dispersion model developed to assess the air quality impacts of the Project is based on data collected from the two weather stations to the south of the mine. The period of 2011 to 2012 dataset was used. HCN notes that these were relatively wet years. The rationale for choosing this dataset is that it was the only complete one available between 2009 and 2012. There is no discussion of data available before 2009.

As described in Section 6.3 and Table 6.1 of the AQIA, data from eight meteorological stations were used to develop the meteorological model used for dispersion modelling. Two of these were owned by Mount Owen, one owned by Liddell Colliery and five operated by the Bureau of Meteorology. These were combined to develop a 3-dimensional meteorological model for the region (shown in Figure 6.4 of the AQIA).

The most important meteorological parameters for modelling air quality impacts are wind speed, wind direction, temperature and atmospheric stability, not rainfall.

It is common practice to use the most recent and most complete year of meteorological data available for dispersion modelling.

2 As noted in Section 5.3.2 of the AQIA, the Upper Hunter Fine Particle Characterisation Study (UHFPCS) (OEH, 2013) found that wood smoke comprised the major proportion of $PM_{2.5}$ (up to 62 per cent in winter at Muswellbrook and 38 per cent in Singleton), rather than coal mining sources

In this case, this data was from September 2011 to August 2012, and used in the Project's modelling.

The model uses 2 g/m^2/month as the annual average dust deposition level across the modelling domain. This is based on readings from dust deposition gauge DD6 which is more than 5km away from mining operations and outside the prevailing wind direction. The gauge is also away from the direction of the expansion and from the likely residents to be impacted by the Project. Gauge DG6 and DD11 have recorded levels of dust deposition above the criteria and are closer to the area of impact. HCN considers this to be an inadequate database for the prediction of a 21 year project.

The DD6 gauge is indeed 5km from the existing operations, outside the prevailing wind direction and away from the direction of the expansion and nearest residents. It was for this reason, DD6, was chosen for the estimation of background levels in the absence of mining.

Modelled contributions from other mines, both now and into the future, as well as contributions from the Project, were then added to this background level for the cumulative assessment for the Project. As discussed in relation to previous comments, the purpose of the background estimate is to best estimate what levels of dust might be in the absence of major sources such as mining, so that the mining contributions (other mines and the Project) can be added to this.

It is not reasonable to use values that are clearly affected by mining and then add mining contributions to this, and for this reason DD6 was selected as being representative of background without mining.

The assessment report refers to information available at the Jerrys Plains BoM site, 19 kms from the Project site as a background to local climate conditions. There appears to be no comparison with the weather data collected on site from the two weather/meteorological stations (met stations). There is also no indication that this BoM information is used in the model.

As discussed above, data from the Jerrys Plains BoM site are presented in the AQIA for information only, displaying climatic trends for the region, and are not used for dispersion modelling purposes.

Five other BoM locations are identified as providing observed hourly surface data in the CALMET pre-processor for the outer grid domain. The two onsite met stations (SX8 and SX13) and the Liddell met station are used for the inner grid domain.

HCN recommends that the meteorological data used in the air dispersion model be independently reviewed.

An independent peer review of the AQIA was undertaken throughout the assessment process, with a final review report completed by Jacobs on 18 September 2014 (refer to Appendix A of the AQIA). This review considered the adequacy of the AQIA to address the DGRs and consistency with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*, with the review including a focus on meteorological data and methods for inclusion. This review concluded:

> *'...the air quality assessment (based on dispersion modelling) has been undertaken in a manner which is consistent with the requirements of the EPA (DEC 2005) for these types of projects. The methodology used in this assessment has been appropriate and applied in a conservative manner, in order to determine the potential air quality impacts. The conclusions of the assessment are supported by the model predictions.'*

The assessment report indicates that the Mount Owen air quality monitoring network currently measures exceedances of PM_{10} criteria particularly at the PM_{10} 3ii monitor downwind of the mining complex during the dominant north westerlies.

Figure 5.5 (p28) demonstrates that PM10 4 monitor has also measured exceedances of annual average criteria and most recently Figure 5.4 (p27) demonstrates that most of the PM_{10} monitors have measured exceedances of 24 hour criteria on a regular basis.

The analysis of dust deposition gauges around the mine site indicates records above the annual average criteria under current operations. This is an indication that dust management on the site is difficult. These issues need to be carefully considered when reviewing the predications for air pollution from the Project.

The assessment report notes that 'the actual number of exceedances per year due to cumulative impacts cannot be predicted precisely' depending on a range of variables.

The day to day fluctuations in operation of the mine and other significant regional sources cannot be taken into account in such detail in dispersion modelling. Annual average emissions are determined based on the same operations occurring on all days of the year. On days of high rainfall for example, predictions will overestimate observed concentrations and on days where there are significant regional weather events, such as bushfires, observed concentrations may be under predicted. In addition to this, while reasonable estimates can be made as to emission reductions that can be achieved over the course of the year, hour-by-hour management practices can result in significant reductions in real-time that cannot be fully accounted for in the modelling over 24-hour periods. This can lead to over predictions under adverse conditions that would generally be avoided due to the application of good practice dust management measures.

In addition to this, as discussed earlier, cumulative impacts are complex to model due to limited data on emission sources at other mines and emission sources. Accordingly, conservative annual estimates are made using the best available source of data and the model is calibrated using modelled versus actual data from production rates in the year of modelling.

As discussed earlier, the approach taken for the cumulative PM_{10} annual average assessment is considered to be conservative and the Monte Carlo approach used to predict cumulative PM_{10} 24 hour levels at selected residences has been shown to be more conservative than the 'Approved Methods'. The predicted impacts in the AQIA are considered to overestimate the impacts from the Project.

There are exceedances from existing activities recorded at SX8, SX9 and SX14 (fig 5.1). The latter two TEOM monitors, and particularly SX9, are in the direction of the project impacts.

There are exceedances noted on the monitors of the 24-hour average PM_{10} criterion from time to time. There are occasions when these may be due to industrial sources such as mining and there are occasions when these will be due to significant regional events such as bushfires and dust storms.

Mount Owen does and will continue to implement measures to manage dust impacts from the operations to meet relevant impact criteria. However, in circumstances where there are significant sources of particulate matter from other sources, for example bush fires and dust storms, exceedances of criteria will occur irrespective of activities at Mount Owen. This is illustrated in the assessment of cumulative PM_{10} levels shown in **Table 4.1.**

The assessment report appears to incorrectly identify the number of private residences without existing acquisition rights to be impacted by 24-hour average 50 µg/m^3 criterion on more than 5 occasions per year.

Table 10.3 (p119) identifies that properties R4, R112, R114 and R116 fall into the above category. However, the assessment report states that there are three (not four) private residences. These residences are in the Middle Fallbrook area which will be impacted by the Project.

Property R116 is clearly shown in Table 5.2.9 of the EIS as being a property that is being affected, however R116 was inadvertently omitted from the text. This landholder has been actively consulted through the assessment and EIS exhibition process and has been advised of the predicted level of impact at their property.

Section 3.2.2 of this Report provides an updated assessment of the properties likely to be afforded acquisition rights if the Project is approved, in accordance with the recently released Voluntary Land Acquisition and Mitigation Policy.

HCN considers that the impacts will be greater than those predicted because of the inadequate inputs to the model.

As previously noted, an independent review of the AQIA determined that the methodology used in the assessment was appropriate and applied in a conservative manner, with the conclusions of the assessment supported by the model predictions (refer to Appendix A of Appendix 6 of the EIS).

HCN does not support the conclusion that because other mines are predominantly responsible for the cumulative impact on air quality, that the impact from the Project is minimal.

The fact that other mining operations are more significant contributors to the annual average cumulative PM_{10} concentrations at a specific residence does not cause the impact from the Project to be minimal. For the specific residence in question (as discussed earlier) however, the Project does not result in the exceedance of the annual average PM_{10} criterion and the impact from the Project at this location is, in fact, predicted to be minimal.

The very large area of mine owned property in the vicinity of the Project indicates that the social and health impacts from mining in this part of the Hunter have been significant.

The additional load of dust generated by the Project, when exceedances of criteria are already occurring, is a significant issue that is not given adequate emphasis in the EIS.

As previously discussed, all reasonable and feasible measures are proposed to minimise air quality impacts. In the locations where exceedances are estimated to already occur, the additional load created by the Project is not estimated to be detectable using conventional monitoring equipment (i.e. less than 1 µg/m^3).

The cumulative level of nitrous oxides emitted from all mine blasts in the region has not been established in the air quality assessment.

As detailed in Section 11.4 of the AQIA, a cumulative assessment of NO_2 and SO_2 in blast fume, diesel fume and background levels has been carried out for the blasts occurring at Mount Owen.

There is no discussion in the air quality and noise impact assessments whether mine-owned residences have tenants in them. The predictions are that mine-owned residences are likely to experience higher dust and noise impacts than surrounding private properties. There are a large number of mine-owned properties in the Middle Falbrook area that appear to have residents.

As discussed in **Section 3.2.3** of this Report, the AQIA predicts that a total of 10 currently tenanted Glencore-owned dwellings will be affected by air quality levels that exceed relevant impact assessment criteria at some point during the mine life.

As discussed in **Section 3.2.3**, existing tenants of Glencore owned dwellings are alerted to the possible impacts of mining, including air quality, as part of the tenancy application process to help inform their decision to occupy the residence. In addition, tenants are provided with a copy of the NSW Public Health Unit's 'Mine Dust and You' fact sheet prior to entering into a tenancy agreement. At any time during tenancy, tenants can make a written request to Glencore if they believe that mining related impacts are unacceptable, with the option of terminating their tenancy without penalty if Mount Owen cannot resolve the issue with the tenants. This process is consistent with the Voluntary Land Acquisition and Mitigation Policy.

The Land and Environment Court judgement on the Warkworth Mine approval considered that tenants in mine-owned properties should have the same rights as private property owners for protection of health.

As previously discussed, predicted air quality impacts associated with the occupation of mine owned properties will be managed with in accordance with the NSW Government's Voluntary Acquisition and Mitigation Policy.

4.1.2.3 Lock the Gate Alliance

The Project would also carry unacceptable impacts on local area residents, who are already subject to PM_{10} particle pollution in excess of national standards. These residents are entitled to cleaner air, and certainly should not be subjected to an even further deterioration in air quality, which would directly impact on their health and life expectancy. A recent review of the health impacts of the Hunter coal industry found that the costs of the industry are already in excess of its benefits to NSW, and recommended no further mining approvals in the region. [Climate and Health Alliance, 2015: Coal and health in the Hunter].

The AQIA has assessed the Project against current EPA assessment criteria and has also assessed the Project against the current reporting standards for $PM_{2.5}$ under the Air Quality NEPM.

The Economic Assessment has included a quantification of the potential costs associated with air quality impacts from the Project. These costs are considered in the cost-benefit analysis which has demonstrated that the Project will deliver net benefits when externalities are considered.

4.1.2.4 Wybong Action Group

Air quality will deteriorate further. Current operations exceed the national standards for PM_{10} emissions, the Project will increase these exceedances.

Every effort has been made to estimate the worst-case scenarios of the proposed Project with a number of conservatisms built in to the modelling. Predictions show some cumulative estimates above relevant criterion and the vast majority of these apply to properties already owned by Glencore or with current acquisition rights from other mining companies. Private properties potentially impacted by the Project are discussed in **Section 3.2** of this Report.

4.1.3 Community Submissions

Air Quality issues were raised in 17 individual community submissions.

The most common concern raised was around a general lowering of air quality in the area, most often related to increases in dust. Other prominent concerns included health and safety concerns and concerns over the accuracy of impact measurement activities.

Negative economic impacts made up eight per cent of responses related to air quality and related specifically to reductions in property values and rental returns relating to increases in dust and decreases in air quality generally.

The issues raised in submissions are discussed further below.

Given the Project is for the expansion rather than the entire Mount Owen Complex, there needs to be a clear, valid and transparent method of distinguishing between existing operations and those involved in the expansion. This will ensure that a residence experiencing an increase dust or noise emissions is not sidelined by using the excuse of the noise/dust arising from the original Mount Owen operations, as opposed to the expansion.

We request further information on the monitoring locations and timing for dust, as well as Mount Owen's planned methodology for distinguishing expansion related impacts from existing mine operations.

The Project is for the continuation of the existing Mount Owen and Ravensworth East operations. There is no proposed increase in production levels. As the mining continues into the proposed new areas, mining activities will reduce in the existing areas. Modelled impacts are for the entire Mount Owen and Ravensworth East operations.

Mount Owen will continue to implement air quality controls in accordance with the Mount Owen Air Quality and Greenhouse Management Plan (AQGHGMP) which will be updated to include the additional controls proposed for the Project. The AQGHGMP details monitoring requirements including locations, air pollutants measured, monitoring frequency and reporting requirements. Should the Project be approved, the AQGHGMP will be updated to reflect the commitments in the EIS and any additional commitments in this RTS. The AQGHGMP will also be updated to reflect any additional requirements under the new development consent, including any revised compliance criteria for continued operations.

We question the accuracy of predictions by Umwelt in regard to noise, air quality and property values. The extension to the Mount Owen mine in 2004 we saw acquisition zones to be within 1.8km from our homes, this we believed was because of noise or air quality or both. In this EA prepared by Umwelt the Project comes 1.7km closer but we see the noise and air quality contours don't change. Our predominant winds are from the north to north-west we don't believe that Umwelt's predictions are correct.

There have been significant improvements in mining practices and mitigation requirements since the previous EIS was published in 2003. Glencore has driven continuous improvement across its operations, including Mount Owen and will continue to seek further improvement as further feasible measures become available over time. As part of the 'Dust Stop' PRP program, the EPA has imposed very stringent controls on dust generating activities, in particular haulage on unsealed roads, which require operators to meet strict dust suppression targets. In addition to this, Mount Owen have committed to continue to implement monitoring to demonstrate haul road dust control efficiency and target an overall dust control efficiency of 85 per cent. It should be noted that recent testing at Mount Owen as part of this PRP process has shown that they are currently achieving well over 85 per cent control on unsealed roads.

The emissions inventories developed for this assessment have taken proposed dust management controls into account which would mean that it is possible for total emissions to decrease under similar production rates used for previous assessments. A reduction in total emissions as a result of the implementation of these management measures can also explain why impact levels at a specific location do not increase as much as may be expected based on the 2004 predictions, despite the Proposed Disturbance Area being closer to that location.

Some proactive management controls, such as limiting operations in certain meteorological conditions, are not able to be included in the modelling. These proactive controls provide further confidence that the Project will meet or have lower emissions than those predicted in the AQIA.

The direction and speed of winds included in the modelling has the potential to significantly impact upon the residences to the SW of the proposed extension. The importance of westerly and north westerly winds to dust dispersion is clearly evident through the Mount Owen Complex reporting.

We request that Mount Owen increase the meteorological modelling to the entire three years and eight months they have meteorological data available and ensure the data is in line with historical wind patterns (both direction and speed) for the area and includes the prevailing NW-W winds in the winter months.

Furthermore, we request that Mount Owen include significant adverse weather events (the strong to gale force west through north quadrant winds) that they so frequently raise in the AEMRs to determine how the properties in the Bridgman/Middle Fallbrook are impacted upon by these recurrent adverse weather events.

The modelling has been undertaken in accordance with the Approved Methods. The meteorology used in the modelling includes all meteorological conditions observed over the 12 month period from September 2011 to August 2012 (this period was demonstrated in the AQIA to be representative of longer term conditions). The selection of meteorological data for use in the modelling, satisfies the requirements of the approved methods. Figures 5.1 and 5.2 in the AQIA demonstrate that the period used for modelling is representative of all the data from 2009 (almost 4 years).

The EIS states that the wind data was based on an 'analysis of the meteorological data collected at SX8 and SX13 between January 2009 and August 2012 was completed to determine the most representative 1-year period suitable for air dispersion modelling. The period chosen for modelling was the 12 month period from 1 September 2011 to 31 August 2012' (EIS Appendix 6, page 20).

The EIS also goes on to report that 'In accordance with EPA guidelines for air dispersion modelling, the meteorological dataset needs to be >90% complete. The only periods where both SX8 and SX13 are >90% complete in the analysis period, are 2011 and 2011/2012. These two yearly datasets are also very similar to each other at both monitoring sites, in terms of the percentage of calms experienced in each season' (EIS, page 20).

Jerry's Plains, located 19km from the Mount Owen site, has wind data available from the 1950s to September 2010. An annual wind rose (Figure 3) reveals that the predominate direction for the year is from the north-west (NW), accounting for over 30 per cent of all wind observations, with all strong winds (>= 40kmh) also coming from the NW. The west through north quadrant contained approximately 50 per cent of all recorded observations. The 2011-12 data selected by Mount Owen for their modelling is broken down into more detail to include the eight half-winds. SX8 data clearly indicates a predominately east to south quadrant instead of the west through north quadrant indicated by the Jerry's Plains historical data (Figure 4). Whilst the SX13 station does contain a higher proportion of the west through north quadrant observations, estimated at around 36 per cent (Figure 5), it is still significantly lower than in the historical Jerry's Plains data. Whilst the percentage of calms may be similar to the SX8 data, there is little evidence to suggest that the September 2011 to August 2012 wind data that is incorporated into the environmental modelling is representative of historical conditions for the area.

We request that Mount Owen increase the meteorological modelling to the entire three years and eight months they have meteorological data available and ensure the data is in line with historical wind patterns (both direction and speed) for the area.

Weather stations Sx8 and Sx13 were used as they were representative of the meteorological conditions likely to apply to the Project. As described in Section 6 of the AQIA, data from other stations were used to support the meteorological modelling for the wider domain. The representative meteorological dataset complies with the requirements of the EPA guidelines for air dispersion modelling (refer to Section 5.1.1 of the AQIA). In terms of its representativeness, Figures 5.1 and 5.2 in the AQIA demonstrate that the period used for modelling is representative of all the data from 2009 (almost 4 years).

As previously discussed, no data from Jerrys Plains was used in the modelling for this assessment.

At a face to face meeting with Mount Owen representatives in October 2013, we raised the issue of why values from the PM_{10} 3 gauge had been increasing throughout 2012 and 2013, as reported in the 2012 Annual Environmental Management Report (AEMR) and the Monthly Monitoring Reports.

We request that Mount Owen provide evidence to demonstrate that PM_{10} 3 levels have not been increased and that the amended data is indeed valid and not 'patched'. Additionally we seek clarification on how the reporting 'errors' occurred, why they did not provide clarification about the errors in their reporting and changes to data in their Monthly Monitoring Reports and 2013 AEMR and what quality control processes are in place to ensure the validity and integrity of their gauge data.

There have been some issues involving reporting accuracy observed in the environmental reports (monthly and annual) that are submitted by Mount Owen to relevant Government departments; as part of their licence conditions.

Actual environmental measurements and meteorological conditions underpin much of the modelling undertaken to determine the impact of dust and noise on surrounding residences. As a result, the presence of multiple reporting errors, which have not been publicly clarified or addressed, raise serious concerns as to the validity and quality of the data and Mount Owen's transparency in reporting and notification.

Between July and September 2013, a reporting error was made within monthly environmental monitoring results posted on the Mount Owen website. The results from the HVAS PM_{10} 2 dust monitoring gauge, located close to the operation on the western side of Falbrook Road, was inadvertently transcribed against PM_{10} 3 over this three month period. This error was identified and corrected in the October 2013 report.

The annual rolling average results since January 2012 for HVAS PM_{10} 3 are shown in **Figure 4.5**.

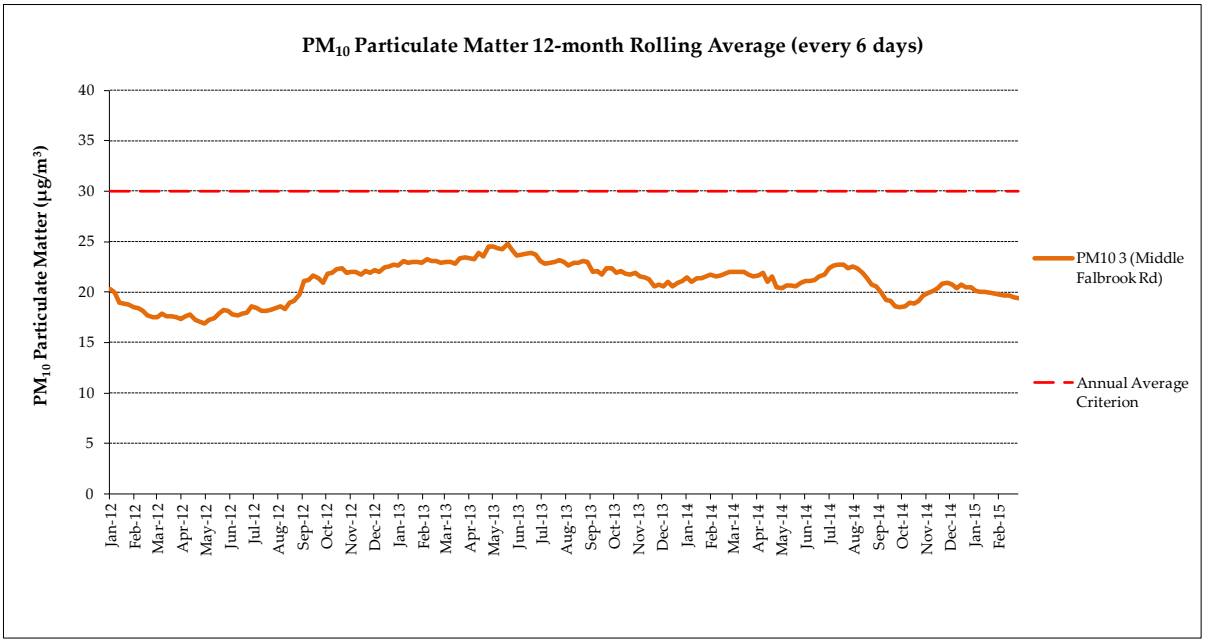


Figure 4.5: PM_{10} 3 - Rolling Annual Average

The rolling annual average has fluctuated over time and in 2012 and early 2013 the trend was increasing. However, since mid 2013, the trend has been generally decreasing where it is currently averaging just below 20µg/m^3 (refer to **Figure 4.5**). This is in line with the modelled predictions associated with the current approval for year 10 PM_{10} which predicted annual average PM_{10} concentrations of 21µg/m^3 at this location.

Mount Owen has in place a process of regular calibration of monitoring equipment and checking and review of all monitoring data. Since 2013, Mount Owen has implemented and utilised an Environmental Monitoring Database, to assist with collation, storage, analysis and review of all environmental monitoring data. Monitoring reports are able to be produced direct from the database, removing the need for transcription of results from the source to another document, thereby reducing the opportunity for errors, such as that noted in the submission, to occur.

The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales require that 'Level 2 impact assessments are conducted using at least one year of site-specific meteorological data. The meteorological data must be 90% complete in order to be acceptable for use in Level 2 impact assessments (i.e. for one year, there can be no more than 876 hours of data missing)'.

As well as proposing that the EPA review raising the minimum standard for modelling to five years in line with United States EPA standards, we request that Mount Owen, at the bare minimum, increase the meteorological modelling to the entire three years and eight months they have meteorological data available.

As discussed above, the modelling has been undertaken in accordance with the Approved Methods and this includes the selection of meteorological data.

The PAEHolmes (2011) report referred to in this submission does not recommend that five years of meteorological data be used for dispersion modelling, but rather recommends that data from a station selected as most representative of actual dust results, would best represent dispersion conditions in a particular area.

The AQIA for the Project used all the available data at the time of the assessment, to determine the representativeness of the selected modelling year (3 years and 8 months).

An analysis of this data in Section 5.1.1 of the AQIA determined that the 12-month period used for modelling, September 2011 to August 2012, was representative of the area. In addition to this, data were available for two stations, more than a single station required in the Approved Methods. A number of other weather stations were also used to provide further confidence in the three-dimensional meteorological model and ensure that a full range of meteorological conditions have been modelled.

In this regard, the assessment methodology exceeds what is required in the Approved Methods.

Should the subject application be approved, there will be an increase in the air quality levels at our property. As you are aware, Integra (owned by Vale) has since gone into a care and maintenance period, which may have reduced the immediate impact on air quality. However, Integra still has an active consent and can recommence operations at any time. Our concerns from reading the EIS, is did the Applicant include the modelled air quality results for Integra and Ashton coal as well as their project? I haven't seen a map showing the cumulative dust affection contours for our property.

Section 8.5.1 of the EIS lists all the mines that have been included in the cumulative assessment for each modelling year and shows that Integra and Ashton are included in the assessment. **Appendix B** identifies the modelled source locations and emissions from each of the mines modelled in the cumulative assessment.

The surrounding human inhabitants will experience worsened air pollution. Current operations exceed PM_{10} emission standards, so of course this would increase those. This is not fair, health impacts must be taken into account and not dismissed and the increased risk of asthma problems in our children and respiratory repercussions.

The AQIA has assessed the Project against current EPA assessment criteria and Reporting Standards for $PM_{2.5}$ contained in the Air Quality NEPM. These levels are set by the NSW Government to limit health impacts associated with particulate matter.

Our main concern at present is that dust is now getting into our house and our domestic water supply. We rely on tank water for drinking and cooking so this is not a good outcome.

As discussed in **Section 4.1.1.2**, Mount Owen is committed to inspecting all rainwater tanks at least every two years for all residences located within four kilometres of the approved mining limit. Mount Owen will also facilitate the cleaning of tanks if the inspection considers that cleaning is warranted.

Mount Owen is committed to continued consultation with the surrounding privately owned properties in order to develop and implement reasonable and feasible management measures to minimise air quality impacts.

Our fresh water tanks are located adjacent to the shed, which is inside the dust affection contour. If the mine is approved, we will be greatly disadvantaged due to the cost of constantly cleaning our gutters and emptying the tanks to clean out the sludge that will be present at the bottom of the tanks. We are aware under the Voluntary Land Acquisition and Mitigation Policy we can enter into an agreement with the Applicant to specify possible mitigation measures for our property. However, we feel the mitigation measures available regarding the decontamination of our drinking supply will be a major inconvenience to us and an ongoing cost to the Applicant.

See response above.

We object to any impact that the Project may have upon our livestock and crops. Dust settling on fodder and water troughs is of concern. Reduced yield of crops from dust collection on leaves or increased water consumption to keep dust off and troughs clean is all extra expense and time to the landholder. We do not want to see a decline in our agricultural ventures from the impact of mining.

It is unlikely that dust emissions will adversely affect vegetation, including commercial crops, beyond the levels currently experienced in the area due to farming and other anthropogenic activities.

A 2006 study entitled "*Airborne Particulates and Vegetation: Review of Physical Interactions*" (Doley, 2006), examined the physical effects of dust on vegetation. The study noted that the effects may be associated with "a reduction in light reaching the photosynthesis apparatus of the leaf" and an increase in leaf temperature. A relevant conclusion for the study suggested that there is no discernible effect on the most sensitive plant functions with dust loads of less than 8 g/m^2 on the leaf surface during growth.

Dispersion modelling for the Project was carried out for dust deposition. The assessment showed that the cumulative predicted annual average deposition levels resulting from each of the operating scenarios are well below that which would affect vegetation. The only areas predicted to experience 8 g/m^2/month or more are within the mining areas themselves.

We object to not being able to open up our homes and being forced indoors to air conditioning because of poor air quality. (Air conditioning is another trigger for both my asthmatic children.) Having to keep windows sealed closed to stop sooty dust from entering our homes and continually have roofs, gutters, tanks and filters cleaned. We do not wish to have Glencore install air conditioning to our home as a measure to give us a clean air environment as how we live now offers us a better option. Dust needs to be watered on haul roads, overburdens, stockpiles and anywhere dust can escape. Monitoring sites need to be set up for air, dust and blast somewhere in the vicinity of our property to Upwards.

As discussed in **Section 4.1.1.2**, a number of mitigation and management measures will be undertaken and implemented to reduce dust generated by the Project. Mount Owen is committed to the ongoing consultation with surrounding properties regarding air quality and the implementation of suitable mitigation and management measures as required.

All haul roads and exposed areas are subject to rigorous management to reduce the potential for dust emissions from these surfaces. This is a requirement for all coal mines in NSW as well as evidence that the appropriate levels of emission reduction are being achieved.

Mount Owen maintains an extensive air quality monitoring network which is described in detail in Section 5.3 of the AQIA and Section 5.2.2.3 of the EIS. This network includes monitoring points located within the vicinity of the properties noted. Mount Owen will continue to maintain this monitoring network and refine it as mining progresses.

Those who want to remain, also reserve the right to full mitigation on request, the issue of giving to one and not to other is a disgrace, the mine impacts on everyone.

Under the Voluntary Land Acquisition and Management Policy, property owners with voluntary acquisition rights can also request mitigation measures be implemented at their properties if they do not wish to exercise their acquisition rights (refer to **Section 3.2**). It is anticipated that any consent granted for the Project would extend this right to properties identified as having voluntary acquisition rights.

The Australian health letter to COAG on the change to NEPM on the release of the WHO on particulate matter has now been proven to cause harm to human health, and there is no threshold. So now it is clear to state any person who is placed in danger by placing a mine close to residents are accountable for their actions, and the mine is accountable for causing harm, just by stating the fact the air quality will affect is an omission of the fact their intent to commit to inflict harm.

The NSW Government has developed the Voluntary Land Acquisition and Mitigation Policy and set air quality criteria on developments to manage impacts to acceptable levels. The consent authority will have regard to the predicted air quality impacts from the Project in its assessment of the Project.

As discussed in **Section 3.2.2**, the private landholdings which are predicted to exceed the relevant air quality criteria will be afforded acquisition rights in accordance with the Voluntary Land Acquisition and Mitigation Policy.

The mine uses TEOM 1 monitor as dust entering the site and either TEOM 2 or 3 monitor as dust leaving the site. I cannot recall exact figures but for example TEOM1 could have a reading of 20 grams per month [sic] and TEOM 3 monitor a reading of 50 grams per month [sic] giving a result that only 30 grams per month[sic] is generated by Mount Owen, this sounds and probably is correct. Fact is there is a distance of approximately 8 to 9 km between TEOM 1 and TEOM 2 - 3 monitors, the mine claims that the dust travel at least this distance for their site specific results but Umwelt claim the same dust to only travel 1km not leaving the present acquisition zones. Umwelt claim the reason for this is improved mining techniques but over burden will continue to be dumped on dumps well above current ground levels, if these new techniques are so good why does the mine not use them now.

Particulate matter can travel a significant distance from its source, however the concentration of particulate matter from any single source decreases as the dust moves away from the source (as it has a larger volume of air to disperse into). Particulate matter from the Project is not predicted to stop at the boundary of the 'acquisition zone'.

Background dust can have its origin several metres from a monitor or several kilometres from the monitor.

Mount Owen monitors dust concentrations at a number of locations surrounding their current operations with a particular focus along the northwest/southeast axis which represents the prevailing wind directions. During periods of northwesterlies, TEOM 1 will provide an indication of concentrations upwind of the mine, and TEOMs 2 and 3 indicating concentration levels downwind. These positions are reversed during periods of southeasterly winds (that is, TEOM 1 will be downwind and TEOMs 2 and 3 will be upwind).

On any particular day, those monitors upwind will predominantly contain emissions from non-Project sources, such as other mines, agriculture, pollen, salts, wood heaters etc, and those downwind will include Mount Owen combined with all these other sources. Mount Owen's contributions to particulate emissions at the downwind monitor can therefore be identified by comparing the upwind and downwind monitoring results for the same period.

As discussed in **Section 4.1.1.2**, Mount Owen will implement a range of mitigation and management measures to ensure potential air quality impacts are minimised. A number of these measures are already implemented at the existing operation and the Project proposes the continuation of these measures.

We have young children that catch the bus to school each morning. The bus picks them up opposite our entrance, on Glennies Creek Road. This is well within the dust affection contour of 50µg/m3.

The 50 µg/m^3 criterion is for a 24-hour averaging period and the 50 µg/m^3 contour represents worst case predictions which may only occur on a single day of the year. This contour does not represent what will occur on every day of the year at a particular location (such as a bus stop).

The Applicant has stated on page 110 of the EIS main summary, our property has an area of 3.3 hectares affected by dust levels, which equates to 80% of our property having exposure to a minimum dust levels of 50µg/m3. The zoomed in aerial maps attached, shown the dust affection contour for receptor 116, which is our property. The contour, at its closest point, is approximately 5 metres from our residence.

This submission also requests that a '*condition of consent be imposed on the applicant requiring them to compulsory acquire our property*'.

Should the Project be approved, the application of the Voluntary Land Acquisition and Mitigation Policy will result in the subject Property being provided with voluntary acquisition rights as a result of more than 25 per cent of the property predicted as experiencing PM_{10} levels above relevant assessment criteria (refer to **Section 3.2.2**).

Mount Owen has had a further meeting with these property owners to discuss the change in affording acquisition rights under the Voluntary Land Acquisition and Management Policy. Mount Owen has outlined the process that would be followed assuming the Project is approved and if voluntary acquisition rights are commenced by the owner.

We witness dust and nitrous oxide flumes from blasting at present from the three Glencore mines which will only get worse with the Project extension.

As discussed in Section 5.4.7 of the EIS, and **Section 4.1.1** above, the results of the Blast Impact Assessment indicate that the potential impacts resulting from blasting activities for the Project can be managed effectively to ensure no exceedance of relevant criteria. Blasting activities at the Mount Owen and Ravensworth East Mines is currently undertaken in accordance with the Blast Fume Management Plan, which will include protocols for detailed blast design and restrictions on blasting during conditions identified as having potential to cause exceedances in the event that a Rating 3 blast fume event occurs. With these controls in place, the potential of an exceedance of relevant criteria at any residence is reduced to as low as reasonably practicable.

Blasting activities will continue to be undertaken in accordance with the Blast Management Plan which includes controls to manage safety to people, property and livestock, vibration and airblast emissions and dust and fume emissions.

The toxic plume of blasting is of paramount concern. Residents need to be informed prior to blasts, kept informed of wind changes and notified of road closure times. SMS services for notification and hotline numbers are yet to be sourced from Glencore but I was made aware by Vicki McBride on Monday that these services are available.

This is standard procedure as part of both the Air Quality and Blast Management Plans. Mount Owen will be in contact with landholders within four kilometres of the approved mining limit to advise them of the blast notification services available. Following receipt of their request, this resident has been added to the blast notification listing.

Blasting as a result of the Project will not require any public road closures.

Upon reading the EIS and supporting studies, it is noted that on page 112 of the EIS main summary, our property will have 10 x 1 hour predicted exceedances of 246ug/m3. The Applicant did not mention anything to us in our previous two meetings regarding blast impacts at our property. We can only presume that the blast fume emissions will be five times worse than the air quality criteria of 50ug/m^3. If this is a correct assumption, we have great concerns regarding the further deterioration of air quality and the potential impact this will have on our quality of life.

As discussed in **Section 4.1.1**, no exceedances of health criteria are expected as a result of the Project due to the implementation of strict controls around blast design and the meteorological conditions that blasts can occur.

The subject Property (residence R116) is identified as having acquisition rights under the application of the Voluntary Land Acquisition and Mitigation Policy as a result of more than 25 per cent of the property predicted to experience PM_{10} levels above relevant assessment criteria (refer to **Section 3.2.2**).

Mount Owen has had a further meeting with the property owners to discuss the change in affording acquisition rights under the Voluntary Land Acquisition and Management Policy. Mount Owen has outlined the process that would be followed assuming the Project is approved and voluntary acquisition rights are commenced by the owner.

We have observed in recent years Mount Owen still running their pit when other nearby mines have 'pulled up' due to wind concerns. We seek clarification on whether Mount Owen has or proposes to have nominated conditions (wind speed and direction) that operations must be pulled up; either involving part or the whole pit, or whether pulling up is more arbitrary in its nature and is at the Open Cut Examiner's (OCE) discretion. Furthermore, we request the parameters at which blasting will not occur due to prevailing wind conditions.

Mt Owen has developed and implemented a Trigger Action Response Plan (TARP) process to manage dust emissions from site. The TARP process involves responses to real time monitoring alarms and visual dust level triggers. Changes undertaken as part of the TARP process are logged and recorded to minimise dust emissions from site. Mount Owen have also implemented a weather forecasting process that provides the mine with a 48 hour forecast for potential high risk noise and dust generating conditions. This process enables Mount Owen to implement changes to the mining operations in advance of the expected adverse weather conditions. These changes will depend on the predicted and prevailing meteorological conditions and may include increased watering of roads, relocating equipment to less exposed areas or suspending certain operations. It is noted that the Mount Owen North Pit is deeper than many other pits in the area and the shielding afforded by the pit walls enables operations to continue in the North Pit when meteorological conditions may trigger activities at other mines to be scaled down. It is also noted that wind conditions vary across the Hunter Valley and are not always identical at all mines.

Air quality impacts will continue to be managed as part of the Project. These management measures include clear instruction for site personnel regarding the roles and responsibilities in the event that unfavourable weather conditions are identified and operations are required to be modified in response to these conditions.

4.2 Noise

Noise was identified as a key issue in the DGRs for the Project and a detailed Noise Impact Assessment (NIA) was completed by Umwelt and is included in the EIS (section 5.3 of the EIS and Appendix 7). As discussed in Section 5.3 of the EIS, noise is also a key issue for the local community and this is reflected in the submissions received on the Project.

Mount Owen has been proactively managing noise from its operations for many years through the implementation of a performance based adaptive management approach. The management of noise at the Mount Owen Complex includes the design and operation of mining activities to proactively manage noise, the implementation of a range of operational controls and implementation of mitigation measures at surrounding residences. Mount Owen's extensive continuous noise monitoring system enables proactive and real time management of operations during noise propagating conditions and has been operating effectively since 2003.

Mount Owen has utilised this long history of effective noise management experience as the basis for the detailed design process for the Project and the identification of reasonable and feasible noise mitigation measures. Potential noise impacts associated with the Project were a key consideration in the Project design with comprehensive noise modelling completed on an iterative basis throughout the design, including an assessment of a number of Project alternatives. The alternatives considered are detailed in Section 2.5 of the EIS. The resulting noise management and mitigation measures are detailed in Section 5.3.10 of the EIS.

This section of the Response to Submissions report includes a response to the submissions from agencies and the community in relation to noise.

4.2.1 Agency Submissions

4.2.1.1 EPA

The predicted $LAeq_{(15\ min)}$ levels in Appendix J of the NIA are different to the predicted levels presented in the (Table 6.1) of the NIA. It is not clear what the reason for the difference is, or which predicted levels should be relied on for consideration as licence limits.

As detailed in Section 6.1.2 of the NIA, Appendix J contains an analysis of predicted noise level results for the inclusion of 'modifying factors' such as low frequency noise. Section 6.1.2 of the NIA explains the analysis contained in Appendix J and concludes that no low frequency modifying factors were required to be applied to the predicted noise levels for the Project.

The predictions contained in Appendix J of the NIA are derived in accordance with Industrial Noise Policy (INP) methodology (i.e. based on worst case INP meteorology conditions) for the purposes of assessing INP modification factors related to low frequency noise. The 10^{th} percentile predicted operational noise levels are not able to be used for the INP prescribed dB(C) - db(A) approach as the 10^{th} percentile numbers are derived from statistical analysis rather than a specific meteorological condition. The 10^{th} percentile dB(A) and dB(C) figures are therefore not directly comparable in the manner required for the consideration of INP

modifying factors (i.e. the 10th percentile value for dB(A) may not align with the meteorological conditions where the 10th percentile dB(C) predicted level is experienced).

The 10th percentile predicted operational noise levels presented in Table 6.1 of the NIA are to be used for setting licence limits for the Project. The model identifies that noise levels are likely to be below these levels for 90 per cent of the time with no additional management controls being implemented. While the model indicates that these levels are likely to be exceeded 10 per cent of the time, the model's predictions are based on a typical, worst case operating scenario and do not consider additional proactive management by the operation to manage noise impacts on a day-to-day basis in adverse weather conditions consistent with the Noise Management Plan.

In practice, the use of real time monitoring, in combination with other adaptive management measures, enables Mount Owen to implement management measures to reduce noise levels as monitoring indicates that noise levels from the operations are approaching limits.

The New South Wales Industrial Noise Policy (INP, EPA 2000) remains the NSW Government's policy defining acceptable assessment methodology for industrial noise. However, alternative approaches can be considered where the INP approach leads to demonstrated perverse outcomes, for example receivers further away from the project receiving acquisition rights, or a proponent having an incentive to emit higher levels of A-weighted noise to reduce the C-A difference. This should be taken into account in the DP&E's assessment of the acceptability of residual noise impacts.

Until the issue of low frequency noise assessment resulting in residual impacts more than 5 dBA above the Project Specific Noise Level (PSNL) is resolved, the EPA is unable to recommend conditions of approval for noise. To assist in providing recommended conditions, the EPA requests the following information:

1. ***Explanation of the differences in A-weighted predictions between Table 6.1, and Appendix J, of the NIA;***
2. ***Clarification of which predicted levels should be considered in determining licence limits; and***
3. ***$Lceq_{(15min)}$ results that correspond with the results in Table 6.1 of the NIA.***

1. ***Explanation of the differences in A-weighted predictions between Table 6.1, and Appendix J, of the NIA***

As discussed above, the dB(A) noise levels in Appendix J of the NIA relate only to worst case night time noise conditions and have been used in the NIA only for the purposes of identifying whether strict compliance with INP would require the use of modifying factors in relation to low frequency noise predictions.

As discussed in Appendix J, the use of modifying factors is not considered appropriate as the predicted dB(C) levels which occur when a dB(C) – dB(A) value of more than 15 is observed are well below the 60 dB(C) night time threshold recommended by Broner (2011) and DP&I (2013).

Additionally, as discussed in Appendix J, the predicted levels of dB(C) (relative to dB(A)) are almost entirely caused by the use of attenuation on mine vehicles and equipment which reduce noise in the higher frequency range. The attenuation does not increase dB(C) levels but makes it more 'audible' simply due to the reduced masking effect from higher frequency noise.

The reductions in dB(A) levels as a result of the use of attenuation are considered to far outweigh any negative impacts associated with more 'audible' low frequency noise. However, a strict adherence to the INP in the present case may result in a perverse incentive to increase dB(A) levels to avoid the 5dB(A) penalty. This perverse incentive should be avoided and is not supported by Mount Owen, particularly given the relatively low levels of low frequency noise that are modelled to arise from the Project having regard to the recommended levels in Broner (2011).

2. Clarification of which predicted levels should be considered in determining licence limits

Given the comments above regarding the perverse incentives created through the application of the INP penalty, the predicted dB(A) levels in Table 6.1 of the NIA (Appendix 7 of the EIS) should be used for the assessment of operational noise impacts (without any modifying factors) for the purposes of setting noise limits for the Project.

3. $Lceq_{(15min)}$ results that correspond with the results in Table 6.1 of the NIA.

As noted above, the 10th percentile dB(A) and dB(C) are not directly comparable in the manner required for the consideration of INP modifying factors (i.e. the 10th percentile value for dB(A) may not align with the meteorological conditions where the 10th percentile dB(C) predicted level is experienced). It is for this reason the 10th percentile dB(C) haven't been included for comparison with the dB(A) results presented in Table 6.1.

4.2.1.2 Hunter New England Population Health

Environmental noise can have negative impacts on human health and well-being, and trigger ongoing community complaints about annoyance, sleep disturbance and stress. Evidence concerning the adverse health effects of environmental noise is detailed in a number of publications, for example, the World Health Organization (WHO) Night Noise Guidelines for Europe (2009) and the WHO Guidelines for Community Noise (1999). To protect public health, it is prudent to take all reasonable and feasible measures to minimise public exposure to mine-related noise, irrespective of compliance with the relevant noise policies.

Section 5 of the NIA contains detailed consideration of all reasonable and feasible noise management practices that can be and will be implemented as part of the Project. It is considered that the design of the Project, and plant that will be used in the Project, incorporates all reasonable and feasible noise management measures.

Existing monitoring of the Mount Owen Operations has demonstrated that proactive noise management practices that are currently implemented are effective at achieving compliance with noise limits.

Data presented in Section 5.1 Complaints Analysis of Appendix 5 - Social Impact and Opportunities Assessment of the EIS, indicate that 75% of the 16 complaints received over the three years to June 2014 related to noise and blasting, and that the majority of complaints came from just two households. These complaints arose despite the blasts that were the subject of complaints, having been undertaken within approval limits.

Under the NSW Industrial Noise Policy (EPA 2000), a development is considered to cause a noise impact if the predicted noise level at the receiver exceeds the project specific noise levels (PSNL) for the Project.

PSNL do not apply to blasts. Blasts are subject to specific ground vibration and overpressure criteria which are considered in Section 5.4 of the EIS.

The assessment of impacts for the Project, as contained in the EIS, has been based on the comparison of predicted impacts against noise (and blasting) criteria.

The Project will be managed to ensure that the Project meets the PSNL at all residences except those properties identified in the NIA as likely to experience levels above the PSNL. Existing monitoring of the Mount Owen Mine has demonstrated that proactive noise management principles are effective at achieving compliance with noise limits.

The noise modelling in the EIS identifies 3 private residences that will experience exceedances of noise criteria of greater than 5 dB(A) placing them in the zone of acquisition . There are a further 8 private residences that will experience exceedances of 2-5 db(A) above the PSNL, placing them in the noise management zone.

The NSW Industrial Noise Policy details the response and mitigation measures required when noise trigger levels are met or exceeded. Effective community consultation is required throughout the Project to facilitate public involvement and to allow for the community to participate in the mitigation selection process.

As outlined above, Section 5 of the NIA contains a consideration of reasonable and feasible noise management practices that can be and will be implemented as part of the Project. These have been developed throughout the environment assessment process in consultation with the community, via the Mount Owen Community Consultative Committee, Community Open Days and face to face meetings with local landholders.

