INVINCIBLE COLLIERY AND CULLEN VALLEY MINE MODIFICATIONS

ENVIRONMENTAL ASSESSMENT RESPONSE TO SUBMISSIONS

for

Coalpac Pty Limited (Subject to Deed of Company Arrangement)

June 2014

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

INVINCIBLE COLLIERY PA 07_0127 MODIFICATION

AND

CULLEN VALLEY MINE DA 200-5-2003 MODIFICATION

RESPONSE TO SUBMISSIONS

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June 2014

For:

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EXECUTIVE SUMMARY

This Response to Submissions document has been prepared to support the Modification applications for Invincible Colliery (PA 07_0127 MOD4) and Cullen Valley Mine (DA 200-5-2003 MOD2) under section 78A(8A) of the *Environmental Planning and Assessment Act 1979*. The document responds to the submissions raised by stakeholders during the public exhibition period from 3 April to 5 May 2014.

The responses to the key issues raised in submissions are summarised below.

Impacts to Escarpment Landforms

No Escarpment landforms will be disturbed by the proposed open cut mining, nor impacted by highwall mining at Invincible Colliery. In total, the buffer area between the Escarpment and the eastern extent of proposed open cut mining area for Invincible Colliery is 200 ha, which is 40% larger than that recommended by the Office of Environment and Heritage in their submission.

No Escarpment landforms will be disturbed by the proposed open cut mining at Cullen Valley Mine. The Escarpment adjacent to the proposed open cut mining areas at Cullen Valley Mine are considered to be of lower conservation value than those adjacent to Invincible Colliery. Whilst proposed open cut mining will not disturb these Escarpments, limited highwall mining is proposed beneath some Escarpments. In marked contrast to other underground mining methods applied locally, highwall mining requires the stability of the overlying strata to be maintained at all times in order to be successful. The Division of Resources and Energy have stated their support for the proposed highwall mining activities, subject to management in accordance with the NSW Extraction Plan Process.

Prior to blasting within 200 m of these Escarpments, a geotechnical expert will inspect the rock structures and additional monitoring and management procedures will be implemented in line with specialist consultant's recommendations.

In summary no noticeable impacts are anticipated to occur to the Escarpments.

Impacts on Threatened and Endangered Species and Ecological Communities

It is considered that the proposed Modifications will not result in significant direct or indirect impacts to Rare or Threatened Australian Plants or to key threatened species listed under the *Threatened Species Conservation Act 1995*, or *Environmental Protection and Biodiversity Conservation Act 1999*. This conclusion is based on careful consideration of each specific species noted in submissions from the Office of Environment and Heritage and a number of Special Interest Groups.

No Endangered Ecological Communities have been identified within the areas proposed to be disturbed by open cut mining. Only one small area of the listed Box Gum Woodland occurs within the proposed Modification Boundaries at Cullen Valley Mine. It will be undermined by highwall mining, with no significant impact on the surface or on the groundwater table as such this vegetation community will not be impacted.

None of the three "Permian" vegetation communities listed by Office of Environment and Heritage in their submission are listed as Endangered Ecological Communities, and as such they are not afforded any additional conservation significance over any other vegetation. Like all other vegetation communities proposed to be disturbed by the Modifications, they can be validly offset and the areas to be disturbed will be appropriately rehabilitated.

The potential habitat for the Broad-headed Snake adjacent to the proposed open cut mining areas at Invincible Colliery has been found to be limited by herpetology experts, and the species has not been recorded in the area. In spite of this, the precautionary principle has been applied by retaining a substantial buffer between potential habitat areas and the Modification Boundary due to connectivity to extensive areas to the east. As such, a buffer zone which is 40% larger than that recommended by Office of Environment and Heritage has been retained between the proposed open cut mining areas and the Escarpments to the east of Invincible Colliery. At the Cullen Valley Mine, due to the much smaller area of potential Broad Headed Snake habitat and the lack of connectivity to the eastern areas of Escarpment in Ben Bullen State Forest, a smaller buffer zone has been retained.

Adequacy of Biodiversity Offsets

In response to the Office of Environment and Heritage submission to the Modifications Environmental Assessment, EcoLogical Australia (ELA, 2014) were engaged to conduct an independent informal BioBanking Assessment covering both the proposed Modification impact areas and the recommended Biodiversity Offset Package.

The independent informal BioBanking Assessment demonstrated that if the entire Gulf Mountain property were to be incorporated into the Biodiversity Offset Package for the Modifications, then it would exceed the offsetting requirements for ecosystem credits.

As such, the proposed Biodiversity Offset Package for the Modifications has been updated to include the conservation of the Gulf Mountain property in its entirety (with the required number of credits retired). The Hillview/Billabong property, the other “Additional” mine site offset lands at Cullen Valley Mine and the rehabilitation of disturbed areas at both Coalpac sites all remain within the package as described in the Modifications Environmental Assessment.

Water Impacts

The Modifications will not have any material adverse impacts on surface water and groundwater resources. This finding is consistent with the Department of Environment's *Environment Protection and Biodiversity Conservation Act 1999* Referral decision that the Modifications do not constitute a Controlled Action.

The water balance and model prepared for the Modifications confirmed that the existing approved water management system has sufficient holding capacity to mitigate and manage surface runoff. Water quality for any discharge is expected to remain within Environment Protection Licence limits, as has been the case under the current approved operations.

Management and mitigation controls have been proposed such that any clean water runoff in excess of Coalpac's harvestable rights can be dealt with appropriately by the mine water management system. The mine water management system does not require any additional surface water licences under the *Macquarie Bogan Unregulated and Alluvial Water Sources Water Sharing Plan*.

Coalpac holds sufficient water access licences under the *NSW Murray Darling Basin Porous Rock Groundwater Sources Water Sharing Plan* to account for the predicted annual volume of groundwater take.

There are no privately registered bores located within the predicted zone of aquifer depressurisation surrounding the Cullen Valley Mine Modification Boundary. The operations proposed for Invincible Colliery will not create a zone of depressurisation as saturated aquifers are located below the Lithgow Seam and will not be impacted by the proposed Modification.

Air Quality and Noise Impacts

The Environment Protection Authority is satisfied that the Modifications Environmental Assessment adequately assesses the potential impacts of the proposed mining activities on the existing environment with respect to noise and air quality.