As detailed in the Social Impacts and Opportunities Assessment contained in Appendix 5 and Section 5.17 of the of the EIS, ongoing consultation will be undertaken throughout the life of the Project providing the community with an ongoing opportunity for involvement in operations at the Mount Owen Complex, including an opportunity for ongoing input into the further development of mitigation measures.

Contemporary consents also include a dispute resolution process regarding the implementation of management and mitigation measures at properties with acquisition or management rights in the event that agreement with the mine operators is not able to be reached.

4.2.1.3 Singleton Council

A number of operational noise mitigation measures are proposed and Council requests the imposition of appropriate consent conditions confirming the proponent's ongoing commitment to this program.

Health impacts associated with noise should be specifically addressed by the Department's assessment.

Section 5 of the NIA contains a consideration of reasonable and feasible noise management practices that can be and will be implemented as part of the Project. It is considered that the design of the Project, and plant that will be used in the Project, incorporates all reasonable and feasible noise management measures. Existing monitoring of the Mount Owen Operations has demonstrated that proactive noise management practices that are currently implemented are effective at achieving compliance with noise limits.

Mount Owen is committed to achieving the noise impact assessment results detailed within the EIS and the implementation of the mitigation measures that enable these to be achieved. The Mount Owen Noise Monitoring Program will be revised and a Noise Management Plan developed that will detail the noise mitigation and management measures to be applied throughout the life of the Project.

4.2.2 Interest Group Submissions

The Hunter Community Network was the only interest group which raised specific issues related to noise impacts.

The issues, with the relevant responses have been summarised below.

HCN recommend that an independent review be conducted on the modelling produced to predict the noise impacts. HCN objects to the Project on the grounds that the Noise Impact Assessment (Appendix 7) is based on poor model inputs and has not been adequately peer reviewed.

The peer review of the noise impact assessment conducted by SLR Consulting (Appendix K) has not reviewed the adequacy of the model inputs nor has it analysed the resulting predictions or conclusions on noise impact associated with the project. HCN considers this to be a critical requirement for reviewing the adequacy of predicted noise impacts.

HCN recommends that an independent review be conducted on the modelling produced to predict the noise impacts of this project.

An independent peer review of the NIA was undertaken by SLR Consulting throughout the preparation of the NIA, with a final review completed and documented on 17 October 2014 (refer to Appendix K of the NIA). This review considered the adequacy of the NIA to address the DGRs.

The peer review of the NIA considered the adequacy of the model inputs including the analysis of the meteorological data, the nominated sound power levels and the proposed noise management measures. The peer review also included an analysis of the resulting predictions and the use of the probabilistic determination of the noise impacts and the conclusions drawn on noise impacts associated with the Project.

The Peer Review concluded:

> *I can conclude that the NIA report has been prepared in accordance with the DGRs which includes the Industrial Noise Policy (EPA, 2000). Where new or updated relevant policies exist, relative to those specified in the DGRs, the most current documents applicable have been used for the purpose of this NIA*

The EIS identifies that 21 properties will be impacted by increased noise from the project. This is an unacceptable cumulative increase of noise intrusion and loss of amenity in the region to the north and north-west of Singleton. However, HCN considers that the impacts will be greater than predicted.

Cumulative noise impacts are assessed in Section 7.0 of the NIA and are also considered against the Voluntary Land Acquisition and Mitigation Policy in **Section 3.2** of this Report. The criteria that the Project is assessed against are set by the NSW Government.

The noise model used for the Project has been developed and refined over a number of years based on noise monitoring data. Assessments of the noise emissions from Mount Owen's current operations in comparison with the noise predictions from the NIA conducted in 2003 for the Mount Owen Operations Project demonstrates that the model is well calibrated and reasonably accurate at predicting likely noise levels as a result of operations at Mount Owen.

The model developed for predicting noise impacts uses the same data period and source as the air quality model, September 2011 to August 2012 from Sentinex 8 and 13 met stations. HCN considers this is an inadequate dataset to be predicting noise impacts for a 21 year project.

The peer review of the NIA conducted by SLR Consulting considered the adequacy of the model inputs including the analysis of the meteorological data, and concluded that the assessment was prepared in general accordance with the DGRs and INP (refer to Appendix K of the NIA).

The predicted noise levels have not had the low frequency modifying factors applied.

HCN does not support the approach taken in the EIS for assessing predicted noise levels in relation to low frequency noise (LNF) impacts. When the INP criteria are applied, the assessment indicates that at least 30 properties will be impacted by LNF that exceeds the 15 dB difference between C-weighted and A-weighted noise levels. The low frequency modifying factor required by the EPA is identified in Tables 1 to Tables 3.10 These demonstrate that the properties listed will be impacted by noise levels greater than the project specific noise levels (PSNL). There is some confusion between Table 2 and Table 3, both being an assessment of Year 5 Night Time predicted INP Low Frequency Modifying Factors. However, the low frequency modifying factors have not been applied to the predicted noise levels because the proponent has used the Broner 2011 and DP&I 2013 recommended night time threshold of 60 dB (C) for low frequency assessment. HCN does not support this approach because it is counter to the current INP. Also, the 60 dB (C) level of LNF has not been considered or monitored in terms of long term health effects on receivers. HCN is concerned that the health impacts of LNF are not assessed and that the noise assessment has not applied the low frequency modifying factor as required by the INP.

The application of the INP criteria for the low frequency modifying factor indicates that 30 properties will experience an increase in noise levels of 5dBA above the predicted noise level from the project. This is a far greater impact than expressed in the EIS.

This issue is discussed above in relation to the submission from the EPA (refer to **Section 4.2.1**).

It is also noted that the peer review of the NIA conducted by SLR Consulting concluded that the NIA was prepared in general accordance with the INP.

The discussion of measuring and predicting cumulative noise impact identifies that 'Cumulative noise impact assessment based on published noise emission limits or predicted noise impacts extrapolated from modelling and monitoring results do not account for actual operational variability or the staged modelling of the operational scenarios considered by the proponent, meteorological conditions and inconsistencies in the data format or differences in monitoring locations. The EIS identifies that a large-scale regional noise model would be the preferred method for assessing cumulative noise impact. However, the complexity of the varied ownership of industrial/mining activities in the region is considered to make this option impractical.

HCN recommend that a large scale regional noise model be developed to assess cumulative noise impact.

As discussed in Section 7.2 of the NIA, the preparation of a large scale regional noise model is not feasible due to the level of uncertainty in modelling noise impacts from sources outside the control of the Mount Owen (e.g., other mining and industrial projects) and is considered to be beyond the scope of the DGRs for the Project or the requirements of the NSW INP. The approach taken to predicting cumulative noise impacts is outlined in Section 7.2.1 and Appendix I of the NIA.

As noted above, an independent peer review of the NIA was undertaken by SLR Consulting throughout the preparation of the NIA, with a final review completed and documented on 17 October 2014 (refer to Appendix K of the NIA). This review included consideration of the approach taken to the assessment of cumulative impacts. The peer review concluded that the NIA had been prepared in accordance with the DGRs (which include the INP).

The Project does not result in a cumulative amenity noise level greater than the acceptable noise levels, as determined in accordance with Table 2.1 of the INP, for residences that are private dwellings (refer to Appendix I of the NIA). The Project therefore satisfies the non-discretionary development standard for cumulative noise level prescribed in clause 12AB of Mining SEPP. The assessment of the Project's noise impacts against the Voluntary Land Acquisition and Mitigation Policy is discussed in **Section 3.2** of this Report.

As noted in Section 7.2.4 of the NIA, Mount Owen proposes to implement and maintain a continuous noise monitoring program that is capable of discerning the contribution the Project makes to the cumulative noise level. Noise levels that are recorded above the cumulative noise impact assessment criteria by the continuous noise monitoring system(s) will be investigated on a case-by-case basis. When required, attended noise monitoring will be undertaken to confirm the noise source(s) contributing to the cumulative noise levels. This approach to noise performance management of the cumulative noise impacts has been successfully implemented at the Mount Owen Complex since 2004.

The predicted noise levels are due only to the Project and do not take into account the total noise at the site as required by the INP. There is no consideration of cumulative LNF impacts from other neighbouring mines. The noise predictions are based purely on PSNL. This is an unsatisfactory assessment of the noise impacts on surrounding properties.

The NIA does assess the total noise from the Mount Owen and Ravensworth East mines, that is, the continued operations, and includes mobile and fixed noise sources.

The assessment of cumulative low frequency noise from the Project and surrounding mines is beyond scope of the DGRs and is not required by INP.

The conclusion that predicted noise levels exceeding the PSNL will not cause increased sleep disturbance or exceed amenity criteria is not supported.

The NIA and EIS have assessed sleep disturbance and the impact on amenity in accordance with the INP.

The conclusion that only 3 private properties will have impacts above 5dBA and therefore be identified for voluntary acquisition rights in an affectation zone is not supported.

The conclusion that only 8 properties will be impacted by noise increases between 2dBA and 5 dBA and therefore be identified for mitigation rights is not supported.

The conclusion that only 10 properties will be impacted by up to and including 2 dBA and therefore be within an identified management zone is not supported.

As noted above, the Project has been assessed using rigorous, peer reviewed monitoring and modelling analysis and assessment in accordance with the INP. The noise model used for the Project has been developed and refined over a number of years based on noise monitoring data. Assessments of the noise emissions from the current operations in comparison with the noise predictions from the NIA conducted in 2003 for the Mount Owen Operations Project demonstrates that the model is accurate at predicting likely noise levels for operations at the Mount Owen and Ravensworth East Mines.

The assessment of the Project's noise impacts against the Voluntary Land Acquisition and Mitigation Policy is discussed in **Section 3.2** of this Report.

The discussion of model inputs for temperature inversions and drainage flow in Appendix 7 appears to be misleading.

Appendix F discusses the two approaches for the assessment of meteorological effects, one is to use the default conditions outlined in the INP, the other is to use local data. The assessment claims to use the latter approach. However, while various tables record collated meteorological data for the September 2011 to August 2012 period, the conclusion has been to adopt the moderate F Class Stability Conditions for the model when there have been higher impact G Class Stability Conditions recorded. The assessment appears to adopt the INP default position while ignoring the greater level temperature inversions recorded on the site. This approach has ignored the possible sleep disturbance factor caused by the Class G temperature inversion strength.

As detailed in Section 5.6 of the NIA, the modelling approach taken with respect to meteorology was to analyse representative meteorological data for the region surrounding the Project Area and determine the percentage of occurrence of inversions and/or wind effects. The noise impacts were then modelled for 172 meteorological conditions considered representative of the local meteorological conditions. This included ten wind speed intervals, wind direction based on eight compass intervals and temperature gradients representative of A to D class stability conditions, and E class, F class and G class stability conditions.

This approach takes account of the influence of local meteorological conditions on the propagation of the noise from the Project to the entire region surrounding the Project Area.

4.2.3 Community Submissions

Noise impact issues were raised in 11 individual community submissions. The issues raised in relation to noise, with the relevant responses, have been summarised below.

At present we can easily hear the Mount Owen and Glendell mines working of a night. As mining progresses we are concerned about the noise of machinery and blasting.

It is important to note that the relevant criteria in relation to noise does not relate to whether noise generated by a project is audible; rather it relates to the potential impact of the predicted noise levels compared to criteria contained in the INP and Voluntary Land Acquisition and Mitigation Policy.

The NSW INP has been developed to ensure the impacts of industrial developments do not unreasonably impact on the community. The noise impact assessment for the Project was consistent with the NSW INP and identifies the potential noise impacts that the Project will have on the surrounding community. The potential noise impacts of the Project at individual residences and properties are detailed in the NIA and Section 5.3 of the EIS. The blast and vibration assessment is contained within Appendix 8 of the EIS and Section 5.4 of the EIS.

We object to the noise that will be produced by the Project in all its entirety be it on an individual or cumulative basis. Noise from the rail holding, extra trains signalling at the crossing, shunting as they start to move, along with the noise of construction of infrastructure for the rail loop, will be possible to be heard from our place. The noise of shovels, diggers, dump trucks, service vehicles especially at night will cause a large disturbance to our present peaceful sounds of the running creek and cattle.

As noted above, the relevant criteria in relation to noise does not relate to whether noise generated by a project is audible; rather it relates to the potential impact of the predicted noise levels compared to relevant NSW Government criteria identified in the INP and Voluntary Land Acquisition and Mitigation Policy.

As discussed in Section 2.3 of the EIS, anticipated train movements will not increase from that currently approved as a result of the Project. Additionally the construction of the proposed additional rail line and northern turnout will allow Glencore Rail trains the ability to turn around within the Mount Owen Complex Rail Line and return to Glencore owned mines to the west to help avoid unnecessary additional rail movement.

Mount Owen is committed to achieving the noise impact assessment results detailed within the EIS and the implementation of the mitigation measures that enable these to be achieved. The Mount Owen Noise Monitoring Program will be revised and a Noise Management Plan developed that will detail the noise mitigation and management measures to be applied throughout the life of the Project.

Existing monitoring of the Mount Owen Operations has demonstrated that proactive noise management practices that are currently implemented are effective at minimising noise and managing noise to meet noise limits.

The noise management and compliance is out of date, it is not acceptable to have one day a month for compliance of consent introduced by the DP&E or the alternative which is a disgrace is the one day every three months by the EPA by attended monitoring. If they cannot be compliant 365 days a year, under attended monitoring they should not be working, the management monitors data must be available on request to the public and placed in all reports, the department must have full access to the monitor for compliance, these management monitors must be the attended monitors, and calibration and noise parameters, span size must be in control of the

attended monitoring companies, and verification and certification, performance reports be available to the department weekly and available to the public in monthly reports. The fact is the exceedance on the Glendell attended monitoring, in which the management monitor was compliant December 2014.

The Mount Owen Complex operates a state-of-the-art continuous noise monitoring system. This system is designed, and used, to continuously measure the noise levels in the region surrounding Mount Owen mine. This system enables the mine to actively manage its operations to reduce the noise impacts from Mount Owen. At Mount Owen, the role of the attended monitoring is not to just independently assess the performance of the mine but to also assess the effectiveness of the noise management strategies and the responsiveness of the mine to the alarms from the continuous noise monitoring system. This continuous noise monitoring system operates 365 days per year and undergoes continuous improvement in accordance with EPL and development consent requirements.

The results from noise monitoring undertaken at Mount Owen are made available to the public in accordance with development consent and other approval requirements. Mount Owen will continue to make results available to the public as required.

There is a need for greater consulting by Mount Owen to work with impacted residents to understand just what the potential effect will be in real terms; not just on paper. We find ourselves within the Noise Management Zone ('exceedance of greater than 2 dBL and up to and including 5 dBL above the relevant PSNL', EIS, page 130), and whilst we understand there are reasonable and feasible noise mitigation measures available to us, we have no real concept of what that noise increase means to us and our day to day quality of life. How does 36 decibels compare to 40 decibels? How do both of these compare to the current noise we experience from Mount Owen? Will we have the same quality of outdoor living and the ability to still leave doors and windows open to sleep?

We request that Mount Owen clearly demonstrate the difference in current decibels levels and what levels can be expected to the residences in the Noise Management Zone. Furthermore, we ask that Mount Owen clarify with impacted residences the mitigation options available and the success these mitigation options have in managing the increased noise to ensure an equivalent quality of life.

Mount Owen consulted with these property owners on a number of occasions, both in a one-on-one context as well as through attendance at open days and other forums. Further consultation between Mount Owen and the broader community will continue throughout the life of the Project.

As discussed in **Section 3.2**, the Voluntary Land Acquisition and Mitigation Policy identifies criteria to be considered by the consent authority when setting conditions regarding noise management and acquisition rights and these are based on the above impacts on audibility and intrusiveness. In summary, properties predicted to experience noise levels of less than 3 dB above PSNL do not have rights to noise management measures at their property, reflecting the fact that such an increase is not readily identifiable. Properties where noise levels are predicted to increase by 3 dB or more and/or where the development would increase the total industrial noise level at a private residence by more than 1 dB and noise levels at the residence are already above the recommended amenity contained in Table 2.1 of the INP will have the right to request certain management measures at their property to reduce the intrusiveness of Project noise. The properties identified by the NIA as meeting these criteria are identified in **Section 3.2.1.2**.

Should it be required, the specific mitigation measures to be applied at the receiver location, i.e. at private properties (where the exceedance is greater than 3dB over the PSNL), will be determined in consultation with the relevant property owner within the Noise Management Zone and in accordance with the relevant development consent conditions.

Examples of successful mitigation measures include (but are not limited to):

- installation of mechanical ventilation/comfort condition systems to enable windows to be closed with compromising internal air quality;
- upgrade windows and doors (seals, double glazing); and
- installation of roof insulation.

There are occasions when we experience what we've been led to believe is low frequency noise. This noise is noticed during the night, and it almost seems more like a vibration than just a noise. A 'pillow over the head' or any other attempt does not stop the noise and it can make sleeping immensely challenging. Table 4.5 of Appendix 7 of the EIS records N16, one of the closest monitoring points to our residence as having 'Local rural noise sources; low-frequency mining noise continuing from the approved North Pit and the SSE' (page 4.10).

However, the elements of 'sleep disturbance' discussed in the EIS refer to 'typically transient noises' that 'often have tonal characteristics', including 'an excavator bucket striking the ground; heavy objects (rocks) being dropped into a truck tray; air horns used to control truck movement; reversing beepers; and track clatter from bulldozers (EIS, page 131).

There does not appear to be any acknowledgment of the impact of this low frequency noise on sleeping disturbance and furthermore, Appendix J in Appendix 7 of the EIS states that 'Given the relatively low levels of low frequency noise predicted, low frequency modifying factors have not been applied to the predicted noise levels for the Project' (page 3).

Mount Owen outline the incidence of low frequency noise required before they need to apply modifying factors to the modelling and whether this incidence will be reviewed once expansion commences. Also they need to clarify how they plan to distinguish between approved and expansion noise sources and whether they concede that low frequency noise can also feature in sleep disturbance.

International standards note that a specific tonal noise (reported as a 1/3 octave) is generally audible at 10 dB(A). When tonal noises become a feature of a development the INP requires penalties or modifying factors to be applied to the noise predictions. A similar process is used to assess sleep disturbing impact or transient noises. In the NIA, both the low frequency noise and sleep disturbing impact noises have been assessed separately, and in accordance with the specific requirements of the INP.

With respect to the impact of low frequency noise on sleep disturbance, the NIA also uses a method to assess the impact of low frequencies noise (measured as dB(C)) on the night time noise levels. **Section 4.2.1** includes further discussion on the assessment of low frequency noise impacts.

The Mount Owen Complex continuous noise monitoring system is designed to monitor the low frequency component of the noise as a part of the ongoing noise management process.

Should the Project be approved, an updated development consent will be issued for the Project. This development consent will include conditions relating to the management of impacts associated with the currently approved Mount Owen operations and the Project. Mount Owen will also develop and implement a Noise Management Plan (NMP) to (update the current Noise Monitoring Program for both Mount Owen and Ravensworth East Mines). The NMP will detail the continued management controls to be utilised to manage potential noise impacts associated with operations.

It is challenging for impacted residences to have an in-depth and accurate understanding of the actual noise conditions experienced on their properties and how those conditions compare with 1) the expected values that were modelled in the EIS and 2) maximum values allowed under the consent of the mining licence. Given the Project is for an expansion rather than the entire Mount Owen Complex, there needs to be a clear, valid and transparent method of distinguishing between existing operations and those involved in the expansion. This will ensure that a residence experiencing an increase dust or noise emissions is not sidelined by using the excuse of the noise/dust arising from the original Mount Owen operations, as opposed to the expansion.

We request further information on the monitoring locations and timing for noise as well as Mount Owen's planned methodology for distinguishing expansion related impacts from existing mine operations.

The NSW Government has released the Voluntary Land Acquisition and Mitigation Policy to apply appropriate noise criteria consistently to mining projects, and to afford the same rights to residents across the State for the installation of noise management measures and for voluntary acquisition rights where noise criteria are exceeded by projects.

As discussed in **Section 4.1.3**, Mount Owen are seeking approval for the continuation of mining operations at the Mount Owen and Ravensworth East Mines. The NIA presented in the EIS includes the entirety of the ongoing Mount Owen and Ravensworth East Mines' operations (excluding the Glendell mine), including the proposed additional disturbance areas. The Project does not involve any increase of production rates from that currently approved.

Should the Project be approved, it will likely be a requirement of the new development consent that under the Noise Management Plan Mount Owen conduct periodic assessments and reporting of the monitored noise levels against the predicted levels documented in the EIS. Mount Owen will also be required to regularly assess noise monitoring results against the criteria contained within the development consent. Any exceedances of the criteria will be reported to the relevant government authorities. Mount Owen will continue to undertake continuous monitoring of noise to enable it to respond to elevated noise levels and maintain compliance with criteria. Mount Owen also provides public access to attended monitoring data through its website, through quarterly reports to the CCC and annual environmental reporting processes.

The noise monitoring locations are illustrated in Figure 5.7 of the EIS.

Figures 6.1 to 6.3 and Table 6.1 of the NIA contained in Appendix 7 of the EIS details the predicted noise levels and the timing of these as they relate to the progressive development of the Project.

Should the Project be approved, a development consent will be issued for the Project which will include conditions relating to the management of impacts associated with the currently approved Mount Owen and Ravensworth East operations and the Project

We object to any impact that noise may have on our livestock and crops. We do not want to see a decline in our agricultural ventures from the impact of mining.

In accordance with the Voluntary Land Acquisition and Mitigation Policy Criteria (DP&E, 2014), the NIA considers the impact on all properties where predicted noise levels that exceed the criteria cover a land area of greater than 25 percent of the land holding. This included land with existing dwellings, farming land and vacant land where there is potential for a dwelling based on relevant planning controls.

Potential impacts on surrounding agriculture is assessed and documented in the Appendix 12 of the EIS and Section 5.8.4 of the EIS. It concluded that the Project will have negligible impacts on agricultural resources in the area surrounding the Project. Other potential impacts on livestock associated with the Project are discussed in **Section 4.3.3** of this report.

4.3 Blasting

4.3.1 Agency Submissions

4.3.1.1 DRE

The Integra mine is currently on care & maintenance, but it is possible that in the future open cut mining and longwall mining will be undertaken simultaneously in the same area. The Division notes the proponent's commitment to maintain consultation with the Integra Underground Management throughout the approvals and operational phase of the project.

Based on the information provided, the Division considers there will be no significant impact from Mount Owen blasting above Integra Underground, but a procedure should be established and implemented to communicate when Mount Owen blasting is scheduled so that Integra workers, supervisors and managers are able to observe any actual impacts such as noise transmission and possibly vibration sufficient to displace dust or small loose roof material or coal from the pillars and working faces. While these examples are identified they are not expected, given the thickness of interburden between the deepest level of the Mount Owen pit and the Integra workings.

The Division recommends that the following conditions be incorporated into the Development consent, if granted:

- ***The proponent must prepare and implement a Blast Management Protocol detailing the procedure between the Mount Owen Open Cut Operations and the Integra Underground mine, which should be incorporated into the Blast Management Plan and submitted to the Division prior to the commencement of mining in the 'relevant area'.***

Section 5.3 of the Blast Impact Assessment specifically addresses the Project's potential interactions with Integra Underground Mine. Mount Owen and Integra Underground management have successfully managed blasting activities in the past when Mount Owen undertook mining within the Eastern Rail Pit in 2005 and 2006 where there was interaction with the Integra Mine operations.

Prior to Integra entering a period of care and maintenance Mount Owen had commenced consultation regarding the preparation of a Blast Management Protocol and the implications of blasting activities associated with the proposed Project.

Based on the anticipated production schedules for the Project and Integra Underground Mine, it is unlikely that direct interaction of operational activities will occur, however with Integra Underground currently on care and maintenance the timing associated with longwall mining in the Integra Underground is likely to be altered should mining recommence.

As discussed in the EIS should mining operations within the North Pit Continuation and RERR Mining Area, and the Integra Underground Mine overlap, a Blast Management Protocol will be developed in consultation with Integra Underground Mine prior to any blasting within 500 metres of the currently approved, and developed underground workings.

The 'relevant area' referred to in the above condition recommended by DRE should be clarified, by DRE, to reflect this commitment.

The objective of the Blast Management Protocol will be to manage any potential impacts on Integra's underground operations associated with blasting activities within the North Pit Continuation. It is noted that there are a number of locations in the Hunter Valley, including existing Glencore mines where blasting at open cut operations has been successfully conducted in close proximity to active underground mining operations. The experiences from these operations will be incorporated into the management measures included in the Blast Management Protocol.

Although the Integra Operations are currently in a period of care and maintenance, Mount Owen will continue to liaise with Integra Underground Mine to establish the Blast Management Protocol.

The Division considers that there is potential for subsidence to affect the stability of open cut high-walls creating additional risks to safety in the open cut. This may result in business risks to either of the mining operations should there be insufficient time to implement adequate management measures to safely undermine the open-cut.

There is no indication in the EIS that the issue of subsidence impacts due to the Integra longwalls on the open-cut have been considered by either mining operation. It is important that both mining operations commence work early to manage their interactions to avoid unnecessary conflict that may arise during the active phases of the relevant mining due to lack of preparation. This should begin as soon as possible with a Joint Risk Assessment. Such interactions between open-cut and underground mining operations have been successfully managed in the past (e.g. Wambo and United).

It is also noted that the mining method at Mount Owen involves the use of buttresses of material in the pit to control wall stability and this will need to consider the impact of subsidence.

The Division recommends that the following conditions be incorporated into the Development consent, if granted:

- ***The proponent must prepare a Joint Risk Assessment detailing the procedures set out between the Mount Owen Open Cut Operations and the Integra Underground mine to address the effects, and potential safety implications, of subsidence on the stability of open cut high-walls. The Joint Risk Assessment must be submitted to the Division prior to the commencement of mining in the 'relevant area'.***

Mount Owen has undertaken a Geotechnical Stability Assessment for the North Pit Continuation. Although buttressing methods have been used at Mount Owen, the geotechnical assessment undertaken for the Project does not indicate that this will be required for the North Pit Continuation to manage subsidence related issues. However,

buttressing will continue to be included as a control method in the Slope Stability Plan, and used (if appropriate) should movement or other risks be detected.

The Geotechnical Hazard Management Plan outlines the protocol to follow when reviewing geotechnical risks as mining progresses. A risk assessment would be instigated should any geotechnical risks be identified through this process.

Mount Owen agree that the requirement for a joint risk assessment would be appropriate however the 'relevant area' referred to in this condition should be appropriate to the management of the risks associated with subsidence.

4.3.1.2 Singleton Council

Best practice blast management should continue to be implemented and be incorporated into any consent conditions. An online blast schedule should be provided and updated regularly.

As required by the existing consent, Mount Owen operate a blasting hotline (1800 248 745) providing the public with up to date information relating to the blasting schedule for the Mount Owen Complex. In addition, Mount Owen currently notifies the landowner / occupier of all residences (who register to be notified) within a three kilometre radius of the approved mining limit of the blasting schedule. These measures are documented in the existing Blast Management Plan (BMP) and will be captured in the revised BMP.

Mount Owen currently maintains a blasting schedule on the Mount Owen Complex website (http://www.mtowencomplex.com.au/EN/Community/Pages/BlastingInformationLine.aspx), with the blasting schedule updated on a weekly basis.

If the Project is approved, Mount Owen will endeavour to contact all residents located in a three kilometre radius of the approved mining limit within six months after granting of the development consent for the Project to advise them of the various methods of blast notification available to them.

4.3.2 Interest Group Submissions

4.3.2.1 Hunter Communities Network

The EIS blast assessment in Appendix 8 identifies that blasting impacts on the Integra longwall operations will require personnel to be withdrawn through impacts from the North Pit Continuation and the RERR Mining Areas. The economic impact of these stoppages and the regularity of them have not been discussed or assessed.

As previously noted, Integra announced in mid-2014 that both its underground and open cut operations were entering a period of care and maintenance, impacting upon the extraction schedule for Integra Underground Mine. Mount Owen has commenced and will maintain consultation with Integra Underground management throughout the approvals and operational phases regarding the management of the interaction between the operations.

Given the uncertainty regarding the potential duration of the care and maintenance period and the likelihood of an altered timing associated with longwall mining, the potential interaction of open cut mining in the North Pit Continuation area and underground mining is difficult to accurately quantify economically.

It is proposed to manage any interaction through the development and implementation of a Blast Management Protocol. As noted above, a similar protocol was developed and worked successfully during the mining of the Eastern Rail Pit in 2005 and 2006 at Mount Owen Mine. Similar protocols have been developed at other mining operations in the Hunter Valley with minimal impacts on production schedules from impacted operations.

Current conditions of consent provide for up to 2 blasts per day. There is no discussion of the number of blasts approved per day in adjacent mining operations.

The assessment identifies that there are limitations in the air vibration model because of the exclusion of stemming column height, topographical features, blast confinement and weather conditions are not included in the model.

HCN considers that the cumulative impact of blasting on the region is not adequately assessed or considered in the planning process for new and extended open cut mining operations in the Hunter region.

Modelling undertaken for the assessment utilises the site model that has been calibrated from past monitoring of blasts at the site over several years. Accordingly, model predictions are considered to reflect the likely overpressure impacts from blasting. In practice operational controls, such as appropriate pre-blast weather checking procedures contained in the Blast Management Plan, can minimise effects of adverse weather by restricting blasting in adverse conditions.

A range of control measures for the management of airblast overpressure impacts are proposed for the Project in Section 6 of the EIS.

As detailed in Section 3.1 of the Blast Management Plan (available on the Mount Owen Complex website), a communication protocol has been developed between surrounding mines to minimise the risks of firing simultaneously. To date, there are no known instances where the overpressure impacts from blasts at different operations have coincided at a particular location, and the likelihood of this occurring in practice is remote given the low number of blasts at each operation in any given day, the short duration of blast related impacts and the existing communication protocol.

4.3.3 Community Submissions

Blasting issues were raised in 3 community submissions. Responses to the issues raised are provided below.

As mining progresses we are concerned about the noise of blasting.

The modelling of the airblast overpressure and peak noise levels for the Project in the Blast Impact Assessment are based on site specific blasting laws. These site specific laws are calculated on actual blasting events at Mount Owen and the recorded noise airblast overpressures and peak noise levels. The monitoring and modelling results are incorporated into the blast design practices at Mount Owen to continually adapt blasting practices such that the impacts are managed within the blast limits.

The detailed modelling of the Project included in the Blast Impact Assessment indicates the airblast overpressure and peak noise levels will not exceed the relevant criteria at any private dwelling or sensitive receiver. The Project's predicted airblast overpressure and ground vibration impacts at private dwellings and sensitive receivers will not exceed the non-discretionary development standards specified in clauses 12AB(4) and (5(5) of the Mining SEPP.

As there is a lot of rock in the area we are also worried about the blasting affecting the structure of our house. What help could you give to combat this problem?

We object to blasting and any other ground or air vibration. Geographically our home that is on stilts is positioned at the end of a ridge line where large rock forms have erupted. The likely hood that we are sitting on rock is very high. House movement, cracking, sagging trusses or the potential for rock movement from blasting is of high concern to us. We have irrigation lines, silos, machinery sheds, tanks and power lines that could all be affected from ground movement. Vibration of the ground from dump trucks, diggers and other heavy vehicles can also cause issues.

The Blast Impact Assessment included an assessment of the potential blast impacts on surrounding private residences located within a 5 kilometre radius of the North Pit Continuation, BNP and RERR mining areas.

The ground vibration and air blast predictive model used for the Blast Impact Assessment for the Project is based on actual vibration and air blast monitoring data collected from the blast monitoring stations at the Mount Owen Complex.

The assessment confirms that blasting activities can be managed effectively to achieve no exceedance of the relevant blast criteria which is developed around minimising structural impacts on buildings. Management will include detailed blast design and monitoring to meet the relevant blast criteria which will not be exceeded at any private residences or other blast sensitive locations without the written consent of the impacted residents or owners or managers of sensitive locations.

Mount Owen will notify all landowners within three kilometres of the approved mining limit that they are entitled to a structural property inspection (to be carried out by a suitably qualified, experienced and independent person) within six months of any Project approval granted.

We object to any impact that blasting may have on our livestock and crops. We do not want to see a decline in our agricultural ventures from the impact of mining.

As noted in Section 5.4.6.5 of the EIS, previous investigations of potential blasting impacts on stock have been completed within the area surrounding the Project. Investigations undertaken by Neil Nelson Advice Pty Limited (Agriculture Consultancy Service) in 2011 included observations made at a Colinta Holdings feedlot, located on Falbrook Road approximately 2 kilometres south of the Project Area.

Observations were made during four separate blasts with no disturbance of the livestock observed within the feedlot or within the paddocks adjoining the feedlot during blasting activities. The report notes that, while blasting can result in immediate noise disruption, so does that of passing traffic and general farming equipment. Given the history of mining activities within the Project Area and surrounding mining operations, blast noise associated with the Project will not be an additional noise source to the area and the majority of livestock and other animals are likely to be accustomed to blast noise.

Mount Owen is aware of at least one landowner located within three kilometres of the approved mining limit that hand feed cattle in a feedlot environment. Based on the observations at the Colinta Holdings Feedlot, no impacts on this feedlot operation are expected, however, Mount Owen will continue to consult with this landholder regarding this issue.

No impacts from blasting on crops are expected. The private landholdings located within 500 metres of the North Pit Continuation are unlikely to be cropped other than for forage purposes. Blasting impacts, including impacts from flyrock, are unlikely to have any discernible impact on forage crops.

4.4 Agricultural Resources

4.4.1 Agency Submissions

4.4.1.1 Office of Agricultural Sustainability and Food Security

Impact on the Presence of Biophysical Strategic Agricultural Land - There is an existing single lane bridge on Hebden Road across Bowman's Creek which is proposed to be upgraded to a dual lane bridge. Hebden Road intersects BSAL at Bowman's Creek so there will be some disturbance of BSAL as a result of the upgrade. This bridge upgrade is not expected to impact on the agricultural productivity of the BSAL since this disturbance is on an existing road and this small area of BSAL is currently not used for agriculture and is not likely to be used for agriculture in the future. There are no agricultural production issues raised in relation to this issue.

The overall conclusions of the Office of Agricultural Sustainability and Food Security (OASFS) support the finding in the EIS regarding the proposed bridge upgrade works having no impact on agricultural productivity.

Soil use for rehabilitation - The availability of soil material for rehabilitation from the three soil types identified in the proposed disturbance area indicates that there is enough material to support land restoration activities. The need to consider amelioration of the restoration area soils is also useful for ensuring a suitable environment for plant establishment and growth is also considered to be useful.

The comments of the OASFS are noted and support the conclusions in the EIS and proposed approach to the rehabilitation of disturbed areas.

Areas to be removed from agriculture include 23.3ha of the proposed disturbance area and 767ha of land (including 681ha of Class 5 to 7 grazing land and 149ha of native vegetation) as a biodiversity conservation offset. The Proponent has estimated the value of lost production from the 23.3ha of the proposed disturbance area to be $4,700/year using the NSW DPI gross margin budget "Yearling (Southern/Central NSW)" Dec 2012. This is a suitable valuation method.

The Proponent has not estimated the value of lost production from the grazing land to be removed from agriculture from the biodiversity conservation offset area. However, the value of production from the 681ha of grazing land to be removed from agriculture from the offset area can be estimated. Estimation by members of the Economic Research Unit within the Department has been undertaken as follows. The Land Classes of the offset area are 5 to 7 which are moderate to low productivity. Using the 2012 NSW DPI gross margin budget for "Inland weaners - stores" as the basis for estimation and assuming 2013-14 saleyard numbers are representative, it seems as though the reduction in livestock numbers would be relatively small, with the total estimated loss in livestock output approximately 0.13% of the total annual saleyard throughput for Scone and Singleton combined . Estimates are presented in Table 1. Available information supports the claims of the Proponent that changes in land

tenure, agricultural output and flow-on impacts to agricultural support services, processing and value adding industries as a result of the project will be small.

Table 1

Offset Area	*Ha*	*Using 2012 NSW DPI weaner budget (100 cows to 372ha)*	*Local Saleyard*	*Annual Throughput 2013-2014*	*Annual throughput with MOCO development*
Esparanga	*153.8*	*34 head/yr*	*Scone*	*60,693*	*60,659*
Cross & Stringybark Creek	*464.5*	*104 head/yr*	*Singleton*	*45,258*	*45,154*

Processing and value adding industries - The estimates in Table 1 indicate that the reduction in annual local sale yard throughput is approximately 0.13%, which is well below the level suggested as a significant threshold (5%, NSW DPI Agricultural Impact Statement technical notes, April 2013).

The comment by the Office of Agricultural Sustainability and Food Security concludes that the estimated reduction in annual local beef sale yard throughput is insignificant and well below the significance threshold identified in the *Impact Statement Technical Notes: A Companion to the Agricultural Impact Statement Guideline* (DPI, 2013) which would require the inclusion of the assessment in the AIS. This conclusion aligns with the findings of the preliminary assessment undertaken for the AIS for the Project.

Agricultural lands – Three main risks to agricultural resources are referenced in Table 5.6 of the EIS, "Review of High Risks to Agriculture Identified in Preliminary Risk Assessment". A small part in the disturbance area will be removed from agriculture, as well as a larger biodiversity offset area which will have a relatively small impact on potential local agricultural output.

Mitigation measures are proposed by the Proponent which will address how long term rehabilitation will meet regional goals for long-term management targets for natural and agricultural resources.

The comments of the OASFS align with the findings in the EIS.

Agricultural enterprises - The project as proposed has low additional impact on agricultural enterprises.

The comments of the OASFS agree with the findings in the EIS.

Agricultural infrastructure - Development of the project will increase traffic and increase rail line use. The Proponent proposes to mitigate impacts via the construction of transport infrastructure, including road realignment and construction of a rail over bridge which will improve local access. This road could benefit the nearby agricultural community.

The Project will not increase traffic or increase the use of the existing rail line. The Project is not proposing to increase the operational workforce from the current levels, therefore the Project is unlikely to result in traffic related impacts during the operational phase from that currently approved. The proposed construction of a new dual lane bridge over Bowmans Creek and rail overpass over the Main Northern Rail Line on Hebden Road will improve road service levels and safety on this road.

As discussed in Section 2.3.13 of the EIS, with anticipated future increases in train movements on the Main Northern Rail Line as a result of proposed future operations west of the Project Area, the proposed Hebden Road Upgrade works will alleviate constraints to vehicle traffic using Hebden Road which will also benefit local agricultural enterprises.

The Project will not increase overall rail traffic on the Main Northern Rail Line however the proposed northern turn-out to be constructed as part of the proposed rail line will potentially reduce congestion on the Main Northern Rail Line and this will also benefit the transport of agricultural produce on the rail system.

Summary of Assessment- from review of the AIS and supporting EIS documents and other independent information, it is concluded that the Mount Owen Continued Operations Project is unlikely to have negative socio-economic impacts on agriculture in the region.

The comments of the OASFS align with the findings in the EIS.

4.4.2 Interest Group Submissions

There were no Interest Group Submissions that related to Agriculture.

4.4.3 Community Submissions

Agriculture issues were raised in one community submission. The issue, with the relevant response is provided below.

The Hunter is a very precious agricultural area and I do not understand why our government would allow it to be destroyed by more and more coal mines.

The areas directly impacted by the Project have been assessed as being of only low to moderately low fertility and are considered to be low quality grazing land.

As noted in the OASFS submission:

> '*the Project has low additional impact on Agricultural enterprises and the Hebden Road upgrade works could benefit the nearby Agricultural community, therefore it is concluded that the Mount Owen Continued Operations Project is unlikely to have negative socio-economic impacts on agriculture in the region*.'

***As more land is lost to mining and Glencore purchases new land around our area the control of wild animals and weeds needs to be addressed and maintained by them on these properties. Wild dogs have already been reported coming from Mount Owen site and baiting and other forms of eradication programs need to be implemented and continued*.**

Land management and monitoring will continue to be undertaken in accordance with a Landscape Management Plan which includes specific strategies in relation to feral animal and weed control. Mount Owen is also currently coordinating a wild dog eradication program which includes the involvement of adjacent mining operations.

4.5 Surface Water

4.5.1 Agency Submissions

4.5.1.1 EPA

The EIS states that controlled discharges may occur to the Hunter River via Swamp Creek and Bowman's Creek and that these discharges will be conducted in accordance with existing Environment Protection Licences (EPLs) and the Hunter River Salinity Trading Scheme (HRSTS).

However, the current EPLs 4460 (Mount Owen Mine) and 10860 (Ravensworth East Mine), both of which are the subject of the project, do not authorise the discharge of saline water under the HRSTS.

On 7 November 2014 EPL 4460 was varied through variation notice 15257 41 removing licence conditions relating to water discharge and monitoring requirements. This variation was made based on the licence variation application letter, dated 1 October 2014, requesting the discharge point and associated licence conditions be removed as the discharge point had not been used since its commissioning due to the Greater Ravensworth Water Sharing Scheme (GRWSS).

As the EIS and Appendix 9 'Surface Water Assessment', dated October 2014, states that any water that cannot be shared or managed through the GRWSS will be discharged through the HRSTS, it should be noted that neither the Mount Owen Mine nor Ravensworth East Mine currently have permissible HRSTS discharges.

As the EIS does not have sufficient detail on potential mine water discharges and has made no assessment of potential tributary impacts, the EPA is not able to provide specific recommended conditions of approval in relation to surface water impacts.

As stated in the EIS Mount Owen will continue to manage water resources within the Project Area in accordance with the Mount Owen Complex Water Management Plan (Mount Owen Complex WMP), the Environment Protection Licences (EPLs) and the requirements of the Hunter River Salinity Trading Scheme (HRSTS). Following the recent variation to EPL 4460 (Mount Owen), neither EPL 4460 nor EPL 10860 (Ravensworth East) authorise discharge of saline water under the HRSTS from the Mount Owen Complex.

As stated in the EIS and Appendix 9 Surface Water Assessment, Mount Owen will share water with other local Glencore operations under the Greater Ravensworth Water Sharing Scheme (GRWSS). Where the GRWSS is in surplus to requirements for all operations, discharges from the GRWSS may be required. These discharges will occur via the licensed discharge points at either Ravensworth Operations or Liddell Coal Operations which are also part of the GRWSS. There is no current intention to discharge from the Mount Owen Complex based on the operation of the GRWSS.

The EPA requests that the EIS be amended to include a Tributary Impact Assessment (TIA). The TIA should examine the likely impact of the proposed discharge volume on the hydraulics, geomorphology, ecology and downstream water users and residents of both Swamp Creek and Bowman's Creek.

Further details on the requirements for a TIA were provided in the EPA submission.

As discussed above, there is no current operational requirement for there to be a licensed discharge point at the Mount Owen Complex. Should a discharge point be required at the Mount Owen Complex, a variation to the Mount Owen EPL will be sought, and an appropriate assessment prepared at that time.

4.5.1.2 OEH

OEH has reviewed Appendix 9 (Surface Water Assessment: Mount Owen Continued Operations Project, Umwelt (Australia) Pty Limited, October 2014) and found that the site is already highly disturbed by existing mining operations that operate under current approvals. The proposed works would further exacerbate these disturbances, including re-routing of additional catchment areas of several of the creeks that traverse the site.

There are numerous considerations for impacts on groundwater and surface water flows in non-flood times, and it is assumed that these will be assessed by the Environment Protection Authority and /or NSW Office of Water, where appropriate, particularly with regard to the changes in flows indicated in the EIS.

The assessment of flooding impacts is covered by the EIS and is discussed further below in relation to specific issues raised by the OEH. Issues associated with surface water and groundwater impacts raised by the EPA and NSW Office of Water (NOW) are discussed in **Sections 4.5.1** and **4.5.3** respectively.

It is difficult to assess the extent of the off-site flood impacts as a result of (further) modifications to creek sub-catchments included in the Project.

An assessment of flood impacts was included in the EIS (refer to Sections 5.5.6.2 and 5.5.6.3) and the Surface Water Assessment (refer to Section 6.2).

As stated in Section 5.5.6.2 of the EIS, dynamic flood modelling of the waterways and catchments surrounding the Mount Owen Complex was undertaken for the current landform, current approved final landform, the Project Year 5 landform, and the proposed final landform. Flood events that were simulated included the 10 per cent, 5 per cent and 1 per cent Annual Exceedance Probability (AEP) events.

Two infrastructure waterway crossings proposed as part of the Project have the potential to impact on flooding: the proposed Bowmans Creek Bridge on Hebden Road; and the proposed rail bridge over Bettys Creek.

As stated in Section 5.5.6.3 of the EIS, during the 1 per cent AEP flood event, the approaches to the existing Bowmans Creek Bridge on Hebden Road are inundated. Modelling indicates that the proposed Bowmans Creek Bridge on Hebden Road will have negligible impact on peak depth and velocity downstream of the proposed bridge for the 1 per cent AEP event. The peak depth and velocity in Bowmans Creek upstream of the proposed Bowmans Creek Bridge is anticipated to increase slightly due to the raised road embankments for the proposed Bridge restricting floodplain flows. There are no private properties within the affected zone, with all land adjacent to Bowmans Creek in this area owned by Glencore, with the exception of one parcel owned by a government authority. Modelling indicates that peak flows for the 1 per cent AEP event, similar to the existing approaches, will overtop the proposed approaches to the Bowmans Creek Bridge across the Bowmans Creek floodplain, but the proposed bridge will not be overtopped.

Section 5.5.6.3 of the EIS also states that the proposed rail bridge across Bettys Creek will generally result in reduced peak flows, depths and velocities in Bettys Creek both upstream and downstream of the proposed rail bridge for the 1 per cent AEP event. There are modelled localised water depth and velocity increases at the proposed rail bridge. The increase in flood depths at the crossing are localised and will not affect any private properties as the land adjacent to Bettys Creek is owned by Glencore. Modelling indicates that peak flows for the 1 per cent AEP event do not overtop the proposed rail bridge. As such, it is considered that the proposed rail bridge on Bettys Creek will have negligible impact on flooding and watercourse stability.

In regard to changes to catchment areas, the Project, in general, reduces some sub-catchment areas as part of the mining and water management process, as rehabilitation progresses to the eventual final landform, the majority of these subcatchment areas are restored to natural catchments. There is therefore reduced potential for flooding impacts downstream in some catchments with the reduction in catchment areas of Swamp Creek, Bettys Creek and Main Creek compared to the approved impacts.

The assessment has identified that the catchment of Yorks Creek will be increased as a result of the Project (to approximately 116 per cent of the current approved final landform catchment area, refer to Table 6.1 of the Surface Water Assessment). The increase in catchment area in Yorks Creek is a result of drainage from rehabilitated areas of the northern Mount Owen emplacement area being directed into the Yorks Creek catchment in Year 5 of the Project; prior to mining, runoff from this area would have otherwise drained to Swamp Creek.

The assessment determined that mitigation measures are required to mitigate potential flood impacts on Yorks Creek associated with the increased area of this catchment from Year 5 (refer to Section 6.2.2.1 of the Surface Water Assessment). The proposed mitigation measures include construction of additional off-line detention capacity adjacent to the Ravensworth East Mining Infrastructure Area (MIA) and flow conveyance at Hebden Road. The assessment indicates that the changes to the catchment area of Yorks Creek will not influence flood flows and levels within Bowmans Creek and that impacts of the Project on flood flows in the Yorks Creek catchment will be limited to Yorks Creek.

As stated in Section 6.2.2.1 of the Surface Water Assessment, modelling indicates that the peak flows, depths and velocities are anticipated to increase over the life of the Project compared to modelling results for the current landform and approved final landform. However, the modelled increases in flood depths associated with the increases in peak flow rates are expected to have minimal impact as there are no private landholders located adjacent to the creek or on the floodplain of Yorks Creek. The modelling also indicates that the modelled increases in velocities will have minimal impact on watercourse stability within the channel of Yorks Creek.

An assessment of the Hebden Road crossing over Yorks Creek with the proposed flood mitigation measures (refer to Section 6.2.2.1 of the Surface Water Assessment) indicates no change in the maximum flood hazard category for the 1 per cent AEP and 10 per cent AEP events. The modelling indicates an increase in maximum flood hazard category for the 5 per cent AEP event. The change in maximum flood hazard category at the Hebden Road crossing over Yorks Creek for the 5 per cent AEP event is primarily driven by an increase in the maximum flood depth over the road. Hebden Road is currently impassable to vehicles during the 5 per cent AEP event. With the Project there will be a small period where the road is also impassable to pedestrians. It should be noted that this is a rural road and pedestrian traffic in this area is very unlikely.

Analysis of the modelling results also indicates an increase in the duration that the Hebden Road crossing over Yorks Creek would be impassable to vehicles (based on the flood hazard category analysis) during the 1 per cent AEP and 5 per cent AEP events of 50 minutes (12 per cent) and 70 minutes (38 per cent) respectively for the proposed final landform when compared to the final approved landform.

All other catchments directly impacted by the Project will be either the same or less than the currently approved final landform associated with the Mount Owen Complex (refer to Table 6.1 of the Surface Water Assessment). Accordingly, the flood impact assessment (refer to Section 6.2 of the Surface Water Assessment) indicates no increased flood impacts in these catchments are expected to arise as a result of the Project.

With regard to flood impacts, any proposed works must ensure that any adverse impacts are maintained within the boundaries of the land owned by the proponent, up to and including the Probable Maximum Flood (PMF). This includes peak water levels and velocities and impacts on roads and other evacuation routes. There must be no adverse flood impacts on properties owned by others.

As stated in Section 6.2.2 of the Surface Water Assessment, in accordance with the NSW Floodplain Development Manual (2005), the 1 per cent AEP flood event has been used in assessing impacts of development on flooding and has also been used as the design event for proposed crossings.

The Office of Environment & Heritage (OEH) identified the information it required to be assessed for the Project in a letter sent to the then Department of Planning and Infrastructure dated 4 March 2013. The assessment requirements for Flooding and Surface Water Management provided by OEH on 4 March 2013 refers to the 1 in 100 year design flood.

The assessment of flooding impacts was therefore undertaken considering the assessment requirements stated by OEH in the letter dated 4 March 2013 and the requirements of the NSW Floodplain Development Manual (2005).

The letter dated 4 March 2013 from the OEH makes no reference to the Probable Maximum Flood (PMF).

The NSW Floodplain Development Manual (2005) states that the:

- 1 per cent AEP flood event is generally used to limit flood exposure and damage to standard residential development; and

- PMF is used for emergency response planning purposes to address the safety of people.

As stated in the Surface Water Assessment (Appendix 9 of the EIS), the assessment determined that the Project, (with the proposed mitigation measures), will result in a range of impacts from negligible to minor on flood flow velocities and depths, downstream landholders, access along public roads and watercourse stability. This assessment has been undertaken considering the potential impacts of the Project for flood event modelling up to and including the 1 per cent AEP flood event in accordance with the NSW Floodplain Development Manual (2005). The PMF is a considerably larger flood event than the 1 per cent AEP flood event and would have much larger flows, flood depths and velocities. From an emergency response planning perspective, the key issue of concern is impact on residences and access. Given the size and scope of the modelled impacts in the 1 per cent AEP event associated with the Hebden Road upgrade works and the lack of any private residences within an area in proximity to the 1 per cent AEP flood level, it is considered highly unlikely that there would be any additional inundation of residences during a PMF in Bowmans Creek as a result of changes associated with the Project. No additional impacts in

terms of access are anticipated and it is noted that the approaches to the existing Hebden Road bridge over Bowmans Creek are already inundated during the 1 per cent AEP event.

As such it is considered that the assessment of flooding impacts up to the 1 per cent AEP flood event is appropriate and considers the potential flood risks of the Project.

The proponent is responsible for flood emergency management procedures within the site. The occupation and use of this site should place no extra requirements on the State Emergency Services for assistance during flood times.

Mount Owen agrees that the proponent is responsible for flood emergency management procedures within the site.

OEH recommends a number of conditions of approval in relation to flooding matters which is provided below:

1. ***The proponent is to ensure that there are no adverse flooding impacts on property owned by entities other than the proponent.***

This proposed condition, in its current form, is not considered appropriate for the proposed development.

The assessment indicates that the Project will only impact flooding on one government owned property on Bowmans Creek which does not contain any infrastructure. There are no predicted negative flood impacts on commercial business enterprises and there are no predicted negative flood impacts to private dwellings or their accessibility from public roads. However, as noted above, the Project will result in a change in maximum flood hazard category at the Hebden Road crossing over Yorks Creek for the 5 per cent AEP event. Although Hebden Road is currently impassable to vehicles during the 5 per cent AEP event, with the Project there will be a small period where the road is also impassable to pedestrians. Hebden Road is a rural road and pedestrian traffic in this area is very unlikely.

2. ***Any flood mitigation measure must ensure there is a minimum of 500 millimetre freeboard between the Probable Maximum Flood level in the adjacent waterway and the crest of the flood mitigation infrastructure. Residual impacts downstream must be managed in an appropriate manner.***

This proposed condition is not considered appropriate for the proposed development.

The flood mitigation measures proposed for the Project will be designed to withstand (i.e. safely convey) the PMF. However, it is not considered an appropriate condition that all flood mitigation measures have a minimum of 500 millimetre freeboard between the PMF level in the adjacent waterway and the crest of the flood mitigation measures as the flood mitigation measure or sections of the flood mitigation measure may be designed to be overtopped during the PMF. Additionally, it is noted that not all flood mitigation measures need to be designed to manage a PMF with many measures being specifically designed to be overtopped in PMF (or smaller) events.

3. ***Any flood mitigation measure must be capable of withstanding flood flows up to and including the Probable Maximum Flood.***

The flood mitigation measures proposed for the Project will be designed to withstand (i.e. safely convey) the PMF.

4. ***The occupation and use of this site should place no extra requirements on the State Emergency Services for assistance during flood times.***

It is expected that the Project will not place any extra requirements on the SES for assistance during flooding times. Mount Owen have well established emergency response measures for their operations.

4.5.1.3 NOW

Clarification is required on the volume of water licences held by Mount Owen under the Hunter Regulated River WSP. The Surface Water Assessment states that Mount Owen holds 1,056ML of high security entitlement and 861ML of general security entitlement in the Glennies Creek Water Source (Hunter Regulated River WSP), however the Groundwater Impact Assessment states that Mount Owen holds 1,000ML of high security entitlement and 192ML of general security entitlement in the Glennies Creek Water Source (Hunter Regulated River WSP).

The relevant water licences currently held by Mount Owen are listed in **Table 4.5**.

Table 4.5 – Current Surface Water Licences

Licence Numbers	Type	Volume (Units)
WAL704	High Security	3
WAL1118	High Security	3
WAL7814	High Security	1000
WAL9521	High Security	50
	Total High Security	**1056**
WAL612	General Security	147
WAL613	General Security	192
WAL637	General Security	384
WAL705	General Security	27
WAL1119	General Security	60
WAL1215	General Security	48
	Total General Security	**858**
WAL1364	Supplementary	2.2
WAL1420	Supplementary	29
	Total Supplementary	**31.2**
WAL706	Domestic and Stock	8
WAL1218	Domestic and Stock	3
WAL7823	Domestic and Stock	9
	Total Domestic and Stock	**11**
WAL18310	Unregulated River Licence	200

The water balance for the Project is in deficit in the early years of the mine. Mount Owen proposes to make up for this deficit by importing water from the Greater Ravensworth Water Sharing Scheme (GRWSS) and from existing water licences held in the Glennies Creek Water Source. The peak deficit for the Project is 810ML and the peak imports predicted are 1450ML/yr in year 1 of the mine (50th percentile). Office of Water requires more certainty that the peak deficit and predicted peak imports can be met through existing licences or the GRWSS and an assessment of the likely volume of water required to be utilised from the existing water licences held.

In particular, the proponent must demonstrate that sufficient water will be available to meet environmental management requirements in dry years (such as dust suppression) that cannot be reduced by modifying operations.

As identified in the Surface Water Assessment, the gross water balance for the Project is in deficit during the early years of the Project. The maximum modelled water deficit is in Year 1 (50th percentile) with an estimated deficit of 810 ML. While the gross water balance model assesses the gross site water surplus or deficit for a given year without importing or exporting water to site, the likely import and export volumes (i.e. including transfers to and from storages within the Greater Ravensworth Water Sharing Scheme (GRWSS)) to meet daily operational requirements need also to be understood.

As discussed in Section 5.0 of the Surface Water Assessment, the Mount Owen Complex water management system has been designed to integrate with the GRWSS and utilise the major water storages that form part of the GRWSS. As such, regular water transfers are required between the Mount Owen Complex and the GRWSS. If in the event the GRWSS is unable to meet water deficit requirements for the complex, Mount Owen can draw on existing water licences held in the Glennies Creek Water Source. Similarly if the GRWSS is unable to meet water surplus requirements for the Complex, Mount Owen can store surplus water on site in the primary and also in the secondary storage areas until water is either transfer to the GRWSS or re used on site.

An operational water balance model has been developed for the GRWSS (Greater Ravensworth Area Water Balance Model (GRAWBM)). The GRAWBM was run with settings to be representative of the Project with limited on site storage and no direct HRSTS discharges from Mount Owen. The model set up allows for discharge from Liddell and Ravensworth operations via the HRSTS, which this would include the discharge of water transferred to these operations from Mount Owen.

A review of the available model outputs found:

- The level in Reservoir North (located at Liddell) for the 50th percentile realisation only reaches the lower operating limit of 482 ML once for the modelled period for 3 to 5 months in Year 4 of the modelled period. This indicates that for the remaining modelled period (10.5 years modelled) Reservoir North has water available for export to other facilities within the GRWSS, including Mount Owen.

- The total stored water volume at Mount Owen for the 5th percentile realisation never reaches zero suggesting that even in a dry year Mount Owen has an adequate supply of water from the GRWSS, runoff inflow, groundwater inflow and water access licences.

- The total amount of water imported to Mount Owen from the GRWSS for the 95th percentile realisation was 22,197 ML (21,398 ML from Liddell and 799 ML from Ravensworth) which equates to 2,114 ML/year. This import volume is comparable with the estimated dry year import volumes in the Project water balance for Years 1 and 5 (refer to Appendix B of the Surface Water Assessment).

The GRAWBM results suggest that the MOCO project water management strategy will meet the operational water demands (dust suppression and CHPP operation) of the mine.

As such, the peak deficit stated above of 810 ML is the gross (i.e. total) water deficit required to be met in Year 1 in a 50th percentile year. The modelling indicates that during Year 1 in a 50th percentile year that 1,450 ML of water will be pumped to Mount Owen from the GRWSS and conversely 640 ML pumped from Mount Owen to the GRWSS.

As noted earlier, Mount Owen presently holds Water Allocation Licences (WALs) for 1,056 units of high security entitlement (HSE) and 858 units of general security entitlement (GSE) to source water from the Hunter Regulated River Water Source. Mount Owen proposes to continue to hold these WALs for the Project. A review of the water allocations since the inception of the *Hunter Regulated River Water Sharing Plan* (WSP) in 2004 reveals that available water determinations (AWDs) for HSE and GSE below 100 per cent (i.e. 1 ML/unit) occurred in only one year (2006/2007). During this year the AWD for HSE were 92 per cent and GSE were 35 per cent following several years of drought in the Hunter. Based on the WALs presently held, Mount Owen would have been entitled to a total water allocation of 1,003 ML in 2006/2007.

Based on historical records for 2006/2007 (i.e. the year of lowest AWD) the current WALs would provide a volume of 1,003 ML which is higher than the predicted Year 1 50th percentile water deficit of 810 ML.

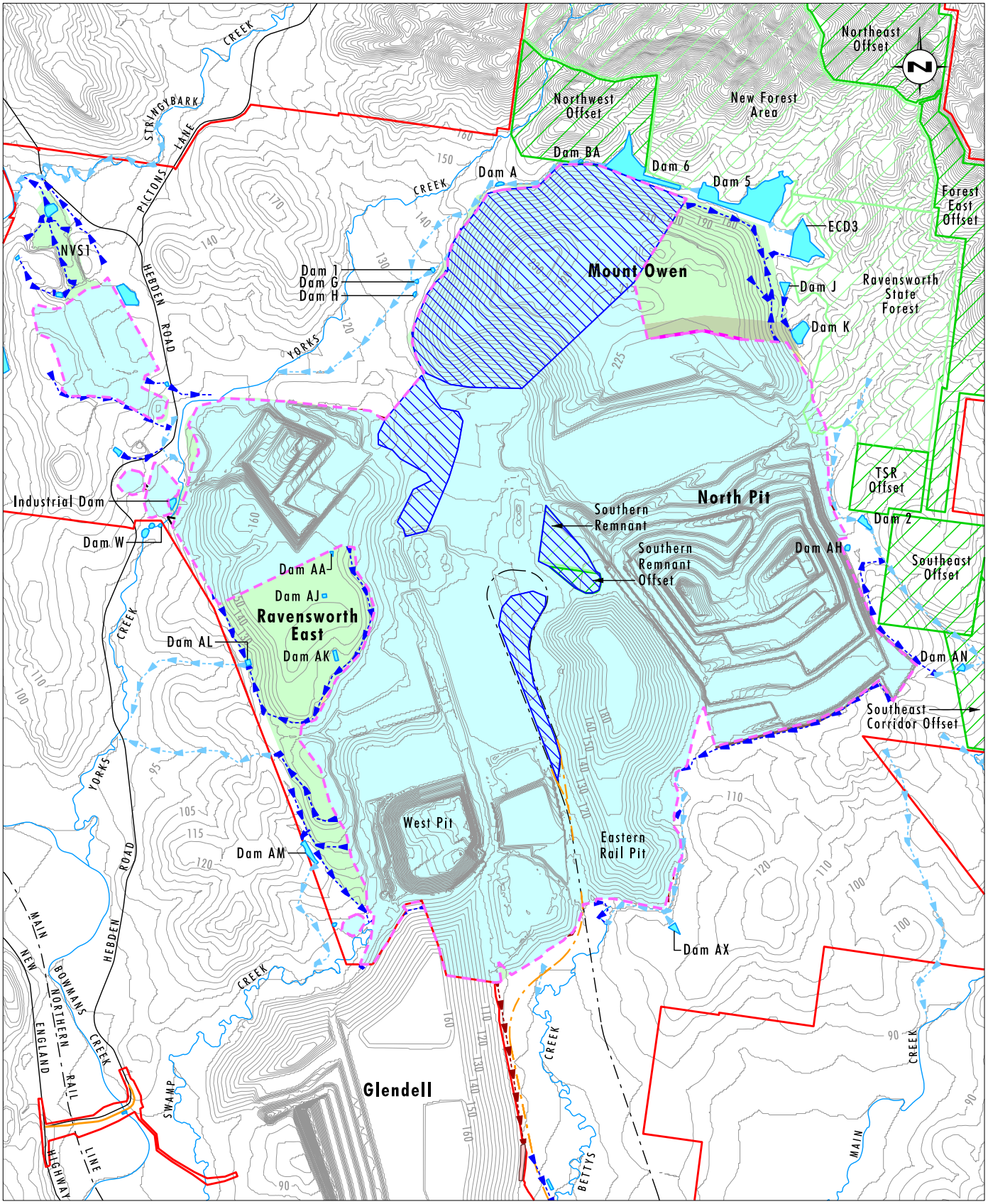
Figures 4.1-4.5 (from the EIS) show the conceptual surface water management of the site, including clean, dirty and mine water flow paths. Office of Water requires a flow chart or schematic to show more clearly the exact flow paths of water onsite at different stages of the mine's life in order to ensure the clean water diversion system is efficient and all clean water is accounted for or licensed appropriately. For example, it appears from the figures that clean water will be diverted into the "Rail Loop Dam" at years 1, 5 and 10, which appears to be a mine water dam. Further information and a document showing the flow paths more clearly is required to further assess the clean water management system and any associated licensing requirements.

The Surface Water Assessment also outlines that clean water will be released "where practicable" to the downstream environment. Office of Water would like more information outlining under what conditions clean water will not be released to the downstream environment.

Office of water requires more information as to whether harvestable rights provisions are being utilised to account for the interception or use of clean water onsite or otherwise how any interception of clean water that is not diverted is to be accounted for.

One of the key objectives of the Mount Owen Water Management System is the diversion of clean water around mining operations to minimise capture of upslope runoff and separate clean water runoff from mining activities.

Figures 4.6 to **4.8** show the extent of the water management system based on the conceptual mine plans for Years 1, 5 and 10 of the Project. These figures also show the existing and proposed clean water diversions for the Project and identify undisturbed areas where clean water runoff will be captured during each stage. This includes an area during Year 1 of the Project that is rehabilitated clean catchment with clean water runoff that will be captured during Year 1 of the Project. The areas identified as clean water runoff capture are approximately 277.5 hectares in Year 1, reducing to approximately 71.6 hectares in Years 5 and 10. Based on 100 per cent capture of runoff at the regional runoff rates (refer to www.farmdamscalculator.dnr.nsw.gov.au) of 0.7 ML/hectare/year, this equates to capture of approximately 194 ML during Year 1 and approximately 50 ML during Years 5 and 10. Based on Mount Owen landholdings of approximately 4,913 hectares, Mount Owen has a harvestable rights provision of approximately 344 ML/year (i.e. 4913 ha x 0.7 ML/ha/yr x 10% harvestable rights provision). As such, the capture of clean water runoff (as outlined above and shown on the **Figures 4.6** to **4.8**) is within the harvestable rights provisions of Mount Owen.



Data Source: Mount Owen (2014)
Note: Contour Interval 5m(AHD). Subject to refinement as part of WMP process

Legend

- Project Area
- Existing Biodiversity Offset Areas
- Ravensworth State Forest
- Existing Railway
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- WMS Catchment
- Clean Capture
- Clean Water Dam
- Existing Flow Path
- Clean Water Diversion Drain
- Drainage Line
- Rehabilitation - Complete
- Rehabilitation - Temporary
- Shaped Not Seeded

FIGURE 4.6

Year 1 - Conceptual Surface Water Licensing

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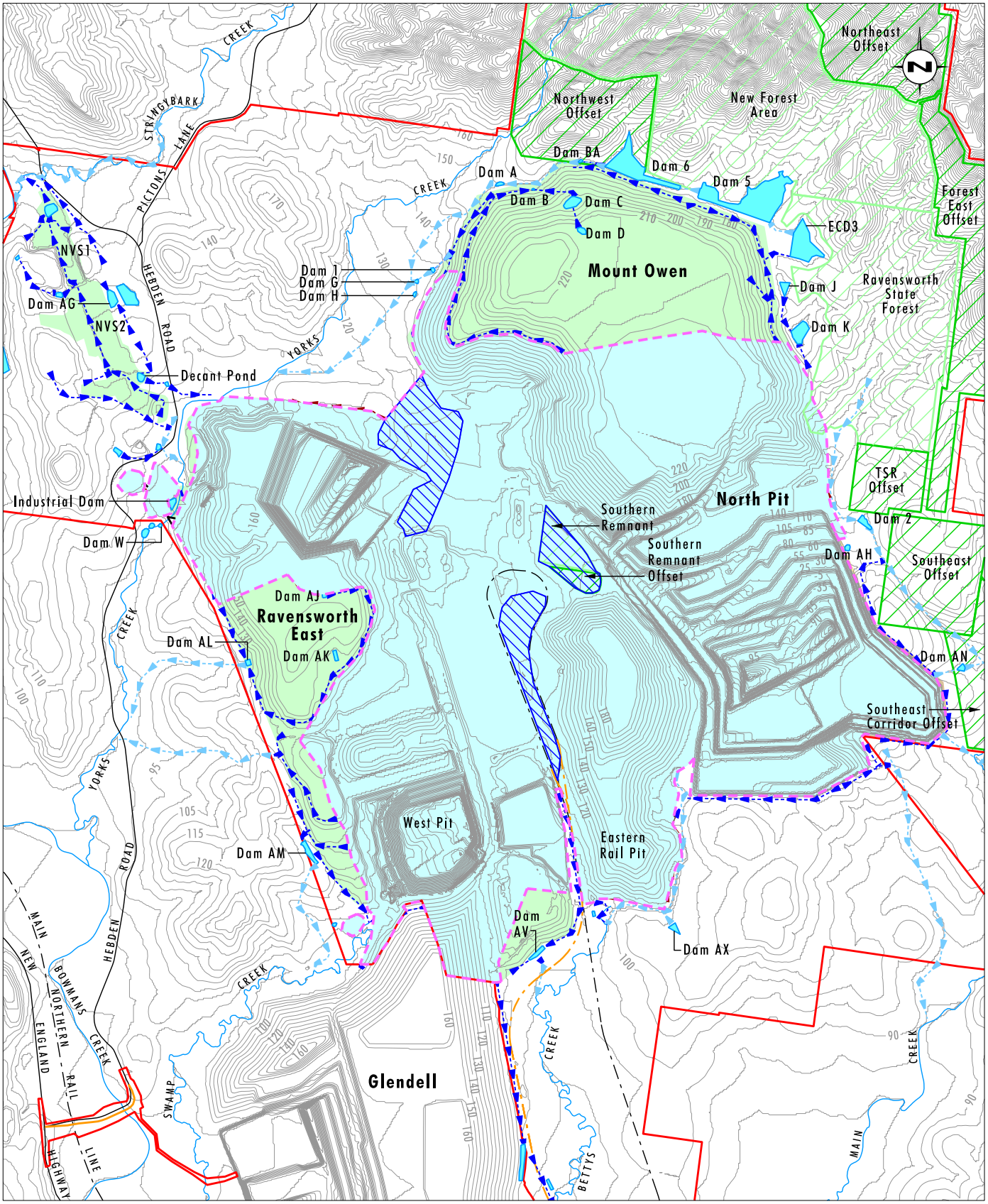


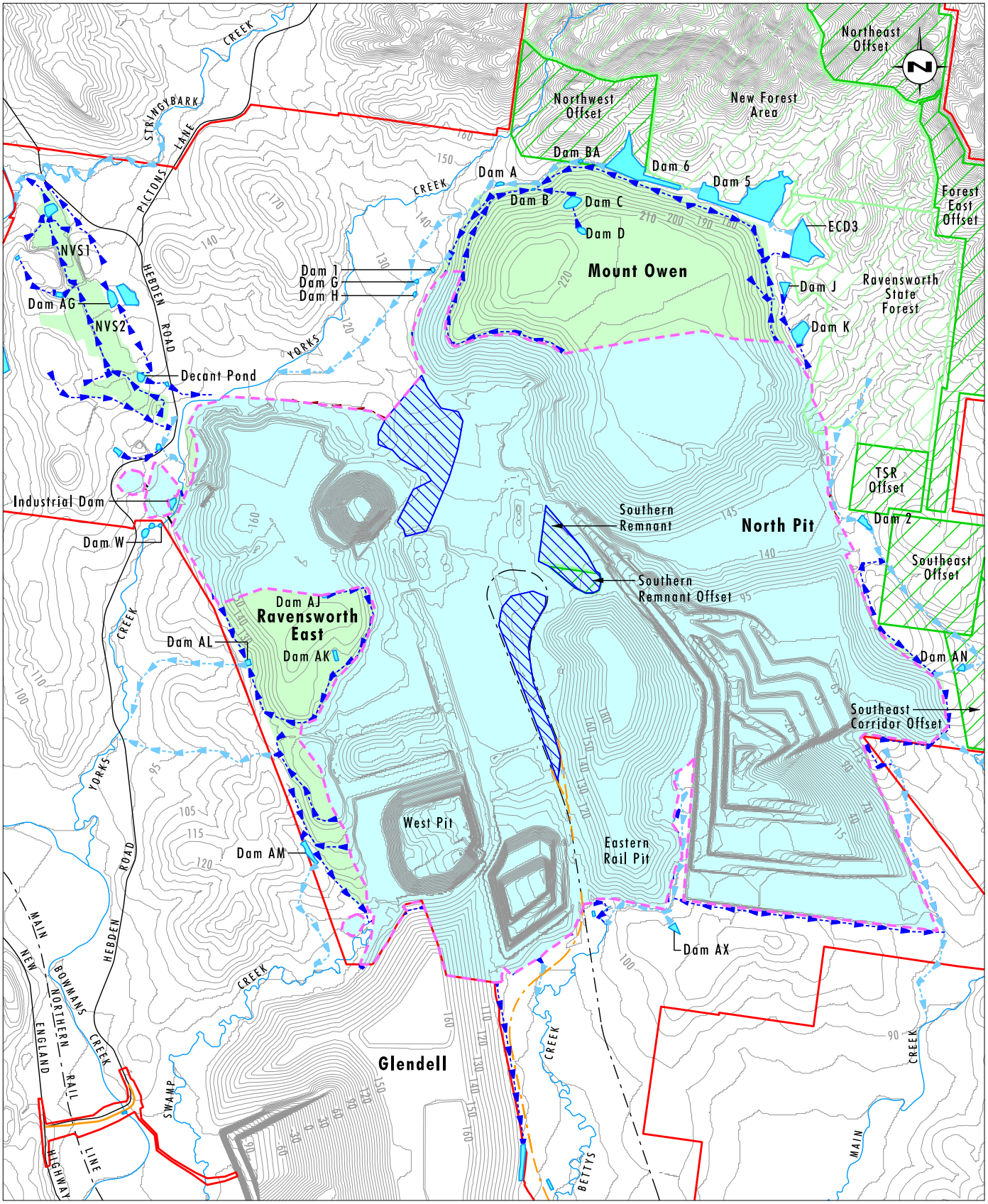
Data Source: Mount Owen (2014)
Note: Contour Interval 5m(AHD). Subject to refinement as part of WMP process

Legend

- Project Area
- Existing Biodiversity Offset Areas
- Ravensworth State Forest
- Existing Railway
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- WMS Catchment
- Clean Capture
- Clean Water Dam
- Existing Flow Path
- Clean Water Diversion Drain
- Drainage Line
- Rehabilitation - Complete
- Rehabilitation - Temporary
- Shaped Not Seeded

FIGURE 4.7

Year 5 Conceptual Surface Water Licensing



Data Source: Mount Owen (2014)
Note: Contour Interval 5m(AHD). Subject to refinement as part of WMP process

0 0.5 1.0 2.0km
1:40 000

Legend

- Project Area
- Existing Biodiversity Offset Areas
- Ravensworth State Forest
- Existing Railway
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- WMS Catchment
- Clean Capture
- Clean Water Dam
- Existing Flow Path
- Clean Water Diversion Drain
- Drainage Line
- Rehabilitation - Complete
- Rehabilitation - Temporary
- Shaped Not Seeded

FIGURE 4.8

Year 10 - Conceptual Surface Water Licensing

File Name (A4): R16/3109_992.dgn
20150615 15.12

As stated in Section 4 of the Surface Water Assessment, rehabilitation of the mining area will be undertaken as mining progresses. Runoff from final, stable rehabilitated areas will be conveyed to the downstream catchment areas once the required runoff water quality criteria are achieved. Site specific water quality triggers for Mount Owen have been developed using methods outlined in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) (ANZECC Guidelines) (refer to Table 2.2 of the Surface Water Assessment). These site specific water quality triggers will be used to determine the required runoff water quality criteria as part of the updated Water Management Plan.

There are a number of clean water dams proposed as part of rehabilitation of the final landform. The proponent should provide further information on the proposed status of these dams, with reference to licensing requirements in the Water Management Act 2000 and the Hunter Unregulated and Alluvial WSP.

Where the water captured by dams is intended to be accounted through harvestable rights, consideration should be given to the final ownership of the land to ensure the dams will be within the maximum harvestable right, or otherwise licensed or decommissioned. Consideration should also be given to the licensing of dams on third order or higher streams, which cannot be considered under harvestable rights provisions.

The licensing requirements associated with final landform will be dependent on the ownership of the land and the licensing arrangements in force at the time of closure. Licensing will be considered through the development of the detailed Closure Plan, five years prior to mine closure in consultation with DRE and NOW.

The design of the final landform, including drainage patterns, is discussed further in **Section 4.12**.

The Office of Water recommends that a Surface and Ground Water Response Plan be prepared to ensure that any unforeseen impacts associated with the Project are mitigated, including protocols for the investigation, notification and mitigation of any exceedance of the surface water, stream health and groundwater impact assessment criteria and the procedures that would be followed if any unforeseen impacts are detected during the project.

As stated in the EIS, the Mount Owen Complex Water Management Plan and associated sub plans, which includes a Surface Water and Groundwater Response Plan, will be updated to reflect management commitments and water management system described in the EIS if the Project is approved. These updates will include addressing the items raised by NOW above.

The existing *Mount Owen Complex Surface Water and Groundwater Response Plan* (July 2014) includes a protocol for the investigation, notification and mitigation of any exceedance of surface water, stream health and groundwater impact assessment criteria, and procedures that would be followed if any unforeseen impacts are detected during the development; in accordance the existing consents for Mount Owen, Ravensworth East and Glendell mines.

As discussed Section 6.0 of the EIS, Mount Owen is committed to updating the *Mount Owen Complex Surface Water and Groundwater Response Plan* within 12 months of Project Approval to include the additional management requirements identified as part of the Project and any other monitoring locations identified during the Project.

4.5.1.4 Office of Agricultural Sustainability and Food Security

Impacts of physical movement of water away from agriculture:

Based on New South Wales Office of Water (NOW) advice, no information was available from NOW on this issue, so no assessment is made.

Section 6.6 of the Surface Water Assessment and Section 5.8.4.3 of the EIS assess the potential impacts of the Project on water users and agricultural resources and enterprises in terms of impacts on water supply and confirms that the Project is considered to have negligible impacts on downstream water users.

4.5.1.5 Singleton Council

Should consent be granted best practice conditions be imposed to monitor surface water.

As discussed in Section 5.5.7 of the EIS, Mount Owen will continue to manage its operations in accordance with the Mount Owen Complex WMP and Environment Protection Licence (EPL). Subject to the Project being approved, the Mount Owen Complex WMP will be updated to reflect the changes to surface water catchments and additional monitoring and management measures that will be required.

4.5.2 Interest Group Submissions

4.5.2.1 Hunter Communities Network

When combined with the impacts on water sources from surrounding mines, the Hunter River catchment is significantly modified.

HCN recommend that a regional study of the cumulative impacts of mining on the integrity of Hunter River system be undertaken.

The Hunter River catchment has been significantly modified by human activities since European Settlement in the early to mid-1800s. Impacts on the river system are now managed though appropriate regulatory arrangements under the *Water Management Act 2000* and the *Protection of the Environment Operations Act 1997*. The existing Mount Owen Complex operates within these regulatory frameworks and the Project, if approved, will also operate within these regulatory frameworks.

HCN does not support the EIS findings that impacts on Glennies Creek, Main Creek, Bowmans Creek and associated ground water systems will be negligible. HCN notes that the Commonwealth has called in the Project as a controlled action under Sections 24D and 24E of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) because it is likely to have a significant impact on a water resource.

Part B of this response contains a response to a number of issues raised by the Commonwealth Department of the Environment in its review of the EIS and the Groundwater Impact Assessment and the Surface Water Assessment.

With the proposed mitigation measures described in the EIS in place, the Project's impacts on surface water and groundwater resources are not predicted to be significant.

The Project will impact on the catchment areas providing surface flows to Bowman's Creek, Swamp Creek, Betty's Creek, Glennies Creek and Bowman's Creek. The reduction in catchment area and flows to ephemeral creeks has not been assessed in relation to the cumulative impacts of mining operations in the area.

The EIS and Surface Water Assessment includes an assessment of the impacts of changes in catchment sizes. This is further discussed in **Section 4.4.1** above. The assessment methodology assesses the impacts relative to the existing approved mining development in the catchments and is therefore a cumulative impact assessment.

The quality of river water in the area is compromised. Cumulative impacts on tributaries and groundwater systems associated with Glennies Creek and the Hunter River have not been assessed sufficiently.

The EIS and Surface Water Assessment have been prepared in accordance with relevant assessment guidelines and are considered to adequately address cumulative impacts on surface water, both locally and regionally.

The loss of flows to ephemeral creeks will increase the variation in flows by extending the period of time of little or no flow. This has not been assessed. HCN does not support the conclusion that this will have negligible impact on the ecology of the water sources. Climate change impacts on rainfall have not been included in the assessment.

With the exception of Main Creek and Swamp Creek, the Project will result in an increase in the catchment area of all catchments directly impacted during the Project relative to their areas in 2012.

The reduction in the Swamp Creek catchment size is only during the early years of the Project and is less than 5 per cent of the existing catchment. The final landform will result in Swamp Creek having a catchment area of approximately four times its current catchment.

Main Creek will also experience a minor reduction in catchment area of approximately 2 per cent relative to its existing current catchment area. It is noted however that the Main Creek catchment is significantly larger than the pre-mining catchment area for the creek, as a result of an approved diversion of the upper reaches of Bettys Creek to Main Creek, and this will remain the case under the Project.

The changes in the catchment areas as a result of the Project will not decrease annual flow volumes in Stringybark Creek, Yorks Creek or Bettys Creek relative to the 2012 conditions. There will be a minor (2 to 5 per cent) reduction in catchment area in Swamp Creek and Main Creek in Year 5 of the Project relative to the 2012 conditions which may result in a minor reduction in annual flow volumes in these creeks relative to 2012 flow volumes. The Project results in a larger final void extent relative to the current approved final landform resulting in reductions in the catchment areas of Swamp Creek, Bettys Creek and Main Creek relative to the current approved final landform.

By their very nature ephemeral flows in the creeks are highly variable depending on a range of factors including duration, amount and intensity of rainfall as well as pre-existing soils conditions. Given the small reduction in catchment areas of Swamp Creek and Bettys Creek (relative to current approved landform), any such impacts are predicted to be minor. In the case of Main Creek however, it is noted that the catchment under the Project will still be over 20 per cent larger than the pre-mining environment, meaning that annual flows in the creek under the Project will be larger than would have occurred in the 'natural' (pre-mining) environment.

Changes in annual flow volumes associated with changes in catchment areas are considered to be small within the context of ephemeral streams. That is, the change in flows as a result of the changes in catchment areas is less than the seasonal and annual variations in flow volumes. Inferring potential variations in flow volumes from historical rainfall data (as no local stream gauges are present) supports this consideration. As analysis indicates that during the historical rainfall period for Jerrys Plains (1884 to 2012) extreme wet and dry periods occur where the rainfall ranges between 200 per cent to 50 per cent of average rainfall conditions.

When loss of surface flow is combined with predicted loss of base flows to the creek systems through drawdown of alluvial aquifers, HCN considers the cumulative impact on the creek systems will be significant.

The loss of base flow to Betty's Creek is predicted to be up to 6 ML/year and loss of base flow to Main Creek is predicted to be up to 15ML/year. This is additional to previous impacts caused by past and present mining operations in the creek catchments.

The impact of the predicted drawdowns on alluvial systems and base flows is discussed further in Report B of the Response to Submissions. It is noted however that Bettys Creek is already subject to significant mining impacts. Despite these impacts, the condition of downstream riparian vegetation along Bettys Creek remains in good condition and there is no observable deterioration in ecological value in the downstream catchment despite the approximately 60 per cent reduction in catchment size (i.e. 660 hectares in 2012) relative to pre-mining conditions (i.e. 1,810 hectares).

The Mount Owen Complex Water Management Plan and Landscape Management Plan will include monitoring of both groundwater impacts on Bettys Creek and Main Creek and the monitoring of riparian ecosystem health downstream of the predicted impacts. These management plans will also include response plans in the event that observed impacts are greater than predicted.

The EIS does not assess the project in the context of existing impacts on water sources within and surrounding the Mount Owen Complex. The diversions of Betty's Creek, the discharge of mine water into the creek system, the proposal to divert increased flows in York Creek through the Industrial Dam and the loss of flows through reduced catchment area are considerable impacts on the environmental integrity of the surface water sources in the vicinity of the project.

There is no proposed mine water discharge into the creek system as part of this Project.

The Surface Water Assessment (refer to Appendix 9 of the EIS) identified that although the Project will result in changes to catchment areas within and surrounding the Project Area, there will be negligible impacts on flows, water quality and water users downstream of the Project Area. Additionally the Project will have negligible impact on annual flow volumes in Main Creek, Glennies Creek and Bowmans Creek; therefore there will be negligible impact on the volume of water available to downstream water users.

4.5.2.2 Lock the Gate Alliance

Coal mining in the Mount Owen area has already impacted profoundly on the quality and quantity of surface and groundwater, and any further mining expansions would exacerbate this.

The EIS and Surface Water Assessment has considered the cumulative impacts of the Project.

4.5.2.3 Hunter Environment Lobby

The edge of the pit will be located approximately 450 m from Main Creek at its closest point.

The impacts on Main Creek are considered in the EIS and Surface Water Assessment. As discussed in Section 2.5 of the EIS, the location of the proposed mining limit was positioned to comply with the minimal harm criteria of the NSW Aquifer Interference Policy (AIP). The minimal harm criteria states that 'no mining activity to be below the natural ground surface within 200 metres laterally from the high bank or 100 metres vertically beneath (or the three dimensional extent of the alluvial water source – whichever is the lesser distance) of a high quality connected surface water source that is defined as reliable water supply'. The proposed setback distance of 450 metres significantly exceeds that required by the minimal harm criteria.

Potential impacts on alluvial aquifers in Main Creek are assessed in the Groundwater Impact Assessment and are discussed further in **Section 4.5**.

4.5.3 Community Submissions

Surface Water issues were raised in two community submissions. The issues, with the relevant responses have been summarised below.

Cumulative impacts on Glennies Creek, the Hunter River and associated waterways have not been considered.

The quality of river water in the area is compromised. Cumulative impacts on tributaries and groundwater systems associated with Glennies Creek and the Hunter River have not been assessed sufficiently.

The EIS and Surface Water Assessment have considered the cumulative impacts of the Project on catchments directly impacted by the Project. These impacts are not considered to be significant. Accordingly, any impacts on downstream catchments are similarly predicted to not be significant.

The EIS and Surface Water Assessment specifically consider the impact of the Project on the catchment size of Glennies Creek (see for example Table 5.5.5 in the EIS). Impacts on base flow in Glennies Creek as a result of changes to groundwater systems are also assessed in the Groundwater Impact Assessment and are considered to be negligible.

The reduction in the size of the Hunter River Catchment and any impacts on surface flows or groundwater inflows as a result of the Project is considered insignificant relative to the overall catchment size and any changes to flow volumes in the River will be undetectable.

4.6 Groundwater

4.6.1 Agency Submissions

4.6.1.1 NOW

Mount Owen has an extensive number of observation points consisting of both open holes and vibrating wires. Quarterly monitoring of pH and EC, six monthly analyses for a suite of inorganic substances is proposed. Whilst the frequency of water quality sampling is adequate, the detail for the extended list of analyses was not provided for review. This will need to be resolved as a component of the ongoing Groundwater Management and Monitoring Program to be developed in consultation with Office of Water.

The Mount Owen Complex Water Management Plan and associated sub plans, which includes monitoring requirements, will be updated if the Project is approved. Based on contemporary approval conditions, the updated Mount Owen Complex Water Management Plan will require consultation with a number of agencies including NOW and will be required to be prepared to the satisfaction of the Secretary of Planning prior to being implemented. As part of this process consideration of further analyte sampling and analysis requirements will be considered in consultation with NOW.

Peak predicted take from the Sydney basin porous rock aquifer is 750ML in year 2022 and an average of 500ML. Mount Owen holds 1160 ML under Part 5 of the Water Act 1912 for this aquifer system. Predicted peak take is 6 ML from Betty's Creek alluvium which forms part of the Jerry's Water Source. Mount Owen holds 200 shares from the Jerry's Water Source under the Hunter Unregulated and Alluvial Water Sharing Plan (WSP).

Predicted peak take is 15 ML from Main Creek alluvium. The EIS states that Main Creek alluvium forms part of the Hunter Regulated River WSP and can be accounted for with existing licences, however this area forms part of the Hunter Regulated River Alluvial Water Source within the Hunter Unregulated and Alluvial WSP. Mount Owen will be required to undertake water trading to acquire and account for 15ML predicted peak water take from this water source prior to commencement of the Project. The applicant is requested to consult with the Newcastle office of the Office of Water to ensure any necessary licence dealings are undertaken to limit any potential for double accounting in the future. This will include the:

- ***6 ML from Betty's Creek alluvium drawn from the 200 shares from the Jerry's Water Source under the Hunter Unregulated and Alluvial WSP***
- ***15 ML from Main Creek alluvium that will need to be acquired prior to commencement of the Project***

The Project is not predicted to have any impact on alluvial aquifers in the Bettys Creek alluvium and Main Creek Alluvium until 2021 and 2023 respectively (refer to Section 3.5.1.1 of the Groundwater Impact Assessment, Appendix 10 of the EIS). Mount Owen recognises the need for licenses to cover the predicted drawdown in these aquifers however the licenses are not required until 2021 at the earliest. Requiring Mount Owen to hold these licenses prior to any impacts occurring would effectively sterilise 21 ML of water in this system in the intervening period that would otherwise be available to other water users, effectively creating a greater impact on available water resources in these alluvial aquifers.

All necessary licences will be held to cover impacts on all groundwater sources. Monitoring of groundwater impacts will be utilised to verify predicted impacts and the groundwater models will be regularly updated and refined.

The Office of Water recommends that a Surface Water and Groundwater Response Plan be prepared to ensure that any unforeseen impacts associated with the Project are mitigated, including protocols for the investigation, notification and mitigation of any exceedance of the surface water, stream health and groundwater impact assessment criteria and the procedures that would be followed if any unforeseen impacts are detected during the project.

As stated in Sections 5.5.7 and 5.6.5 of the EIS, the Mount Owen Complex WMP and associated sub plans, which includes a Surface Water and Groundwater Response Plan will be updated to reflect management commitments and water management system described in the EIS if the Project is approved. These updates will include addressing the items raised by NOW above.

4.6.1.2 Singleton Council

Should consent be granted best practice conditions be imposed in respect of groundwater monitoring.

As discussed above, Mount Owen will continue to manage its operations in accordance with the Mount Owen Water Management Plan and the Environment Protection Licence (EPL). Subject to the Project being approved, the Mount Owen Complex WMP will be updated to reflect the changes to surface water catchments and additional groundwater requirements. Monitoring requirements will be developed in consultation with relevant Government agencies and reflect contemporary standards.

4.6.2 Interest Group Submissions

4.6.2.1 Denman Aberdeen Muswellbrook Scone Healthy Environment Group (DAMS HEG)

There will be a permanent impact on ground water systems, which has not been considered.

The Groundwater Impact Assessment (Appendix 10 of the EIS) includes an assessment of the long term impact of the Project on groundwater systems.

4.6.2.2 Hunter Communities Network

The expected drawdown in alluvial aquifers exceeds the minimal impact criteria under the NSW Aquifer Interference policy, requiring detailed assessment.

Predicted groundwater impacts associated with the Project were assessed in relation to the minimal harm criteria with respect to groundwater sources. The Project was determined to have a Level 2 impact and therefore required further detailed assessment. A summary of the results of the assessment against the minimal impact criteria for both the alluvial and hard rock water sources is summarised in Table 5.6.3 of the EIS.

Details of the assessment are contained in Section 4 of the Groundwater Impact Assessment.

HCN does not support the EIS conclusion that impacts on groundwater dependent ecosystems will not occur. This is based on the surmise that impacts on alluvium and base flows to creeks will be negligible. This is a prediction that HCN does not support.

The EIS does not predict that there will be no impact on the riparian vegetation along Bettys Creek and Main Creek (the only groundwater dependant ecosystems (GDEs) potentially impacted by the Project); rather, the EIS and Ecological Assessment predict that any impacts will be minimal.