The detailed air quality and acoustic impact assessments undertaken for the proposed Modifications confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure potential impacts to receivers in the township of Cullen Bullen will continue to be limited with all relevant NSW regulatory criteria achieved.

Consistent with NSW Health recommendations, Coalpac is committed to the continued implementation of reasonable and feasible measures at both Invincible Colliery and Cullen Valley Mine to minimise potential air quality and noise impacts.

In the unlikely event that coal processing at the Invincible Coal Preparation Plant is required during the evening, an assessment of noise impacts will be undertaken prior to any operations in that time period to determine if additional noise controls are required.

Rehabilitation Effectiveness

Consistent with current approval conditions, rehabilitation areas at Invincible Colliery and Cullen Valley Mine are surveyed by independent qualified ecologists on an annual basis to monitor and report on key aspects of the rehabilitation strategy and performance.

The main observations from these ecological surveys to date are that the areas will likely develop into mature woodland over time. In the short to medium term, while they are still developing, rehabilitation communities can provide an important habitat and ecological value to support local fauna. In the medium to long term, natural selection and recruitment from undisturbed local forests will allow mature forest and woodland communities to become established. The communities will ultimately be consistent with the local area and have high ecological value. The rehabilitation areas provide a diverse range of native flora species with the planned degree of biodiversity, and with a high density of early and successional native species providing good organic material through root structures and leaf drop accumulation. Dominant canopy species and ground cover species will continue to develop over time and this will further assist in providing an organic layer and establishing the soil profile.

The close proximity of native woodland communities to rehabilitated areas has allowed natural recruitment into these areas with regular use of the rehabilitation by a range of woodland birds, mammals and reptiles.

Local examples including the Newnes oil shale refinery, the abandoned Renown Open Cut and the Mount Piper Power Station surrounds contain areas disturbed by previous mining and industrial works that have been re-established to mature native woodland communities.

Reservation status of Ben Bullen State Forest

The current Gardens of Stone National Park was originally proposed and rejected in 1986. It was proposed again in 1993 and over an 18 month period was carefully considered by multiple Government departments across a wide range of portfolios including the Department for Mineral Resources, The Department of Conservation and Land Management, National Parks and Wildlife Service and the Forestry Commission to define and agree an area that balanced the interests of agriculture, mining, forestry and conservation. The original 12,000 ha area was subsequently expanded by 25% to 15,000 ha in 1995.

There are two important points to note:

- Neither the original proposal nor the subsequent 25% expansion of the Gardens of Stone National Park included the main area of Ben Bullen State Forest, in recognition of current and future mining operations, and
- Government policy was clear that any future expansion of the Gardens of Stone National Park should not impact upon the current or future colliery operations in the area.

It was proposed when the original Gardens of Stone National Park was under review that consideration be given to multiple and sequential land uses when reviewing areas potentially suitable for future conservation. The environment, heritage and resource development are considered to be mutually essential, not mutually exclusive.

The potential incorporation of the Ben Bullen State Forest into the NSW Conservation Reserve is inconsistent with the current policy of the NSW Government and would require whole-of-Government approval. The current Government's policy position regarding consideration of mining projects has been further clarified with the implementation of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment (Resource Significance) 2013* which states that:

> *"…in determining any application for consent for development for the purposes of mining, the consent authority must consider the significance of the resource… having regard to the economic benefits … of developing the resource."*

Therefore, the government policy remains that the resource significance and economic contributions are to be key factors in any planning decision.

The proposed Modifications have been based on the concept of multiple and sequential land use. The total disturbance area proposed for the Modifications (approximately 150 ha) represents only 1.9% of the area of the Ben Bullen State Forest (7,812 ha). The proposed Modifications will have a net positive outcome for the environment in regards to the final landform and rehabilitation. If the mines were to be closed in their current form, the six residual voids (three at each site) would remain as water holding depressions, resulting in a final landform that is not compatible with the surrounding landscape. The Modifications will enable a stable, free-draining final landform and higher quality rehabilitation outcome that is commensurate with the surrounding landscape of the Ben Bullen State Forest.

Economic Justification

Submissions from the Colo Committee, Colong Foundation, Environmental Liaison Office and Nature Conservation Council correctly state that the coal quality produced by Coalpac ranges from 14 - 30% ash. As such there is no issue in the product coal from the Modifications meeting Mount Piper Power Station coal quality requirements.

The Environmental Impact Statement documents for the extension of both Angus Place Colliery and Springvale Colliery confirm that the Mount Piper Power Station has approximately two years of coal supply remaining under current approvals. Unless current applications to extend these operations are approved, they will not be able to provide any coal to the local power stations beyond 2016.

Clearly there is an imperative for local coal supply to continue beyond 2015/2016 and if approved, the proposed Modifications will supply 60% of the coal needed by Mount Piper Power Station for several years. This will allow time for Mount Piper Power Station to secure additional long term coal supply as required.

The Economic Impact Assessment undertaken for the Modifications was conducted in accordance with NSW Government guidelines and appropriately considered the specific issues noted in The Australia Institute submission. The Economic Impact Assessment for the Modifications is therefore considered to provide a reasonable estimation of the net benefit to Australia and NSW from the proposed Modifications and the economic activity that would be generated in the regional economy if they were to be approved. This position is supported by the submissions on the Modifications made by Division of Resources and Energy. The Lithgow City Council has also been very clear in their submission that the economic benefits of the proposed Modifications are important for the regional economy.

Aboriginal Heritage

The Cave Art Site noted in multiple submissions from Lithgow Environment Group, Colong Foundation for Wilderness, and other Special Interest Groups was inspected and assessed by a qualified archaeologist from AECOM on 13 May 2014. The cave art site was compared to other Aboriginal heritage hand stencil sites known in the area and its heritage significance was assessed. The Cave Art Site in question was previously inspected in December 2010 and no hand stencil was present at the site at that time.

This 2014 assessment confirmed that the site identified by Lithgow Environment Group members is a maximum of 3.5 years in age and is a modern replica of a traditional Aboriginal hand stencil (AECOM, 2014). AECOM therefore recommend that the site should not be added to the AHIMS database as it is not a traditional Aboriginal cave art site and is not considered to be of heritage significance.

The Aboriginal archaeology and cultural heritage impact assessment methodology adopted for the Modifications is considered appropriate and has been effectively conducted. In any case, this site will not be impacted by the Modifications.