The drawdown in the Bettys Creek and Main Creek alluvial aquifers is limited to the upper reaches of these creek systems where the volume of alluvium is relatively small compared to other reaches of the creeks. Greater than 2 metres drawdown is predicted in some areas, such as in an area on Main Creek where a narrowing of the alluvium channel amplifies the drawdown impact. The impact of this drawdown on the creek systems is considered to be minimal as the assessment identified that the significance of these alluvial aquifers is limited, with both creeks having low flow volumes, ephemeral surface water flow, and essentially acting as drainage courses for local runoff.

The Central Hunter Swamp Oak Forest community (the community present in the areas of predicted drawdown in Main Creek and Bettys Creek) has potential to be groundwater dependant due to reliance in some circumstances on groundwater in periods of drought. Similar vegetation exists further upstream and in other creek systems where there is unlikely to be any significant alluvial groundwater present. Further, the riparian vegetation along Bettys Creek (including areas of Hunter Lowlands Red Gum Forest endangered ecological community (EEC)) is also subject to reduced levels of alluvial groundwater due to past mining at Glendell and the mining of the Eastern Rail Pit, with ecological monitoring of the Central Hunter Swamp Oak Forest along Bettys Creek continuing to show that this vegetation is in good condition. Based on the observed condition of similarly impacted vegetation along Bettys Creek and the ability of similar vegetation communities to exist in environments containing little or no alluvial groundwater, it is considered unlikely that the riparian vegetation along Bettys Creek or Main Creek is heavily reliant on groundwater in the alluvium for its long term survival. Accordingly, there is strong confidence and evidence in the conclusion in the EIS and Ecological Assessment (refer to Section 5.7 of the Appendix 11 of the EIS) that the Project's predicted impacts on groundwater will have a minimal impact on the GDEs present in the area of predicted drawdown.

HCN considers that the prediction of cumulative impact on groundwater sources has not been adequately assessed and that the current impact of combined existing mining operations is significant.

The Groundwater Impact Assessment is based on a regional groundwater model that includes existing and approved mining projects in the entire area of coverage by modelling. The model has been peer reviewed and is considered by both the peer reviewer and NOW to be appropriate for assessment purposes, including predictions of cumulative impacts from all mining activities in the area.

The drawdown in the hard rock aquifer is predicted to be up to 65 metres at the end of mining (2030). The median predicted groundwater inflow into the pits is 510 ML/year. This is not an insignificant impact. It is significant that the groundwater assessment report identifies the complicating factor of the groundwater impacts from the Integra underground mining operation.

As discussed in Section 5.6 of the EIS, the drawdown on the Bayswater seam was modelled for the Project as it represents the primary basal seam mined in the proposed mining areas.

Mount Owen currently holds sufficient licences under the *Water Act 1912* to cover the predicted groundwater inflows from the hard rock aquifer systems.

The comment regarding the interaction with Integra underground operations suggest that this casts doubt on the model results. This is not the case. The Groundwater Impact Assessment relevantly states (section 4.1.1.3 of the Groundwater Impact Assessment):

> *At Mount Owen Complex, the post-mining equilibrium water table will be heavily influenced by longwall panel development by Integra Underground Mine beneath the proposed North Pit Continuation. The concurrent and overlapping operations make it extremely difficult to distinguish the relative influence and impacts of the operations on the post mining equilibrium water table.*

Both operations are included in the groundwater model and both will have an impact on inflows to the final void of the North Pit as a result of their impacts on hard rock aquifers. By including both in the model, it is difficult to accurately identify how much of the predicted impact is attributable to each operation but this does not affect the integrity of the total predicted pit inflows.

4.6.3 Community Submissions

Groundwater issues were raised in 6 community submissions. The issues, with the relevant responses have been summarised below.

Please explain why final voids are required and how they will be used in the future, and what is the groundwater location to the void - how is the environmental loss accessed by the void taking water, how much water will be removed from the water network system and how is this calculated, how is the water quality of the void been assessed on the impacts on the surface and underground water, and will this make this area uninhabitable in the future.

The final landform and requirement for final voids is discussed further in **Section 4.12**.

Final voids will receive inflows from groundwater infiltration through highwalls emplacement material in backfilled areas of the void, in addition to direct rainfall into the void and runoff. The voids will also lose water to the atmosphere through evaporation.

The potential for the void to be potentially used for ongoing operational water storage as part of the GRWSS to support ongoing mining activities in the area will be investigated. As the RERR Mining Area is scheduled later in the Project, the potential for continued use of this area for tailings emplacement will be considered as part of detailed mine closure planning process. At this stage, the Project assumes this will be a final void for worst case impact assessment purposes however the mine planning closure process, initiated at least five years prior to cessation of mining as part of this Project, will investigate a range of future land uses for the site including potential use or alternative closure options for the voids.

Section 5.3.5 of the Water Balance Assessment (Appendix B of the Surface Water Assessment) includes a detailed assessment of predicted final void recovery rates and salinity levels based on the indicative mine plan. The detailed mine closure process for the mine will include further refined models of void recovery rates and void water quality as a more detailed understanding of final void capacity and final landform is developed. This is discussed further in **Section 4.15.2** of this Report.

The water study has not looked at the cumulative impacts of final voids and this needs to be addressed, stop making concessions relating to a single mine.

The EIS and Groundwater Impact Assessment have considered the cumulative impacts of the Project on groundwater systems likely to be directly impacted by the Project. The Groundwater Impact Assessment, which includes the quantification of predicted groundwater inflows to the final voids, is based on a regional groundwater model which includes other mining operations in the region. Section 5.3.5 of the Water Balance Assessment (Appendix B of the Surface Water Assessment) includes a detailed assessment of predicted final void recovery rates and salinity levels based on the indicative mine plan. These impacts are not considered to be significant.

4.7 Ecology

4.7.1 Agency Submissions

4.7.1.1 OEH

On 01 October 2014, the 'NSW Biodiversity Offsets Policy for Major Projects' (OEH, 2014a) commenced. According to this policy OEH must assess the impacts on threatened biodiversity in accordance with the 'Framework for Biodiversity Assessment' (FBA) (OEH, 2014b). Due to the timing of the key events for this proposed project it falls within the 'transitional period' of the new offsetting policy. As such OEH is able to apply some flexibility in the application of this policy or the FBA if the policy results in perverse outcomes for this project; it also requires that the biodiversity assessment by the proponent is comparable to that of the FBA.

The survey work and preparation of the Ecological Assessment was undertaken prior to the release of the FBA policy. As confirmed in the OEH submission, an assessment under the FBA was not required for the Project as the DGRs were received prior to the transitional phase of the FBA policy which commenced on 1 October 2014.

Umwelt notes that OEH have undertaken a conceptual application of the FBA on the Project as part of their assessment and has made comment in relation to the credit results and the new NSW Offset Principles for Major Projects. OEH also considers that the offset package is suitable to offset the biodiversity of the development footprint based on the NSW OEH Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI) (OEH 2011). The Ecological Assessment was prepared in accordance with the NSW OEH Interim Policy which was applicable at the time of preparation of the Ecological Assessment.

Assessment of Offset Package using FBA - Overall, the FBA assessment suggests that the proposed land-based offset is insufficient for the development impact, particularly for the impact on Spotted Gum - Ironbark forest and woodland in the development footprint

Assessment of the Project in relation to the NSW offset principles for major projects (state significant development and infrastructure) On 1 October 2014, the 'NSW offset principles for major projects (state significant development and infrastructure)' came into force. This policy has six principles against which the proposed offset package has been compared:

Principle 1: Before offsets are considered, impacts must first be avoided and unavoidable impacts minimised through mitigation measures. Only then should offsets be considered for the remaining impacts - This has been discussed in section 7.8.1 of Appendix 11 of the EIS to OEH's satisfaction.

Principle 2: Offset requirements should be based on a reliable and transparent assessment of losses and gains.

The EIS has not been able to clearly demonstrate that this Principle has been met in light of this Policy. OEH acknowledges that the assessment occurred when this Policy was in draft form and thus there was no requirement to use the FBA (which OEH had to use for our assessment) but instead, OEH does not consider that the assessment in Appendix 11 is a 'reliable and transparent assessment' particularly when the 'substitution ratio' approach used is not sufficiently described. OEH understands that a BCAM assessment has been conducted (e.g. p. 7.66) but this has so far not been seen; provision of the BCAM report and background information would likely meet this Principle.

Principle 3: Offsets must be targeted to the biodiversity values being lost or to higher conservation priorities.

The proponent have not yet been able to demonstrate that the offset package meets this Principle for this project based on area of remnant woody and total native vegetation to be cleared versus that to be offset; or that the conservation value of the offset vegetation is of the same or higher conservation value.

As noted above, the FBA does not apply to the assessment process for the Project**.** The OEH submission recognises this and in relation to the proposed package, conclude:

> In summary, the offset package does not meet the FBA requirements in terms of credits generated by the offset package in relation to credits generated by the development site, and not all of the offset credits fall within the trade-rules of the FBA However, as discussed above this project falls within the transition period for the new policy and thereby OEH is able to apply some flexibility to the way in which this policy applies in this situation. OEH therefore accepts all of the components of the offset package as being suitable matches to the biodiversity of the development footprint. However, OEH suggests that additional rehabilitation is provided along Stringybark creek to assist with Spotted-tailed Quoll movement across the landscape (see comments below).

Further consideration of the Stringybark Creek rehabilitation options is discussed below.

During consultation with the OEH on an earlier mine design, it was noted that a BCAM assessment had been undertaken for internal comparative purposes. Subsequent design changes altered the proposed impact area, making this earlier BCAM assessment redundant. As the FBA did not apply to the Project and a BCAM assessment was not required as part of the assessment, a BCAM assessment of the final mine plan has not been undertaken.

OEH notes that the lower section of Stringybark Creek is located within the current Project Area and thus recommends that the proponent includes plans to fill the gaps of riparian vegetation along the other parts of Stringybark Creek that it has management control of as part of the offset package for this project. That way there is a greater chance of meeting the objective, of linking " ... existing Biodiversity Offset Areas in the north of the Project Area, with native vegetation corridors established on rehabilitated mine land and restored habitats along Bowmans creek at the Liddell Mine ... " (p. 7.4). OEH recommend the following Condition of Approval:

That additional sections of riparian vegetation along Stringybark Creek to the west of the Stringybark Creek Corridor Offset must be rehabilitated as part of this project to create a more complete wooded corridor that will more effectively act as a migration route for Spotted-tailed Quolls between Bowmans Creek and the New Forest area.

The intent of the proposed Stringybark Creek Corridor Offset is to improve the habitat linkages between known spotted-tailed quoll habitat in and adjacent to Mount Owen and known habitat along Bowmans Creek including that proposed for in-perpetuity conservation as part of the Liddell Biodiversity Offset Strategy. It is acknowledged that there are parcels of land between the western-most portion of the proposed Stringybark Creek Corridor Offset and the eastern-most portion of Bowmans Creek that are not proposed for offsetting or revegetation. The land in question is within the Project Area, but is not currently owned by Glencore. It is therefore difficult to commit to the rehabilitation requested by OEH. However, subject to ownership and potential mining constraints, Mount Owen will continue to investigate the potential to improve the vegetation linkages in this area in the future.

Principle 4: Offsets must be additional to other legal requirements. OEH understands that the proposed offset lands have no pre-existing conservation obligations.

This Principle reflects existing NSW Policy regarding offsets and is relevant to the consideration of the offsets proposed for the Project despite the FBA not applying to the Project.

There are no pre-existing conservation obligations in relation to the proposed offset areas. All three proposed offset areas have previously been, and could in the future, be developed for agricultural purposes under existing legislative arrangements. The economic viability of any farming on these areas in the future (i.e. if not used for offsetting the impacts from the proposed Project) would almost certainly require an improvement in pasture quality which will significantly lower the ecological value of this land from that which presently exists.

Principle 5 'Offsets must be enduring, enforceable and auditable' of the 'Biodiversity Offsets Policy for Major Projects' (OEH, 2014a) will require offsets to be secured under BioBanking Agreements under Part 3A of the Threatened Species Conservation Act 1995 once particular mechanisms are in place. These are not yet in place so OEH requires the biodiversity offsets to be secured and managed so as to meet the following criteria:

a. The principal objective of ongoing site management is biodiversity conservation.

b. Management actions are undertaken in accordance with a plan of management.

c. There is reasonable likelihood that sufficient resources will be available to implement the plan of management over time.

d. There are appropriate accountability mechanisms in place to secure the outcomes, and these mechanisms cannot be altered without alternative and comparable offsetting arrangements being put in place.

e. The arrangements are in perpetuity and conservation obligations are transparently transferred and disclosed to any new owners of the land through appropriate administrative procedures.

OEH will require offset lands for this project to be secured for conservation through one or more of the available and appropriate mechanisms listed in section 126L of the Threatened Species Conservation Act 1995, of which securing the land under a BioBanking Agreement is OEH's preferred option.

While the FBA does not apply to the assessment process for the Project, the comments regarding the mechanism for securing biodiversity offsets remains applicable to the Project. The proposed Biodiversity Offset sites will be secured for long-term conservation. The offset lands will be secured through the available and appropriate mechanisms listed in Section 126L of the *Threatened Species Conservation Act 1995* (TSC Act) and be determined in consultation with the relevant government agencies. The management of the sites will consider the criteria listed in Principle 5 of the 'Biodiversity Offsets Policy for Major Projects'. Currently Mount Owen envisages that land-based offset sites would be managed in a manner consistent with the existing Mount Owen Biodiversity Offset Areas, which were established and approved in 2003.

Principle 6: Supplementary measures can be used in lieu of offsets. The proponent may consider supplementary measures to make up the short-fall in their offset package under the current policy.

The inclusion of rehabilitated land in biodiversity offsetting is increasing in importance and proponents, including Mount Owen, are demonstrating improved outcomes and increasing confidence in relation to the re-establishment of key vegetation communities and fauna habitats. Mount Owen has been a leader in this area, as is well recognised by OEH whose staff are establishing mine rehabilitation ecological monitoring reference sites within Mount Owen rehabilitation areas. Biometric assessments has also shown strong trends towards ecological re-establishment of endangered ecological communities. Mine rehabilitation is also being incorporated into the Upper Hunter Strategic Assessment as a means for mining proponents in the Hunter Valley to offset impacts to biodiversity.

Assessment of threatened Greenhood Orchids on the development footprint

The seven-part test of the assessment (Table 1 in Appendix A of Appendix 11 of the EIS) included an assessment of the likelihood of the project affecting Pterostylis gibbosa, an endangered orchid known from populations about 47 km east of the project site. However, it was argued that the project had no potential to impact this species.

Pterostylis chaetophora, a species currently listed as 'Vulnerable', has records as close as about 42 km west of the Project area, with most records in the lower Hunter Valley between about 60 and 70 km away to the east. This species does not appear to have been considered by this Project. OEH notes that at least one unidentified species of Pterostylis was found in the Study area (Tables 1 of Appendix 8, and Table 8 of Appendix G; both in Appendix 11 of the EIS). Presumably these plants were not identified to species level because the plants were not in flower. However, it is possible to assign sterile Greenhood orchids at least to basic groups, based on such things as whether rosette leaves are sessile or petiolate; the number of flower buds or fruit or aborted flowers on any scapes present; the nature and number of any stem leaves: this could then be used to perhaps discount whether the plants occur in the same group as any local threatened Greenhood orchids.

The *Pterostylis* sp. noted in the flora list for the Ecological Assessment was recorded within the Kunzea Shrubland vegetation community and was collected for identification purposes. The specimen was not able to be determined to the species level, however notes on the identification confirm that the specimen had “very small flowers, basal and cauline leaves”, features which are not consistent with the description of *Pterostylis chaetophora*.

Pterostylis chaetophora was not originally considered in the Ecological Assessment due to the species’ distribution and it not appearing in any of the literature that was reviewed or databases that were searched when preparing the assessment for the Project. The species is associated with moist and dry sclerophyll forest, chiefly in the Taree district.

4.7.1.2 Singleton Council

Biodiversity offsets should be provided within the immediate locality and at the very least within the Singleton Local Government Area.

Two of the proposed offsets, the Cross Creek Offset Site and Stringybark Creek Corridor Offset Site, are immediately adjacent Mount Owen holdings and within the Singleton LGA.

The Esparanga Offset Site is located 60 kilometres to the north-west of the Project Area and within the adjoining Muswellbrook LGA.

The Ecological Assessment and Offset Strategy was prepared in accordance with the *NSW OEH Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI)* (OEH 2011), the *Principles for Biodiversity Offsetting in NSW* (OEH 2013) and *the EPBC Act Environmental Offsets Policy* (DSEWPC 2012) which were applicable at the time of preparation of the report. These policies do not require offsets to be located within the same Local Government Area (LGA) as the proposed development.

A significant biodiversity asset of the Esparanga Offset Site comes from its position in the landscape, particularly its proximity to Manobalai Nature Reserve and its location within the corridor identified as part of the Great Eastern Ranges Initiative. The inclusion of the Esparanga Offset Site as part of the Biodiversity Offset Strategy is of strategic benefit as securing privately owned land in this corridor for conservation purposes is a major conservation priority for the NSW Government

4.7.2 Interest Group Submissions

The potential impact of the Project on flora, fauna and their habitats were raised in five interest group submissions.

Submissions regarding ecological impacts were characterised by concerns relating to:

- Flora – e.g. vegetation / forest removal;
- Fauna – e.g. habitat loss; and,
- Assessment methods – e.g. insufficient ecological surveying.

A number of submissions raised concerns in relation to offsets with specific concerns that the strategy will not fully mitigate the ecological impact of the Project.

4.7.2.1 Hunter Communities Network

The Red Gum community associated with Betty Creek just to the north of the proposed pit expansion is consistent with the 'Hunter Lowlands Red Gum Forest' endangered ecological community (EEC). Being a Forested Wetland and a groundwater dependent ecosystem, according to the EIS, the pit expansion may have adverse impact on the long term viability of this community by lowering adjacent water tables.

Based on the predictions in the Groundwater Impact Assessment, the Project is not expected to result in an adverse impact on the Hunter Lowland Red Gum Forest mapped as occurring in the upper reaches of Betty Creek. Any impacts on alluvial aquifer systems in this area as a result of mining at Mount Owen would already have occurred as a result of the currently

approved mining in North Pit. The Groundwater Impact Assessment does not predict any additional drawdowns of alluvial aquifers in this area and there is no geological reason to suggest any drawdowns in this area could occur. Surveys of this vegetation community indicate that it is in good condition and the Project is unlikely to affect this as the community is located wholly outside the Proposed Disturbance Area.

[The Hunter Lowland Red Gum Forest EEC] provides core Koala habitat and food sources. There were no targeted Koala surveys conducted in this area during the fauna assessment. However, there are recent records of Koala in and near the project study area. There needs to be more detailed assessment of impacts on Koala habitat.

The Ecological Assessment and survey effort for the Project focused on the areas to be directly impacted as a result of Project. Fauna surveys were undertaken by Umwelt within the Proposed Disturbance Area (and surrounds) in August 2011, February and June 2012, January 2013, March, April and July 2014. In addition to Project-specific surveys undertaken by Umwelt, annual monitoring surveys have also been undertaken annually since 1996 in the Proposed Disturbance Area and within Ravensworth State Forest, providing almost 20 years of continuous fauna monitoring across the site. These surveys are undertaken in accordance with the DEC (2004) survey guidelines and include methods to detect koala such as spotlighting surveys, cage trapping and call playback surveys. Umwelt surveys undertaken in the Proposed Disturbance Area that targeted koala included nocturnal call playback, spotlighting surveys and Spot Assessment Technique (SAT) searches in koala habitat.

Despite almost 20 years of monitoring surveys within Ravensworth State Forest (including within the Hunter Lowland Red Gum Forest EEC), the koala has not been recorded in this area utilising the habitats of this community. An assessment of the koala is provided in the Seven-Part Tests under the EP&A Act (refer to Appendix E of the Ecological Assessment) and Assessments of Significance under the EPBC Act (refer to Appendix F of the Ecological Assessment) that conclude that the Project is unlikely to result in a significant impact on the species.

Additionally, the Project will not directly impact on the Hunter Lowland Red Gum Forest EEC and, as discussed in **Section 4.6.2.2**, is not predicted to have an adverse impact on this community as a result of predicted groundwater impacts from the Project.

HCN considers that the proposed biodiversity offset strategy designed to mitigate the significant biodiversity impacts of the project is highly inadequate.

The area to the north of the New Forest block [Cross Creek Offset Site] has been highly modified and consists mainly of isolated paddock trees. HCN considers this offset property to be over rated in the calculation of offset values. Only three threatened species were recorded during fauna surveys of the property in four individual sightings.

The Cross Creek Offset Site contains a total area of 367 hectares, of which 51.7 hectares comprises Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC listed under the TSC Act. The remaining area of the property, approximately 315.3 hectares, comprises native grassland, which is likely to have once supported Central Hunter Ironbark – Spotted Gum – Grey Box Forest. As noted in the submission, isolated trees remain in the native grassland areas. The regeneration of this EEC represents a significant environmental gain in the central Hunter Valley of previously disturbed vegetation, rather than simply offsetting with existing mature vegetation. There is a high degree of confidence that these native grassland communities can be returned to native vegetation which will meet the Central – Hunter Ironbark – Spotted Gum – Grey Box Forest EEC in a relatively short period of time. The Hunter Valley floor was heavily cleared for agriculture in the mid 1800s through to the mid 1900s, with additional significant agricultural clearing occurring between 1930 and 1960.

Almost all of the vegetation that is now present on the valley floor, including the Central – Hunter Ironbark – Spotted Gum – Grey Box Forest EEC, has regenerated from cleared land similar to that present at the proposed Cross Creek Offset Site, as evidenced in early aerial photos of the Hunter. Almost all of this regeneration has occurred through an absence of active land management and there is abundant evidence to suggest that recovery of Central – Hunter Ironbark – Spotted Gum – Grey Box Forest EEC can occur in areas of native grassland in periods of around 20 years; indeed, significant areas of the Project area that will be impacted have been identified as having regenerated from grassland communities over a similar period with little or no active management for biodiversity outcomes. While the new trees growing will not initially provide high habitat values, the existing 'paddock trees' provide important habitat due to their age.

The gain in biodiversity resulting from the regeneration of this community from a relatively low biodiversity value grassland is significant. The gain is particularly important for the hollow-dependent fauna species which can utilise the habitat values of the currently isolated paddock trees and recolonise the area. Hollow-bearing trees are a limiting resource in the local area due to the long history of vegetation clearance for agriculture and the time required for mature trees to develop tree hollows. Although only a few threatened species have been recorded on the site, this is considered to be due to the current lower quality of the habitat, which will be improved over a relatively short period of time.

As noted above, the ongoing use of this land for farming purposes (i.e. its likely land use if not used as an offset for the ecological impacts associated with the Project) is likely to further degrade the ecological value of this land.

It must be remembered that the proposed offsets are not offsetting impacts on old growth woodland. As discussed in Section 2.3 of the Ecology Assessment, the majority of the existing vegetation within the Proposed Disturbance Area exists as a result of the extensive re-growth over the past 30 years. A relatively small proportion of the existing native vegetation (approximately 36 hectares) that will be cleared in the Proposed Disturbance Area is at least 55 years old. Approximately 186 hectares of the existing woodland vegetation in the Proposed Disturbance Area has regenerated since 1967, of which 127 hectares (56 per cent) comprises regrowth that has regenerated since 1983.

None of the vegetation communities recorded in the Project Area can be currently considered 'old growth' vegetation. Old growth vegetation refers to any vegetation that was present at the time of European arrival in Australia that still remains in essentially similar condition. The extant woodland in the Project Area is entirely 'regrowth' or logged vegetation, that is, it has been previously cleared and its present extent is based entirely on natural regeneration or on targeted planting of canopy species.

[The proposed Stringybark Creek Offset Site] is also highly disturbed containing mostly isolated paddock trees and a large infestation of African Olive. HCN considers this offset property to be over rated in the calculation of offset values. Only two records of one threatened woodland bird species were made during fauna surveys of the property.

As discussed for the Cross Creek Offset Site above, active weeding of African olive and assisted regeneration of Central Hunter Ironbark - Spotted Gum – Grey Box Forest EEC in what is currently grassland areas will positively benefit many of the threatened species in the locality and represent a gain in vegetated habitats in the central Hunter Valley. Although only a few threatened species have been recorded on the site, this is considered to be due to the current lower quality of the habitat, which will be improved with active management.

[The Esparanga Offset] area is on the edge of the Sydney Basin bioregion, over 60kms from the Mount Owen Complex and contains vegetation communities that bear little resemblance to those in the proposed disturbance area. There is no 'like for like' representation of the EECs impacted by the project.

The Esparanga Offset Site is located 60 kilometres to the north-west of the Project Area. A significant biodiversity asset of the Esparanga Offset Site comes from its position in the landscape, particularly its proximity to Manobalai Nature Reserve and its location within the corridor identified as part of the Great Eastern Ranges Initiative developed by State and Federal agencies as a priority strategic biodiversity conservation area. The inclusion of the Esparanga Offset Site as an area managed for conservation outcomes within this corridor ensures important connectivity to existing nature reserves in a region that is continually experiencing mining growth and expansion.

The loss of habitat and significant impact on 20 threatened fauna species and 2 EECs has not been adequately offset by the Project. The reliance on future regeneration and rehabilitation of habitat values will not offset the immediate loss of old growth habitat values, such as tree and log hollows and mature flowering trees, that take centuries to develop. The significant impact on federally listed endangered species such as the Spotted-tailed Quoll and Swift Parrot through the loss of important foraging and denning habitat will not be offset.

The Ecological Assessment concludes that the Project is likely to have a significant impact on the spotted-tailed quoll and squirrel glider (at a State but not Commonwealth level) and will have a potentially significant impact on the Central Hunter Ironbark - Spotted Gum – Grey Box Forest EEC and 12 other fauna species (refer to Section 5.8.1 of the Ecological Assessment).

Little or none of the vegetation proposed to be impacted by the Project could be considered to be 'Old Growth'. As noted above, almost all of the remnant vegetation in the Hunter Valley floor has regenerated from disturbed farmland cleared in the 19th and 20th Centuries. This is not to say that the vegetation that will be disturbed does not contain significant habitat values; the ecological value the vegetation is recognised in the assessment of likely and potentially significant impacts on 14 fauna species and the woodland community itself.

Offsetting policies and practice are increasingly encouraging the concept of 'environmental gain' in offsetting strategies by including poorer quality sites with developers committing to improve and increase woodland vegetation to provide a gain in woodland habitats in the locality, while also acknowledging the importance of protecting high quality sites that provide good connectivity and existing quality habitats. The Mount Owen Offset Strategy includes both of these elements of offsetting including the environmental gain through revegetation and improvement of adjacent lands (Cross Creek and Stringybark Creek Corridor) and conserving existing high quality habitats at the Esparanga Offset Site.

The submission received from OEH indicates that OEH consider the offset strategy suitable to the biodiversity to be impacted by the Project.

4.7.2.2 Wybong Action Group

This latest expansion, while not impacting on the remaining forest area, will continue to remove critical habitat from the floor of the Upper Hunter. This includes Central Hunter Grey Box – Ironbark Woodland EEC (4.4ha – not offset) and Central Hunter Ironbark- Spotted Gum- Grey Box Forest EEC (131.9ha -17% of remaining extent in the valley – a shortfall in offsets of 80.2ha).

As discussed in the Ecological Assessment, the Project will result in an approximate 17 per cent reduction in the size of the large remnant of vegetation and habitats within the Project Area only; not all of this area is made up of Central Hunter Ironbark- Spotted Gum- Grey Box Forest EEC. The Hunter Remnant Vegetation Project (HRVP) (Peake, 2006) indicates that the mapped extent of Central Hunter Ironbark- Spotted Gum- Grey Box Forest EEC across its distribution prior to 2006 was approximately 18,300 hectares. Based on the Peake (2006) estimate of the community extent, the loss of approximately 159.3 hectares as a result of the Project represents a loss of less than approximately 0.9 per cent of the distribution of this community.

A Seven-Part Test of significance under the EP&A Act was undertaken for Central Hunter Grey Box– Ironbark Woodland EEC which concluded that the removal of approximately 4.4 hectares of the community (which represents less than 0.03 per cent of the remaining extent of the community (Peake 2006)) was unlikely to result in a significant impact.

The cumulative loss of native vegetation since the commencement of the mine will be 1,838 ha, if this latest expansion is approved. The final protection of the current biodiversity offset areas has not yet been resolved.

As noted in **Section 6.6.1.1** above, the proposed Biodiversity Offset sites will be secured for long-term conservation. The offset lands will be secured through the available and appropriate mechanisms listed in Section 126L of the TSC Act and be determined in consultation with the relevant government agencies. The management of the sites will consider the criteria listed in Principle 5 of the 'Biodiversity Offsets Policy for Major Projects'. Currently Mount Owen envisages that all three land-based offset sites would be managed in a manner consistent with the existing Mount Owen Biodiversity Offset Areas.

Rehabilitation of post-mining areas will be completed as soon as practicable after shaped areas become available. The aim of the rehabilitation will be to re-establish those vegetation communities and fauna habitats currently recorded in the area and connect, as far as practicable, the habitat areas to the north and south of the Mount Owen Complex, (including existing rehabilitation areas) with a vegetated corridor. Approximately 518 hectares of rehabilitation is proposed as part of the Project, in addition to rehabilitation commitments resulting from previous project approvals. The total area of post mining rehabilitation for the Mount Owen Complex will be approximately 1,900 hectares.

The previous approvals have required mine rehabilitation to recreate the forest. After 20 years this objective is nought but a miniscule joke and abject failure.

Mount Owen has had considerable success in mine rehabilitation and re-establishing vegetation communities on mine spoil. Mount Owen has worked closely with researchers from the University Of Newcastle with the initial goal of the Mount Owen mine research program to re-establish sustainable nutrient acquisition and cycling using natural root-microbe associations. Since commencement, research has continued to develop as part of the Ravensworth State Forest Complex Research Program, with over forty experiments and investigations currently established. Mount Owen is now listed as a 'Highly Commended' site on the Global Restoration Network of the Society for Ecosystem Restoration, International.

An assessment of mine rehabilitation and regeneration activities at Mount Owen was undertaken to report on the ecological value of the rehabilitated vegetation communities, particularly in the context of vegetation community re-establishment and threatened species habitat (Umwelt 2013b). The assessment of similarity between rehabilitation, revegetation and regeneration areas and the EEC determination for Central Hunter Ironbark – Spotted Gum – Grey Box Forest identified that areas of revegetation and regeneration in the New Forest Area and Biodiversity Offset Areas conform to the NSW Scientific Committee determination of Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC and

therefore meet the rehabilitation objectives and site preliminary completion criteria detailed in the Landscape Management Plan (Xstrata Mount Owen 2011). At this stage, the mine rehabilitation was assessed as trending towards the Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC. This represents one of the most successful mine rehabilitation programs in the Hunter Valley and NSW, and is currently being surveyed by OEH as an example of good ecological mine rehabilitation.

4.7.2.3 Land and Management Planning

Mount Owen has a commendable record in biodiversity monitoring and management. The long term monitoring undertaken to date is of regional and national scientific importance. It is essential that the existing fauna and flora monitoring, management and governance program be maintained until the end of the mine life, and in the rehabilitation period following closure.

Specific matters that must be addressed in any consent are:

The fauna and flora monitoring and management as outlined in the application documents are inadequate. The existing program must be maintained and properly documented, and appropriate requirements need to be included as part of the development consent.

As part of the revision of the existing Landscape Management Plan (LMP) for this Project it is proposed that the existing monitoring in the Project Area be reviewed and expanded to include the proposed Biodiversity Offset Areas. This review will consider all existing commitments to develop a consolidated, cost effective yet informative approach to ecological monitoring for the Project. Attention will be paid to making best use of the existing long-term data sets for the Project Area. Details on the monitoring program will be documented within the revised LMP, to be completed post-approval, and prior to the commencement of mining works in the Project Area.

The biodiversity offsets for the existing and continued project are inadequate to fully compensate for the biodiversity impacts of the additional clearing of 136.3 ha of endangered ecological communities. Opportunities should be considered to expand biodiversity offset areas and to secure their long-term protection.

The submission received from OEH indicates that OEH consider the offset strategy for this Project suitable to the biodiversity to be impacted by the Project. The Biodiversity Offset Strategy includes long-term protection of 767.5 hectares in addition to the 437 hectares within existing offset sites. The mechanism to achieve the long-term protection objective will be determined in consultation with DP&E, OEH and DotE.

Consent for the project must provide public access to the results of ecological monitoring undertaken on the site, and ensure publication of results in scientific journals.

The outcomes of the ecological monitoring program will be reported in the Annual Review and be made available on the Mount Owen website.

Flora and Fauna management plans and practices must be subject to periodic peer review processes to ensure that best biodiversity management practice at the mine is being maintained.

Mount Owen will incorporate the relevant strategies from the existing Mount Owen Complex Flora and Fauna Management Plan into a revised and consolidated Landscape Management Plan should the Project be approved. The Landscape Management Plan will be reviewed and updated within 12 months of any Project approval. The Landscape Management Plan will be prepared in consultation with OEH and DRE and be prepared to the satisfaction of DP&E.

4.7.2.4 North East Forest Alliance

The EIS resorts to "related" communities and "substitute ratios" to offset the destruction of an area of EEC acknowledged to be irreplaceable. In the end, notwithstanding all this weakening of offset principles, there is still a very significant deficit in the offset area for the Central Hunter Ironbark Spotted Gum Grey Box Forest EEC.

The matters raised in this submission have been addressed in the response to the OEH submission in **Section 4.7.1.1**.

The submission received from OEH indicates that OEH consider the offset strategy suitable to the biodiversity to be impacted by the Project.

The EIS claims "The Cross Creek Offset Site provides targeted 'like for like' vegetation and threatened fauna habitats." It manifestly does not do so.

As discussed above, the Cross Creek Offset Site was selected in the Offset Strategy due to the existing areas of Central Hunter Ironbark – Spotted Gum - Grey Box Forest EEC and the available grassland that would have previously supported this community. The active regeneration of the site will result in an increase in this community and provide a gain in the extent of the community in the Hunter, rather than simply conserving existing remnants while removing the community from the Proposed Disturbance Area. The regeneration of Central Hunter Ironbark – Spotted Gum - Grey Box Forest EEC coupled with the conservation of existing remnants of the community will result in a 3.3:1 offset ratio for the Project.

The listing process is also an inadequate measure of irreplaceability because with respect to vegetation, it is based on floristics – vegetation type – not structure or condition. For the Hunter Valley, and especially the Valley Floor, sizeable mature forest and woodland remnants on private land are especially rare, and provide critical fauna habitat and resources, regardless of the particular floristics which determine whether listing criteria are met.

These comments are noted. Mount Owen cannot comment on the listing process of threatened species and communities.

The requirement that offsets should be local has never really been applied, and now seems abandoned entirely. Since 'like-for-like' communities are scarcely to be found locally, or anywhere for that matter, in the Hunter, the strategy in this EIS is "to seek non-local areas where long-term protection can be more readily afforded to the same and 'related' vegetation communities."

Moreover, even offset areas set aside for protection, generally as feeble, inadequate compensation, may be subsequently permitted for mining, as has occurred with this Mount Owen Mine, and a number of others.

The Project has been designed to avoid any disturbance of the existing Biodiversity Offset Areas and the Ravensworth State Forest.

The Ecological Assessment and Offset Strategy was prepared in accordance with the *NSW OEH Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI)* (OEH 2011), the *Principles for Biodiversity Offsetting in NSW* (OEH 2013) and *the EPBC Act Environmental Offsets Policy* (DSEWPC 2012) which were applicable at the time of preparation of the report. These policies do not require offsets to be located within the same locality as the proposed development. It is noted however that, two of the proposed offsets, the Cross Creek Offset Site and Stringybark Creek Corridor Offset Site, are immediately adjacent Mount Owen holdings and the Project.

The Esparanga Offset Site is located 60 kilometres to the north-west of the Project Area. A significant biodiversity asset of the Esparanga Offset Site comes from its position in the landscape, particularly its proximity to Manobalai Nature Reserve and its location within the corridor proposed as part of the Great Eastern Ranges Initiative developed by State and Federal agencies as a priority strategic biodiversity conservation area. The inclusion of the Esparanga Offset Site as part of the Biodiversity Offset Strategy is of strategic benefit as securing privately owned land in this corridor for conservation purposes is a major conservation priority for the NSW Government.

4.7.2.5 Hunter Environment Lobby

Some fauna species are overlooked in the EA introductory overview that are subject to an assessment later in the document, namely, the Green and Golden Bell Frog (GGBF) which is known from the Project Area as recently as 2009; the Koala, Common Bentwing Bat, Little Bentwing Bat, Large-eared Pied Bat, Flame and Scarlet Robins, Black-chinned Honeyeater, Powerful Owl which have also been recorded from the Project Area. In addition, one threatened flora species is known from Ravensworth State Forest Ozothamnus tesselatus and may be subject to a significant impact.

The Executive Summary of the Ecological Assessment aims to provide a brief overview of the key ecological impact assessment outcomes for the Project. All of the species outlined above have been addressed in detail in Section 4.1.5, 4.2.4 and in the assessments of significance in Appendix E and F of the Ecological Assessment.

All mature native vegetation will be removed to the west of the main corridor running south from Ravensworth Forest, including one section of a minor stream, except for a small patch of vegetation to the north-east of the Disturbance Area and south of the state forest totalling about 50 ha. At one point, 2/3 of the width of the corridor will be removed, to the west and adjacent to the Southern Biodiversity Area Corridor which contains only scattered trees and some regrowth. In terms of effective corridor width (as defined under the BioBanking Assessment Methodology) this is an effective 100% removal of the corridor width in this location.

It is acknowledged that an area of existing connectivity to the south of the North Pit will be partially removed as a result of the Project. This has been assessed, particularly in relation to impacts on the spotted-tailed quoll (Dasyurus maculatus), in the 7 Part Tests of Significance in Appendix E and Assessments of Significance in Appendix F of the Ecological Assessment. The planned staging of the Project will see this corridor remain intact until the Stage 3 (Year 10) expansion into this area. The existing Biodiversity Offset Areas to the south of Ravensworth State Forest (TSR Offset, Southeast Offset and Southeast Corridor Offset) will not be directly impacted as a result of the Project, which will retain connectivity from the New Forest Area and Ravensworth State Forest in the north to woodland habitats along Main and Glennies Creek in the south.

HEL have commented on a range of matters regarding the fauna survey effort undertaken by Umwelt for this assessment. These are addressed below, both in regard to the overall survey effort and for specific species survey requirements as raised by the HEL submission.

Overall Fauna Survey Effort

Umwelt survey effort was primarily focused on the areas proposed to be disturbed as a result of the Project and were undertaken in consideration of the DEC (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft*.

Umwelt fauna surveys were undertaken over seven survey periods in 2011, 2012, 2013 and 2014 and included Elliot, cage and harp trapping, hair funnel surveys, spotlighting, call playback, echolocation recording, diurnal bird searches and herpetological surveys. Targeted surveys were also undertaken for green and golden bell frog (*Litoria aurea*), swift parrot (*Lathamus discolor*) and regent honeyeater (*Anthochaera phrygia*). These were undertaken at two 'general fauna sites' within woodland and riparian habitats and within other various targeted locations within and surrounding the Proposed Disturbance Area (refer to **Figure 4.9**). In addition to this, targeted species surveys undertaken as part of the Upper Hunter Strategic Assessment within the Mount Owen Complex (including remote camera surveys, green and golden bell frog surveys, koala Spot Assessment Technique (SAT) surveys) were incorporated into the results of the Ecological Assessment.

In addition to Umwelt surveys, annual ecological monitoring has been undertaken (and continues to be undertaken) over the last 20 years in similar habitats within the wider Project Area (refer to **Figure 4.9**), providing substantial data on the presence of fauna species in Proposed Disturbance Area and the locality. The annual monitoring surveys have allowed for all seasonal requirements and utilised a wide range of sampling techniques, resulting in the development of a substantial data set from which a detailed assessment of the range of fauna species that occur in the Mount Owen Complex can be made, including threatened, cryptic and rare species. Many of these species are difficult to detect during project-specific surveys due to limitations in survey timing, seasonality and duration. Although survey effort for the wider 1,300 hectare Project Area was not required for purposes of this assessment, the use of the annual monitoring survey data was integral to provide contextual information on the habitats and species occurring in the locality. One general fauna survey location and two micro-bat survey locations for annual monitoring occur within the Proposed Disturbance Area.

The overall survey effort and ecological data considered in the Ecological Assessment is more than sufficient to assess the Project's predicted impacts on these species and satisfies the recommendations in DEC (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft.* It is also noted that OEH did not raise any concerns regarding the level of survey effort undertaken for the Ecological Assessment.

Location of Fauna Survey Sites and Stratification

Three stratification units relevant for terrestrial fauna survey effort were identified in the Proposed Disturbance Area, being woodland/forest, riparian and grassland habitat. Two 'general fauna sites' were established each within the woodland/forest and riparian habitats. The survey techniques undertaken within the 'general fauna sites' included Elliot, cage and harp trapping, hair funnel surveys, spotlighting, call playback, echolocation recording, diurnal bird searches and herpetological surveys. In many cases, these survey techniques require certain habitat features in order to be effective, such as trees for arboreal traps, fly-aways for echolocation recording, water resources for frog surveys or rocks and logs to target reptile

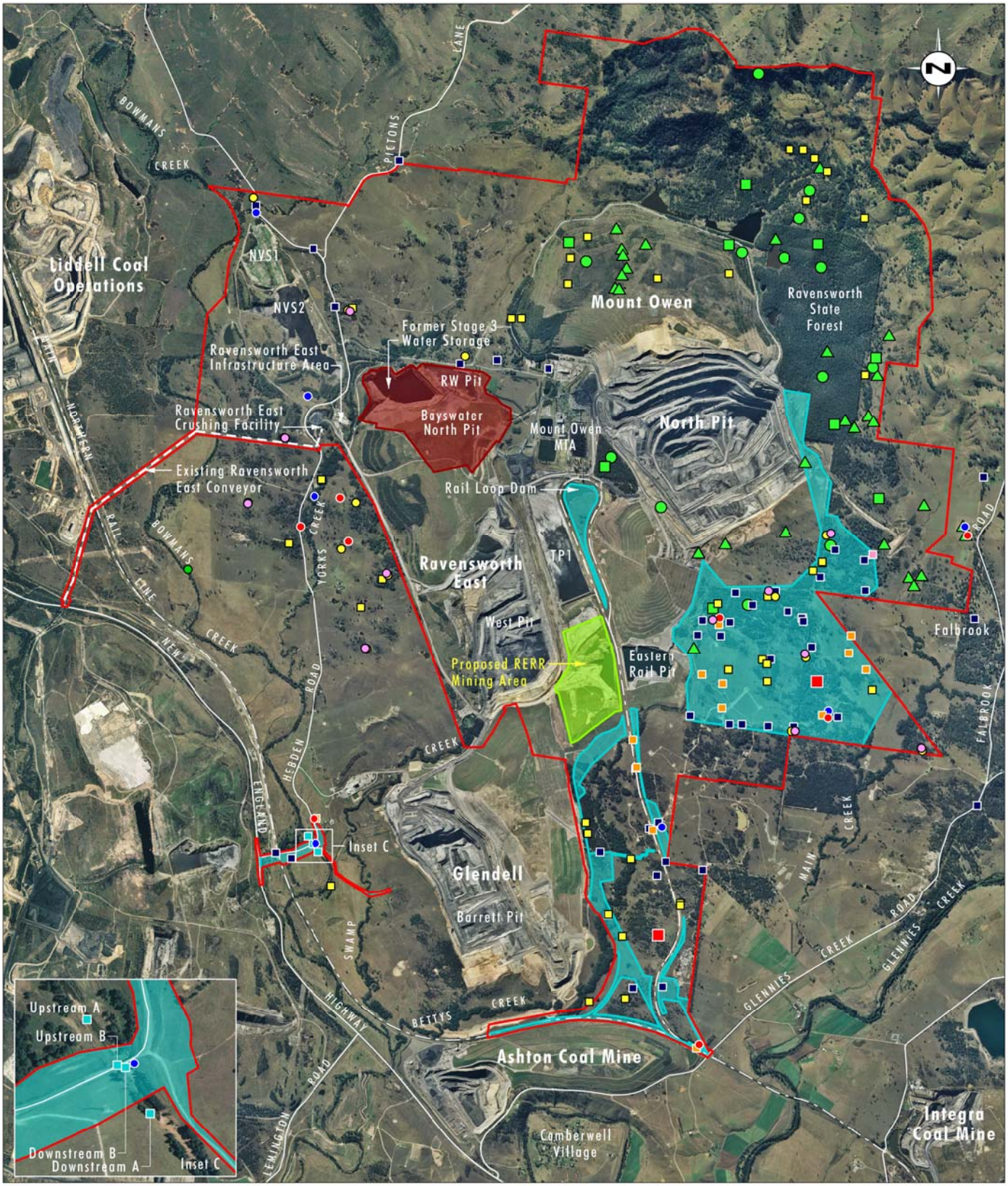


Image Source: Mount Owen (2012-2013)
Data Source: Mount Owen (2014)

0 1 2 3km
Main Scale 1:60 000
0 150 300 450m
Inset Scale 1:10 000

Legend

- Project Area
- Proposed Disturbance Area
- Bayswater North Pit
- Proposed RERR Mining Area

Targeted Fauna Survey:
- Green and Golden Bell Frog Survey
- Habitat and Condition Assessment
- Aquatic Survey Site
- Diurnal Bird Survey
- Swift Parrot and Regent Honeyeater Survey

General Fauna Survey Site:
- Terrestrial and Arboreal Elliot Trapping
- Terrestrial Cage Trapping
- Harp Trapping
- Terrestrial and Arboreal Hair Funnel
- Diurnal Bird Survey
- Diurnal Herpetological Survey
- Spotlight Survey
- Nocturnal Call Playback Survey
- Micro-bat Echolocation Recording

UHSA Targeted Fauna Survey:
- Green and Golden Bell Frog Survey
- Koala SAT Survey
- Micro-bat Echolocation Recording
- Red Goshawk Black-breasted Buzzard Survey
- Remote Camera Survey

Current Monitoring Locations:
- Targeted Frog Survey Location
- Targeted Microbat Survey Location
- General Fauna Survey Location

FIGURE 4.9

Fauna and Aquatic Survey Effort

File Name (A4): R06/3109_1005.dgn
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species. Although the grassland areas were not subject to a 'general fauna site, the survey effort in these areas focused on targeted species surveys such as broadcasting nocturnal bird calls and spotlighting.