Conclusion

This Response to Submissions document addresses all of the outstanding matters raised by the relevant regulatory authorities and in consultation with Office of Environment and Heritage has resulted in a significantly improved Biodiversity Offset Package to compensate for any residual environmental impacts.

Responses to the Modification Applications, as publically exhibited, have confirmed overwhelming support from the local community who live and work in the Lithgow and Bathurst regions and are familiar with the company's commitment to them and the environment and the criticality of Mount Piper Power Station operations to local job security and the regional economy.

When put in context, the submissions received have confirmed that the Modifications have carefully considered the objects of the *Environmental Planning and Assessment Act 1979* and provide a balanced consideration of all environmental, social and economic impacts.

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INVINCIBLE COLLIERY AND CULLEN VALLEY MINE MODIFICATIONS

RESPONSE TO SUBMISSIONS

for

Coalpac Pty Limited

1 INTRODUCTION

This section outlines the status of the Project in the approvals process and explains the purpose of this Response to Submissions (RTS) document.

1.1 BACKGROUND

Coalpac Pty Limited (Subject to Deed of Company Arrangement) (Coalpac) owns and operates Invincible Colliery and Cullen Valley Mine, located approximately 25 km north-west of Lithgow, NSW. Both operations are near the township of Cullen Bullen, with Cullen Valley Mine and Invincible Colliery located to the north-west and south-east, respectively. Invincible Colliery has been owned and operated by Coalpac since 1988 and Cullen Valley Mine was acquired by Coalpac in 2007.

All activities at both sites are undertaken in accordance with:

- Project Approval 07_0127 for Invincible Colliery, which was granted on 4 December 2008 by the (then) NSW Minister for Planning under Section 75J in Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act); and
- Development Consent DA 200-5-2003 for Cullen Valley Mine, which was granted on 19 August 2004 by the (then) NSW Minister for Planning under Section 80 in Part 4 of the EP&A Act.

Coalpac is seeking Modifications under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the existing approvals held for Invincible Colliery and Cullen Valley Mine (see **Figure 1**) (the Modifications).

The Modification of PA 07_0127 for Invincible Colliery seeks approval for the following:

- Extension to the life of PA 07_0127 for four years from December 2016 to December 2020;
- Extension of 88 ha to the 152 ha area currently approved for open cut mining;
- Extension of 86 ha to the area currently approved for highwall mining. These highwall mining operations will not result in additional surface disturbance;
- Installation of a water pipeline connecting to the existing Cullen Valley Mine water pipeline which will provide the ability to transfer water between Invincible Colliery and Cullen Valley Mine. The pipeline alignment will largely remain on or adjacent to existing access tracks within the Ben Bullen State Forest (BBSF); and

- Backfilling of the proposed and residual final voids from existing mining operations and resulting in the rehabilitation of areas currently affected by subsidence from historic underground mining operations in the area to create a free-draining final landform at the conclusion of the proposed mining activities.

The Modification of DA 200-5-2003 for Cullen Valley Mine seeks approval for the following:

- Extension of 62 ha to the 362 ha area currently approved for open cut mining;
- Extension of 79 ha to areas currently approved for highwall mining. These highwall mining operations will not result in additional surface disturbance;
- Ability to benefit from the transfer of water to and from Invincible Colliery; and
- Backfilling and rehabilitation of the proposed and residual final voids resulting from existing mining operations to create a free-draining final landform at the conclusion of the proposed mining activities.

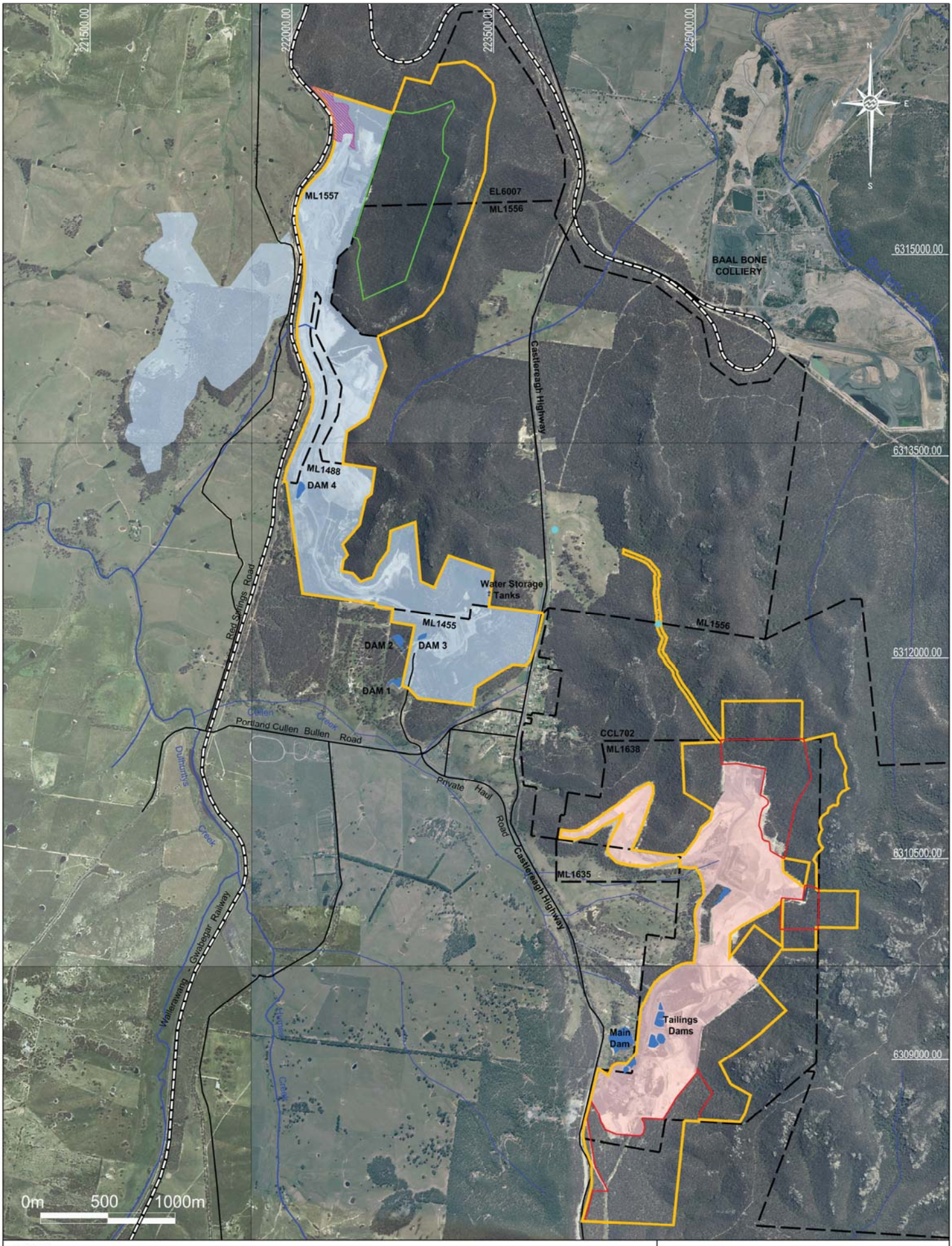
To support the Modification applications, an Environmental Assessment (the Modifications EA) was prepared by Hansen Bailey in March 2014, and placed on public exhibition by the Department of Planning and Infrastructure (DP&I) during the period from 3 April 2014 to 2 May 2014. A total of 753 submissions on the Modifications EA were received by DP&I, from regulatory agencies, Special Interest Groups (SIG) and private individuals during this public exhibition period.

The appointed administrators are maintaining both mine sites under Care and Maintenance pending the outcome of the two Modification Applications.

1.2 DOCUMENT PURPOSE

This RTS has been prepared by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of Coalpac to support the Modification applications for Invincible Colliery (PA 07_0127 MOD4) and Cullen Valley Mine (DA 200-5-2003 MOD2) under section 78A(8A) of the EP&A Act.

The document responds to matters raised by stakeholders during the public exhibition of the Modifications EA and as documented in their submissions.



LEGEND

- Coalpac Mining Leases
- Modification Boundaries
- Invincible Colliery Modification Disturbance Boundary
- Invincible Colliery Approved Disturbance
- Cullen Valley Mine Modification Disturbance Boundary
- Cullen Valley Mine Approved Disturbance
- Creeks
- Road
- Rail
- Clandulla Geebung Conservation Area
- Water Management Structure
- Proposed Staging Pump & Water Storage Tanks

Modification Layout

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 1

Drawn By:	Date:	Drawing No.:	Revision:	
D.E	12/06/14	23.4.6.11-1	B	MGA Zone 56

1.3 DOCUMENT STRUCTURE

This RTS is structured as follows:

- **Section 2** outlines the submissions received from stakeholders in response to the Modifications EA;
- **Section 3** provides a summary of the stakeholder engagement process undertaken during exhibition of the Modifications EA and the submissions received from the public;
- **Section 4** provides comprehensive responses to the issues raised by regulatory agencies;
- **Section 5** provides comprehensive responses to the issues raised by Special Interest Groups (SIGs);
- **Section 6** provides comprehensive responses to the issues raised by the public;
- **Section 7** provides a consolidated list of all primary commitments made in this RTS;
- **Section 8** includes a conclusion to this RTS;
- **Section 9** lists the abbreviations used within this RTS; and
- **Section 10** outlines all materials referenced within this RTS.

Appendix A provides a summary of the stakeholders who made submissions in relation to the Modifications EA and identifies the relevant environmental or socio-economic aspects raised. Responses to stakeholder submission issues (see **Section 5** to **Section 7**) have been prepared in response to submissions received. A summary of each submission made by regulators and SIGs has been included in **Appendix B**, with copies of all submissions available in full on the DP&I website.

Technical specialists involved in the preparation of the EIS have provided expert input into the preparation of this RTS. Where applicable and as referenced, this document should be read in conjunction with these reports, which provide additional detailed technical information as appendices.

2 SUMMARY OF SUBMISSIONS RECEIVED

This section provides a summary of the stakeholders that made submissions pertaining to the Modifications EA.

Following public exhibition of the EA, DP&I provided to Hansen Bailey a total of 753 submissions from various stakeholders, including 8 from regulatory agencies and 21 from SIGs. A total of 724 private stakeholder submissions were received for the Modifications (including submissions to each application).

A list of the submissions that are addressed within this report are summarised below and included in **Appendix A**.

2.1 REGULATORY AGENCIES

The following regulatory agencies provided a submission in relation to the Modifications EA:

- NSW Environment Protection Authority (EPA);
- NSW Office of Environment and Heritage (OEH);
- Roads and Maritime Services (RMS);
- Department of Primary Industries - Office of Agricultural Sustainability & Food Security (OASFS);
- NSW Office of Water (NOW);
- NSW Department of Trade & Investment - Resources & Energy (DRE);
- Lithgow City Council (LCC); and
- NSW Health – Nepean Blue Mountains Local Health District (NSW Health).

2.2 SPECIAL INTEREST GROUPS

The following SIGs provided a submission in relation to the Modifications EA:

- Bathurst Community Climate Action Network (BCCAN);
- Blue Mountains Conservation Society (BMCS);
- Colo Committee;
- Colong Foundation for Wilderness (Colong Foundation);
- Cullen Bullen Lifestyle Group;
- Cullen Bullen Tidy Towns;
- EnergyAustralia;
- Environmental Liaison Office (ELO);
- Hawkesbury Environment Network;

- Lithgow Environment Group (LEG);
- Nature Conservation Council (NCC);
- NSW Heritage Network;
- Parramatta Climate Action Group;
- Rivers SOS Alliance;
- Stop Coal Seam Gas Blue Mountains;
- Portland Newsagency;
- Portland District Motorsports Club;
- Portland Automotive Services;
- The Greens NSW;
- The Australia Institute (TAI); and
- Big Rim Pty Limited.

2.3 PRIVATE INDIVIDUALS

724 private individuals provided a submission in relation to the Modifications EA. Of the total submissions received, 200 were in support of the Modifications and 524 objected. A summary of the private submissions made in response to the Modifications is provided in **Section 3.2**, with a response to issues raised by private individuals who objected to the Modifications detailed in **Section 6**.