As the Project has sought to reduce its impacts on quality habitats throughout the Project Area, there was little availability of suitable habitats for targeted species surveys within parts of the Proposed Disturbance Area. Due to the fragmented nature of the vegetation, and the Proposed Disturbance Area effectively avoiding most areas of high quality, mature vegetation, the Proposed Disturbance Area alone was unlikely to provide an accurate representation of the species that could potentially be impacted by the Project. Accordingly, one Umwelt 'general fauna site' was located in higher quality woodland habitat adjacent to the rail loop component of the Proposed Disturbance Area. As fauna species are generally mobile, Umwelt consider that the survey results from this area of adjacent habitat provided an appropriate indication of the species likely to occur in the Proposed Disturbance Area.

Survey Techniques and Effort Across the Proposed Disturbance Area

Hair Funnel and Spotlighting Effort in Stratified Units

Arboreal hair funnel surveys and spotlight surveys were undertaken in two stratified habitats being woodland/forest and riparian habitat, which meets the guidelines for these stratification units. Although this excludes the third stratified habitat unit, being grassland, arboreal hair funnels and substantial spotlighting efforts would not have been appropriate due to the lack of trees. The above discussion on the location of 'general fauna survey' sites, and the treatment of habitat stratification units is also relevant to this issue.

Remote Camera Survey Effort and Appropriateness for Spotted-tailed Quoll

Remote camera surveys were undertaken as part of the Upper Hunter Strategic Assessment surveys that occurred within and surrounding the Proposed Disturbance Area and were not specifically targeted for the Mount Owen Project. These surveys targeted the brush-tailed phascogale as targeted surveys were required for species-credit species under BioCertification. The cameras were mounted to trees however were positioned in a way to direct the camera to bait on the ground. This was appropriate for both brush-tailed phascogale and the spotted-tailed quoll. Based on the extensive spotted-tailed quoll data from radio-tracking surveys undertaken during annual monitoring, the spotted-tailed quoll was considered highly likely to occur in the Proposed Disturbance Area and the impact assessment assumed its presence in the Proposed Disturbance Area. The spotted-tailed quoll was successfully recorded on one of the cameras set up within the Proposed Disturbance Area, confirming this assumption. These results were relevant to the impact assessment for the Project and therefore reported on in the Ecological Assessment.

Twenty remote cameras were distributed over the Mount Owen, Liddell and Ravensworth mines during these surveys, with nine occurring within and around the Mount Owen Complex. Five cameras were located within the Proposed Disturbance Area in March and April 2014 totalling 117 trap nights. It is noted that remote camera surveys are not described or required in DEC (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft.*

Koala SAT Surveys

Koala Spot Assessment Technique (SAT) surveys were also carried out for the UHSA that occurred within and surrounding the Proposed Disturbance Area and were therefore not specifically targeted for the Project. Annual monitoring surveys have also been undertaken since 1996 in the Proposed Disturbance Area and within Ravensworth State Forest, providing almost 20 years of continuous fauna monitoring across the site. These surveys are

undertaken in accordance with the DEC (2004) survey guidelines and include methods to detect koalas such as spotlighting surveys, cage trapping and call playback surveys. Despite almost 20 years of monitoring surveys within Ravensworth State Forest (including within the Hunter Lowland Red Gum Forest EEC), the koala has not been recorded in this area utilising the habitats of this community.

Sonar-recording Survey Effort

An Anabat device was placed in each applicable stratified habitat including two within riparian habitats (6.0 hectares) and four (including one adjacent to a dam) within forest/woodland habitat (217.7 hectares). The devices were left between two and four nights, adequately meeting the recommendations in DEC (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft.*

Diurnal Bird Survey Effort

In addition to the three diurnal bird survey locations, 42 targeted surveys were undertaken for swift parrot and regent honeyeater in August 2011, July 2012 and July 2014. These surveys targeted areas of woodland habitat and consisted of one person hour of survey in a walking transect in a two hectare area. These surveys also recorded any other bird species occurring within the walking transect and are considered to be applicable in the general diurnal bird survey assessment. In addition to these surveys, there is ongoing annual monitoring of similar habitats within the Project Area and the results of these surveys have been considered in the Ecological Assessment. Flowering events for eucalypt species are cyclic and do not always occur every year, or at the same time each year. It is known that prolific flowering occurred in 2005 and 2007 when the swift parrot was recorded within Ravensworth State Forest. Although there were no major flowering events in the years when Umwelt undertook targeted winter bird surveys, it was considered important that surveys were undertaken regardless, to help to determine the usage of the habitats across the site by these species, should they be recorded there.

Nocturnal Bird Survey Effort

In addition to the nocturnal bird surveys undertaken specifically for the Project, nine fauna survey sites are routinely sampled as part of the annual fauna monitoring within Mount Owen Complex with one fauna survey site located within the Proposed Disturbance Area. These surveys include call playback sessions for the powerful owl, masked owl and barking owl. These monitoring surveys have been undertaken for almost 20 years where both the masked owl and powerful owl have been successfully detected, primarily in the northern areas of the Mount Owen Complex. The results from these were incorporated into the Ecological Assessment. As a precautionary measure, 7 Part Tests of Significance under the EP&A Act were undertaken for both the masked owl and powerful owl for the Project.

Green and Golden Bell Frog Survey Coverage and Effort

HEL notes that the larger water body on the western edge of Ravensworth State Forest was not surveyed. This area was not able to be safely accessed during the Umwelt surveys undertaken for this assessment and was therefore not surveyed. Frog surveys were undertaken following light rain events (up to 2.7 mm) and warm days (30.5 degrees) experienced around Singleton on the 15 and 17 March 2014 (BoM 2014). Tadpole surveys were not undertaken by Umwelt during the surveys undertaken for this assessment however these surveys, as well as diurnal searches and nocturnal call playback and spotlighting, are carried out extensively across the Mount Owen Complex as part of the annual monitoring surveys that have been undertaken since 1996 across the site . The results of these surveys are incorporated into the Ecological Assessment.

As a general statement, the assessments of significance undertaken by Umwelt seem to be poorly done, with a poor interpretation of terms contained within the Commonwealth criteria, particularly the term "occupancy". The failure to use the criteria as defined by the NSW Assessment of Significance guidelines is also central to the failure to identify a significant impact for a large number of species.

HEL considers that the EA vastly under-estimates the significant impact of the Project on threatened species recorded in the area.

When assessing whether the Project would 'reduce the area of occupancy' of a species or an important population under the Significant Impact Guidelines 1.1 (DotE 2013), the Assessments of Significance described, in detail, the known and potential occurrence, and therefore occupancy, of a species or important population in the Proposed Disturbance Area and the wider locality. All Assessments of Significance followed the significant impact criteria as outlined in these guidelines and carefully addressed the specific criteria and terminology to determine the potential significant impact on these species. Additionally, the precautionary principle was consistently applied when assessing the potential impacts of the Project on threatened and migratory species and communities. Where there was lack of scientific certainty, the maximum potential impact was assumed. The Assessments of Significance do not take into account the range of impact mitigation strategies and biodiversity offsets proposed for the Project, rather they consider the impacts of the Project without any mitigation or offsetting, consistent with the requirements of both State and Commonwealth significant impact assessment guidelines.

The Ecological Assessment acknowledges that the Project will result in the loss of a substantial and important area of habitat for a range of woodland-dependent threatened fauna species recorded in the Proposed Disturbance Area and wider Project Area. As detailed in Section 5.7.5 of the EIS, the Project is considered likely to result in significant impact (under the EP&A Act but not the Commonwealth EPBC Act) on the spotted-tailed quoll (*Dasyurus maculatus*) and squirrel glider (*Petaurus norfolcensis*) and potentially result in a significant impact (under the EP&A Act but not the Commonwealth EPBC Act) on masked owl (*Tyto novaehollandiae*), brown treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*), speckled warbler (*Chthonicola sagittata*), grey-crowned babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*), varied sittella (*Daphoenositta chrysoptera*), hooded robin (south-eastern form) (*Melanodryas cucullata cucullata*), diamond firetail (*Stagonopleura guttata*), brush-tailed phascogale (*Phascogale tapoatafa*), yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*), east coast freetail-bat (*Mormopterus norfolkensis*), southern myotis (*Myotis macropus*), greater broad-nosed bat (*Scoteanax rueppellii*) and Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC.

Umwelt does not consider that this assessment under-estimates the impacts of the Project.

Umwelt have stated that their objective was a Tier 3 outcome due to the lack of suitable 'like for like' offsets on the market or available in the Hunter Valley. While the decrease in the availability of central Hunter ecosystems is a fact due mainly to ongoing mine expansion, there is in excess of approximately 30,000 ha of central Hunter box/ironbark/spotted gum vegetation on private land.

It is not known where the figure of 30,000 hectares used in the submission was derived however it is noted that the area of Central Hunter Ironbark – Spotted Gum - Grey Box Forest EEC estimated by Peake (2006) was only 26,000 hectares and much of this is not located on private land. Glencore have made a number of attempts over the years to acquire additional woodland areas in the valley floor but the availability of suitable offset habitat is limited. Most occurs in small, discontiguous parcels under different ownership, meaning that their consolidation into manageable offset areas would be very difficult and would have lesser conservation outcomes than the offsets identified as part of the Offset Strategy.

It is also noted that offsetting policies are increasingly encouraging the concept of 'environmental gain' in offset strategies by including poorer quality sites with developers committing to improve and increase woodland vegetation to provide a gain in woodland habitats in the locality, while also acknowledging the importance of protecting high quality sites that provide good connectivity and existing quality habitats. The Mount Owen Offset Strategy includes both these elements of offsetting including the environmental gain through revegetation and improvement of adjacent lands (Cross Creek and Stringybark Creek Corridor) and conserving existing high quality habitats at the Esparanga Offset Site. As discussed above, while the proposed Esparanga Offset site is located over 60 kilometres from the Project area and contains similar but not like vegetation communities, improved conservation of high quality woodland in this area is considered of high value due to the strategic biodiversity importance in establishing a permanent conservation corridor along the entire length of the Great Dividing Range.

The EA does not provide a Biometric analysis of the vegetation communities to be impacted by the Project.

According to the OEH contribution to the DGRs, the Project could be assessed using either the BioBanking Assessment Methodology (Scenario 1) ***or*** a detailed biodiversity assessment (Scenario 2). The Project was assessed under Scenario 2 and therefore was not required to provide BioMetric analysis under the BioBanking Assessment Methodology (BBAM).

For the vegetation community with the biggest impact, Spotted Gum Ironbark Forest (159.3 ha), the offset package only provides for 51.7 ha of 'like for like' offset, and 151.9 ha at the same formation level. This is less than 1:1 and does not meet the Tier 3 requirement.

The impacts on Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC will be offset with 525.1 hectares of existing Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC and grassland areas that will be actively regenerated into the same community. Both the existing 51.7 hectares of forest to be offset and the 473.4 hectares to be actively regenerated are part of the Biodiversity Offset Strategy for the Project which provides an offset ratio of 3.3:1 which exceeds the Tier 3 requirement of a 2:1 offset ratio.

As noted above, almost all of the Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC in the Hunter Valley floor (including the areas to be impacted by the Project) is regrowth from previously cleared agricultural land; much of this regrowth has occurred through passive management rather than active management. Accordingly, there is a high degree of confidence the grassland areas in the proposed Cross Creek and Stringybark Creek Offset Areas can be actively regenerated to Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC in a relatively short timeframe.

Mount Owen has also had previous success regenerating Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC in mine rehabilitation and the New Forest Area adjacent to the Cross Creek Offset Site and Stringybark Creek Habitat Corridor.

For the Forested Wetland types (Swamp Oak and River Oak), 0.5 ha of 'like for like' is provided and 1.5 ha provide at the same formation level. This is less than 1:1 and does not meet the Tier 3 requirement.

This community is not predicted to be significantly impacted by the Project. While not directly offset, it is noted that the revegetation and conservation of the proposed Cross Creek and Stringybark Creek offset areas is likely to significantly improve the ecological quality of the creek systems within and immediately downstream of the proposed offset sites and this is likely to benefit swamp oak and river oak growing in these creek lines. Other riparian habitat types such as River-flat Eucalypt Forest EEC will be regenerated along Stringybark Creek which totals an offset of 16.5 hectares (or a 2.75:1 offset ratio, which meets the Tier 3

requirement) for this habitat type. The use of vegetation communities of a similar type (or a type of higher conservation priority) is consistent with OEH's *NSW Offset Principles for Major Projects (state significant development and state significant infrastructure)* seven principles.

For the Derived Grassland type, there are 374.1 ha provided on a 'like for like' basis and a total of 475.5 ha provide at a formation level. This is less than 2:1 and does not meet the Tier 3 requirement.

The 465.5 hectares of Derived Native Grassland within the offsets have been included as offsets for woodland communities as Mount Owen have committed to active regeneration in these areas to provide a gain in the woodland community habitats in the Hunter Valley. Prior to this regeneration, the offset sites provide a 2:1 offset ratio to offset the impact of 223.1 hectares of Derived Native Grassland within the Proposed Disturbance Area as per the Tier 3 requirement. Regeneration of these grassland communities to woodland communities is a highly desirable outcome and will provide significant ecological gains in these areas which will offset the removal of like vegetation communities in the Proposed Disturbance Area. As noted earlier, there is a high degree of confidence based on evidence that these areas can be successfully returned to woodland habitats similar to that which will be impacted by the Project.

In October 2013 the Commonwealth determined that there would be a significant impact on the Spotted-tailed Quoll, Regent Honeyeater, Swift Parrot and perhaps several other entities. As a result it was called in by the Commonwealth as a controlled action for determination by the Minister.

The Project was given to the state to assess as an "Accredited Assessment" under the EP&A Act. However, in the MNES assessment (Supplementary DGR Report) given to the state government in October 2014 Umwelt maintained there would be no significant impact on MNES using the Commonwealth guidelines.

HEL considers this conclusion is in error.

The Project is likely to have significant impact on [the spotted-tailed quoll] using the Commonwealth criteria.

The Assessment of Significance under the EPBC Act acknowledges that the Proposed Disturbance Area contains a small population of the spotted-tailed quoll likely to comprise part of a regional population centred on the Barrington Tops southern and western footslopes. The species has only been occasionally recorded in the southern areas of the Mount Owen Complex despite many years of annual fauna monitoring and radio-tracking surveys for the species. The core habitat for the species within the Mount Owen Complex appears to be in Ravensworth State Forest and although habitats within the Proposed Disturbance Area are known to provide some habitat, it was not considered critical to the survival of the local population. Despite this conclusion, the Offset Strategy for the Project has taken a precautionary approach and has focused on securing known and potential habitat for this species both locally and in the broader region.

The Project is likely to have significant impact on [the swift parrot] using the Commonwealth criteria. Of note is Umwelt's assessment of significance of impact using the Commonwealth criteria state that because it only breeds in Tasmania that no significant impact was likely.

The Assessment of Significance under the EPBC Act acknowledges that the Proposed Disturbance Area is considered to form part of a regional dispersal route close to important winter foraging areas in the lower Hunter Valley for the swift parrot. The area is identified as potential foraging habitat for the species but unlikely to disrupt the breeding cycle of the population as the species exclusively breeds in Tasmania. Although the species was not identified as being significantly impacted, the Offset Strategy for the Project will secure known and potential foraging habitat for the species locally and in the broader region.

The local extinction of [green and golden bell frog] has not yet been verified. The proposed new pit will isolate known sites for this species making any possible future dispersal more difficult for this species. The isolation of known habitat locations will detract from the ongoing viability of this species.

The Assessment of Significance under the EPBC Act acknowledges that the Project will remove dams and associated terrestrial habitat that provide potential habitat for the species and is likely to contribute to the ongoing fragmentation of remaining potential habitat areas within the Project Area. The present occurrence of the species in the Project Area is unknown as the species has not been positively identified at the site in 12 years, despite extensive annual and targeted monitoring for the species. The Project does not propose the disturbance of historical known habitat of the species, only potential habitat.

The Commonwealth's Offset Policy (2012) makes it a requirement that any offset package should be consistent with a number of objectives.

The Policy states that 'land-based outcomes' must constitute 90% of the offset outcomes, with the other 10% being provided in 'in-kind' measures which will benefit the conservation of any particular species through research or other recovery actions. No additional measures are being put forward in the Biodiversity Offset Strategy.

Report B addresses issues raised by the Commonwealth DotE which include considerations of the Commonwealth Offset Policy.

HEL is concerned that under this policy a lot of weight is given in the assessment to rehabilitation outcomes which can constitute part of the land-based outcome.

It is noted that it is not the responsibility of Mount Owen to justify the requirements of NSW policy.

Notwithstanding, as shown by Table 5.7.4 of the EIS, the proposed offset strategy provides a significant offset without the inclusion of rehabilitation. Additionally, it should be noted that, as per discussions with OEH and DP&E, rehabilitation is not assigned the same weighting on offset calculations as the regeneration of woodland in areas not directly impacted by mining. Despite the commitment requiring the full area of proposed rehabilitation to be revegetated, only 50 per cent of the total area of the rehabilitation counts towards the overall offset calculations (refer to **Table 5.7.5** of the EIS).

Mount Owen has had considerable success in mine rehabilitation and re-establishing vegetation communities. An assessment of mine rehabilitation and regeneration activities at Mount Owen was undertaken (Umwelt 2013b) to report on the ecological value of the rehabilitated vegetation communities, particularly in the context of vegetation community re-establishment and threatened species habitat. The assessment of the ecological values of rehabilitated formerly mined land and those areas that have been subject to vegetation community and fauna habitat reconstruction programs demonstrates that rehabilitated land can create quality vegetation communities and fauna habitats that includes threatened fauna species and EEC habitat. Accordingly, it is considered appropriate that rehabilitated land is included as part of the offset package, particularly given it encourages better biodiversity outcomes as part of the mine site rehabilitation process.

As previously noted, there is a high degree of confidence that both passive and active revegetation works in the other land based offset sites will result in significant biodiversity improvements given the fact that most of the 'remnant' woodland vegetation in the Hunter Valley floor has regenerated from land previously cleared for agriculture.

In addition to this, the offset strategy also conserves a large area of existing high quality woodland habitat at the Esparanga Offset Site. While the Esparanga Offset Site is located 60 kilometres to the north-west of the Project Area, it has significant biodiversity values due to its position in the landscape, particularly its proximity to Manobalai Nature Reserve and its location within the corridor identified as part of the Great Eastern Ranges Initiative. The site includes known habitat for a range of threatened species including the spotted-tailed quoll.

4.7.3 Community Submissions

The potential impact of the Project on flora, fauna and their habitats were raised in 13 community submissions.

The issues raised in the community submissions, with the relevant responses, have been summarised below:

It is not acceptable that Mount Owen Mine has been allowed to mine having a significant impact over a 20 year period. The current Project will disturb an additional 485 ha including 136.6 ha of endangered ecological communities (EEC), with mature component including hollows and habitat for 29 threatened fauna species such as the spotted-tailed quoll and the swift parrot. Further decline is likely to result in extinction regionally, because of progressive loss of habitat and resources.

The additional disturbance area associated with the Project (Proposed Disturbance Area) is approximately 485 hectares. Approximately 381 hectares of this is associated with the North Pit Continuation and approximately 104 hectares is associated with the proposed infrastructure upgrades. The Ecological Assessment undertaken to support the EIS was a detailed study that aimed to assess the impacts of the Project on the local biodiversity features of the Mount Owen Complex. Key factors in Project design have been to ameliorate the impacts on significant ecological features, such as threatened species, endangered populations, threatened ecological communities and/or their habitats. The approach to this has been to avoid ecological impact and maximise use of existing disturbed areas as much as possible. In addition to actions undertaken by Mount Owen to avoid and minimise impacts on ecological values, significant impact mitigation measures and a Biodiversity Offset Strategy are proposed to ameliorate the residual significant impacts of the Project on ecological values.

As discussed in Section 4.2.4 of the Ecological Assessment, the Proposed Disturbance Area contains known habitat for the threatened spotted-tailed quoll (*Dasyurus maculatus*) and potential foraging habitat for the swift parrot (*Lathamus discolor*). The spotted-tailed quoll has been recorded occasionally in the Proposed Disturbance Area (including more recently during remote camera surveys), however the core habitat for the species is known to occur within Ravensworth State Forest and the northern portions of the Mount Owen Complex. Additionally, the swift parrot has been recorded on three occasions foraging within the quality forested habitats of Ravensworth State Forest, but not within the Proposed Disturbance Area, although potential habitat does occur there. The Ecological Assessment acknowledges that the Proposed Disturbance Area contains known and potential habitat for a range of threatened species occurring in the locality.

There should be no further loss of remnant high conservation value forest and woodland in the already-disgracefully over-cleared Hunter Valley, especially the Hunter Valley Floor. The Director-general's requirement that an offset strategy ensure improved biodiversity outcomes is clearly not met. It has been estimated that an 84.6ha deficit exists regarding the environmental offset areas in this latest proposal.

Current offsetting policies encourage the concept of 'environmental gain' in offsetting strategies by including poorer quality sites with developers committing to improve and increase woodland vegetation to provide a gain in woodland habitats in the locality. The proposed Mount Owen Offset Strategy includes this through the revegetation and improvement of the Cross Creek Offset Site and the Stringybark Creek Corridor Offset Site.

The active regeneration of these sites will result in an increase in woodland habitats and provide a gain in the extent of habitats in the Hunter. The regeneration of these sites coupled with the conservation of existing remnants of forest and woodland habitats will result in a 3.4:1 offset ratio for the Project on woodland impacts.

The Project identified the need for a comprehensive Biodiversity Offset Strategy to compensate for the residual significant impacts that could not be avoided or mitigated. As discussed in Section 7.8 of the Ecological Assessment, the Mount Owen Biodiversity Offset Strategy is compliant with the *Principles for Biodiversity Offsetting in NSW* (OEH 2013) and the *EPBC Act Environmental Offset Policy* (DSEWPC 2012).

It is also noted that the submission received from OEH indicates they consider the offset strategy suitable to the biodiversity to be impacted by the Project.

Endangered Ecological Communities must be offset by like communities and if this is not possible, then the project should not proceed.

Where possible, vegetation communities to be impacted have been offset with the same vegetation communities, commonly referred to as using 'like-for-like' communities. However like-for-like communities are not readily available for offsetting in the Hunter Valley at the scale required for the Project. In the Hunter Valley, suitable land based offsets are not always available that contain the same vegetation communities that will be impacted by a development. Central Hunter Ironbark – Spotted Gum - Grey Box Forest EEC is proposed to be offset with 51.7 hectares of existing Central Hunter Ironbark – Spotted Gum - Grey Box Forest EEC and 359.1 ha of grassland that would have previously supported this community that will be actively revegetated to return these areas to the EEC. It is acknowledged that regeneration activities will not provide immediate environmental gain for the community, but it is also not possible to do so either by conserving existing remnants or by regenerating woodlands.

As discussed above, the proposed Mount Owen Biodiversity Offset Strategy is compliant with the *Principles for Biodiversity Offsetting in NSW* (OEH 2013) and the *EPBC Act Environmental Offset Policy* (DSEWPC 2012). It is also noted that the submission received from OEH indicates they consider the offset strategy suitable to the biodiversity to be impacted by the Project.

It is unacceptable that areas set aside for protection as offsets should subsequently be mined, as has occurred at Mount Owen. It is unacceptable that the offset mechanism should be applied fraudulently, resorting to "related" communities, contrived "substitution ratios", cleared grassland becoming over time mature woodland EEC, and regeneration "trending towards the EEC", and other such nonsense, to pretend the EEC is thus offset.

Disturbance and vegetation clearing associated with the existing site approvals has been subject to the establishment of Biodiversity Offset Areas. The Proposed Disturbance Area for this Project avoids disturbance of the established Biodiversity Offset Areas and avoids disturbance of the Ravensworth State Forest.

The approach to offsetting for the Project has sought to initially seek 'like-for-like' communities within the local area, subject to there being opportunities to afford them long-term protection and then to seek non-local areas where long-term protection can be more readily afforded to the same and 'related' vegetation communities. The use of related vegetation communities is only included where there is a robust ecological and conservation argument for the use of those communities, at a reduced ratio, in the offset package. As a result of the use of substitution ratios, a much larger area of land is required to offset an area of impact. The increase in the area of offset due to the use of substitution ratios has a significant indirect benefit for fauna and flora species that occur in the offset communities, increasing the area of conservation well above that achieved using like-for-like offsets.

An assessment of mine rehabilitation and regeneration activities at the Mount Owen Complex found that areas of revegetation and regeneration in the New Forest Area and Biodiversity Offset Areas conform to the scientific committee determination of Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC. As Mount Owen has had success regenerating Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC in mine rehabilitation in the New Forest Area adjacent to the proposed Cross Creek Offset Site and Stringybark Creek Corridor Offset site, it is reasonable to suggest that it is achievable in revegetating un-mined areas within the locality.

4.8 Aboriginal Archaeology and Cultural Heritage

4.8.1 Agency Submissions

4.8.1.1 OEH

OEH reviewed Appendix 13B of the EIS: Aboriginal Archaeological Values Assessment - Mount Owen Continued Operations Project, Near Ravensworth, Upper Hunter Valley, NSW, Singleton LGA. Prepared by Ben Churcher, OzArk Environmental & Heritage Management Ply Ltd, for Mount Owen Ply Ltd, October 2014, and concurs with the all the management recommendations provided. OEH has no additional comments with respect to Aboriginal cultural heritage associated with the proposed Mount Owen Continued Operations Project and recommends that the following conditions of approval for Aboriginal cultural heritage are reflected in any approval conditions for the Project.

Recommendation 1:
The proponent must consult with and involve all the registered local Aboriginal parties for the Project, in the ongoing management of the Aboriginal cultural heritage values. Evidence of this consultation must be collated and provided to the consent authority upon request.

Mount Owen will seek to establish an Aboriginal Cultural Heritage Working Group, to be formed within six months of Project approval which will include representatives of Knowledge Holder groups, the Project's Registered Aboriginal Parties (RAPs) and the Wanaruah LALC. Mount Owen will prepare and implement an Aboriginal Cultural Heritage Management Plan (ACHMP) for the Project in consultation with the working group and will include the Aboriginal Cultural heritage management measures to be implemented as part of the Project. This consultation process undertaken will be documented by Mount Owen.

Recommendation 2:
The proponent must update the existing Aboriginal Cultural Heritage Management Plan for the Project Area in consultation with the registered Aboriginal parties to detail procedures for managing all Aboriginal cultural heritage values associated with the project area. This process must be undertaken prior to commencing any ground disturbance or development works subject to the development.

As discussed above, and committed to in the EIS, Mount Owen will prepare and implement an ACHMP for the Project. The development of the ACHMP will be undertaken in consultation with representatives of the Knowledge Holder groups, the RAPs and the Wanaruah LALC. The preparation of the ACHMP is likely to be staged. No known sites will be impacted unless the management controls for the site are identified in the ACHMP and the controls are implemented.

Recommendation 3:
In the event that ground disturbance identifies any new Aboriginal objects within the Project Area, all works must halt in the immediate area to prevent any further impacts to the object(s). A suitably qualified cultural heritage specialist and representatives of the local Aboriginal community must be contacted to determine the nature, extent and significance of the finds.

The site is to be registered in the Aboriginal Heritage Information Management System (AHIMS) (managed by OEH) and the management outcome for the site included in the information provided to AHIMS. The proponent must consult with representatives of the local Aboriginal community, and the cultural specialist to develop an appropriate management strategy for all objects/sites which complies with the requirements of the National Parks and Wildlife Act 1974.

The ACHMP will include the measures required to be implemented as part of the Project Approval and the recommendations of the Aboriginal Archaeological Values Assessment and the Aboriginal Cultural Heritage Assessment. These management measures include strategies to be adopted in the event that a previously unidentified item of Aboriginal cultural heritage is found during operations. Different management strategies are identified for different site types. These strategies have been developed in consultation with RAPs and Knowledge Holders and further consultation on the strategies will be undertaken as part of the consultation process on the draft ACHMP.

Recommendation 4:
If human remains are located in the event that surface disturbance occurs, all works must halt in the immediate area to prevent any further impacts to the remains. The NSW Police are to be contacted immediately. No action is to be undertaken until the NSW Police provide written notification to the proponent. If the skeletal remains are identified as Aboriginal, the proponent must contact OEH's Environment Line on 131 555 and representatives of the local Aboriginal community. No works are to continue until OEH provides written notification to the proponent.

This is consistent with the management controls identified in the Aboriginal Archaeological Values Assessment (Appendix 13 B to the EIS) and is supported.

Recommendation 5:
All Aboriginal sites impacted by the project must have an Aboriginal Site Impact Recording form completed and be submitted to OEH's AHIMS Register within three months of being impacted.

Mount Owen will include the new sites identified in the Aboriginal Archaeological Values Assessment Report completed for the Project in the ACHMP. Sites identified in the Mount Owen ACHA have been recorded on site cards and submitted to OEH.

Mount Owen will complete Aboriginal Site Impact Recording forms for all sites impacted by the Project. Completed forms will be submitted to OEH's AHIMS register within three months of being impacted.

Recommendation 6:
An Aboriginal Cultural Education Induction Program must be developed for the induction of all personnel and contractors involved in the construction activities on site. Records are to be kept of which staff/contractors were inducted and when for the duration of the project. The program should be developed and implemented in collaboration with the registered Aboriginal parties.

Mount Owen is committed to revising the onsite induction program to include material to raise awareness of Aboriginal cultural values of the Project Area and local area more generally and this will be reflected in the ACHMP. The induction material will positively message the Aboriginal Cultural Heritage Values of the area. The induction materials and content will be developed in consultation with the Working Group.

4.8.1.2 Singleton Council

Council requests the Department ensures local aboriginal interests are protected.

The request to DP&E is noted. The preparation of the ACHA has included extensive consultation and involvement from the local Aboriginal community. Mount Owen is committed to continued engagement and involvement with the local Aboriginal community in the development and implementation of the ACHMP to be prepared for the Project to aid in the management of aboriginal interests.

4.8.2 Interest Group and Community Submissions

There were no interest groups or community submissions received in relation to the Aboriginal cultural heritage issues.

It is noted that extensive consultation was undertaken with the Aboriginal community during the preparation of the ACHA and EIS and details regarding this consultation are set out in the ACHA (Appendix 13A of the EIS).

4.9 Greenhouse Gas and Energy

4.9.1 Agency Submissions

There were no agency submissions received on greenhouse gas or energy issues.

4.9.2 Interest Groups

The Denman Aberdeen Muswellbrook Scone Healthy Environment Group (DAMS HEG), Hunter Communities Network and the Wybong Action Group raised similar issues relating to Greenhouse Gas and Energy. The comments raised have been summarised below with the relevant response.

The NSW Government and the coal mining industry have a responsibility to the economy and to society to move to investment in renewable energy sources to provide future jobs. The EIS does not assess the cost to the Hunter and NSW economy of the climate impacts caused by the production of the predicted additional 137,653,000 tonnes of CO2 equivalent.

The impact of the continuation of the Mount Owen Continued Operations Project will be felt in the medium and long term by all of us via climate change, which has not been considered

A detailed Greenhouse Gas and Energy Assessment was undertaken to consider emissions from the Project. The outcomes of this assessment are discussed in the EIS and the full Greenhouse Gas and Energy Assessment is attached to the EIS as Appendix 15.

The assessment included the following:

- Scope 1 emissions - primarily from the combustion of diesel and release of fugitive emissions as part of the construction and operation phase;
- Scope 2 emissions - associated with electricity used by the Project; and
- Scope 3 emissions - indirect emissions that will occur downstream of the Project and be generated by third parties during product transport and consumption activities, and represent approximately 96 per cent of the Project's greenhouse gas emissions.

Externalities from Scope 1 and Scope 2 emissions associated with the Project have been costed in the Cost Benefit Analysis and Economic Impact Assessment (Economic Assessment) (refer to Section 5.2.15 in the Economic Assessment, Appendix 17 of the EIS).

The assessment found that the Project is unlikely to impact National Greenhouse Gas Policy objectives due to the relatively small contribution the Project will make to National emissions on an annual basis.

4.9.3 Community Submissions

Greenhouse Gas and Energy issues were raised in seven community submissions.

The submissions, have been summarised below.

Full cost benefit accounting has been totally inadequate when the damage to the environment and the planet resulting from this Co2 emission has not been included in the assessment.

The project is estimated to generate 137,653,000 tonnes of CO_2 over 15 years of operation, the greenhouse gas contribution for this project has not been considered in any of the predictions.

No new mines or extensions should be approved, because of global warming.

As discussed in the previous section, a detailed Greenhouse Gas and Energy Assessment was undertaken to consider emissions from the Project. Additionally, externality costs associated with Scope 1 and 2 emissions from the Project have been costed in the Economics Assessment. The issues raised by the community in relation to CO_2 emissions and global warming are addressed in **Section 4.9.2**.

4.10 Traffic and Transport

4.10.1 Agency Submissions

4.10.1.1 TfNSW

TfNSW has undertaken a review of the documents associated with the Project and it is advised that the design of the proposed rail infrastructure works and network interface is to be resolved to the satisfaction of Australian Rail Track Corporation's (ARTC).

In addition, the proposed road improvement works on Hebden Road needs to accommodate the swept path of two largest design vehicles travelling in opposing direction. The design and construction of the road works including the preparation of construction traffic management plans should be in accordance with Austroads and Australian Standards and resolved to the satisfaction of Singleton Council and Roads and Maritime Services. The proposed rail overpass over the Main Northern Railway Line will also need to satisfy ARTC's requirements.

The above matters relating to the design of rail infrastructure and road improvement works should be resolved prior to determination and appropriate conditions included in the consent to the satisfaction of ARTC, Singleton Council and Roads and Maritime Services.

Mount Owen engaged Parsons Brinkerhoff to undertake the detailed design of the proposed Hebden Road upgrade works and during this process Mount Owen consulted the ARTC, RMS and Singleton Council on various design options and issues. A summary of the discussions with these authorities is provided below.

- Mount Owen met with ARTC in February and September in 2013 to discuss the proposed overpass. ARTC design and consent requirements were discussed in detail.

- Singleton Council were consulted numerous times during the development of the Project and in February 2013 met to review Council concerns and final designs. During this meeting, Council indicated that they were generally supportive 'in principle' of the design of the proposed Hebden Road upgrade works and ongoing consultation regarding the Project should continue. Council specifically identified issues regarding the grade of the road, the curve east of Bowmans Creek and the implications of flooding, and these have been taken into account in the concept design process.

- Mount Owen and Parsons Brinckerhoff also met with RMS in February 2013. The design of the proposed upgrade works and proposed tie-in with the existing intersection at the New England Highway was discussed and RMS agreed in principle with this approach. The constraints of the site and proposed grades were discussed and it was explained that adequate site distances would be achieved and that advisory signage would be provided. RMS indicated that a Traffic Impact Assessment and Construction Management Plan would be required for the Project. Additional consultation with RMS

has been undertaken since exhibition of the EIS and further detail on this consultation process is provided in **Section 4.10.1.2** below.

Mount Owen will continue to consult with ARTC, Singleton Council and RMS as part of the detailed design process which will continue should the Project be approved.

4.10.1.2 RMS

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

In accordance with the Roads Act 1993, Roads and Maritime has powers in relation to road works, traffic control facilities, connections to roads and other works on the classified road network. The New England Highway is a classified (State) road and part of the National Land Transport Network. Roads and Maritime concurrence is required for connections to this road with Council consent, under Section 138 of the Act. Council is the roads authority for this road and all other public roads in the area.

Roads and Maritime has reviewed the information provided and advises that additional information is required to enable Roads and Maritime to undertake a review in accordance with current legislation and relevant guidelines.

Roads and Maritime requires the applicant to provide a concept design of the road works proposed in Hebden Road, including the vertical alignment (long section) from the existing New England Highway intersection to the proposed new bridge over Bowmans Creek, to Roads and Maritime for review.

Roads and Maritime will provide further advice and/or requirements on receipt and review of the additional information outlined above.

As discussed above, Mount Owen has consulted with the RMS during the design process for the proposed Hebden Road upgrade works. The discussions with RMS in 2013 related to early designs of the Hebden Road upgrade works which included changes to the intersection with the New England Highway for which the RMS is the relevant roads authority. Under this early design, the approval of RMS would have been required to undertake the intersection works. Subsequent to this consultation, the design has evolved and no longer includes works on the intersection with the New England Highway.

Notwithstanding the changed design and reduced impact on the New England Highway, Mount Owen provided RMS with the most recent designs for the roads in early May 2015 to enable them to provide an informed comment on the Project and, in particular, the proposed Hebden Road upgrade works.

As noted above, Mount Owen will continue to consult with RMS as part of the detailed design process which may continue after Project approval.

4.10.1.3 Singleton Council

Forest Road is an unsealed non maintained Council road which is intended to be used by trucks during construction. The proposed level of usage could create unsafe conditions for the construction traffic. Council would request that a suitable condition be imposed ensuring that the road is suitably maintained and left in a satisfactory condition.

As detailed in Section 6.0 of the EIS, Mount Owen has committed to the preparation and implementation of Construction Traffic Management Plans (CTMPs) in consultation with Singleton Council which will cover traffic movements on the local road network including Forest Road, Glennies Creek Road and Hebden Road during the construction phase of the Project. The CTMPs will include the development of specific management measures in relation to Forest Road to ensure the road is upgraded where necessary and sufficiently maintained during use in the construction phase of the Project to meet appropriate safety standards.

The design of the new dual lane bridge over Bowmans Creek presents constraints and challenges which will result in steeper grades within Hebden Road between Bowmans Creek and the New England Highway. While this is not desirable it is acknowledged that the site constraints have significantly influenced this outcome.

Mount Owen has consulted with Singleton Council during the design process for the proposed Hebden Road upgrade works. As noted in the Singleton Council submission, the proposed grade of the road is heavily influenced by the existing site constraints. Singleton Council will continue to be consulted in the detailed design stage of the Hebden Road upgrade works and an appropriate condition of approval is recommended above.

4.10.2 Interest Group Submissions

There were no Interest Group Submissions related to traffic and transport issues.

4.10.2.1 Submission from Rio Tinto Australia

Section 1.2 (page 5) of the Environmental Impact Statement for the Mount Owen Continued Operations Project suggests that up to 2 million tonnes per annum of ROM coal or crushed gravel may be transported from Mount Owen Mine to Liddell Coal Operations and the Ravensworth Coal Terminal. Despite Coal & Allied's efforts to formalise a commercial agreement for the long-term usage of the load point by LCO, a formal agreement remains to be in place and as such Coal & Allied cannot support the loading of Mount Owen coal via the Liddell load point. Capacity constraints within the Newdell loop mean that such a proposal would cumulatively impact on HVO's existing land use rights with respect to loading coal via the Newdell loop to the consented tonnage limits.

Coal & Allied, as owner of the loop, requests that the Mount Owen Continued Operations Project consider alternative options in its Response to Submissions for the transport of coal that does not impact on HVO's approved tonnage to be loaded out via the Newdell rail loop. As it is currently proposed, the addition of 2 million tonnes per annum of ROM coal from Mount Owen would negatively impact Coal & Allied's legitimate business interests by further increasing the congestion on the Newdell rail loop. Importantly, this objection could be withdrawn if:

1. ***A rail loop access and coal loading agreement is in place; or***
2. ***The proponent confirms that no Mount Owen Coal will be loaded via Liddell loading point on Newdell rail loop***

We would be pleased to further discuss this matter with the Department of Planning and Environment and Glencore.

Mount Owen, pursuant to the Ravensworth East consent (DA 52-03-99), has current approval to transfer ROM coal to the Liddell and Bayswater power stations via the Ravensworth East and M-series conveyors. As part of the Project, Mount Owen is seeking approval to transport up to 2 Mtpa ROM coal and crushed gravel on an 'as required' basis via the existing overland conveyor to the Liddell Coal Operations and the Ravensworth Coal Terminal (RCT) in addition to maintaining the current approval to transport ROM coal to Bayswater and Liddell power stations. Liddell Coal Operations has recently been granted approval to receive ROM coal and crushed gravel from the Mount Owen Complex and also the construction of a conveyor which will link to the existing M Series Conveyor.

This is a contingency measure for Glencore, and does not represent additional coal and will not "cumulatively impact" HVO's existing consented tonnages on the Newdell rail loop. If coal is transported from Mount Owen to Liddell Coal Operations, the coal processed and transported from Liddell Coal Operations will be subject to Liddell Coal Operations existing maximum approved limits on the Newdell rail loop.

It is therefore irrelevant to Coal & Allied, where this coal comes from within Glencore operations, to be processed and transported from Liddell.

It is also noted that this is a commercial matter and therefore not an issue for consideration in the development application assessment process.

4.10.3 Community Submissions

Traffic and transport issues were raised in one community submission. The issues, with the relevant responses have been summarised below.

We object to the use of Middle Falbrook Road by all Glencore workers and contractors. This road is not designed for heavy traffic flow. It has no pavement edgelines, limited centrelines and no night lighting. The access onto and off Middle Falbrook Bridge is tight and vision obstructed. There is a sharp right hand turn at the bottom of the hill that is also the access driveway for Lot 1064 which currently has 23 residents living on it. Residents will be impacted by traffic noise and fumes.

The Project Area and Glendell Mine is primarily accessed from the New England Highway via Hebden Road, however, some vehicles could also gain access along Antiene Road. Glennies Creek Road and Forest Road will be used during construction of the proposed rail line, for a period of approximately 18 months.

The Traffic Impact Assessment indicates that there is potential for existing employees to use other roads in the vicinity of the Project Area including Middle Falbrook Road, however based on the existing traffic volumes and employee trip assignments, the likely use of these for access to the site is low. Therefore it is unlikely that the Project would cause any significant impact in relation to increased traffic movements, noise and fumes along Middle Falbrook Road. The Project is not proposing to increase the operational workforce from the current levels, therefore the Project is unlikely to result in traffic related impacts during the operational phase that differ from those of currently approved operations.

Mount Owen proposes to prepare and implement CTMPs, in consultation with Singleton Council, to proactively manage construction traffic movements on the local road network including Glennies Creek Road, Forest Road and Hebden Road, during the construction period.

Hunter Valley Buses have two school runs between 7:30-9am and 3-4:30pm 5 days a week. From the intersection of Glennies Creek Road to the Middle Falbrook Bridge 15 children catch the bus. Glencore have already set precedence at Mangoola Mine and Ulan on road usage for workers and as the construction phase ramps up on Ravensworth East there will be more vehicles using this road to access the Hunterview side of Singleton. It is only a matter of time before an incident occurs as back roads are not designed for excessive traffic.

The Project is not proposing to increase the operational workforce from the current levels, therefore the Project is unlikely to result in increased traffic related impacts during the operational phase from that currently approved. Consideration of school bus timetables will be included in the development of the CTMPs applying to roads that have bus runs.

The Traffic Impact Assessment indicates that the overall road safety for other road users on Glennies Creek Road/Forest Road and Hebden Road would not be compromised by the additional vehicle trips associated with the construction phase of the Project. The proposed construction of a new dual lane bridge over Bowmans Creek and rail overpass over the Main Northern Rail Line on Hebden Road will improve road service levels and safety on this road and at the railway crossing.

4.11 Visual Amenity

4.11.1 Agency Submissions

4.11.1.1 Hunter New England Population Health

The Proponent states that the Project is an extension of an existing approved activity, screened by existing landforms, and that local tourism is not an important land use along the adjacent roads. The Proponent also reports in the Social Impact and Opportunities Assessment that community concerns "centred on general changes to landscape" and the cumulative impacts from night lighting from mines in the area. The Proponent states that surface operation views from two residences and two public viewing areas will be mitigated by rehabilitation and final landform.

Due to the lack of local tourism, the negative visual amenity impacts from surface operations are expected to be small, however the timing of mitigation to reduce negative impacts for local residents will depend on the time required for rehabilitation to provide effective screening. Mitigation from final landform will not occur until close to or after the Project ends.

As detailed in Section 5.13 of the EIS, the visual impact assessment indicated that there are only two public viewing locations and two residences in the vicinity of the Project Area that have views of the existing Mount Owen and Ravensworth East mining operations and therefore likely to have a view of the Project. Mount Owen is committed to the implementation of progressive rehabilitation to reduce the duration of visible soil exposure and the development of a final landform which conforms to the surrounding environment as mining progresses reducing the visual impact of the Project.

Landscape values - additionally, Table 5.5 in the AIS reports farmer concerns regarding reduced visual amenity but these comments were not specific to Mount Owen.

The Mount Owen Complex is located within a rural environment in close proximity to several other mining operations. The predominant land uses in the vicinity of the Project Area include coal mining, forestry, grazing and rural residential holdings. The character of the immediate visual environment of the Mount Owen Complex is strongly influenced by the existing mining operations. The visual impact assessment has indicated that there are only two residences and two public viewing locations in the vicinity of the Project Area that are likely to have views of the Project. Mount Owen is committed to the implementation of progressive rehabilitation to reduce the duration of the visual impact of the Project when viewed from the surrounding land.