Appendix A includes a summary of the issues raised in each private stakeholder submission and allocates a reference number for each submission. Private submissions in objection to the Modifications included several standard form letters, generated by SIGs and submitted from their websites, that raised the same issues. These are referred to in **Section 6** as Form Letters 1 – 3, and each included the following private stakeholder submissions:

- **Form Letter 1 -** P3, 4, 11, 15-17, 19, 25-26, 34-40, 42, 44-45, 50-54, 59, 61-63, 69-70, 73-76, 78, 84, 87-89, 91, 96, 98-100, 103-105, 112-115, 118, 121-125, 127-129, 139-140, 142-143, 144, 146-148, 150-152, 154-156, 160-161, 163-166, 168-169, 175, 183-186, 188, 191-195, 198-201, 203, 205, 207-209, 214-216, 219-220, 222, 227-228, 230, 237, 239, 242, 254, 259, 261, 267, 282-283, 289, 295, 301, 306, 309, 323, 325-327, 329, 332, 338-343, 357, 359-362, 364-365, 367, 372, 374, 376-378, 384-385, 388-393, 397, 399-400, 402, 409, 411-412, 415-417, 422, 424, 426. 428, 430-434, 436, 438-439, 441-442, 444, 446-449, 461, 464-465, 468, 470;
- **Form Letter 2 -** P7-9, 12, 14, 28, 41, 49, 53, 60, 86, 94, 97, 106-107, 116, 149, 170, 174, 180, 212, 218, 229, 236, 238, 243, 245, 248, 253, 258, 270, 274-275, 278-281, 290, 294, 298, 312, 337, 358, 363, 366, 368-369, 373, 375, 382, 395, 404-406, 418-

419, 421, 427, 435, 437, 440, 445, 450, 452, 454-455, 457, 459-460, 462, 466, 469; and

- **Form Letter 3 -** P13, 29-30, 55, 79-80, 132, 134-136, 138, 153, 171-172, 196-197, 202.

3 STAKEHOLDER ENGAGEMENT

This section provides a summary of the stakeholder engagement process conducted by Coalpac during and following the public exhibition of the Modifications EA. A summary of submissions provided to DP&I during the public exhibition period from private individuals is also included below.

3.1 COMMUNITY ENGAGEMENT

Since the community and stakeholder engagement process outlined in Section 5 of the Modifications EA, Coalpac has undertaken a range of additional consultation activities in the local community, as outlined below.

3.1.1 Aboriginal Community Engagement

During the public exhibition of the Modifications EA, Coalpac approached both the Gundungurra Tribal Council Aboriginal Corporation and Warrabinga Wiradjuri People to consult with them regarding the Modifications.

Coalpac met with a representative of the Warrabinga Wiradjuri People on 27 March 2014 to explain the proposed activities under the Modifications. No specific concerns were raised at the meeting by the Warrabinga Wiradjuri People and Coalpac reaffirmed their intent to continue to adhere to all regulatory requirements and previously agreed protocols regarding the management of any Aboriginal heritage issues relating to the Modifications. Despite several attempts, a meeting could not be convened with the Gundungurra Tribal Council Aboriginal Corporation.

Coalpac will continue to engage with local Aboriginal community stakeholders on any issues relating to the management of archaeological and cultural heritage issues relating to Modifications.

3.1.2 Community Information Sessions

Coalpac held Community Information Sessions (CIS) at the Cullen Bullen Progress Hall on 15 and 16 April 2014 to provide the local community with the opportunity to ask questions directly and gain a greater understanding of the proposed Modifications.

The CIS were well attended by the local community members as well as the State Member for Bathurst and the Mayor of Lithgow. A total of 53 attendees signed the visitor's book, although total attendance was significantly higher than that as not all visitors signed the book. The predominant issue noted in the visitor's book was the need for local jobs as soon as possible.

The CIS also attracted good media coverage with the Lithgow Mercury newspaper, Win News, Prime News and ABC News in attendance. This media coverage assisted in further raising regional public awareness of the proposed Modifications.

As shown on **Figure 2**, attendees of the CIS were predominantly local residents.

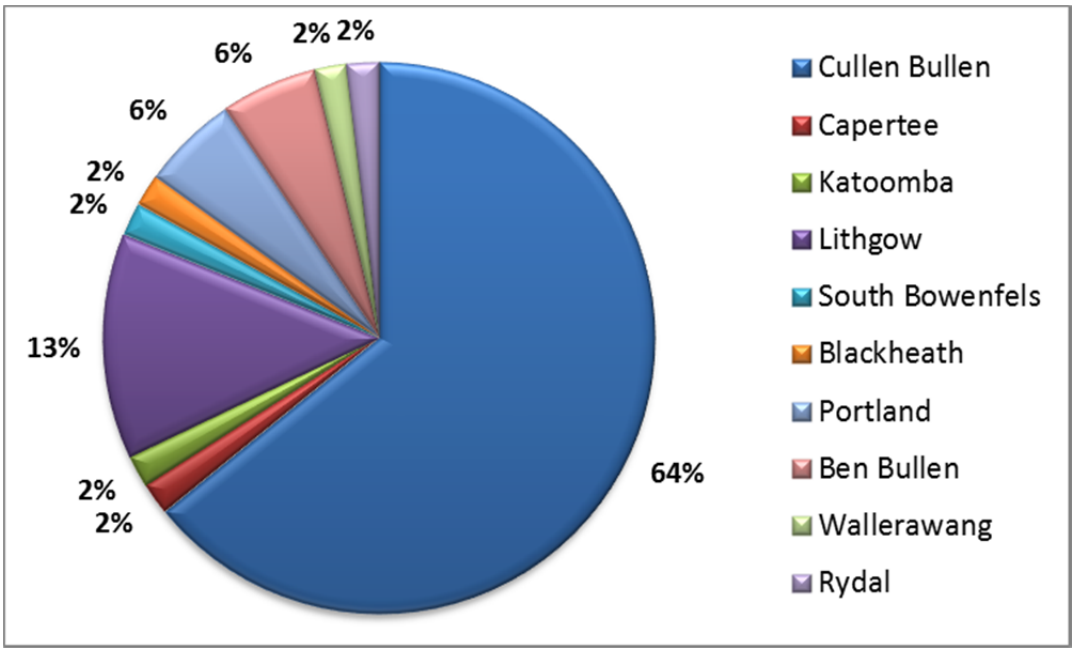


Figure 2
Summary of CIS Attendees by Home Suburb

The CIS was supported by Coalpac staff members who were available to explain all aspects of the Modifications and to answer any questions attendees may have had. A poster display was mounted outlining the key aspects of the Modifications and fact sheets covering major topics were also available for people to take away. Copies of the poster display material and fact sheets provided at the CIS are included as **Appendix C**.