4.11.2 Interest Group Submissions

There were no Interest Group Submissions related to visual impacts.

4.11.3 Community Submissions

Visual amenity issues were raised in one community submission. The issue raised and relevant response is provided below.

The lights from vehicles at the mine which is generated on a 24hr basis, will be seen from our house.

As the site operates on a 24 hour basis, lighting is required to meet operational and safety requirements but will be kept to a minimum where practicable. To minimise impacts, Mount Owen has implemented a range of measures to reduce the impact on the scenic quality of the area including the use of shields and directional lighting.

Mount Owen will undertake the following measures to reduce the potential impact of night lighting:

- ongoing management of mobile lighting to reduce the impacts of lighting at night, where practical, positioning lights so they are shielded by walls, overburden emplacement areas and vegetation and the ongoing implementation of procedures for the appropriate placement of mobile lighting plant; and

- all lighting associated with the Project will be installed and maintained in accordance with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*.

Mount Owen will work with any landholders who feel they are being adversely impacted by specific night time lighting installations or vehicle movements to see if any changes can be made to the lighting arrangements or operations to further minimise impacts without adversely affecting the safe and efficient operation of the mine.

4.12 Bushfire

4.12.1 Agency Submissions

4.12.1.1 RFS

The New South Wales Rural Fire Service (NSW RFS) has reviewed the application and advises a comprehensive bush fire management plan has been undertaken by the applicant for the site which addresses the bush fire measures outlined within Planning for Bush Fire Protection 2006 for the proposed project.

Therefore the NSW RFS has no objection to the project, subject to compliance with the Mount Owen Complex Bush Fire Management Plan being implemented and to include the continued operations into the plan.

Mount Owen is committed to continuing to manage bushfire threat at the Mount Owen Complex in accordance with the Bushfire Management Plan.

The Bushfire Management Plan will be reviewed and updated within 12 months of Project Approval and as required in consultation with the RFS.

4.12.2 Community and Interest Group Submissions

No submissions were received by members of the community or interest groups regarding bushfire hazard or management issues.

4.13 Social Impacts

4.13.1 Agency Submissions

4.13.1.1 Singleton Council

Voluntary Planning Agreements provide an opportunity for the proponent to seek to offset some of the potential adverse social and environmental impacts on the community associated with a project in terms of financial initiatives. The Council requests that a suitable consent condition be imposed should consent be recommended.

As discussed in Section 5.17, of the EIS Mount Owen proposes to implement a number of strategies and programs to mitigate and/or enhance the Project impacts which includes continued discussion with Singleton Council regarding the establishment of a Voluntary Planning Agreement (VPA) that is commensurate with the local infrastructure impacts associated with the Project.

Mount Owen has held a number of meetings with Council with the most recent meeting on the 4th of May 2015. At this meeting, it was agreed that Council would identify a list of potential projects and their value and develop a package for consideration by Mount Owen as part of a VPA process. It is noted that the Minister may require a planning agreement to be entered into as a condition of development consent, but only if it is in the terms of an offer made by Mount Owen to Council in connection with the application.

4.13.1.2 Office of Agricultural Sustainability and Food Security

Local and regional employment - The Project will require additional construction phase labour (330 additional employees for 18 months). Accommodation availability during this phase is not discussed in the Agriculture Impact Statement. However, it is analysed in Appendix 5, Section 7 of the EIS in the Social Impact and Opportunities Assessment (SIOA).

A low to medium risk was identified of accommodation in Singleton not being able to meet demand during the construction phase, and proposed mitigation measures for this scenario are listed in Table 8.1, p8.2 of the SIOA. Available information supports the claims of the Proponent that the Project is not expected to have any additional impacts on local and regional employment in the longer term as the permanent mine labour force is expected to remain unchanged. The region has an existing skills shortage with competition for employees impacting a range of industries. Competition for agricultural labour from mining will continue and is a cumulative impact from the growth of mining in the region. Regional strategies are now being developed to address this issue (e.g. Upper Hunter Workforce Plan and Economic Diversification Project).

The comments of the OASFS support the findings in the EIS and the SOIA.

Tourism infrastructure - The Proponent states it is expected that the Project will have minimal impact on tourism infrastructure, since little tourism exists adjacent to the Mount Owen Complex. The SIOA discusses accommodation impacts and reports that the labour force will be sourced from across the local and surrounding regions with existing accommodation infrastructure able to accommodate demand. The recent downturn in mining has been linked to reduced overall demand for accommodation in Singleton during 2013-14, so from available information, there would appear to be accommodation capacity in the local area. Singleton Council is currently developing a Housing and Accommodation Strategy and Action Plan to address the housing needs of Singleton for the next 10 to 20 years.

The comments of the OASFS support the findings in the EIS and the SOIA.

4.13.2 Interest Group Submissions

4.13.2.1 Hunter Communities Network

Figure 1.6 in the EIS (Main Report p5) demonstrates that a very large area of land is owned by mining companies in the vicinity of the Mount Owen Complex. This indicates a significant cumulative social impact in the region over time as farming families have been displaced off their land due to the impacts of open cut mining operations.

It is acknowledged that a number of the existing residences to the south and southeast are currently mine owned or have acquisition rights under approved mining development consents along with other rural private residential land holdings present within the surrounding area. These private residential blocks are predominantly located to the south-east of the Project Area. Further privately owned land is located to the north and north-west of the Project Area, and continued mining operations will be moving further away from the existing residences in these northern and north-western localities.

The SIOA (Appendix 5) discusses the impacts associated with population change in relation to acquisition. When a property is affected by acquisition rights; it provides the owner of the property with the option to request that Mount Owen purchase their property and binds Mount Owen to enter into negotiations to purchase the property at a fair and reasonable price. It does not mean that these properties must be acquired, or will be automatically acquired in order for the Project to progress. Given that the population change associated with acquisition is very small (i.e. five rural residential households of the total population of approximately 240 households within the Bridgman and Camberwell State suburb boundaries), the impacts of the Project on the community associated with population change are considered to be minimal.

The predictions in the EIS indicate that further impacts on private landholders, particularly to the east of the project will occur if the project is approved. This will impact on the community of Middle Falbrook.

As discussed above, it is considered that the potential population change associated with the acquisition of property as a result of the Project is very small (i.e., five rural residential households of the total population of 577 people within the Bridgman and Camberwell State suburb boundaries). Accordingly, the impacts are considered to be minimal.

The Social Impact Assessment, Appendix 5, does not adequately address the issue of health impacts and ongoing displacement of private land owners in the region. This is a significant issue for the Hunter. The emphasis on benefits to the Singleton and Maitland community from the mine demonstrates a lack of appreciation of the social impacts caused through displacement of families and farming enterprises close to mining operations.

As discussed in Section 7.4 of the SIOA (Appendix 5 of the EIS), two key health and wellbeing related aspects of the Project were identified as requiring further assessment: air quality and increased traffic on the road network during construction. The impacts associated with particulate emissions from the Project and potential traffic related impacts are covered in Sections 5.2 and 5.12 of the EIS. A number of submissions have been specifically raised in relation to these issues and have been discussed in **Sections 4.1** and **4.10** of this Report.

There are no submissions by members of the local community that contend otherwise or oppose the Project due to the loss of potential farming land. The OASFS also confirm that the Project has 'low additional impact on agricultural enterprises'.

The SIA specifically addresses the influx and outflux of population as a result of the Project. As is noted in section 7.4 of the SIA report, the existing Mount Owen workforce predominantly resides within around 30 minutes of the Mount Owen operations in the Local Government areas of Singleton, Maitland and Muswellbrook. These locations tend to be where a significant portion of workforce household expenditure (approximately $46 million annually) and use of local services (e.g. health and education), occurs. Furthermore, the existing Mount Owen workforce is seen to have resided in the area, on average 14 years, are predominantly married (67 per cent) with a mortgage (63 per cent) and participate in a range of local community groups and activities.

In relation to population change associated with the current Project, no additional workforce will be required as part of the operational workforce for the project, but existing jobs will be sustained; a peak construction workforce of 330 workers is also predicted and is able to be accommodated within proximal Local Government areas. The five rural households which are subject to new acquisition rights sit within the larger population of approximately 240 households within the Camberwell and Bridgman State suburb localities. Consequently, the *population change* associated with the potential Project acquisitions are categorised as low,

however there is a degree of sensitivity to acquisition issues in the community and potential community concern regarding any contribution to existing population decline trends, regardless of how proportionally small.

An assessment of potential impacts on local and regional communities, including increased demand for local and regional infrastructure and services was also provided in Section 7.0 of the SIOA (Appendix 5 of the EIS). This assessment included an assessment of the risk to community sustainability. As discussed in Section 7.6.4 of Appendix 5 of the EIS, there are not anticipated to be any significant negative consequences regarding community sustainability at the scale of the study area.

Communities within the study area are considered comparatively resilient, and can incorporate the range of assessed impacts

The EIS does not identify what will happen to mine owned-land once mine closure has been achieved. The issue of social fabric in rural communities is ignored in the current planning process.

As discussed in Section 2.5 of the Mine Closure and Rehabilitation Strategy (Appendix 18 of the EIS), the indicative post-mining land use for the Project Area (refer to Figure 2.1 of Appendix 18 of the EIS) will primarily involve the establishment of woodland areas, specifically a vegetation community consistent with the Central Hunter Ironbark – Spotted Gum – Grey Box Forest. The objective is to create a native vegetation corridor network that promotes regional fauna movements between the Mount Owen Complex, Ravensworth Operations, Liddell Coal Operations, Lake Liddell and the Ravensworth Operations Hillcrest Offset Areas.

Depending on outcomes of final land use analysis to be completed as part of the detailed closure planning process five years from closure, it is the intent that some rehabilitated areas could be used for sustainable agricultural purposes such as grazing. As such, revegetation may involve the use of both native and suitable pasture species for the establishment of grasslands in these areas. In this instance, pockets of native vegetation may be established as shelter belts to support grazing activities.

Social impacts associated with closure and potential future land uses will be considered as part of the detailed closure planning process, to be completed five years prior to mine closure.

4.13.3 Community Submissions

Social impacts were raised in four community submissions. The issues, with the relevant responses have been summarised below.

A number of the concerns raised in relation to the potential social impacts of the Project made reference to the rapid increase in mining operations within the Hunter Valley and the change in community dynamics as a result of this including:

"We first moved to the Hunter in 1996 in order to develop and run a vineyard. It was a beautiful place and we were very happy to bring up our four young children in this vibrant rural community. However, unfortunately, over the years coal mining has taken over and it is no longer and an area that we wish to live in".

"We object to our quality of life being destroyed by the Mount Owen Complex Expansion. The ramifications for Middle Falbrook and its unique environment are catastrophic. When this expansion goes ahead Middle Falbrook will be an unbearable place to live".

"We object to all mining and infrastructure associated with this expansion that encompasses the Mount Owen Open Cut, Ravensworth East and Glendell Mine Open Cut. Our objections are based on the well documented and visible impacts that mining has on peoples physiological and mental being and the social and environmental degeneration of rural communities".

"Middle Falbrook became our home December 2013 after a lengthy search to acquire property within the Singleton Council that provided us with a rural lifestyle close to town but without the impending impact of mining. Before we purchased we did our own investigations but were unsuccessful in acquiring any relevant information. Our decision to move forward on the purchase of the property was based on our findings and locals information that Mount Owen would never impact on them".

"Impacts on residents, stop treating residents in the line of fire as cannon fodder to be eliminated on request by a mine. This practice is not acceptable and it is time, the department realise that fact continual extermination of communities does have a negative impact on the local region, and that mines eventually must be halted to maintain communities, they are the growth of the future".

The rights of residents private and renters, must be protected to ensure clean air, water and prevention of intrusion of unwanted noise

Your mental wellbeing is also challenged by the constant destruction of your living environment by mining. The stress associated with having to constantly fight for your rights while having to live with poor air quality, noise and the impacts on physical health is not acknowledged enough by the mining industry or governments and they should be made do more as part of the DA approval.

As outlined previously, there are five private residences which have been identified as being subject to acquisition as result of the Project. The associated impacts to sense of local community are discussed in Section 7.6.2 of the SIOA.

The population change associated with property acquisition resulting from the Project is very small (i.e., five rural residential households of the total of approximately 240 households within the Bridgman and Camberwell State suburb boundaries), and the impacts of the Project on the local community associated with population change are considered to be minimal.

Notwithstanding the minimal nature of the local population change impacts, Mount Owen have committed to the implementation of a number of strategies to both mitigate the negative social impacts of the Project but also enhance the positive social impacts in the Singleton LGA. The Mount Owen Community and Stakeholder Engagement Strategy and Community Development Plan will be revised to include these strategies, to monitor the effectiveness of the proposed strategies and mitigate negative social impacts and/or enhance positive social impacts over time. These strategies are detailed in Section 8.0 of the SIOA.

While there is no question that the potential population impacts from the acquisition of five occupied residences, out of a wider settlement of approximately 240 properties, presents a *low* population impact, it is worth noting the community context in which the new acquisition will occur. Of the approximately 240 residences in Bridgman and Camberwell, 53 are already owned by mining companies, and a further 11 covered by acquisition rights (excluding those affected by the Project).

However, consultation with stakeholders (local and regional) and a review of regional issues (including media coverage) suggests there is considerable concern across the Upper Hunter regarding these impacts. Perceptions relating to these impacts are real to those concerned and have been noted in the SIOA for the Project and have been considered in the selection of mitigation measures.

We object to this expansion on the grounds that Glencore have failed to consult with and keep all the community informed. We had no prior knowledge of the affect that this expansion was going to have upon us until information came to light from a private resident who had been approached for voluntary acquisition. The exhibition disc I viewed for the first time on Thursday 26th February 2015 and was informed that submission closed Friday 6th March 2015 leaving me only 8 days to submit.

We have been a private residence at this current address since December 2013 and have never received any correspondence from Glencore i.e. Community Newsletters, notices of CCC meetings, mine open days. A local resident engaged with Vicki McBride, Approval Manager, Mount Owen Continued Operations on Thursday 26th March 2015 to organise a meeting which took place 6pm Monday 2nd March 2015. At this meeting Vicki McBride informed us that she had visited twice but no one was home and she did not leave a business card or any information to advise us of her visit. It has become very clear that Glencore have no interest in our opinion or wellbeing.

Mount Owen made every effort to consult with the surrounding landowners throughout the EIS process with a comprehensive stakeholder engagement program being implemented to support Mount Owen's aim of developing a Project that will coexist with the local community.

Community engagement for the Project involved a four phase program.

Phases 1 and 2 (2012-2013) sought stakeholder feedback on key issues and aspects of the Project design. Phase 3 (2013) presented results and outcomes of the assessment and engagement process, and sought feedback on predicted impacts and proposed mitigation measures. Phase four (2014) provided further information to stakeholders regarding changes to the Project and also presented results and outcomes of the updated assessment.

A range of mechanisms were used to engage the community and other stakeholders. Community consultation mechanisms included individual meetings with surrounding landholders, Community Information Sheets, presentations to stakeholder and community groups, community information sessions (including open days) and a number of briefings to the Mount Owen Community Consultative Committee.

While all properties were visited by representatives of Mount Owen in the 3-4 years leading to the submission of the development application, Mount Owen was not able to meet all residents. A number of different attempts to meet and/or communicate with the few residents who were not consulted in the early rounds of consultation was ultimately unsuccessful prior to lodgement of the development application.

During the exhibition period for the EIS, Mount Owen representatives continued to try and engage the few residents that Mount Owen was unable to meet or contact during the EIS consultation period. Mount Owen met with these residents during the exhibition period and briefed them on the Project.

4.14 Economics

4.14.1 Agency Submissions

4.14.1.1 DRE

[DRE] has calculated that in a typical full production year the State will receive around $32 million per annum, and in dollars of the day total royalty payable from the Project would be around $475 million. The net present value of this royalty stream would be around $280 million using a 7% real discount rate.

The estimated royalty stream of $280 million exceeds the estimated royalties indicated by the Cost Benefit Analysis and Economic Impact Analysis (Economic Assessment) completed for the Project by Deloitte Access Economics (DAE), which indicates that the Project is anticipated to generate royalties of an estimated $258 million in NPV terms to the NSW Government.

The estimated benefits of the Project from royalty payments in the EIS are therefore more conservative than the estimates provided through their verification process by DRE.

4.14.1.2 Singleton Council

Council request that in the absence of a successful negotiation prior to determination of the Project, and should consent be granted, that a suitable consent condition be imposed setting a framework to negotiate a Voluntary Planning Agreement which seeks to offset social and environmental impacts by developing a range of commitments from the proponent to implement appropriate programs and strategies within the immediate locality and the broader Singleton Council Local Government Area.

Mount Owen proposes to implement a number of strategies and programs to mitigate and/or enhance Project impacts including establishment of a VPA in consultation with Singleton Council that is commensurate with the local infrastructure impacts associated with the Project.

4.14.2 Interest Group Submissions

Economic issues were raised in two interest group submissions. The submission from the Australia Institute was the most detailed of these and focused on the Economic Assessment.

These issues are discussed further below.

4.14.2.1 Hunter Communities Network

The Mount Owen mine has current approvals to continue mining operations to the year 2025 including rehabilitation requirements. This gives the company and the workforce 10 years to transition into other activities. The production of coal beyond that time is very questionable in the context of a global shift away from carbon intense industries.

As discussed in Section 2.2 of the EIS, the current approval does allow for mining operations in the North Pit until 2025; however Mount Owen expects that mining will be completed within the currently approved areas of the North Pit by the end of 2018 (based on the current geological information and production rates). The completion of mining in the North Pit in 2018 would result in a reduction in employment at the Mount Owen mine from approximately 2016 as mining operations start to wind down with the loss of approximately 96 jobs and ultimately resulting in the loss of employment for the remaining North Pit workforce by 2018, not 2025.

Additionally the coal industry's share of the global energy mix is still rising, with global coal demand expected to continue to grow. According to the International Energy Agency (IEA), coal consumption is projected to increase by another 15% until 2018, or about 2.3% year on year (IEA 2013a). The Project is well positioned to contribute to meeting this expected demand in the short to medium term and will maximise coal recovery from within existing Glencore mining tenements and utilising existing infrastructure while minimising the environmental impact associated with meeting this demand.

4.14.2.2 The Australia Institute

The Australia Institute acknowledges the overall view that the assessment is "in many ways an improvement on recent economic assessments of mining projects" (pg 8) and that "transparency around coal pricing, cost and production assumptions is a major improvement and the consideration of some externalities such as particulate pollution is impressive" (pg 8).

Within this overall view, the Australia Institute identifies issues with some areas of the economic assessment. DAE has prepared a detailed response to the issues raised by the Australia Institute, as provided below.

Costs and benefits to NSW

The economic assessment does not adequately address the Director General's Requirement to assess whether the project would provide a net benefit to the NSW community. **[T]*here is no discussion as to whether the negative externalities that accrue to NSW (most of them) would outweigh the benefits to NSW, which are largely royalties. Instead, the assessment focuses on the global level.***

This is the key question facing decision makers – are the impacts of the project on NSW worth $28 million per year for 15 years, or present value of $258 million, or increase of 0.04 per cent of revenue?

The DAE assessment does not present decision makers with this question. It further misleads decision makers by understating the key likely environmental impact, the impact on biodiversity.

The DGRs for the Project require:

- An assessment of the potential direct and indirect economic benefits of the development for local and regional communities and the State;
- a detailed assessment of the costs and benefits of the development as a whole, and
- whether it would result in a net benefit for the NSW community.

The Economic Assessment includes a regional analysis that is derived from the Cost Benefit Analysis (CBA) (Section 5.5) and this is further complemented by the Computable General Equilibrium (CGE) analysis, which identifies impacts for the Hunter region and NSW (Section 6). Taken together, this approach satisfies the assessment requirements in the DGRs.

Having said this, DAE recognise that the guidelines (NSW Government 2012) introduce a concept of a CBA at a regional level (pg. 9) as well as a concept of breaking the whole of project CBA down into a State level CBA (pg. 5).

Breaking down the results of a CBA on a geographical basis is difficult due to the fact that many costs and benefits which are transfer payments and net out in a whole project CBA become costs and benefits that must be measured when focussing on a specific geographic area. For example, operating expenditure is clearly a cost from the point of view of the Project as a whole but, when looking at the NSW economy, whether operating expenditure is a cost or a benefit will depend on whether the suppliers are located in NSW or overseas.

The Australia Institute's submission indicates they believe that the benefits to NSW are largely related to royalty payments. While royalties are a reasonable inclusion in benefits to NSW, it is clear that mining activity creates other benefits for NSW, which could potentially be larger than royalty payments. For example, employment generation and project expenditure (such as capital investment) related to the Project generate significant economic benefits for NSW.

Section 5.5 of the Economic Assessment considers costs and benefits to particular geographic areas. The approach used allows the CBA results to be broken down geographically in a way that is internally consistent and complete in accounting for all costs and benefits. The analysis below uses the same approach but includes results at the NSW level. In this analysis, 'NSW' includes costs and benefits to residents of NSW, the NSW Government and Singleton Council. The 'Rest of World' category includes costs and benefits to all residents outside NSW, the residual claimants on the mine's profit (essentially the debt and equity holders of the mine) and the Australian Government. Placing the residual claimants in the 'Rest of World' category is a conservative assumption as some of these debt and equity holders could be NSW residents.

In order to illustrate the range of outcomes that could be achieved in the absence of the Project, two scenarios are presented. One where it is assumed that businesses and workers could earn the same level of income from alternative sources and a second scenario where businesses and workers earn the average level of income in Singleton. The average level of income in Singleton is approximately 64% of income from mining.

These two scenarios reflect the uncertainty around the opportunity cost of mine suppliers. The first scenario is likely to represent a lower bound of the potential benefits for NSW as it essentially assumes that all workers and mine suppliers could do just as well without the mine operating. The second scenario is likely to represent an upper bound. In reality however, given the current down turn in the mining sector, it is extremely likely that many of the workers at the mine would have to accept positions in lower paid jobs or, potentially, have to move from the local area if the Project did not go ahead. This is supported by the strong anecdotal evidence supplied in many of the submissions of support of the Project received during the exhibition period for the EIS. Accordingly, this 'worst case scenario' in terms of the Project's net benefit to NSW is considered extremely unlikely to occur in the current economic climate.

It is noted however that the need to ensure consistency between the whole of Project CBA and the regional disaggregation somewhat restricts the methodology used to undertake the disaggregation. Accordingly, while the results shown in **Tables 4.8** and **4.9** may not reflect a perfect allocation of costs and benefits, they represent an allocation that is considered reasonable and consistent with the CBA as a whole.

Table 4.8 - NPV of costs and benefits ($m, 2014 prices) with no worker benefits from mine operation

		NSW	Rest of World
Benefits	Modelled profit after tax	0	371
	Payments from Capital Expenditure	91	37
	Payments from wages	683	0
	Payments from other operating expenditure	1507	87
	Royalties	258	0
	Company tax	0	193
	Rates	2	0
	Payroll tax	16	0
	Other revenue	1	0
	Total benefits	2557	688
Costs	Rehabilitation Costs	0	9
	Decommissioning costs	0	22
	Residual value of land	0	2
	Capital expenditure and related costs	81	47
	Operating expenditure related costs	2189	87
	Externalities	32	17
	Total Costs	**2302**	**184**
	Net Benefit	**255**	**503**

Table 4.9 - NPV of costs and benefits ($m, 2014 prices) assuming worker benefits from mine operation

		NSW	Rest of World
Benefits	Modelled profit after tax	0	371
	Payments from Capital expenditure	91	37
	Payments from wages	683	0
	Payments from other operating expenditure	1507	87
	Royalties	258	0
	Company tax	0	193
	Rates	2	0
	Payroll tax	16	0
	Other revenue	1	0
	Total Benefits	**2557**	**688**

		NSW	Rest of World
Costs	Rehabilitation costs	0	9
	Decommissioning costs	0	22
	Residual value of land	0	2
	Capital expenditure related costs	81	47
	Operating expenditure related costs	1401	55
	Externalities	32	17
	Total Costs	**1514**	**153**
	Net Benefit	**1043**	**534**

In short, the benefits to the State are far more significant than just royalties which is what the Australia Institute submission is asserting.

In addition, Section 6 of the Economic Assessment contains CGE modelling of the expected overall economic impact of the Project. This analysis found that, if the Project was to go ahead, NSW's Gross State Product is expected to increase by around $1.9 billion in NPV terms over the period from 2016 to 2030. This finding reinforces that above that the project creates significant economic benefits for NSW.

Biodiversity

The main shortcoming of the economic assessment is its approach to biodiversity and the ecological impacts of the project. The assessment assumes that biodiversity offsets work immediately, perfectly and permanently.

Biodiversity impacts are likely to be the major external cost of this project. The risk of losing biodiversity entirely is considerable and almost certain for a period of many years.

DAE do acknowledge these risks:

> ***The risks to biodiversity generated by the Project are considered qualitatively in this analysis. (page 51)***

While there is no detailed discussion of these risks, the authors seem to be referring to their conclusion that non quantified negative impacts are likely to be outweighed by quantified benefits. To reiterate, this comparison overlooks the fact that the vast bulk of this benefit accrues to a foreign mining company, while the cost of the biodiversity impacts (e.g. potential local extinction of the spotted tail quoll) would largely be felt by local communities and residents of NSW and Australia.

DAE do not agree with The Australia Institute's suggestion that the Economic Assessment does not provide a detailed discussion of the risks of the Project to biodiversity.

Section 5.2.21 of the report details both the vegetation communities and threatened species of flora and fauna that have the potential to be significantly impacted by the Project, as identified in the Ecological Assessment of the EIS.

However, these impacts must also be considered within the context of the mitigating activity that is proposed to offset any loss of biodiversity.

Offsetting policies typically require that there be 'no net loss' of biodiversity as a result of the Project. The factors noted by The Australia Institute are considered in the OEH's biodiversity offset policies.

In light of the outcomes of the OEH review (refer to **Section 4.4.1**), it is considered that the approach to the valuation of the biodiversity impacts of the Project is methodologically sound.

In addition, The Australia Institute inappropriately compare this approach with the approaches that DAE have taken to assess the value of the impacts of the Project on noise and air quality. Such a comparison is inappropriate because the legislative approach to management of the impacts of these externalities differ. While the legislation regarding biodiversity requires the impact of the Project to be fully offset by compensating actions elsewhere in the State, the legislative approach in relation to noise and air quality seeks to put an upper limit on the costs that are borne by the broader community that is exposed to those impacts. It is therefore important to value the cost of those realised noise and air quality impacts within the CBA.

Costs and benefits for Singleton

> ***The Singleton community will receive a net benefit of up to $306 million, in NPV terms, under the assumption that, in the absence of the Project, local employees and suppliers would earn the average level of income in Singleton. (page 65)***

The assumption here is that workers labour is not priced at its opportunity cost – in other words that that workers cannot earn the same wage outside of the project. There is minimal discussion of how this figure was arrived at, which is surprising given that it contradicts NSW Government Guidelines for Economic Appraisal:

> ***It can be argued that in times of unemployment the opportunity cost of labour employed on a project is less than the wage costs, and project costs and benefits should be adjusted accordingly. However, in practice such adjustments are not generally made and are not recommended.***

DAE assume here that the entire project workforce would leave the mining industry and would all enter average wage jobs. Alternatively, they assume that project workers would leave the mining industry and go into all sectors of the economy in proportion to the current spread of the Singleton labour force that is significant numbers go into health care, retail and other low-wage sectors.

This is a major assumption and one which DAE do not attempt to justify. While NSW mining employment has reduced sharply in the last year to 29,000, back to 2008 levels, this still represents a higher level than any time since 1990. It is unlikely that experienced mine workers, living in the middle of NSW largest mining region will re-enter the workforce almost entirely outside of the mining industry.

DAE's lack of discussion around this finding is even more surprising given that their own research suggests a prolonged downturn in the coal industry would have a very small impact on employment in the Hunter. In a 2013 report Prospects and challenges for the Hunter region: A strategic economic study, DAE modelled a situation where prolonged lower coal prices of 10 to 20 per cent were experienced due to "moderating Asian demand". This situation would:

> ***Significantly reduce profitability across the mining sector and the string of related industries which provide the materials and services required for mining and resource projects. This is demonstrated by the sizeable drop in regional output and other macroeconomic variables such as exports, wages and consumption levels.***

The approach taken by DAE seems certain to overstate this value.

Fundamentally, The Australia Institute's interpretation "that workers labour is not priced at its opportunity cost" is incorrect. The analysis in the Economic Assessment has assumed that workers labour is priced at its opportunity cost but that this opportunity cost is best represented by the average wage in the local area. Using the average wage accounts for the fact that, if the Project was not approved, some workers would move to employment in the mining industry while others would move to employment in industries such as construction or administration. DAE consider that the average wage is the most appropriate opportunity cost to use, in the absence of better data, as there is significant uncertainty around the opportunity cost of labour and significant diversity between workers, particularly in the current economic environment where employment in the mining industry in the Hunter Valley is decreasing and there is limited availability of other jobs in the mining industry.

Further, The Australia Institute's comparison to the DAE 2013 report "Prospects and Challenges for the Hunter Region: A Strategic Economic Study" is flawed. The Australia Institute's example attempts to compare outcomes in terms of wages with outcomes in terms of employment and suggests that effects on both measures should be the same. It is completely possible for wages to decrease without a significant effect on employment – particularly if workers move from high paid mining jobs to lower paid trades or service jobs. In fact, the quote The Australia Institute provides from the DAE report notes the "sizable drop in…wages" found in the DAE report.

Coal prices

The economic assessment acknowledges an important fact – at low coal prices, mines are not financially viable. The economic assessment estimates that at coal prices 30 per cent lower than their central estimate, the project has negative NPV of minus $165 million (Table 5.14, page 64). Clearly at prices somewhat above this level, the project is likely to be financially vulnerable.

The central estimate of coal prices is shown in Chart 5.2 (page 26). The July 2014 price is AUD $90/t, substantially above the benchmark price of $78/t as noted on page 92. The values in Chart 5.2 seem to imply a long term forecast of USD$91-$98/t for thermal coal, considerably higher than current benchmark prices and many analysts forecasts.

This suggests either a very optimistic price forecast, or the proponent expects the Mount Owen coal to trade at a 15 per cent premium to standard thermal coal. This seems possible if somewhat optimistic judging by the ash content estimated at 12.5 per cent on page iv of the executive summary and not discussed anywhere in the body of the report. The absence of discussion of coal specifications and the justification of this premium is surprising given the financial difficulties the project will face at lower coal prices.

The Economic Assessment report contains a detailed description of coal prices in Section 5.2.1. As discussed in the report, the price assumptions used in the Mount Owen modelling reflect the relative quality of the coal, forecast reference prices and exchange rates.

The starting point is a Consensus Economics forecast of coal prices, in USD from 2015 to 2020, beyond that, coal prices are assumed to stay at the Consensus long-term average. The next step is to adjust the price to AUD using the Consensus forecast USD/AUD exchange rate. Finally the price is adjusted to reflect the kcal quality of the coal from the Mount Owen mine. The reference price assumes a benchmark thermal coal calorific content where Mount Owen coal is around 3% above benchmark levels.

It is noted that DRE have also undertaken an assessment of expected royalty payments that would arise from the Project and have independently determined a price for coal to be used in its assessment. DRE's coal price used to verify the estimated royalty payments from the Project is higher than that used by DAE for the Project.

Sensitivity testing

Section 6.5 page 77 examines the results of the CGE model at different coal price levels. The GRP impacts in Table 6.3 and the employment estimates in Chart 6.10, detail DAE's modelled estimates of output and employment under low, mid and high coal price scenarios. Several points to note:

- ***Employment impacts under the central scenario are rarely higher and sometimes lower than the project's direct employment levels in Chart 4.1. There is no large "jobs multiplier" as is often claimed by the mining industry.***
- ***Estimates of impacts at the lower price level ignore the finding in Table 5.14 that at lower price levels the project is financially unviable. If the project proceeds at all at this price level, impacts are likely much lower.***
- ***It is unclear why employment due to the project would be higher at higher price levels – as the project is foreign owned this would merely increase profitability rather than increase employment. An increase in wider coal industry employment may occur, but this is the result of the price increase, not a result of the Mount Owen project.***

The sensitivity analysis conducted in Section 6.5 of the Economic Assessment is intended to show the sensitivity of the CGE modelling results to alternative assumptions, on key inputs; one of which is the coal price.

Although 'employment multipliers' can be derived from these results, the modelling was not intended to be used in this way and does not support any general conclusions about the mining industry.

DAE also consider that, in addition to the modelling output, practical experience suggests that employment in mining is higher at higher prices levels. The Australia Institute's submission notes that "NSW mining employment has reduced sharply in the last year" which has coincided with a period of lower prices.

Conclusion

The economic assessment of the Mount Owen project by Deloitte Access Economics is in many ways an improvement on recent economic assessments of mining projects. Transparency around coal pricing, cost and production assumptions is a major improvement and the consideration of some externalities such as particulate pollution is impressive.

The submission then goes on to summarise some of the key points addressed above and further states:

In our opinion an increase in state revenue of 0.04 per cent is not worth the risks to endangered species and ecosystems and the project should be rejected.

DAE strongly disagree with the Australia Institutes statement that the Project should be rejected on economic grounds. The comments relating to the economic assessment raised by the Australia Institute have been addressed above.

The Cost Benefit Analysis and Economic Impact Analysis conclude that overall, the Project is expected to generate net benefits and to generate increased economic activity and employment within the NSW community.

4.14.3 Community Submissions

Economic impacts raised in submissions from members of the community were predominately related to potential reduction in property values, and rental returns.

The submissions, with the relevant response are set out below.

My family and I are objecting to this development due to the potential environmental and economic impacts on our property. The southerly extension of the existing North Pit further increases our exposure to the downside of mining.

We own three pristine properties, we take great pride in their maintenance and care while practicing sustainable farming for the future. We know that if we wish to sell with the current mine and the proposed Project that we will have difficulty selling these properties to their full value.

We know that if we wish to sell with the current mine and the proposed Project that we will have difficulty selling these properties to their full value.

Our property has already been devalued because of mining activity. As this has been our home for over forty years this seems very unfair as in this EA there is no new acquisition zone.

As discussed in **Section 3.2**, five additional residential properties and four additional vacant land holdings (i.e. holdings that do not contain residences) will be subject to voluntary acquisition rights under the application of the Voluntary Land Acquisition and Mitigation Policy. Under the Policy, the owners of land identified as having voluntary acquisition rights will be entitled to request that Mount Owen acquire the property, in terms defined in the Policy.

The Land and Environment Court has confirmed that the impact of a proposed development on property values is not a relevant planning consideration in the assessment of a development application.

The project will shift long term environmental and social costs onto the taxpayers of NSW.

The economic benefits and costs of the Project are discussed in detail in the Economic Assessment. While there are a number of externalities associated with the Project, there are also significant economic benefits that flow to both the community through wages and flow-on/multiplier effects and also benefits to the State and Commonwealth Governments in the form of royalties and taxes.

Overall, the Project's benefits are considered to far outweigh the costs and the Project is predicted to generate a net benefit to the Singleton community of around $306 million (in net present value (NPV) terms over the life of the Project and increase the Hunter economy by just under $1.3 billion (NPV terms).

4.15 Mine Closure and Rehabilitation

4.15.1 Agency Submissions

4.15.1.1 OEH

Ecological Monitoring, Analysis and Reporting

OEH notes that Glencore's ecological monitoring commitments for this project are described in Section 8 and includes a feedback mechanism to determine if stated aims are being met. Floristic cover and abundance appears to be measured using the Braun-Bianquet scale, which combines both features (for example so that a single large fig covering most of a quadrat or a quadrat largely covered by a small annual herb with have the same score but have very different structure). OEH has found that Braun-Bianquet values are often too coarse for statistical analysis to detect trends before they are obvious. Therefore, OEH suggests that cover and abundance are recorded as separate measures at quadrats. Thus OEH recommends that more precise cover and abundance values are recorded during subsequent site inspections, for which the 'DECCW Vegetation Field Survey Form' in Sivertsen (2009: pp. 59-65) is recommended so as to be able to have a better chance of detecting and measuring changes.

OEH recommends that appropriate statistical analysis of monitoring data of rehabilitation is undertaken to enable changes to be measured, and where possible, enable earlier adaptive management measures to be implemented before any problems may become obvious. The Analysis of Similarity (ANOSIM) has often been used to assess changes in plant species composition in space and time (e.g. Brown, 2006; Wevill and Florentine, 2014; and Wilkins et a/., 2003) and OEH recommends consideration of this type of analysis in vegetation monitoring for this project; if appropriate in relation to the type of data gathered, the questions being asked and underlying assumptions. OEH recommends that such analysis is presented in the Annual Environmental Management Reports produced by the mine site.

OEH recommend the following condition - That vegetation monitoring for this project includes appropriate statistical analysis to guide revegetation and management to help ensure that rehabilitation objectives are met, and that rehabilitation is consistent with the requirements of the 'NSW offset principles for major projects (state significant development and infrastructure)'. Any rehabilitation that does not meet the requirements of this policy will not count toward the offset package and this shortfall must be met with additional offsets.

Glencore is currently in discussions with OEH regarding the monitoring required for both rehabilitation and offset sites at its other operations in the Hunter Valley. The current annual ecological monitoring program focuses on the monitoring of flora and fauna species across remnant vegetation sites, and regeneration and rehabilitation sites. The current Landscape Management Plan (LMP) will be reviewed, expanded and revised to provide appropriate inclusion of rehabilitation and revegetation programs.

Inclusion of a greater mix of species in post-mine rehabilitation:

The current assessment of measuring success of on-going rehabilitation against objectives has largely been qualitative. For example; 'flora species assemblages characteristic of desired native vegetation communities' (Table 6.1) and ' strongly trending towards' (s. 7.2.2.2). The assessments have often been against abbreviated lists of some characteristic species found in the current descriptions in the NSW Vegetation Information System Classification (VIS) database or the final determinations of endangered ecological communities (EECs) prepared by the NSW Scientific Committee, rather than the more comprehensive species lists found in vegetation reports, such as Peake (2006) - particularly as many EECs in the central Hunter Valley are based on vegetation communities are defined in this report. Further details are required on how different elements of rehabilitation are trending; for example rehabilitation dominated by several required canopy species above a depauperate mid-storey or ground layer may score well on a general comparison against a standard, but may lead to a poor result compared with a site where a greater mix of plant habits and ecological roles are present. OEH recommends that more details are provided of the components of rehabilitation and further suggests that quantitative comparisons, using appropriate statistical analysis are included in future rehabilitation assessments.

As noted above, Glencore is currently in discussions with OEH regarding the monitoring required for both rehabilitation and offset sites at its other operations in the Hunter Valley. Post-mine rehabilitation of the Project Area will be undertaken according to the best practice techniques developed by the University of Newcastle and Glencore at Mount Owen (Nussbaumer *et. al.* 2012). The monitoring techniques and data collection from these areas will be outlined in the revised Rehabilitation and Offset Management Plan.

4.15.1.2 DRE

The Division notes that the EIS has identified general rehabilitation strategies and objectives.

Under the Mining Act 1992, mining and rehabilitation are regulated by conditions included in the mining lease, including requirements for the submission of a Mining Operations Plan (MOP) prior to the commencement of operations, and subsequent Annual Environmental Management Reports (AEMR). The Division requires that the proponent submit a revised MOP to include the Mount Owen Continued Operations Project, if approved.

The proponent should be aware that ESG3: Mining Operations Plan (MOP) Guidelines dated September 2013 are available on the Division's website at: http://www.resources.nsw.gov.au/environment/pgf.

As discussed in Section 4.0 of the Mine Closure and Rehabilitation Strategy (Appendix 18 of the EIS), rehabilitation will be undertaken progressively in accordance with the updated mining operations plan (MOP) to be approved by DRE. The updated MOP will be developed in accordance with the mine closure and rehabilitation strategy and will include the detailed measures and schedules for all rehabilitation activities.

The MOP will be updated in accordance with the *ESG3: Mining Operations Plan (MOP) Guideline, September 2013*.

The Division recommends that the following conditions be incorporated into the Development Consent, if granted:

1. ***The Proponent must prepare and implement a Rehabilitation Plan to the satisfaction of the Secretary, DTIRIS.***

2. ***Rehabilitation Plan must:***

    a. ***be submitted and approved by the Secretary, DTIRIS prior to carrying out any surface disturbing activities of the development, unless otherwise agreed by the Secretary;***

    b. ***be prepared in accordance with the Division guidelines; and in consultation with the Department, Office of Environment and Heritage, Environmental Protection Authority, Office of Water, Council and the mine Community Consultative Committee;***

    c. ***incorporate and not be inconsistent with the rehabilitation objectives in the EIS and Table 1;***

    d. ***integrate and build on, to the maximum extent practicable, the other management plans required under this approval and,***

    e. ***address all aspects of mine closure and rehabilitation, including post mining land use domains, rehabilitation objectives, completion criteria and rehabilitation monitoring and management.***

As detailed in Section 6.0 of the EIS, the existing LMP for Mount Owen will be revised to reflect the Project and will include a Rehabilitation and Offset Management Plan for the Project developed in consultation with relevant agencies.

4.15.1.3 NOW

Office of water requires further information on the design of the final landform, with consideration of the hydrological, geomorphic and ecological function of the landform. The proposed landform and final surface water management system (Figure 4.5, Surface Water Assessment) shows an extensive network of drains that do not replicate natural drainage or geomorphic patterns (for example drains close together running in opposite directions). Comment is sought on how natural hydrological and geomorphic conditions will be considered in the design of the final landform.

Figure 4.10 shows the likely drainage lines in the indicative final landform. The Conceptual Closure Plan developed for the Project will include further consideration of natural hydrological and geomorphic conditions in the development of drainage lines. The MOPs developed for the operations will include further detail on the drainage in parts of the rehabilitated landform that will be returned to the surrounding clean catchments. The Detailed Closure Plan for the Project developed within 5 years of proposed closure, will include greater detail on drainage in the final landform. This Plan will be developed having regard to the experience in the management of drainage in the landform of the Mount Owen Operations and natural hydrological and geomorphic conditions.

As discussed in the EIS, through the consultation process it has been communicated to Mount Owen that one of the key community issues associated with the Project related to land management and the proposed final landform. Specific feedback indicated that the Project should not leave a 'traditional flat topped' final landform that is evident in the Hunter Valley and should investigate conceptual design options that would provide landforms that are undulating and more natural in appearance.

Subsequently Mount Owen commenced a conceptual design process for final landform options for the Project. This conceptual design process seeks to integrate the planning for new areas with existing areas within the North Pit and Ravensworth East that are currently shaped to their final landform and have been rehabilitated with the Project.

The technical basis for the conceptual design process involved analysis of stable natural landforms formed within weathered materials in a reasonably close proximity to the Mount Owen Complex to determine the key parameters to be used. The approach looked to understand stable landform characteristics that have developed over geological time periods to allow development of similar stable landforms within the rehabilitated area at Mount Owen Mine.

The key components used in the conceptual design include:

- Overburden emplacement areas will include variation in vertical relief in order to prevent extended ponding of surface water as well as create a profile that is commensurate with the natural local topography.

- The final landform will generally be designed to direct runoff away from the final voids and into the Main Creek, Yorks Creek, Bettys Creek and Swamp Creek catchments. This will return catchment flows to Yorks Creek and Main Creek and reinstate some of the natural flows to Bettys Creek and Swamp Creek.

- Drainage structures will be designed to minimise scouring associated with anticipated runoff. Where practicable, drainage lines will be designed to be commensurate with surrounding natural landforms.

The proposal for a natural landform design approach offers an alternative to the conventional engineered profile design and involves using the key geomorphological characteristics evident in stable landforms within the natural landscape and adapting them to the materials and constraints of the site. Amongst the key principles of the approach include:

- the drainage density of the landform, being the number of drainage lines relative to the overall area, and reflecting the dendritic nature of the drainage;

- steeper slopes located close to the watershed where flows are smallest, with gradients that are typically initially convex in profile becoming concave and flattening out moving downstream;

- drainage lines that have both a channel component and a floodplain, providing stability during frequent and more extreme events; and

- the avoidance of knick points or transitions from sub-critical to super-critical flows other than where located in high erosion resistant material or where gentle transitions are constructed emulating natural transitions that maintain a balance between the scour risk and sediment load.

The conceptual design process for the final landform option for the North Pit Continuation has commenced. It is proposed that Mount Owen will continue to consult with the DRE to further develop the conceptual design through the MOP and mine closure planning processes.

It is important to note that the proposed conceptual landform is based on developing a more sustainable long term hydrological solution to the rehabilitation process. As such, the more natural appearance allowing for the establishment of a number of different landform features such as drainage lines, variable slopes and different aspects (such as north or south facing within an area previously intended to be left flat) are secondary but important benefits. These features allow the development of a variable and diverse post mining landform, and are also visually more natural in appearance.

4.15.1.4 Singleton Council

The adequacy of rehabilitation is an ongoing community concern which if carried out regularly minimises air quality impacts.

Mount Owen has undertaken progressive rehabilitation throughout the life of the Mount Owen and Ravensworth East Mines. Rehabilitation works have included extensive flora and fauna monitoring and research projects in order to develop rehabilitation techniques and ensure the development and success of the rehabilitation programs in place.

A detailed mine closure and rehabilitation plan has been developed for the Project. Rehabilitation will be undertaken progressively to avoid wind erosion of overburden emplacement and exposed areas reducing dust and improving air quality. Where prompt rehabilitation is not feasible temporary treatment will be undertaken. The rehabilitation strategy includes monitoring and the ongoing review and refinement of rehabilitation completion criteria as part of the MOP and LMP process.

A regular and systematic schedule of rehabilitation should be incorporated into any consent conditions which include a significant per cent of exposed land being rehabilitated on an annual basis.

The revised MOP will be developed in accordance with the mine closure and rehabilitation strategy and will include the detailed measures and schedules for all rehabilitation activities in consultation with the DRE.

The final land form will contain a significant void. It will be important that the final land form integrates with surrounding future land uses and the Council would appreciate being involved in future discussions in this regard.

Mount Owen proposes the progressive rehabilitation of the Mount Owen and Ravensworth East Mines which will consist of the shaping of overburden emplacement areas to create a suitable final landform. The rehabilitation works will include optimisation of ongoing overburden emplacement and final landform shaping to achieve an undulating natural final landform with adequate surface drainage which is in keeping with the surrounding landscape. Mount Owen acknowledges that Singleton Council would like to be included in future discussions regarding the final landform and will be consulted as part of the detailed closure strategy development.

4.15.2 Interest Group Submissions

4.15.2.1 Hunter Communities Network

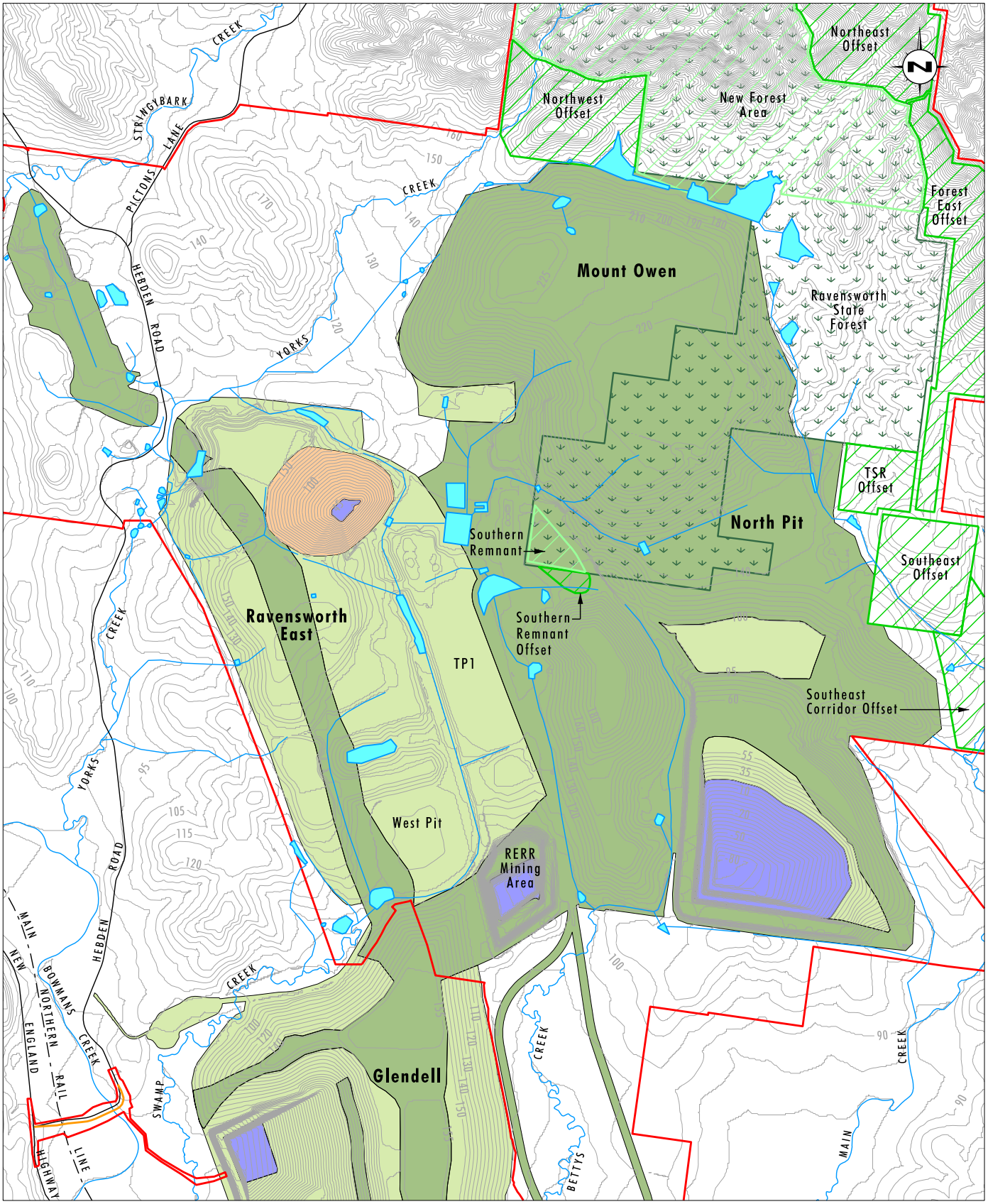
The project will leave three final voids in the landscape. The area of land to be left as open void does not appear to be provided in the EIS. HCN opposes the approval of final voids based on the argument that the backfilling of these areas will impose an economic burden on the project. HCN considers this planning approach to be a cost shifting exercise onto the environment and the taxpayers of NSW. If the project cannot afford to backfill all the open cut pits then it is not a viable operation.

As discussed in the EIS, Mount Owen has reviewed a number of final landform options as part of the Project and is seeking to plan for and design a final landform that will be undulating and natural looking post mining. The conceptual final landform presented in the EIS has been designed to meet the objectives of being safe and stable while providing opportunities for sustainable post mining land use options. The approximate surface area of the 'pit lakes' in the indicative final landform is 100 hectares, comprising 2 hectares for the Bayswater North Pit void, 87 hectares for the North Pit void and 11 hectares for the RERR Pit void. Battered slopes above the 'pit lakes' will be vegetated. The indicative final landform identified in **Figure 4.10** is conceptual only and will continue to be refined as part of the development of the Closure Plan for the Mount Owen Complex.

Mount Owen reviewed a number of potential options to reduce the need for final voids as a result of the Project, including the potential for the use of material from the Western Out-of-Pit (WOOP) Emplacement Area to backfill the proposed final voids. Mount Owen estimates it would take approximately an additional five years to use the material from the WOOP Emplacement Area in the final voids and the double handling of overburden would severely impact the economic viability of the Project. Additionally the process of filling the voids with overburden would result in increased air quality and noise impacts during the emplacement and extend the duration of these impacts on the community. Based on these considerations the option to rehandle overburden to fill the final voids was discounted.

The initial design for the BNP final void had very steep batter angles that would render successful rehabilitation very difficult. Mount Owen subsequently reviewed these batter angles and amended the design to reduce these batter angles to improve the potential for rehabilitation success. The use of RERR overburden material considerably improved the final landform shape of BNP. Additionally, Mount Owen is currently reviewing the potential option of using the BNP void for beneficial reuse for water storage. The potential use of the BNP void in this capacity may eliminate the need for water storages to be developed within other Glencore mines in the Greater Ravensworth Area and also realise a beneficial reuse for a final void.

The RERR Mining Area will be mined in the later stages of the Project and will be used for tailings emplacement during the final years of the Project to enable the West Pit tailings area to consolidate prior to capping. It is anticipated that the RERR Mining Area will have tailings capacity remaining. There is the potential option for the RERR Mining Area to be used for tailings emplacement from other Glencore mines within the Greater Ravensworth Area. The potential for continued use of this area for tailings emplacement and implications for mine closure, will be considered as part of detailed mine closure planning, initiated five years prior to cessation of mining as part of this Project.



Data Source: Mount Owen (2014)
Note: Contour Interval 5m(AHD). Subject to refinement as part of WMP process

0 0.5 1.0 2.0km
1:40 000

Legend

- Project Area
- Existing Biodiversity Offset Areas
- Ravensworth State Forest
- Proposed Hebden Road Upgrade Works
- Final Void Water Level
- Clean Water Dam
- Native Woodland
- Open Grassland (Potential grazing areas) with pockets of Native Vegetation
- Grassland for Stabilisation
- Drainage Line

FIGURE 4.10

Conceptual Final Landform

File Name (A4): R16/3109_993.dgn
20150625 11.45

The EIS does not assess the cumulative impact of final voids in the Hunter landscape. The long term impact of seepage of highly saline water into groundwater systems and base flows to surface water sources is not assessed.

Predicted final void levels and salinity levels in void water are assessed in Section 5.3.5 of the Water Balance Assessment which is Appendix B of the Surface Water Assessment (Appendix 9 of the EIS).

Evaporative concentration of total dissolved solids in the final voids results in long-term projected salinities that increase over time, with North Pit increasing from end of mine levels of about 4,000 mg/L (approximately 6,500 µS/cm) to reach 5,000 mg/L after about 200 years. Over the same period the BNP void is not projected to increase in salinity above the end of mine levels of about 600 mg/L. The final void salinity at RERR is projected to increase from 5,000 mg/L to 13,000 mg/L over the 200 years post-mining.

EC data for the regional hard rock aquifer at Mount Owen Complex typically ranges between 5,000 and 15,000 µS/cm, indicating that void waters will remain fresher than local groundwaters for at least 200 years following the end of mining. Critically, the BNP and North Pit voids will not generate water of lower quality than local groundwaters while the RERR void will remain a sink to groundwater and hence not pose a threat to aquifer water quality.

4.15.2.2 Lock the Gate Alliance

The proposal to leave three vast mine voids in the area is typical of the exploitative attitude towards the Hunter, its people and environment that we are used to seeing from mining companies. Just for once, it would be nice if an approval authority made these companies fill their holes in. After all, they can afford it.

Backfilling the final voids associated with the Project requires the consideration of economic, social and environmental impacts. As discussed above, backfilling the final voids and the double handling of overburden would severely impact the economic viability of the Project. Additionally the process of filling the voids with overburden would result in increased air quality and noise impacts during the emplacement and extend the duration of these impacts on the community. Based on these considerations the option to rehandle overburden to fill the final voids was discounted.

4.15.3 Community Submissions

Mine Closure and Rehabilitation issues were raised in six community submissions.

These issues, with the relevant response have been summarised below:

Please explain why final voids are required and how they will be used in the future, and what is the groundwater location to the void - how is the environmental loss accessed by the void taking water, how much water will be removed from the water network system and how is this calculated, how is the water quality of the void been assessed on the impacts on the surface and underground water, and will this make this area uninhabitable in the future.

The water study has not looked at the cumulative impacts of final voids and this needs to be addressed, stop making concessions relating to a single mine.

The Final landform will have 3 voids and will not resemble the original land form, and is environmentally unacceptable as they will blight and dewater the Hunter. The spoil heaps and remediation will be of too great a slope and prone to erosion making re-establishing plant and ground cover difficult. No mine should be able to leave a final void. If this makes the mine uneconomic, then it should not be allowed to proceed.

As discussed in **Section 4.15.1.3,** through the consultation process it was communicated to Mount Owen that one of the key community issues associated with the Project related to land management and the proposed final landform. Specific feedback indicated that the Project should not leave the 'traditional flat topped' final landform that is evident in the Hunter Valley and investigate conceptual design options that would provide landforms that are undulating and more natural in appearance.

Subsequently, Mount Owen commenced a conceptual design process for final landform options for the Project. This conceptual design process seeks to integrate the planning for new areas with existing areas within the North Pit and Ravensworth East that are currently shaped to their final landform and have been rehabilitated with the Project.

As discussed in Section 2.18.5.1 of the EIS, backfilling the final voids associated with the Project requires the consideration of both economic and air quality and noise impacts. As discussed above backfilling the final voids and the double handling of overburden would severely impact the economic viability of the Project. Additionally, the process of filling the voids with overburden would result in increased air quality and noise impacts and extend the duration of impacts on the community. Based on these considerations the option to rehandle overburden to fill the final voids was discounted. As previously discussed the use of the future use of the voids for water and tailings storage is being investigated.

Water quality in the final voids is discussed in Section 5.6.2.2 of the EIS and the Groundwater Impact Assessment.

4.16 Cumulative Impacts

Hunter Communities Network, the Wybong Action Group and 6 community submissions raised issues within their submission relating to the inclusion of cumulative impact studies and the adequacy of the EIS, statements included:

HCN strongly objects to the proposed expansion of the Mount Owen mining complex (the project) because there are a considerable number of cumulative social and environmental impacts that have not been adequately identified or assessed in the Environmental Impact Statement (EIS).

The cumulative impact of Mount Owen Mine since original approval in 1991 and in relation to surrounding mines has not been adequately addressed.

I object to this project proceeding, and I object to any further approvals of new mines or mine extensions, as irresponsible and indefensible because of global warming and the severe loss of biodiversity in the Hunter, and the dreadful impacts on the health and amenity of local and regional communities affected.

I am a resident of the Hunter Valley and strongly object to the expansion of the upper hunter Mount Owen mine. I believe any further increase in coal mining to be negligent when considering the health of all living things. Instead of expanding we need to be decreasing our reliance on fossil fuels.

The EIS includes integrated consideration of cumulative impacts as part of all studies for the key issues, which includes consideration of the impacts from the currently approved Mount Owen Complex and other approved mining operations.

The EIS and supporting documentation addresses the DGRs provided for the Project. Further we note that the EIS has been reviewed by all relevant government agencies, with many having no issues or comments, and others noting matters for clarification but no major concerns regarding the adequacy of the EIS.

4.17 Ecologically Sustainable Development

Only one submission specifically raised the issue of ecologically sustainable development.

4.17.1.1 Hunter Environment Lobby

HEL is submitting an objection to the Mount Owen Continued Operations Project (the proposal) because it will not meet the principles of Ecologically Sustainable Development.

Section 7.3 of the EIS provides an assessment of the Project in relation to the principles of Ecologically Sustainable Development. The principles of Ecologically Sustainable Development include:

- the precautionary principle;
- inter-generational equity;
- conservation of biological diversity; and
- valuation and pricing of resources.

Section 7.3 of the EIS provides the assessment of the Project in relation to these principles through a detailed overview of the environmental assessment undertaken to support the Project, the consultation program, the management and monitoring methods proposed and the objectives of the Project, the proposed Biodiversity Offset Strategy and the expected revenue and benefits associated with the Project.

The Precautionary Principle

The EP&A Regulation defines the precautionary principle as:

> *'if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*
>
> *(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
> *(ii) an assessment of the risk-weighted consequences of various options.*

In order to achieve a level of scientific certainty in relation to potential impacts associated with the Project, the EIS included an extensive evaluation of all the key components of the Project. Detailed assessment of all key issues and necessary management procedures has been conducted and is comprehensively documented within the EIS. The assessment process has involved a detailed study of the existing environment, and the use of engineering and scientific modelling to assess and determine potential impacts as a result of the Project. Consequently there has been a careful evaluation to avoid, where possible, irreversible damage to the environment.

Intergenerational Equity

The EP&A Regulation defines the principal of intergenerational equity as:

> '*that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.'*

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, biodiversity and productivity.

The objectives of the Project are:

- the continued operation of the Mount Owen and Ravensworth East Mines with a focus on:
  - maximising resource recovery from within the existing Glencore mining tenements;
  - optimising the use of existing infrastructure;
- maintaining the economic life of the Mount Owen and the Ravensworth East Mines and providing ongoing employment for the existing workforce;
- further development of the existing environmental mitigation and management strategies, expanding the existing commitments to mitigate and manage the predicted impacts associated with the Project;
- maximising the use of previously disturbed areas and existing mining infrastructure, thereby minimising the overall Proposed Disturbance Area as far as practicable;
- avoidance of any existing biodiversity offset areas and the Ravensworth State Forest;
- continuing to actively engage and consult with the surrounding community; and
- establishing a final landform that is safe and stable and provides sustainable post mining land use options.

The design of the Project and commitment to the management of environmental issues as outlined in this EIS will maintain the health, diversity and productivity of the environment for future generations. The Project will also make a significant contribution to maintaining services in the community through the direct and flow on effects of employee and operational expenditure and through development contributions in accordance with the EP&A Act.

Conservation and Biological Diversity

The EP&A Regulation identifies that the principal of conservation of biological diversity and ecological integrity should be a fundamental consideration in the decision making process. The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. All environmental components, ecosystems and habitat values potentially affected by the Project are described in the EIS. Potential impacts are also outlined in the EIS and measures to ameliorate any negative impact.

A key objective of the Project is to utilise the existing approved disturbance areas within the Mount Owen Complex and accordingly reduce the magnitude of additional disturbance areas. Additionally, Mount Owen has designed the Project such that impact to the extant areas of Ravensworth State Forest and the existing biodiversity offset areas will be avoided.

Notwithstanding design measures to reduce the extent of impacts to significant ecological features of the Project Area, the Project results in significant and potentially significant ecological impacts. Mount Owen has committed to a package of extensive measures that aim to further mitigate the identified ecological impacts, including a comprehensive Biodiversity Offset Strategy for the Project. The Biodiversity Offset Strategy consists of a number of key components designed to address the impacts on EECs and threatened species identified in the Project Area.

Valuation and Pricing of Resources

The principle has been defined in the EP&A Regulation as:

> *'that environmental factors should be included in the valuation of assets and services, such as:*
> *(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
> *(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
> *(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems'*

The polluter pays principle applies to the Project through the discharge of salt in surface water discharges to the Hunter River catchment through the Hunter River Salinity Trading Scheme. Pricing of resources is also captured in the regulatory regime applying to surface and groundwater extractions.

Project considerations have included the costs of management measures to minimise potential environmental and social impacts. There will also be additional costs associated with establishing and managing ecological offsets to reduce the magnitude of ecological impacts. In many cases, operational efficiencies are also associated with improved environmental outcomes. For example, efficient haul routes reduce total noise and dust emissions and diesel use (with associated greenhouse gas and particulate emission reductions).

The Project also optimises the valuation and pricing of the coal resources with minimal impact by:

- optimising available use of the existing coal processing and transportation facilities to wash coal and to transport product coal to existing markets; and

- maximising the efficient extraction of the coal resource and avoiding the isolation and sterilisation of coal through effective mine planning, utilisation of existing infrastructure and location of site infrastructure.

4.18 Further Approval Requirements

Three submissions from NSW Agencies raised matters for clarification in relation to further approval requirements following any development consent for the Project.

4.18.1 EPA

The EPA notes that it is the intention of the proponent to consolidate the current Environment Protection Licences (4460 (Mount Owen Mine) and 10860 (Ravensworth East Mine). Table 3.7 of the EIS notes that if approval is granted, amendments will be sought for EPL 4460 to consolidate the expanded operations and that the proponent will seek to surrender EPL 10860.

If approval is granted for the Project, the proponent will be required to make a separate application to the EPA addressing the proposed variation to EPL 4460, and potential surrender of EPL 10860.

Mount Owen will undertake the required approval process regarding the EPLs for the site following Project approval.

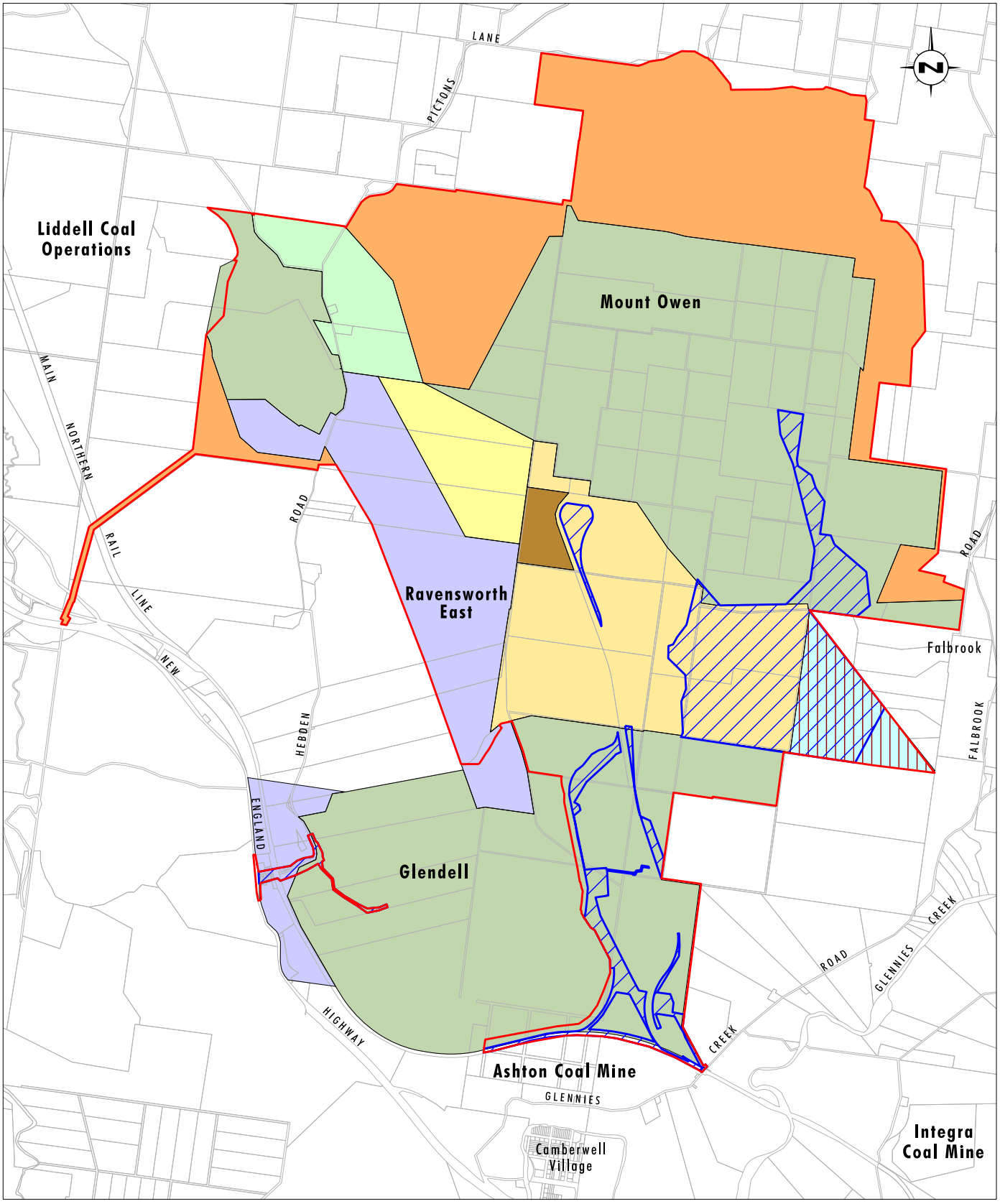
4.18.2 DRE

As coal is a prescribed mineral under the Mining Act 1992, the proponent is required to hold appropriate mining titles from the Division in order to mine this mineral. The Division understands the proposed mining activities are within existing mining titles held by the Proponent.

The Division notes the proponent's intention to convert Assessment Lease 8 to a mining title. This will require the submission of a mining lease application to the Division. As part of this application the Proponent will need to provide proof of native title extinguishment or go through the right to negotiate process.

All mining activities will be undertaken within areas covered by existing mining titles held by the Proponent. A review of the mining titles for Mount Owen show that an area of the proposed North Pit Continuation is located in an area where there are no mining leases applying to the land between the surface and a depth of 15.24 metres. We note however that the surface to 15.24 metres in this area is subject to Assessment Lease 8 (AL08) with mining leases CL382 and ML1415 applying to all strata below a depth of 15.24 metres. **Figure 4.11** shows the coverage of the various leases which apply to the Project Disturbance Area. An application to convert AL08 to a Mining Lease will be made by Mount Owen and mining and mining purposes associated with the Project will not commence in this area until a lease is granted over the area.

Confirmation that Native Title has been extinguished over the area will be provided with the mining lease application.



Data Source: Mount Owen (2014), Department of Lands (2009)
Note: Refer to Figure 2.1 for lease area coverage

0 1.0 2.0 3km
1:60 000

Legend

- Project Area
- Proposed Disturbance Area

Assessment Leases:

- Surface to 15.24m (AL08)

Mining Lease Depths (and reference to relevant mining leases - refer to note):

- Surface to Unlimited (ML1419, ML1476, ML1694, CL358, CL715, ML1453, CL382)
- Surface to 106.68m (ML1410, CL358, ML1415)
- Surface to 152.4m (ML1415, ML1475)
- Surface to 182.88m (ML1415, ML1475, AL08)
- Surface to 213.36m (ML1415, ML1475, ML1694, ML1561)
- Surface to 243.84m (ML1415)
- Not Mapped (outside disturbance area)
- Excludes Surface to 15.24m (CL382, ML1415)

FIGURE 4.11

Mount Owen Complex
Strata Depth of Mining Titles

4.18.3 NOW

Clarification regarding the water licences currently held by Mount Owen and any further licensing requirements for the Project is provided in **Section 4.5.1.3**.

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APPENDIX A

Department of Resources and Energy
Advice on Resource Significance

Mount Owen Continued Operations Project
Assessment of the Significance of the Resource:

In considering the significance of the resource in comparison with other resources across the State, NSW Trade & Investment – Division of Resources and Energy (the Division) has made the following assessments.

Size, quality and availability of the resource

The Mount Owen Continued Operations Project (the Project) is owned by Mount Owen Pty Ltd (the Proponent). Mount Owen Pty Ltd is a subsidiary of Glencore Coal Pty Ltd (Glencore), the largest producer of coal in NSW.

Approval is sought for extensions to the currently operating Mount Owen and Ravensworth East open cut coal mines located 25 km north-west of Singleton. Mount Owen and Ravensworth East are part of the Mount Owen Complex which also includes the Glendell Mine. The mining operations at the Mount Owen Complex include the integrated use of the Mount Owen coal handling and preparation plant (CHPP), coal stockpiles and the rail load-out facility. The Project does not include any aspect of the ongoing operations at Glendell. The Project will extend the life of the currently operating Mount Owen Mine by 12 years through the extraction of an additional 74 million tonnes (Mt) of run-of mine (ROM) coal. Without Project approval the Mount Owen mine will cease operations in 2018.

Also approval is sought to extract an additional 18 Mt of ROM coal from the Ravensworth East Mine which will allow the mine to operate at its currently approved production rate of 4 Mtpa of ROM coal over a period of 12 years. Without Project approval the Ravensworth East Mine will close in 2021.

The Project also offers the opportunity to consolidate the existing development consents for Mount Owen and Ravensworth East Mines and provide for further compliance efficiency by providing a single development consent for continued operations.

The Division has verified that the Project will provide approximately 92 Mt of additional ROM coal and approximately 52 Mt product coal. The Proponent has completed a resource and reserve estimation for the Project in accordance with the Australasian Code for Reporting Exploration Results, Mineral Resources and Ore Reserves 2012 “the JORC Code”.

Coal qualities in the Project area are comparable with coal currently produced at the Mount Owen Complex. Raw ash levels necessitate washing to meet export market specifications. Coal will be processed in accordance with current operational procedures at the Mount Owen CHPP prior to transport for export. The Mount Owen Complex currently sells its coal on the export thermal and metallurgical markets, in proportions of around 90% thermal and 10% metallurgical. The Proponent plans to sell coal from the Project into these same markets.

Given the constraints outlined in the EIS, the Division considers that the Project mine plan adequately recovers the in-situ coal resources.

The Hunter coalfield has 20 mines that produced coal during 2013-14, 15 are open cut mines and five are underground mines. The existing Mount Owen Mine commenced

operations in 1993, whereas the Ravensworth East Mine commenced in the early 1960's. The Mount Owen Complex produced slightly over 15 Mt of ROM coal in 2013-14, making it the fourth largest producing mine in the Hunter coalfield and the fifth largest of the 56 operating mines in NSW.

The Division considers the Project is vital to ensure production from the Mount Owen Complex is maintained at current levels. The Project, if approved will play a pivotal role in ensuring the Mount Owen Complex continues to produce at optimal levels and that existing mining equipment and associated coal handling, preparation and rail load-out facilities will be fully utilised. The Mount Owen Complex is considered a large mine when compared to other operating coal mines in NSW, i.e. the average size of currently operating coal mines in NSW in 2013-14 was around 4.7 Mtpa of ROM coal.

As well as the Project being pivotal to the continued operation of the Mount Owen Complex the Division also considers that the Project:

- maximises resource recovery;
- is the optimal and most efficient mine plan;
- does not sterilise other resources;
- is an effective use of existing resources, both within the Project area and also adds to the utilisation of the State's infrastructure;
- provides ongoing employment up to a maximum of around 900 employees, which is particularly important given the current trend of reducing coal mine employment in NSW.

Over the life of the Project assuming production is sold in the export market, the value of the coal produced would be worth nearly $6 billion in current dollars. The net present value of this revenue stream has been estimated by the Division at approximately $3.5 billion.

The resource is available to be mined, in that the Project is a logical extension of both the Mount Owen Mine and the Ravensworth East Mine. Over the first five years of the Project life the overburden to coal ratio remains close to current levels and hence the existing mining equipment can continue to be used to achieve the Project production rate.

Proximity to existing infrastructure

Coal from the existing Mount Owen Complex is processed at the Mount Owen CHPP and associated infrastructure which has an approved capacity of 17 Mtpa of ROM coal. Processed coal is primarily transported via the Main Northern Rail Line to the Port of Newcastle for export. The Project intends to continue to use the existing surface infrastructure at the Mount Owen Complex.

As well as utilising the existing infrastructure it is understood the Proponent is seeking approval to undertake additional infrastructure works as follows:

- an upgrade of the Hebden Road, which is the main primary employee and services access for the Project. The upgrade include a road overpass over the Main northern

Rail Line and a new dual lane road over Bowmans Creek, these upgrades will greatly improve road safety and reduce traffic delays on the Hebden Road;

- upgrade the existing Mount Owen rail line which result in a reduction of unnecessary traffic flow on the rail line:
- extend and improve the existing CHPP and coal stockpile facilities;
- upgrade the existing heavy vehicle workshop and ancillary services.

Therefore, the Division considers that the Project will continue to utilise the existing mine infrastructure at similar capacities to the existing Mount Owen Complex. The Project, if approved, would also enhance existing infrastructure and greatly improve it from both the safety and efficiency of use perspectives.

Relationship of the resource to any existing mine, petroleum production facility or extractive industry

The Project is integrated with the existing Mount Owen Complex, in that without Project approval the Mount Owen Complex would cease operations in 2022 or possibly in 2018 depending on future export coal prices.

In particular, the Mount Owen Mine provides the majority of tonnage for the Mount Owen Complex which allows efficient economic use of the CHPP and provides suitable quality coal feed to the CHPP and hence the traditional Mount Owen Complex export coal blends can be produced for Glencore's overseas customers.

Therefore, the Division is of the opinion that without Project approval one of the Hunter Valley's largest operating mines has only a short term future.

Dependency of other industries on the resource project

Many local industries rely on the Mount Owen Complex, and hence Project approval would ensure that these businesses continue to operate, or new mine related businesses could commence. These industries include; mine equipment maintenance firms, mining equipment supply firms, coal handling plant maintenance and supply firms. These firms are mainly local industries which employ locally and would rely on the Project for either their continued existence or expansion.

As employment from the Project will not be increased from current levels at the operating Mount Owen Complex, indirect employment flowing from the project will be maintained for around an additional 12 years. Based on other mine projects, the Division believes the 3000 indirect positions within the region, and NSW as a whole, could also be maintain.

Mining Royalties

The Project is a proposed open cut mine and as such 8.2% of the net disposal value is applicable. Net disposal value is the price received per tonne minus any allowable deductions. The main allowable deduction is for coal beneficiation which is either; $3.50 per tonne for coal subjected to a full washing cycle, or $2.00 per tonne for coal subjected to a simple washing process, or $0.50 per tonne for coal that is washed and screened. As all coal from the Project will be subjected to the full washing cycle a deduction of $3.50 per tonne applies. A deduction for levies applies which would amount to around $1.00 per tonne. Hence allowable deductions for royalty for the Project would amount to $4.50 per tonne.

One of the most important assumptions in the calculation of future Royalty for a coal proposal is the estimate of a future coal price over the life of a project. Coal from the Project is projected to be sold into the export thermal and metallurgical markets on a 90% export thermal and 10% export metallurgical split basis.

For the 6 quarters from Dec 2012 to March 2014(Coal Services data) export thermal coal prices were at or slightly below $A90 per tonne and had dropped to A$77 per tonne by the December 2014 quarter.

The bottom of the price cycle appears to have occurred in late 2014 as the Newcastle spot price has been reported to be around A$90 per tonne in mid February 2015, as a result of slight rise in the commodity price and the fall in the Australian Dollar.

Coal price forecasting is inherently difficult and over the long term time frame of the Project there will be many variations in coal prices. There is a growing consensus in the coal industry that coal prices will improve in the medium to long term over the current five year lows. For its royalty calculation, the Division uses the current low short term coal prices, and medium to long term export thermal prices in the range of A$97 to $A117 per tonne. A similar methodology has been used to arrive at future semi-soft metallurgical coal prices for the Project, traditionally this coal type receives around an additional A$20 per tonne over and above export thermal prices.

Another important aspect of future royalty calculation for a proposed coal project is estimation of future annual production. The Division has estimated that if the Project is approved, around 52 Mtpa of product coal would be able to be economically mined from the Project area from 2016 to 2030.

Using the above parameters the Division has calculated that in a typical full production year the State will receive around $32 million per annum, and in dollars of the day total royalty payable from the Project would be around $475 million. The net present value of this royalty stream would be around $280 million using a 7% real discount rate.

Other Factors

The Division also notes from the Economic Assessment prepared by the Proponent that the Project will:

- spend $153 million on construction;
- generate an estimated net economic benefit of $306 million (in NPV terms) to the Singleton community over its life;
- increase the Hunter region's gross regional product by $1.3 billion (in NPV terms) over its life;
- increase the NSW gross state product by $1.9 billion (in NPV terms) over its life.

APPENDIX B

Pacific Environment Limited –
EPA Response

Pacific Environment Limited

Consulting • Technologies • Monitoring • Toxicology

30 June 2015

David Holmes
Principal Environmental Consultant – Approvals and Policy
Umwelt (Australia) Pty Limited

Dear David

In order to more fully expand on some of the comments raised by the NSW EPA in their submission for the Mount Owen Continued Operations – Air Quality Impact Assessment (AQIA), we provide the following letter report. This will include discussion on the following issues:

1. The background values applied for PM_{10} and $PM_{2.5}$ annual averages, including discussion of the mean vs median values for PM_{10}
2. The model calibration methodology for the annual average cumulative assessment
3. Recalculation of the $PM_{2.5}$ annual average background value to align with the PM_{10}
4. Application of the recalculated $PM_{2.5}$ annual average background and the subsequent update of cumulative $PM_{2.5}$ assessment
5. Consideration of particulate emissions in diesel exhaust.

Pacific Environment Operations Pty Ltd
246 Arthur Street
North Sydney NSW 2060

(ASX: PEH) ABN: 86 127 101 642
www.pacific-environment.com
Ph: +61 2 9870 0900

BACKGROUND VALUES FOR ANNUAL AVERAGE PM_{10}

The word 'background', is used here to define the levels of particulate matter (PM) that might be found in the atmosphere in the absence of mining activity in the Valley. In other words, the contributions that all other sources, both natural and anthropogenic, would make to the air shed. We then add mining sources to this, both from the Project and also from other mines in the modelling domain.

Given that mining is such a significant source of PM in the region, the monitoring data (specifically from the Upper Hunter Air Quality Monitoring Network (UHAQMN)) were analysed and the Merriwa, Wybong and Jerrys Plains monitors (refer to **Figure 1** below), which are less influenced by mining, either due to distance or relative location, were considered to be the most representative of what background levels in the Hunter Valley might be without mining influences. Jerrys Plains, while close in proximity to mining operations, lies outside the NW/SE axis of prevailing winds in the Valley relative to most mining activity in the valley. Merriwa and Wybong, while still relatively aligned to that prevailing wind axis, are relatively distant from substantial existing mining operations, particularly the Merriwa monitor (the Jerrys Plains monitor has potential to be influenced by the Wambo and HVO Operations, while the Wybong monitor has potential to be influenced by the Mangoola Mine).

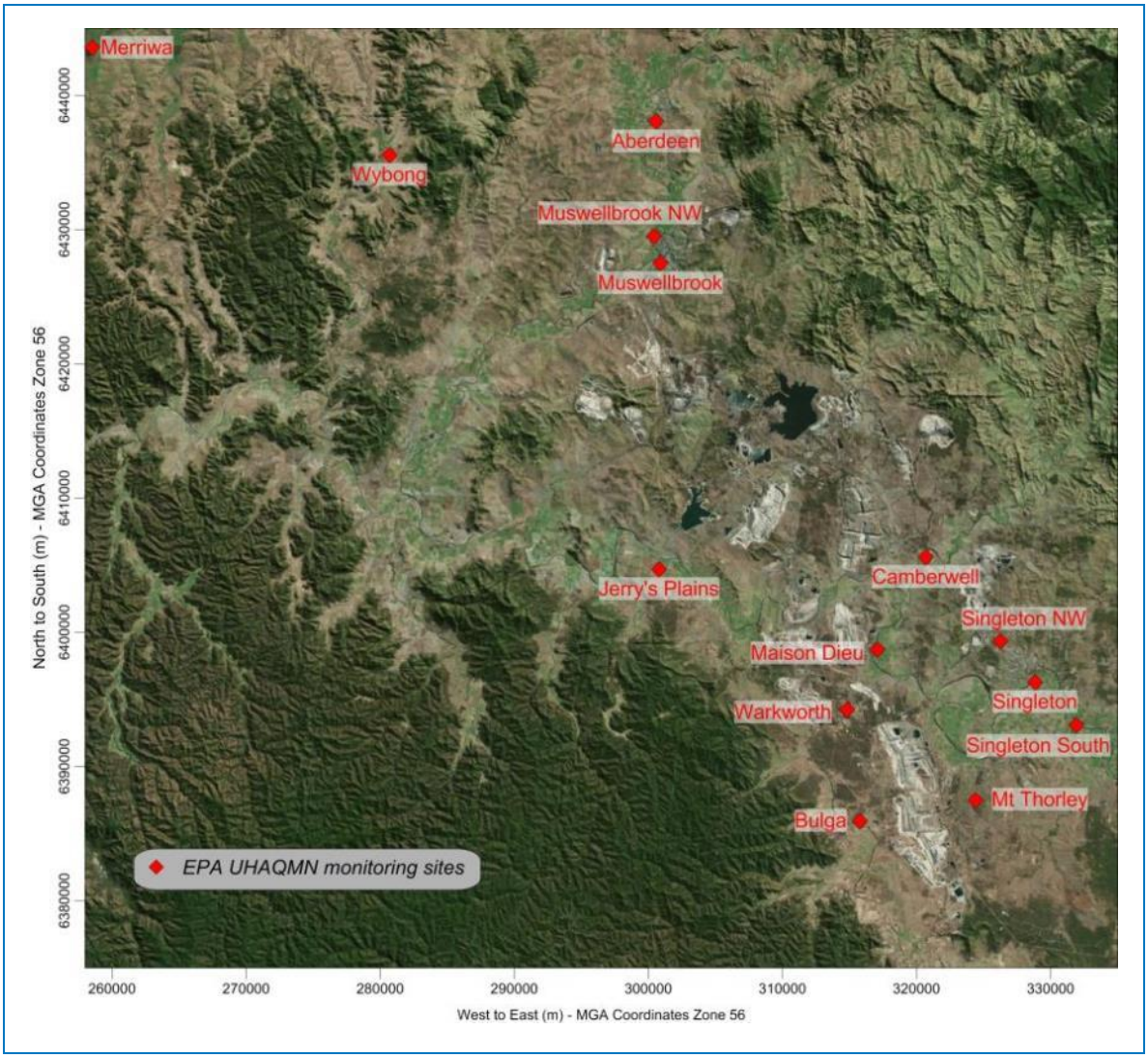

Figure 1: Locations of the UHAQMN monitoring sites

An analysis of the data from these three sites resulted in an annual average PM_{10} "background value" of 13.2 µg/m^3. This value was the median of the data from these sites. This will still be conservative representation of non-mining influenced background levels as there will always be a small mining component included at these monitors.

Seen in this context then, a background concentration of 13.2 µg/m^3, representing contributions from non-mining sources, would not be considered low but representative of a rural agricultural area.

If 13.2 µg/m^3 was used to represent all existing sources including mining then we would agree that this would appear low. However, the predicted cumulative impacts add mining contributions (both for the Project and other mines) on top of this background.

There was also a comment from the EPA relating to the way this value was determined and the potential reduction of the influence of extreme values. It is not explicit from the comment, but we assume this refers to the use of the median value rather than the annual mean (described in Section 5.3.2 in the AQIA). The median value was used to reduce the influence of significant weather events which are unpredictable into the future and can potentially skew the annual mean. **Figure 2** shows the frequency of occurrence of the 2,148 measured values from the Jerrys Plains, Merriwa and Wybong UHAQMN monitoring sites in ranges of 1 µg/m^3. The median and mean values are shown in red and green, respectively.

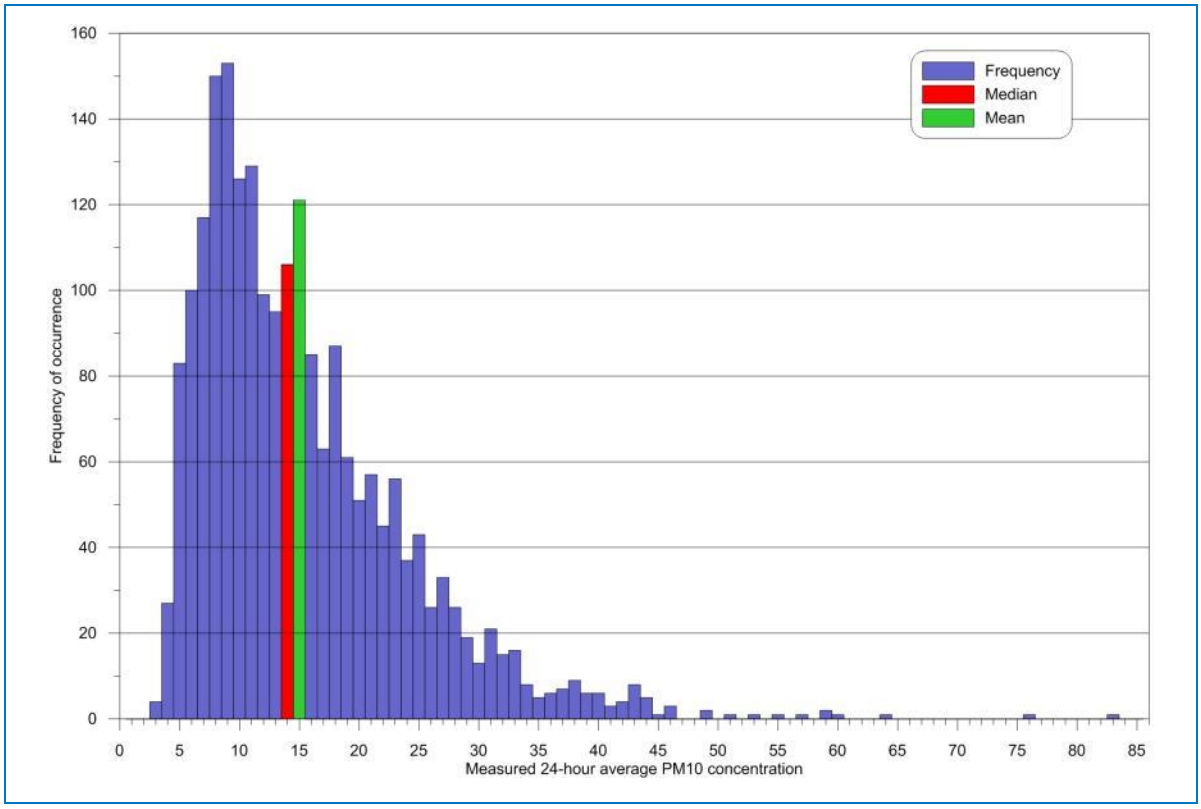

Figure 2: Frequency of occurrence of PM_{10} concentrations at Jerrys Plains, Merriwa and Wybong

As can be seen from **Figure 2**, there is a strong skew in the data with a higher frequency of occurrence of lower measured PM_{10} concentrations. The histogram shows that the mean is slightly affected by the relatively few higher measurements, particularly those above the annual criterion of 30 µg/m^3. Given that the median is closer in value to the most frequently observed concentration levels shown in the data, its use as the basis for the background levels in the cumulative PM_{10} annual average assessment is considered to be appropriate.

Notwithstanding, a further analysis has been carried out to compare the cumulative PM_{10} annual average results in the AQIA using the results using the annual mean to see what the effect of the use of the higher background value would mean in terms of assessed impact. The annual mean for the same period is 14.9 µg/m³. If this mean value is applied to the cumulative annual average PM_{10} plots, the differences are minimal and any observed differences would be within the margin of error of current monitoring. **Figure 3**, **4** and **5** show the extent of the annual average PM_{10} criterion contour, using both the median (red line) and the mean (yellow line). In the worst case year (Year 1), three additional residences are predicted to exceed the 30 µg/m³ criteria if the mean, rather than the median, is used. Two of these, R166 and R160, are already owned by other mines. The third, R148, is privately owned but has existing acquisition rights for noise under the Integra project approval.