The poster display material and fact sheets were also placed on the Coalpac website following the CIS to allow interested members of the public and local interest groups direct access to the information.

A site visit to Cullen Valley Mine was arranged for concerned local residents of the community (Mr and Mrs Larkin, neighbours to Cullen Valley Mine) on the 16 April 2014 to directly observe the current conditions at the site and to better understand the impact to their grazing property from the proposed activities under the Modifications. Mr and Mrs Larkin also provided a submission on the Modifications and a response to their issues is provided in **Section 6.1.11**.

3.1.3 Community Newsletter

1,600 copies of a newsletter advising the local community of the proposed Modifications and how they could provide comment were distributed in April 2014 prior to the CIS and the Modifications EA being placed on public exhibition. The community newsletter was also placed on the Coalpac website to permit broader public access. A copy of this Community Newsletter is included in **Appendix C**.

3.2 PRIVATE SUBMISSIONS SUMMARY

A total of 724 individual submissions were received by the Department of Planning & Environment regarding the Modifications. There were 200 supporting submissions and 524 objecting submissions.

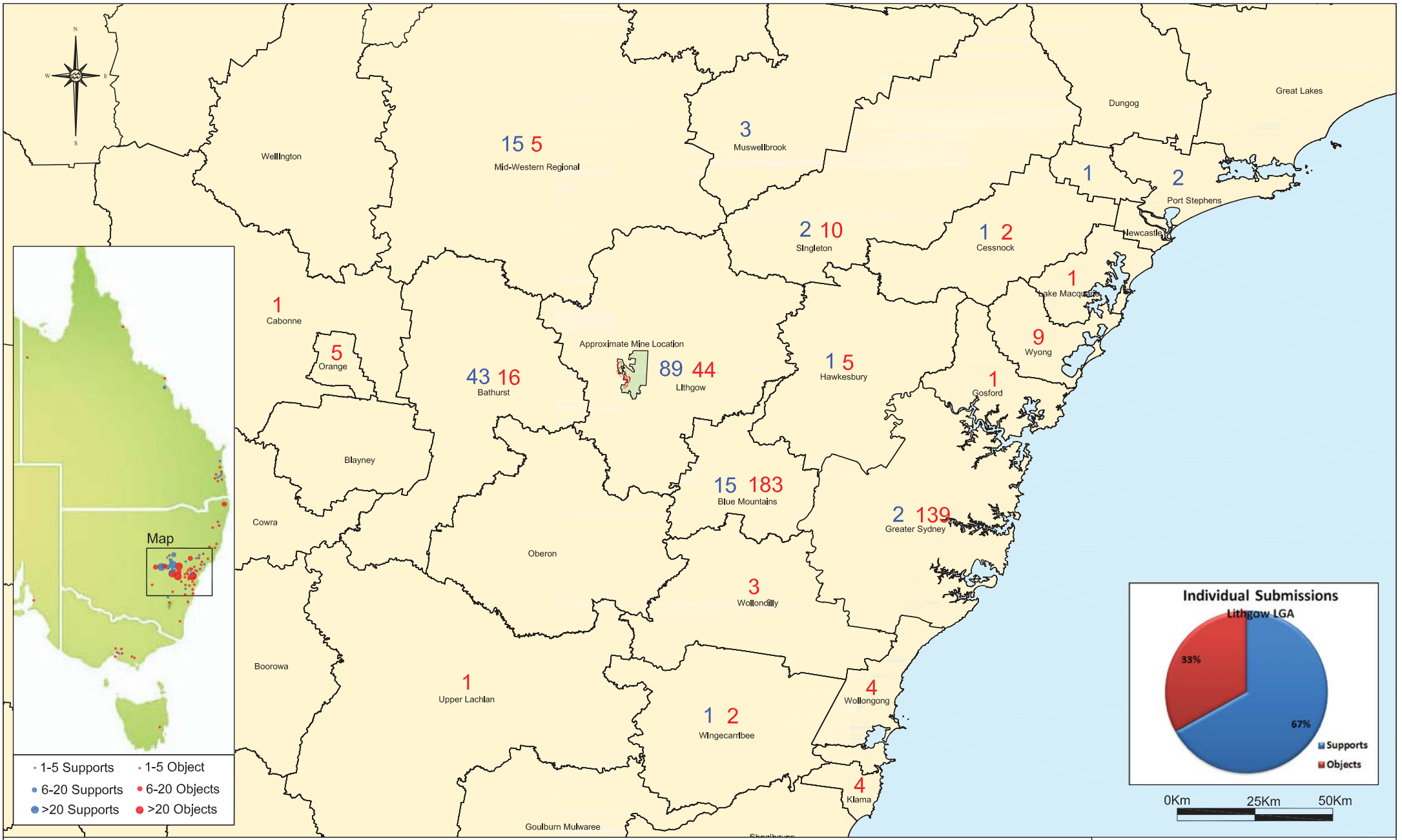
The submissions were collated geographically by Local Government Areas (LGAs) to track the distribution of concerns regionally, see **Figure 3**. Private individual's submissions received from the Lithgow, Bathurst and Mid-Western Regional LGAs showed a strong level of support for the Modifications (147 submissions from a total of 212 in these areas were in support of the Modifications or 69%). The positive impacts to the local economy and employment were noted as the primary reasons for expressions of support for the proposed Modifications.

The Blue Mountains, Greater Sydney, Hawkesbury and Singleton LGAs all showed a strong level of objection (337 objecting submissions from a total of 357 from these areas, or 94%) with the primary issue of objection being the proximity of the proposed Modifications to the Gardens of Stone National Park and the potential for environmental impacts to this area. A number of submissions were received from outside of NSW that also showed a strong level of objection to the Modifications (50 objecting submissions from a total of 67 submissions, or 75%).

A further analysis of the submissions was conducted to screen '*standard form*' responses; that is, standard submissions that were prepared by somebody other than the person who submitted it. The standard form letters objecting to the Modifications were available from the websites of several SIGs, including the Colong Foundation, BMCS, NCC, LEG, and referred from the Facebook page, "Protect Gardens of Stone". A total of 266 submissions were screened as '*standard forms*' (or 37%) from both supporting and objecting submissions. 33 submissions which included individual views in addition to a *'standard form'* letters were retained in this analysis.