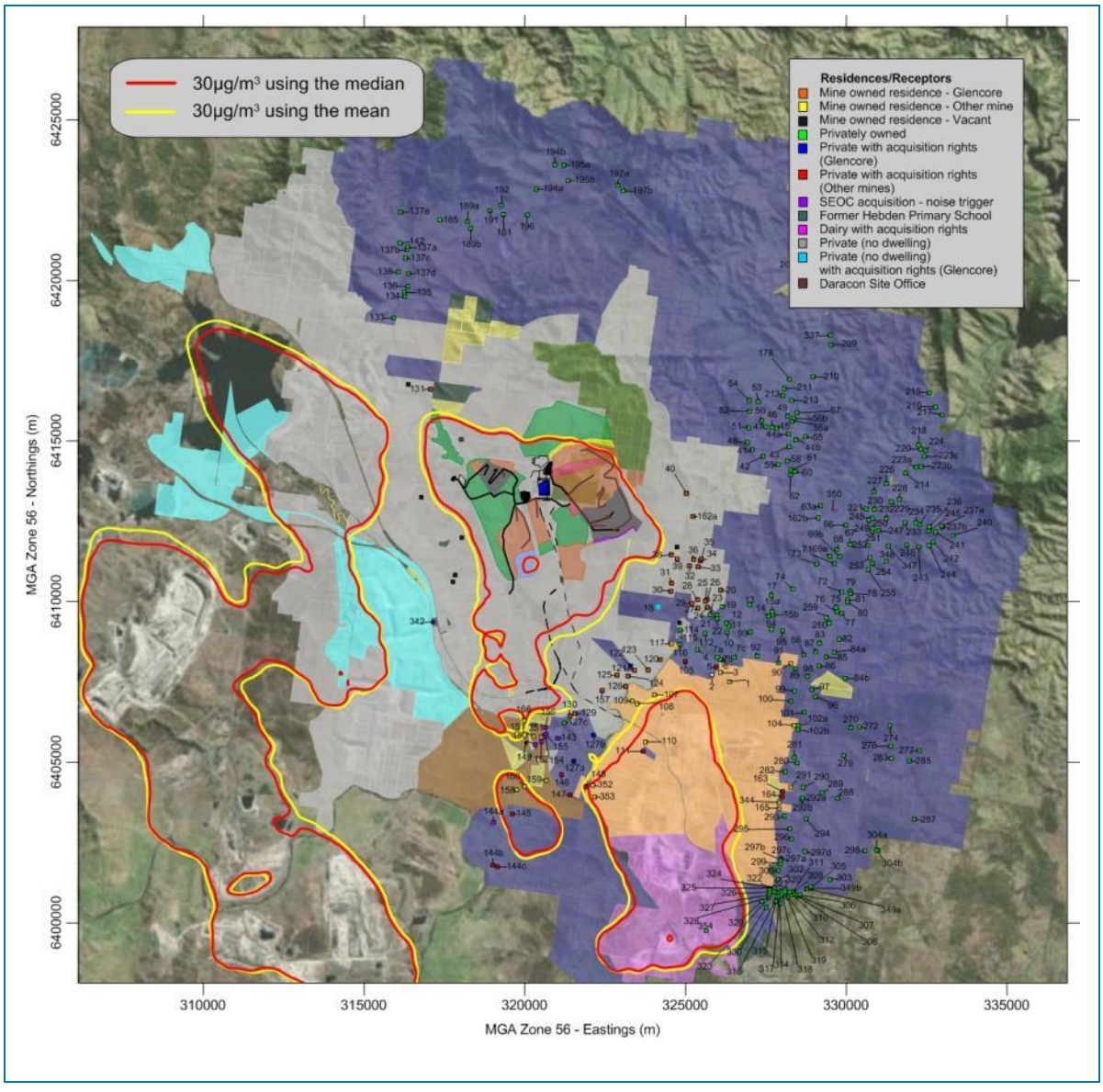

Figure 3: Predicted cumulative annual average PM_{10} concentrations in Year 1 (µg/m³)

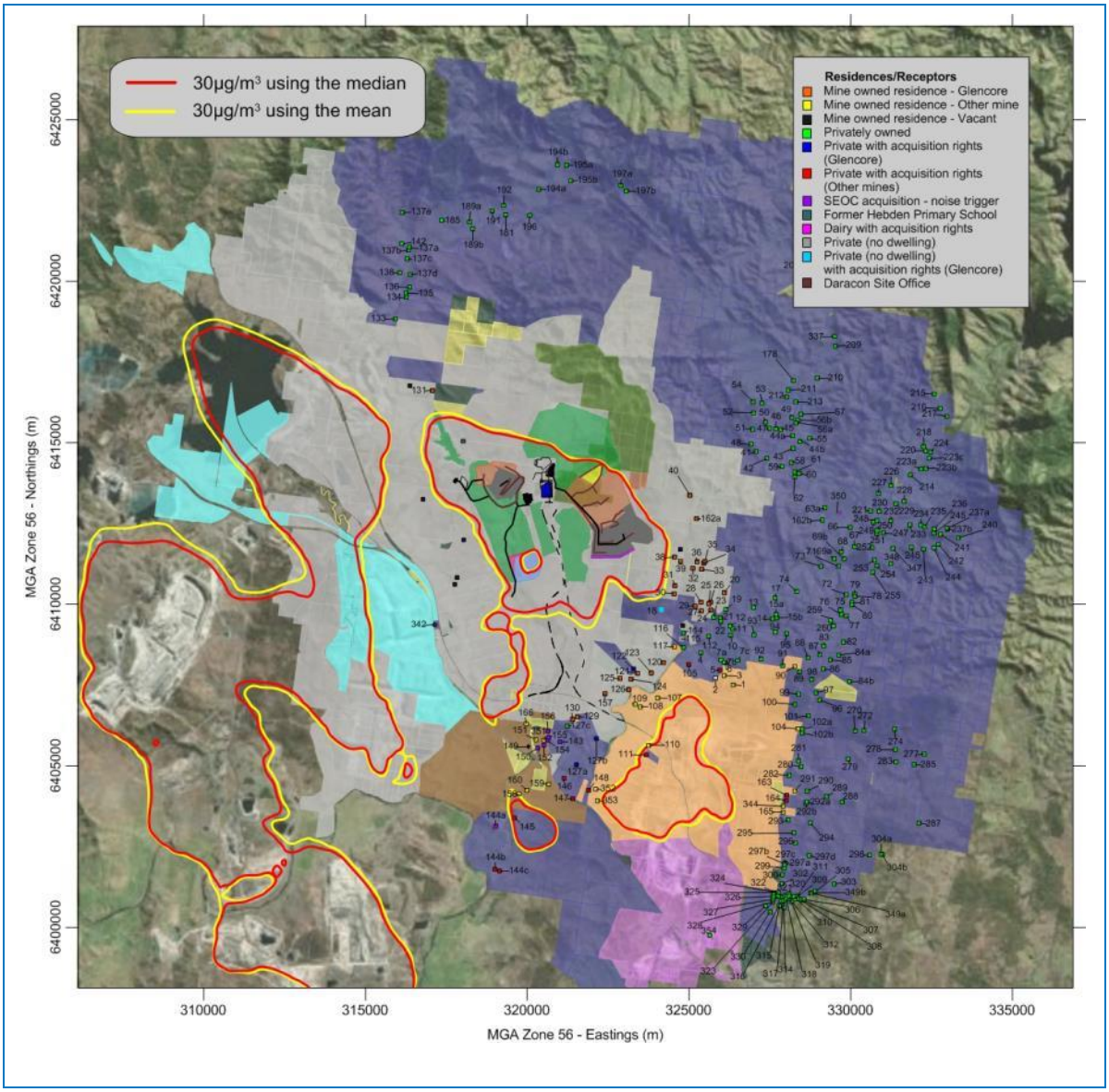

Figure 4: Predicted cumulative annual average PM_{10} concentrations in Year 5 (µg/m³)

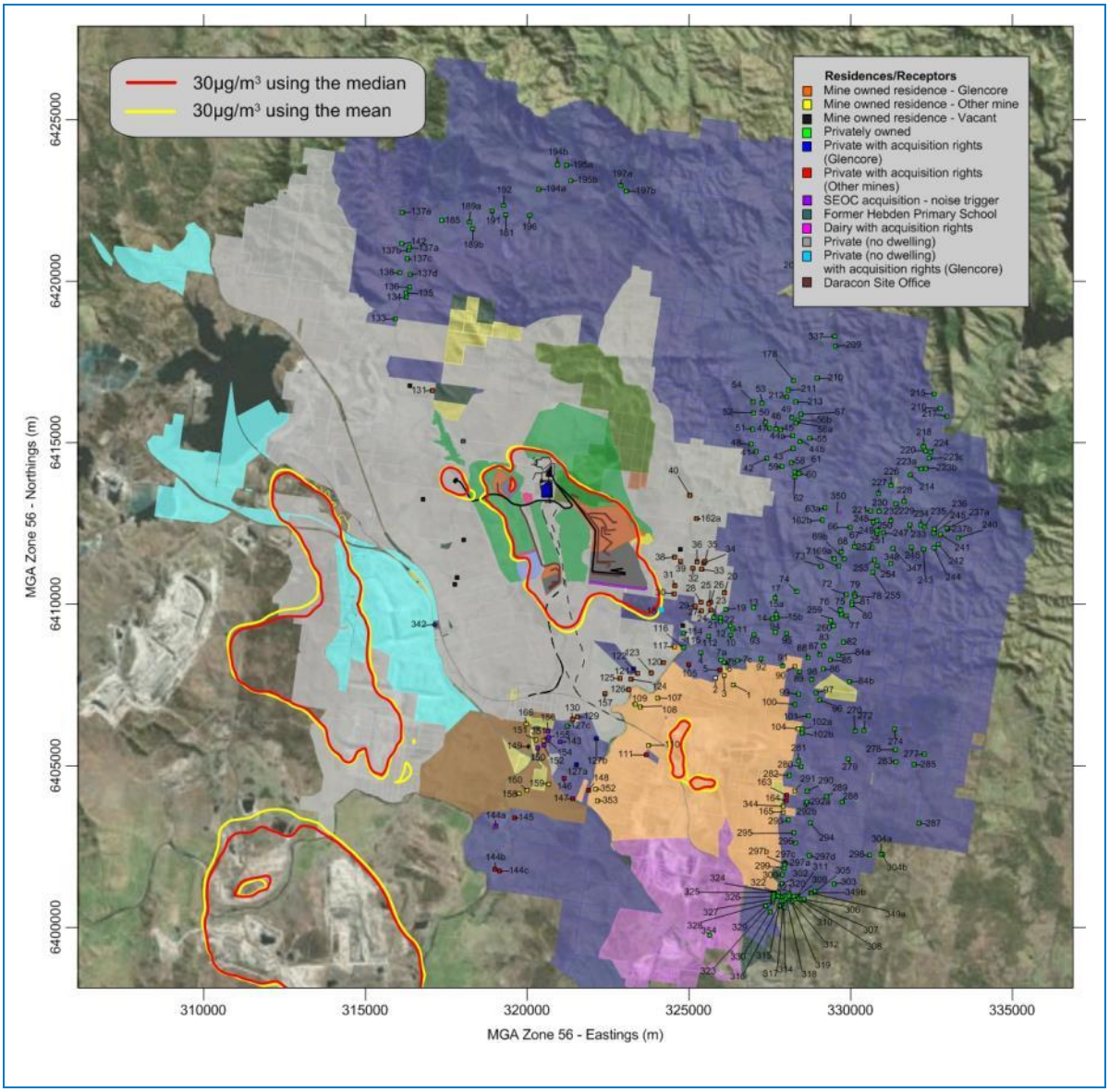

Figure 5: Predicted cumulative annual average PM_{10} concentrations in Year 10 (µg/m³)

It should also be noted that the approach of setting the background level for use in the annual cumulative assessment as well as the cumulative assessment itself, went through a comprehensive peer review. One of the outcomes of this review was confirmation that the approach of adding a background level (discussed above) to the modelled Project contribution plus the modelled other mining contribution was undertaken in a manner consistent with the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC 2005). This review was conducted by Jacobs Group (Australia) Pty Limited (Jacobs) and is presented in Appendix A of the AQIA.

THE ANNUAL CUMULATIVE ASSESSMENT APPROACH – MODEL CALIBRATION

Dispersion models have a tendency to over-predict, particularly for cumulative assessment. The calibration described in the AQIA was therefore undertaken to address some of this conservatism and provide results which are closer to the levels which are measured at various locations across the model domain. This calibration also considers the spatial nature of variations in model performance (influenced by meteorology and source locations) to minimise the model uncertainty.

Section 8 of the AQIA outlines the approach to the annual cumulative assessment. The approach involves a 3 step process which results in the addition of 3 components of the total cumulative PM concentration. These 3 components are:

1. The 'background'. As described above, this is an estimation of the contribution of all sources other than mining.[1]
2. Mines within the modelling domain, not including the Project.
3. The Project, as proposed for the future modelling scenarios.

The 'background' (1) has been discussed above. The Project (3) is simply Years 1, 5 and 10 of the Project as proposed and is added in full, uncalibrated. The following discussion will focus on the other mines in the modelling domain (2) and involves the calibration of the model using monitoring data in the vicinity of the Project.

Model performance is evaluated by comparing model predictions for existing mines with monitoring data for the same period. Operating mines in 2011-2012 (the meteorological modelling year) were modelled and annual average PM_{10} predictions were compared to monitoring data from the UHAQMN and mine monitoring sites. The locations of each of these monitoring sites are shown in **Figure 6**, along with the locations of each of the sources used to represent existing mines. These also include the Mount Owen and Ravensworth East Mines as they were in 2012.

To account for the non-modelled dust sources, the 'background' annual average PM_{10} concentrations of 13.2 µg/m^3 was added to model predictions at each monitoring site. The results are shown in **Table 1**.

Most of the locations of pits, dumps, haul roads and processing areas were taken from the relevant PRPs[2] for each mine, as were the total PM_{10} emissions. These mines and their total PM_{10} emissions used in the model, as well as the source of the emissions data are listed in **Table 2**. The details for Mount Owen and Ravensworth East Mines in the 2011-2012 period were obtained directly from the proponent and included greater detail on both sources and emissions intensity than was available from the PRP data for either Mount Owen or the other operations modelled in the cumulative assessment. For this reason, there is greater accuracy in this modelling of impacts attributable to existing (2012) Mount Owen operations in the calibration model than is expected from the other operations.

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[1] The particulate matter emitted from the Liddell and Bayswater power stations are captured by the current monitoring network used in this assessment. A new 2000 megawatts (MW) power station (Bayswater B) was conceptually approved in January 2010. The air quality impact assessment (Katestone, 2009) predicted that the maximum 24-hour average PM10 concentrations at sensitive residences were 0.13 µg/m3, that is, less than 0.5% of the EPA assessment criteria of 50 µg/m3. Maximum predicted annual average PM10 concentrations at sensitive residences were 0.004 µg/m3 - approximately 0.01% of the EPA assessment criteria of 30 µg/m3. Given the extremely low predicted impacts from the operation of Bayswater B, power stations were not included explicitly in the cumulative assessment. However, as noted, they were implicitly included, as any emissions will be captured in the monitoring data.

[2] Pollution Reduction Programs (PRPs) were added to all Environmental Protection Licences for NSW coal mines in 2011/2012, which required each mine to quantify total TSP, PM_{10} and $PM_{2.5}$ emissions and identify various mitigation measures which could be adopted to reduce these emissions.

Table 1: Comparison of measured and modelled annual average PM_{10} concentrations for 2011/2012

Monitoring Site	Measured	Model + Background	Ratio of measured to modelled
PM10-1	17.2	26.1	0.7
PM10-2	23.1	27.2	0.8
PM10-3iii	20.3	28.1	0.7
PM10-4	25.5	79.6	0.3
PM10-3ii	22.6	51.8	0.4
SX8	18.4	46.4	0.4
SX9	18.7	50.7	0.4
SX10	21.5	27.2	0.8
SX13	19.0	92.8	0.2
SX14	15.6	75.0	0.2
Maison Dieu (UHAQMN)	23.2	83.5	0.3
Camberwell (UHAQMN)	22.6	76.4	0.3
Singleton NW (UHAQMN)	23.1	48.4	0.5

Table 2: Estimated PM_{10} emissions for 2011-2012 for each of the existing mines used in the calibration

Mine	PM_{10} emissions (kg/y)	Source
Mt Owen	833,025	These estimates were made specifically for this assessment, not sourced from PRP documents as for other mines. Calculations were based on information provided as to lengths of haul roads, production rates, pit, dump and rehab locations and terrain for the modelling period.
Ravensworth East	189,606	
Ashton UG	42,709	'Particulate Matter Best Management Practice Pollution Reduction Program, Ashton Coal Operations Pty Ltd', **Todoroski Air Sciences (2012)**
Glendell	1,088,220	'Mt Owen Complex - Coal Mine Particulate Matter Control Best Management Practice Determination', **ENVIRON (2012a)**
HVO North	4,593,902	'Coal Mine Particulate Matter Control Best Practice Management Determination: Hunter Valley Operations', **ENVIRON (2012b)**
HVO South	5,180,357	
Integra OC & UG	881,000	'Integra Particulate Matter Control Best Practice Pollution Reduction Program', **PAEHolmes (2012)**
Liddell OC	3,218,880	'Coal Mine Particulate Matter Control Best Practice Management Determination: Liddell Coal Operations', **ENVIRON (2012c)**
Rav Ops (Narama, Cumnock)	4,569,000	'Ravensworth Surface Operations - Coal Mine Particulate Matter Control Best Management Practice Determination', **ENVIRON (2012d)**
Rav UG	17,167	'Ravensworth Underground Mine - Coal Mine Particulate Matter Control Best Management Practice Determination, **ENVIRON (2012e)**

It is clear from the data presented in **Table 1**, that the model over predicts at all monitoring locations to varying degrees. To account for the model over prediction, a spatially varying calibration gird was used for modelling future years. This model calibration grid is presented in **Figure 6**, and shows the main areas of over prediction are where there are multiple mines operating in relatively close proximity to each other and to monitoring sites. Once this model performance was calibrated (using existing conditions), the grid was applied to the 'other mines' component for the three Project modelling scenarios.

It is also worth noting that there are other factors that can lead to the over-prediction that are not captured in the modelling. For example, the model does not consider rainfall and its potential effect for reducing emissions. The model assumes emissions occur all year and is not able to account for periods of significant rain which will dampen these emissions. In addition, the model does not consider the modifications to mining activities that would be made in response to adverse weather conditions. These modifications are part of the Air Quality Management Plan and are triggered under different

conditions depending on the activity and can range from increased watering to a complete halt of operations. The latter would have a significant effect on emissions that is not accounted for in the modelling.

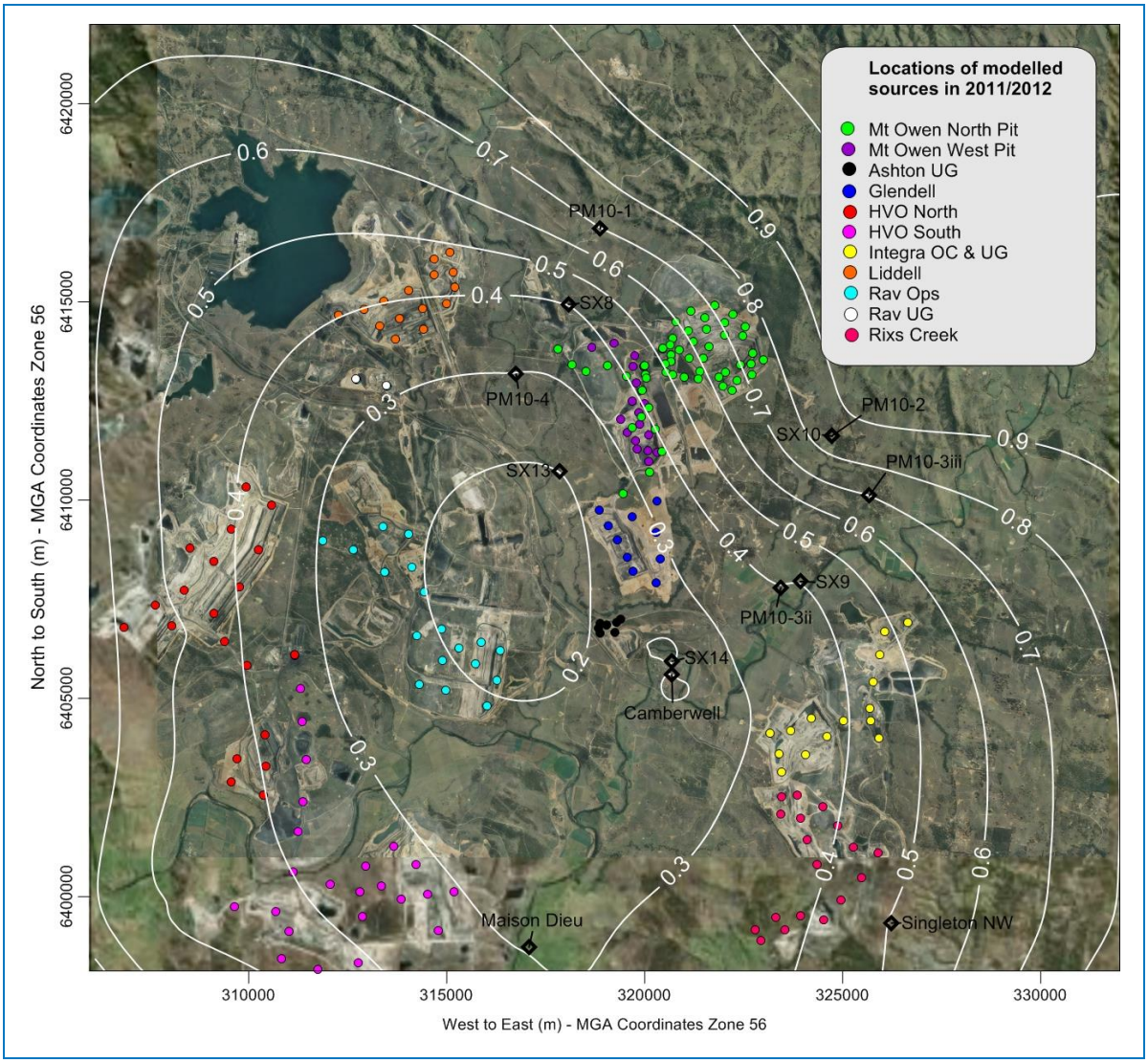

Figure 6: Monitoring sites, source locations for existing mines and calibration grid

It is important to understand that this calibration grid is only applied to the 'other mines' model output in the modelling of cumulative impacts for years 1, 5 and 10 off the Project. That is, the calibration is not applied to the Project, nor to the estimated 'background'. In other words, the following 'equation' is assumed:

Total cumulative = [Other mines x spatially varying calibration factors] + ['background' x 100%] + [Project x 100%]

It is clear from **Figure 7** that the model performs much better close to the existing Mount Owen operations, where significantly more detail was available for modelling. It also performs well in the Middle Falbrook area where there are a significant number of residential properties, which means there is less model adjustment required in those areas.

Performance is poorest to the southwest of Mount Owen where there are more approximations required to represent those mines, in particular HVO North and South and Ravensworth Operations. According to the PRPs for these three operations, these are also relatively large emitters of PM_{10} in this locality. These factors are likely to have contributed to over predictions in this area. It is also noted that the model performs poorly at Camberwell Village, with a larger adjustment required there. A body of work carried out in 2010 (**PAEHolmes, 2010**), also indicated that models tend to over predict in the Camberwell area. The report analysed modelled results from surrounding mines and compared these with monitoring results for the same period. Models were estimated to over predict, sometimes by up to a factor of three.

The reason the calibration is applied to other mines is to adjust for some of the overly conservative assumptions that need to be made when modelling these operations. Both the background levels and the modelled Mount Owen emissions used in the 2012 calibration model (and the predicted Project emissions in Years 1, 5 and 10) are more accurate than modelled impacts from other mines. It is noted however that both background and the modelled Mount Owen 2012 emissions are included in the ratios of modelled:measured used to derive the calibration grid (see **Table 1**). Using both of these values in the ratios will improve the overall performance of the model and be reflected through higher[3] calibration factors. This is illustrated in **Table 3** below, which shows that the calibration factors would have been significantly lower if background only was removed from the ratios used in the calibration process. Including the background prior to calibration and then adding it in again after calibration, therefore results in a more conservative approach.

Table 3: Ratio of measured less background and modelled less background annual average PM_{10} concentrations for 2011/2012

Monitoring Site	Measured	Measured less background of 13.2 µg/m³	Model only (no background)	Ratio of measured (less background) to modelled*
PM10-1	17.2	4.0	12.9	0.3 (0.7)
PM10-2	23.1	9.9	14.0	0.7 (0.8)
PM10-3iii	20.3	7.1	14.9	0.5 (0.7)
PM10-4	25.5	12.3	66.4	0.2 (0.3)
PM10-3ii	22.6	9.4	38.6	0.2 (0.4)
SX8	18.4	5.2	33.2	0.2 (0.4)
SX9	18.7	5.5	37.5	0.2 (0.4)
SX10	21.5	8.3	14.0	0.6 (0.8)
SX13	19	5.8	79.6	0.1 (0.2)
SX14	15.6	2.4	61.8	0.1 (0.2)
Maison Dieu (UHAQMN)	23.2	10.0	70.3	0.1 (0.3)
Camberwell (UHAQMN)	22.6	9.4	63.2	0.2 (0.3)
Singleton NW (UHAQMN)	23.1	9.9	35.2	0.3 (0.5)

* The values in brackets in the final column indicate the original values used in the AQIA. In all cases, these values are higher than what would have been the case if the background was subtracted from the measurements. This indicates that a more conservative approach was taken to calculate the total cumulative values than could have otherwise been applied.

Also, by only applying the calibration factors to the predictions from 'other mines' and not the Project, the annual cumulative assessment retains much of its conservatism. That is, the estimated cumulative of average PM_{10} resulting from the existing background, the Project and other surrounding mines is conservatively high, and actual results should be less than the predicted results. This is consistent with

[3] As the model values are multiplied by the calibration factor, a higher value implies better model performance and therefore less calibration is applied. The highest value achievable would be 1, which would mean model predictions match measurements and as such, no calibration is required. In other words, the calibration factor is inversely proportional to the amount of calibration/adjustment applied and so a high calibration factor equates to less calibration.

the precautionary principle in that if there is inherent uncertainty in the impact assessment, a more conservative and precautionary approach should be applied.

It is also noted that this approach was also subject to a comprehensive peer review before submission. Agreement was reached during this review process that a model performance evaluation, and adjustment of the future model outputs, was necessary for deriving predictions as close as possible to the levels which might be measured in various locations across the model domain. This review was conducted by Jacobs Group (Australia) Pty Limited (Jacobs) and is presented in Appendix A of the AQIA.

Both this letter and Section 4.1 from Report A of the response to Submissions Report have been independently peer reviewed throughout the drafting of these documents with a final review report completed by Jacobs on 30 June 2015 (refer to **Appendix A**).

RECALCULATION OF THE ANNUAL AVERAGE PM2.5 BACKGROUND VALUE

In the case of $PM_{2.5}$ there are not nearly as much data available as for PM_{10} as there are only 3 $PM_{2.5}$ monitoring stations in the UHAQMN. None of the three stations, Singleton, Muswellbrook or Camberwell, are likely to be representative of true non-mining influenced background levels of $PM_{2.5}$ around the Project, as all are located in areas which there are potential sources such as mining and/or wood smoke (as discussed in the air quality assessment). Accordingly, the data that are available (from Singleton, Muswellbrook and Camberwell) are not representative of what we have defined as 'background' above, as is the case for PM_{10}. In the case of $PM_{2.5}$, this will therefore lead to an unrealistically conservative estimate of that 'background' as it will include an element of double counting of mining sources. Notwithstanding, the data from the Camberwell monitoring site was used for the 24-hour cumulative assessment in the AQIA, due to its closer proximity to the Project.

The annual $PM_{2.5}$ background value of 7.1 $\mu g/m^3$ adopted for the cumulative annual average $PM_{2.5}$ assessment in the AQIA is more than 50% of the background PM_{10} value of 13.2 $\mu g/m^3$ used in the cumulative PM10 annual average predictions. A subsequent, more realistic approach to determining the annual average $PM_{2.5}$ background level, and its potential effect on the conclusions of the assessment, is discussed below.

The approach in previous assessments (for example, the Bulga Optimisation Project) was to analyse co-located monitors for PM_{10} and $PM_{2.5}$. The average ratio of $PM_{2.5}/PM_{10}$ across the UHAQMN sites is 0.40. Applying this factor to the annual average PM_{10} background of 13.2 $\mu g/m^3$ then, results in a $PM_{2.5}$ background of 5.3 $\mu g/m^3$, a value which is therefore intended to be representative of the average $PM_{2.5}$ concentration in the absence of mining sources. This values accounts for 66% of the annual $PM_{2.5}$ Advisory Reporting Standard (ARS) (**NEPC, 2003**).

UPDATE OF $PM_{2.5}$ ANNUAL CUMULATIVE ASSESSMENT

Using this updated estimation of 'background' $PM_{2.5}$ (i.e. 5.3 $\mu g/m^3$) , the annual cumulative concentrations have been recalculated and the updated plots for Years 1, 5 and 10 are presented in **Figure 7**, **8** and **9**, respectively.

It is important to note that the NSW Government have not adopted any specific criteria for assessment of $PM_{2.5}$ emissions at this stage. The ARS is a national reporting standards and the NEPM is currently subject to review and consideration. For this reason, assessment against the $PM_{2.5}$ ARS was included in the AQIA and is updated below but has not been adopted as a formal criterion for the impact assessment.

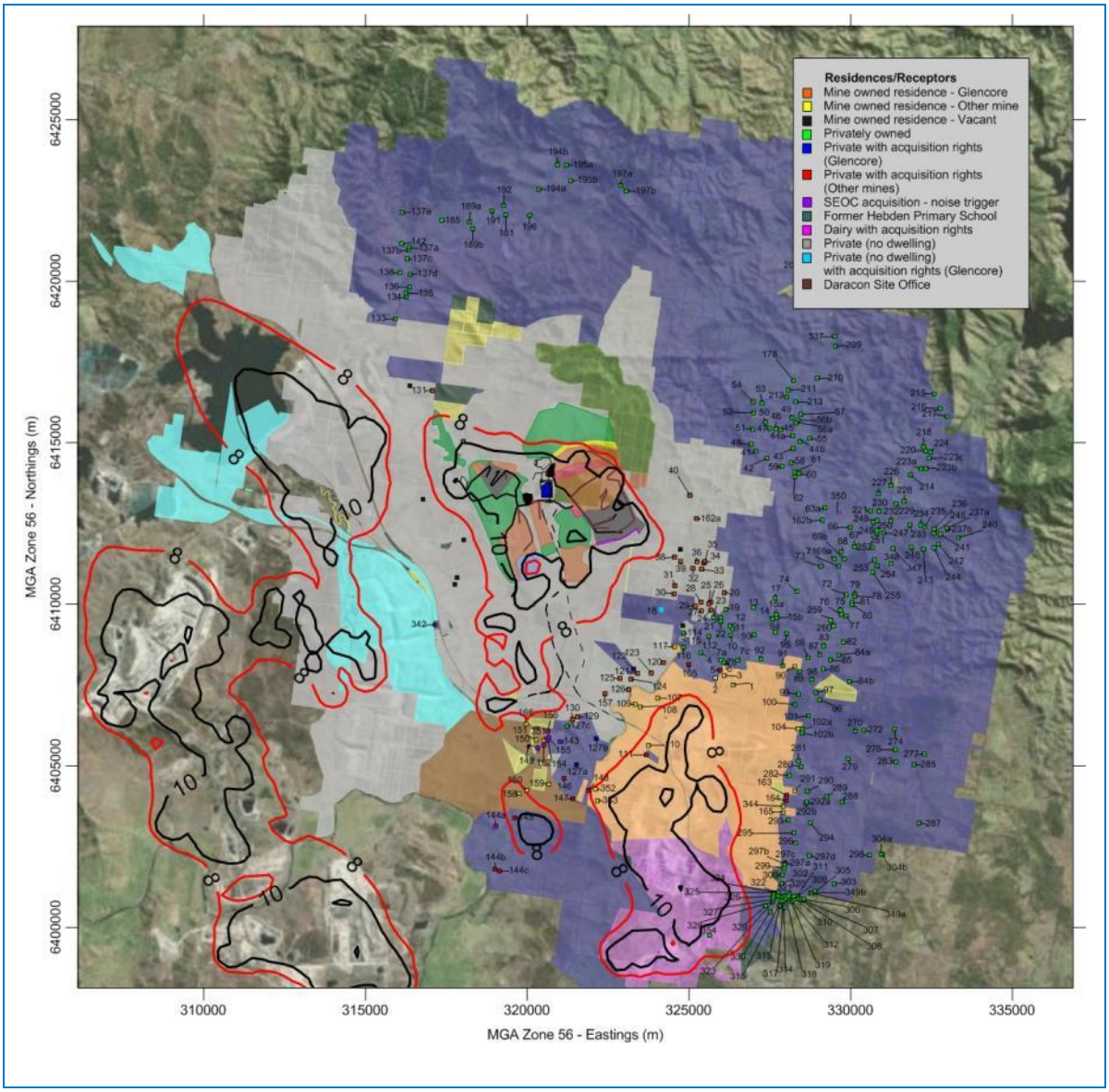

Figure 7: Predicted cumulative annual average $PM_{2.5}$ concentrations in Year 1 (µg/m³)

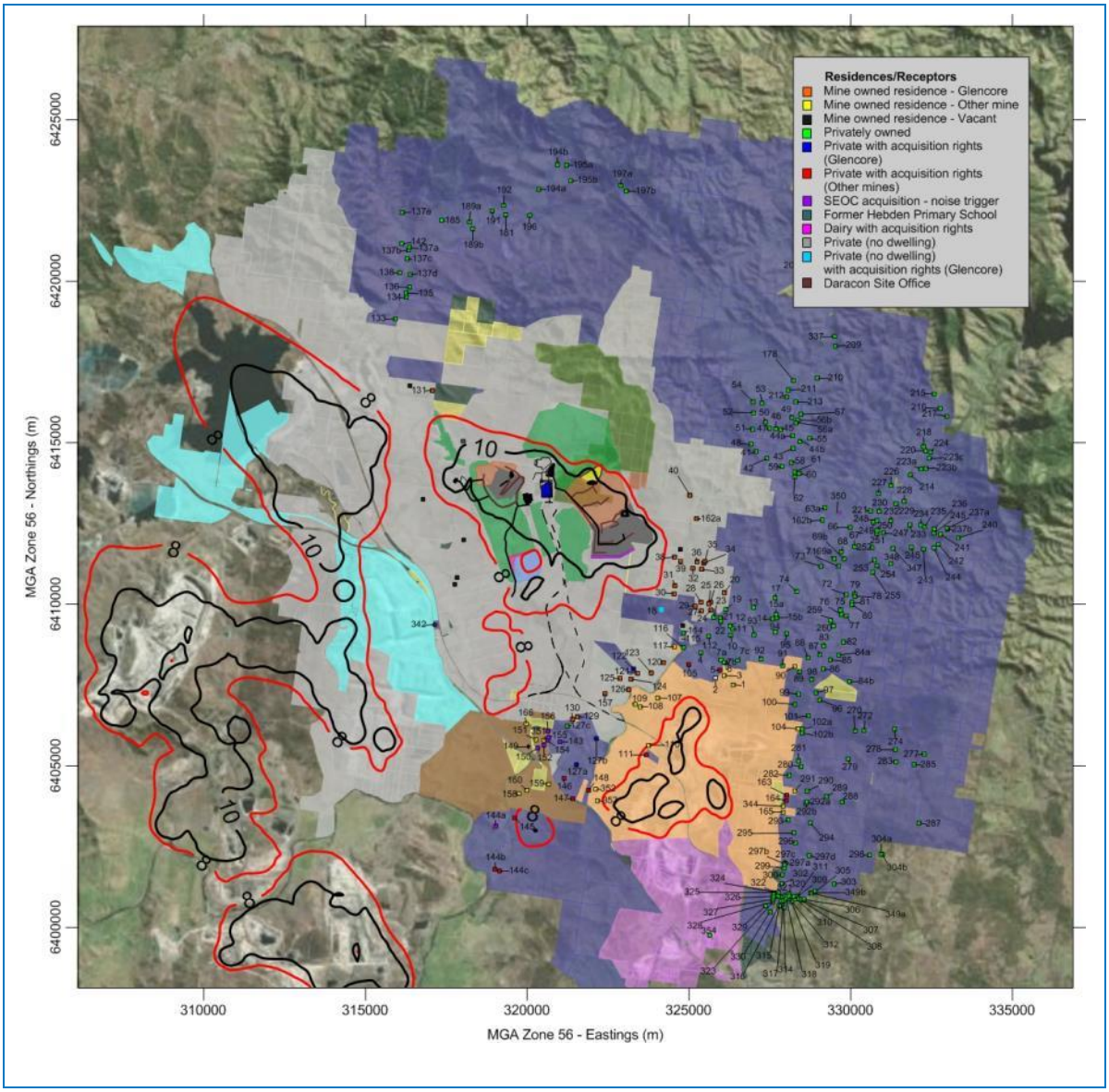

Figure 8: Predicted cumulative annual average $PM_{2.5}$ concentrations in Year 5 (µg/m³)

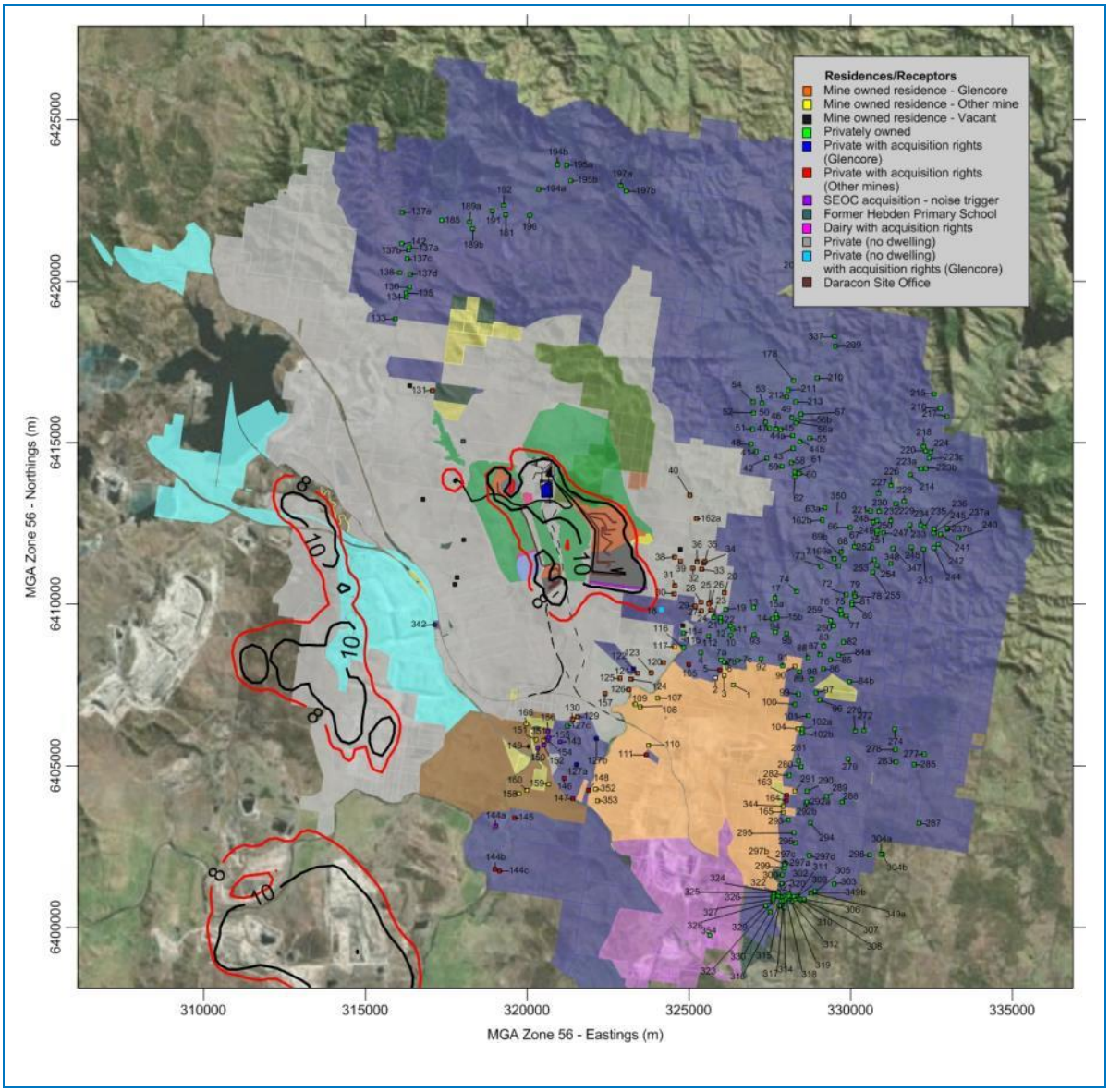

Figure 9: Predicted cumulative annual average $PM_{2.5}$ concentrations in Year 10 (µg/m³)

Table 4 lists the residences that are predicted to exceed the annual average ARS of 8 µg/m³ using the background levels of 5.3 µg/m³. There are no predicted exceedances in Year 10.

Table 4: Summary of residences predicted to exceed the annual average $PM_{2.5}$ ARS

Exceeding Residence ID	Current Ownership Status	Year 1	Year 5	Year 10
110	Other Mine Owned	X		
111	Private - Acquisition Rights Other Mines	X	X	
145	Private - Acquisition Rights Other Mines	X		
158	Other Mine Owned	X		
352	Other Mine Owned	X		
353	Other Mine Owned	X		
354	Private	X		

Table 5 and

Table 6 summarise the individual contributions for each residence that is predicted to exceed the annual ARS for $PM_{2.5}$ in Year 1 and Year 5, respectively.

Table 5: Contributions to the predicted annual average cumulative $PM_{2.5}$ concentration in Year 1 (µg/m³)

Exceeding Residence ID	Current Ownership Status	Other Mines (calibrated)	Background	Project	Total
110	Other Mine Owned	2.5	5.3	0.6	8.4
111	Private - Acquisition Rights Other Mines	3.1	5.3	0.5	8.9
145	Private - Acquisition Rights Other Mines	3.9	5.3	0.1	9.3
158	Other Mine Owned	3.2	5.3	0.2	8.7
352	Other Mine Owned	2.5	5.3	0.3	8.1
353	Other Mine Owned	2.7	5.3	0.3	8.3
354	Private	3.6	5.3	0.1	9.0

Table 6: Contributions to the predicted annual average cumulative $PM_{2.5}$ concentration in Year 5 (µg/m³)

Exceeding Residence ID	Current Ownership Status	Other Mines (calibrated)	Background	Project	Total
111	Private - Acquisition Rights Other Mines	3.1	5.3	0.5	8.9

It should be noted that the only private residence with no specific acquisition rights from other mines that has a predicted $PM_{2.5}$ concentration above the ARS is residence 354. This residence is located 12 kilometres to the south-southwest of the Project, with both Integra and Rixs Creek mining operations located between this private residence and the Project. The Project's predicted contribution at this location is conservatively estimated to be 0.1 µg/m³ and is likely to be negligible given the conservative nature of the modelling. The ARS is predicted to be exceeded at this residence without any contribution from the Project.

CONSIDERATION OF EMISSIONS FROM DIESEL EXHAUST

As discussed in Section 9.2 of the AQIA, NO_x, SO_2 and CO emissions have been considered in relation to diesel exhaust.

The US EPA AP-42 emission factors used in the particulate (PM_{10} and $PM_{2.5}$) emissions inventories include particulate matter emissions from both the mechanical processes (i.e. crustal material) and the diesel exhaust (combustion). These emission factors do not distinguish between these two sources, since the sampling method used to derive the original emission factors captured both mechanical and combustion particulate matter sources.

The following text is taken from the Version 2 of the NPI for Mining and supports this:

> *"It should be noted that the emission factors for mining activities in Tables 1 and 2 have been derived from measurements that cover all PM_{10} emissions associated with a unit operation, including exhaust emissions. To add the exhaust PM_{10} emissions to the fugitive emissions would involve some measure of double counting for those activities."*

Discussions with Chattern Cowherd, who carried out the original work to determine these AP-42 emission factors several decades ago, support the NPI comments that vehicle exhaust are captured to a large extent in these emission factors. While exhaust emissions from some equipment might have had sufficient buoyancy allowing a portion of those to rise above the downwind sampling tower under light wind conditions, Chattern Cowherd indicated that testing under such conditions was avoided.

It is further noted that the historical nature of the particulate matter emission factors referenced in the assessment means that the combustion component of the particulate matter emission would be reflective of both engines and fuels from several decades ago. Given the significant improvements in both of these aspects over this time period, the combustion particulate matter component within the aggregated emission factors may be regarded as highly conservative.

Yours sincerely,

Jane Barnett
Principal Consultant – Air Quality
Pacific Environment Limited

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APPENDIX C

Peer Review of Response to Submissions
on Air Quality (Jacobs) – June 2015

Jacobs Group (Australia) Pty Limited
710 Hunter Street
Newcastle West NSW 2302 Australia
PO Box 2147 Dangar NSW 2309 Australia

T +61 2 4979 2600
F +61 2 4979 2666
www.jacobs.com

JACOBS

Mr David Holmes
Principal Environmental Consultant - Approvals & Policy
Umwelt (Australia) Pty Limited
75 York Street
Teralba, NSW 2284

30 June 2015 IA047900

Dear David

Review of the air quality information in the Response to Submissions

I have been asked to conduct a peer review of air quality information contained in the Response to Submissions documents. Specifically, the information reviewed was:

- Section 4.1 Air quality, from the Response to Submissions document. Prepared by Umwelt (Australia) Pty Ltd.
- Appendix B, from the Response to Submissions document. Prepared by Pacific Environment Limited.

Draft versions of the above documents were also reviewed on 19 June 2015, in addition to submissions from agencies (EPA, Singleton Council and New England Health) and the community in relation to air quality issues.

Based on my review of the final documents listed above, the Response to Submissions has addressed the key issues that have been raised with respect to potential air quality impacts. The air quality information contained in the Response to Submissions is consistent with my current understating of the state of science for predicting air quality impacts and NSW EPA methods for assessment.

Yours sincerely

Shane Lakmaker

Senior Associate (Air Quality)
Jacobs Group (Australia) Pty Ltd

Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au