When viewed on this basis, there were 180 supporting and 278 objecting individual submissions. The results are plotted in **Figure 4**. A similar distribution of support was still evident with the Lithgow, Bathurst and Mid-Western Regional LGAs, which showed a higher majority of support for the Modifications (127 positive from a total of 175, or 73%). The Blue Mountains, Greater Sydney, Hawkesbury and Singleton LGAs all still show a strong level of objection to the Modifications (167 from a total of 187, or 89%) albeit with a reduced majority.

What the analyses showed most clearly was that those communities most directly impacted by the Modifications are also those who provided the strongest level of support for the approval of the Modifications.



LEGEND

- Local Government Area Boundaries
- 2 Number Of Submissions In Support
- 2 Number Of Submissions Objecting
- Coalpac Modification Boundaries
- Ben Bullen State Forest

Supports	200
Objects	524
Total	**724**

Source: Coalpac 2014

Geographic Distribution of Individual Submissions to Coalpac Proposed Modification

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 3

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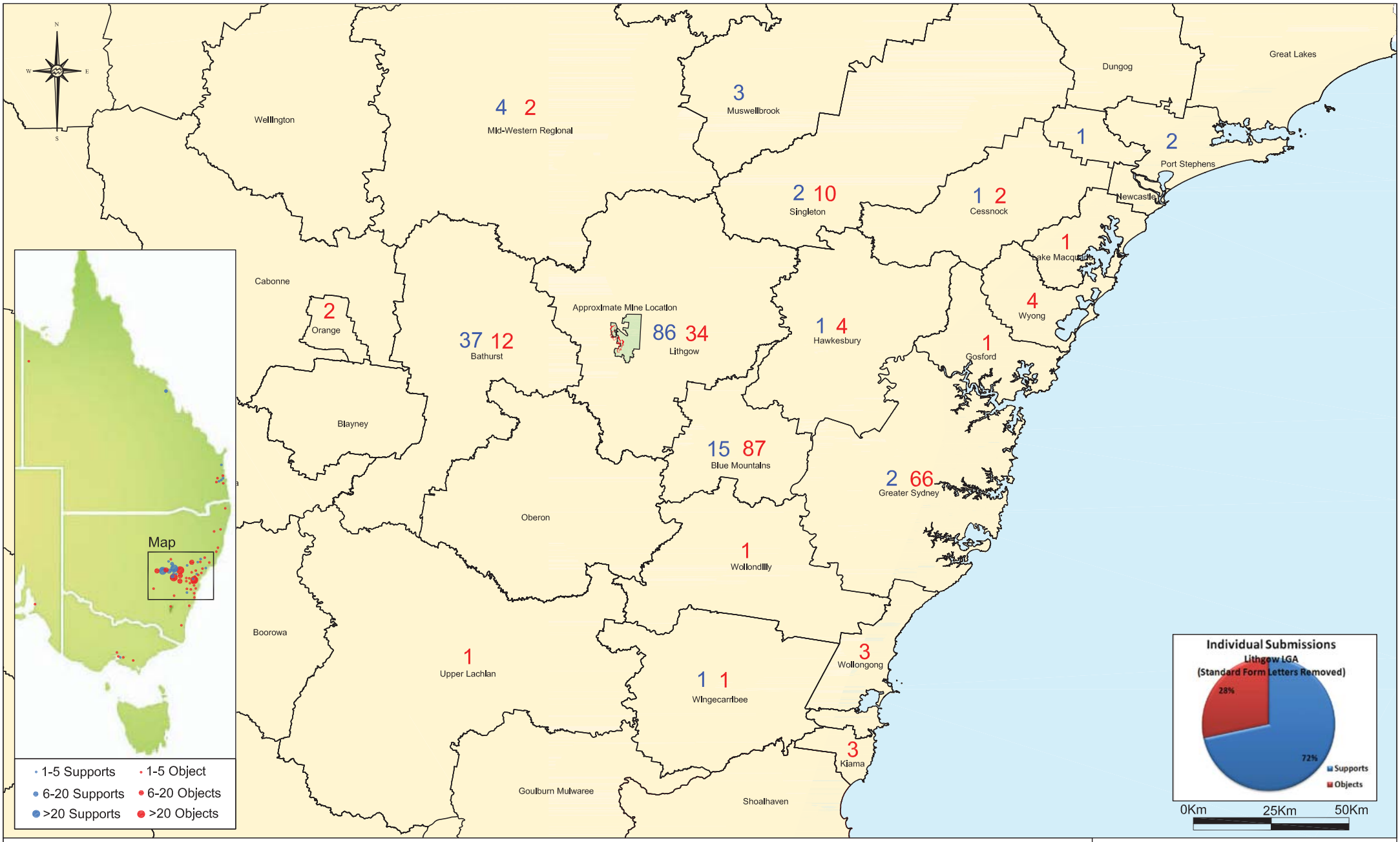

LEGEND

- Local Government Area Boundaries
- 2 Number Of Submissions In Support
- 2 Number Of Submissions Objecting
- Coalpac Modification Boundaries
- Ben Bullen State Forest

Supports	180
Objects	278
Total	**458**

Source: Coalpac 2014

Geographic Distribution of Individual Submissions to Coalpac Proposed Modification
with Standard Form Letters Removed

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 4

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4 REGULATOR SUBMISSIONS

This section provides a response to the issues raised in submissions from regulators made during the public exhibition of the Modification EA.

4.1 ENVIRONMENT PROTECTION AUTHORITY

4.1.1 Air, Noise and Surface Water Quality Assessments

The EPA is satisfied that the EA adequately assesses the potential impacts of the proposals on the existing environment with respect to air, noise and surface water quality.

Response

Noted.

4.1.2 Environment Protection Licences

Environmental Protection Licences

In their submission, EPA referred to the current licences held by Coalpac for the existing operations at Cullen Valley Mine and Invincible Colliery and confirmed that the existing conditions of these licences are considered appropriate for the Modifications.

Response

Coalpac will continue to operate under the conditions of Environment Protection Licences (EPLs) 1095 and 10341 held for Invincible Colliery and Cullen Valley Mine, respectively.

4.2 OFFICE OF ENVIRONMENT & HERITAGE

4.2.1 Consultation

During the preparation of the Modifications EA, Coalpac held a number of meetings with OEH to discuss their issues in relation to the proposal. This included consultation meetings on 21 January and 14 February and site visits to the Gulf Mountain property, the mine sites and the other proposed offset properties on 20 February and 6 March 2014.

A further meeting was held with OEH on 16 May 2014 to discuss the key ecological issues raised in their submission and Coalpac's response to OEH recommendations. This meeting included a discussion on the mine plan design and presentation of the independent informal BioBanking assessment of the biodiversity offset strategy undertaken in consultation with OEH.

Responses to the issues raised and recommendations made in the OEH submission on the Modifications EA are provided in the sections below.

4.2.2 Adequacy of Biodiversity Offsets

In their submission on the Modifications EA, OEH provided comment on the biodiversity offset properties proposed for the Modifications and questioned the adequacy of these as a way to address the losses that would be caused by the proposal.

Key criticisms and recommendations made by OEH in relation to the proposed biodiversity offset package [BOP] *included that:*

- *A recognised metric was not used to assess the biodiversity losses and gains predicted to occur as a result of the Modifications. OEH confirmed that this approach does not allow the adequacy of the proposed offsets to be quantified;*
- *Further offsets are provided to ensure that the offsets adequately address the biodiversity impacts of the proposed Modifications; and*
- *The offsetting of a portion of the Gulf Mountain property would create difficulties for the future management of the part that would not be included as an offset.*

Response

In response to the OEH submission to the Modifications EA, ELA (2014) were engaged to conduct an independent informal BioBanking Assessment (the ELA Assessment) covering both the proposed impact areas and the proposed offset properties. This assessment was undertaken in line with the current BioBanking Assessment Methodology (BBAM) guidelines (OEH, 2011) to quantify the biodiversity losses from the Modifications compared to the biodiversity gains which will be realised from the proposed biodiversity offset strategy. A copy of the ELA Assessment has been provided to OEH during consultation in May 2014. This report is reproduced in full as **Appendix D**.

The independent ELA assessment demonstrated that if the entire Gulf Mountain property were to be incorporated into the biodiversity offset strategy for the Modifications, then the offset package would meet the offsetting requirements for ecosystem credits (with excess credits to be retained). This is demonstrated by the **Table 2** below, which is reproduced from the independent ELA assessment (2014).

In summary, the independent ELA assessment found that the impact area would generate a BioBanking "liability" of 8,628 ecosystem credits. Assuming that the Modification Disturbance Boundaries would be rehabilitated and revegetated, rehabilitation can account for 1,094 ecosystem credits, leaving 7,534 ecosystem credits to be sourced within offset lands.

It is estimated by ELA that 12,416 ecosystem credits can be generated by the inclusion of the Gulf Mountain property, Hillview/Billabong property and the other “Additional” offset lands. Therefore an excess of ecosystem credits can be generated, indicating a net benefit for biodiversity resulting from the BOP.

As such, the proposed BOP for the Modifications has been updated to assume that the entirely of the Gulf Mountain property will be managed for conservation purposes (with the required number of credits retired). The Hillview/Billabong property, other “Additional” mine site offsets lands at Cullen Valley Mine and the rehabilitation of disturbed areas at both Coalpac sites will continue be included in the BOP.

Table 1
Preliminary BioBanking Credit Analysis

Vegetation Formation	Impacts				Hillview and "Additional" Mine Site Offsets		Gulf Mountain Offset		Total Offset Area Credits Available	
	Area (ha)	No. Credits required	No. Credits generated (Rehab)	Final credits required	Area (ha)	No. Credits generated	Area (ha)	No. Credits generated	Area (ha)	No. of Credits generated
Grassy Woodlands	0.09	5	1	4	34.89	317			34.89	317
Dry Sclerophyll Forests (Shrubby sub-formation)	59.16	3523	435	3,088	56.19	454	364.25	3,129	420.44	3,583
Dry Sclerophyll Forests (Shrubby sub-formation)	36.88	2,106	271	1,835	0	0	0	0	0	0
Dry Sclerophyll Forests (Shrub/grass sub- formation)	34.95	2,287	259	2,028	0	0	753.07	6,733	753.07	6,733
Wet Sclerophyll Forests (Grassy sub-formation)	17.39	707	128	579	22.43	235	164.01	1,493	186.44	1,728
Forested Wetlands	0	0	0	0	0	0	6.81	55	0	55
Total	**148.47**	**8,628**	**1,094**	**7,534**	**113.51**	**1,006**	**1,288.14**	**11,410**	**1,394.84**	**12,416**

Source: ELA (2014)

4.2.3 Reservation Status of Ben Bullen State Forest

In their submission, OEH state that the proposed project footprint encroaches further on Ben Bullen State Forest, which previously has been identified by the department as being of suitably high conservation value for future reservation under the National Parks and Wildlife Act 1974. Proposals for future reservation of part of Ben Bullen State Forest also have the support of numerous environment groups including the Colong Foundation for Wilderness and the Blue Mountains Conservation Society. OEH stated that it has been working with other agencies to maximise positive reservation outcomes in the Gardens of Stone area, including Ben Bullen State Forest.

Response

It is important in any discussion of future conservation in the region to understand the long history of the formation of the current Gardens of Stone National Park. It was originally proposed in 1986 and was rejected with Mr R. Carr MP, then Minister for Planning and the Environment, advising that the Government considered that the proposal was neither feasible nor practical and decided not to proceed with the "Gardens of Stone" addition to the Wollemi National Park in a letter to the NSW Coal Association dated 20th May 1986.

The original Gardens of Stone proposal reappeared in 1993 as part of a Private Members Bill by Peter MacDonald MP to create nine new National Parks, four new nature reserves and investigate a further seven areas. The Gardens of Stone area was listed as an area for investigation only. With regard to the Gardens of Stone area proposed for investigation by MacDonald, the Department of Mineral Resources noted the following;

- Some 70% was within existing colliery holdings;
- Some 40% covers known economic coal resources;
- Some 10% covers known friable sandstone resources; and
- Some 20% is considered prospective for diamonds.

Subsequently, Clover Moore MP proposed an amendment to the MacDonald Private Members Bill to revoke certain State Forests and for a reduced area to be immediately dedicated as the Gardens of Stone National Park. **Figure 5** shows the proposed Gardens of Stone areas for both the MacDonald Bill and the Moore amendment.

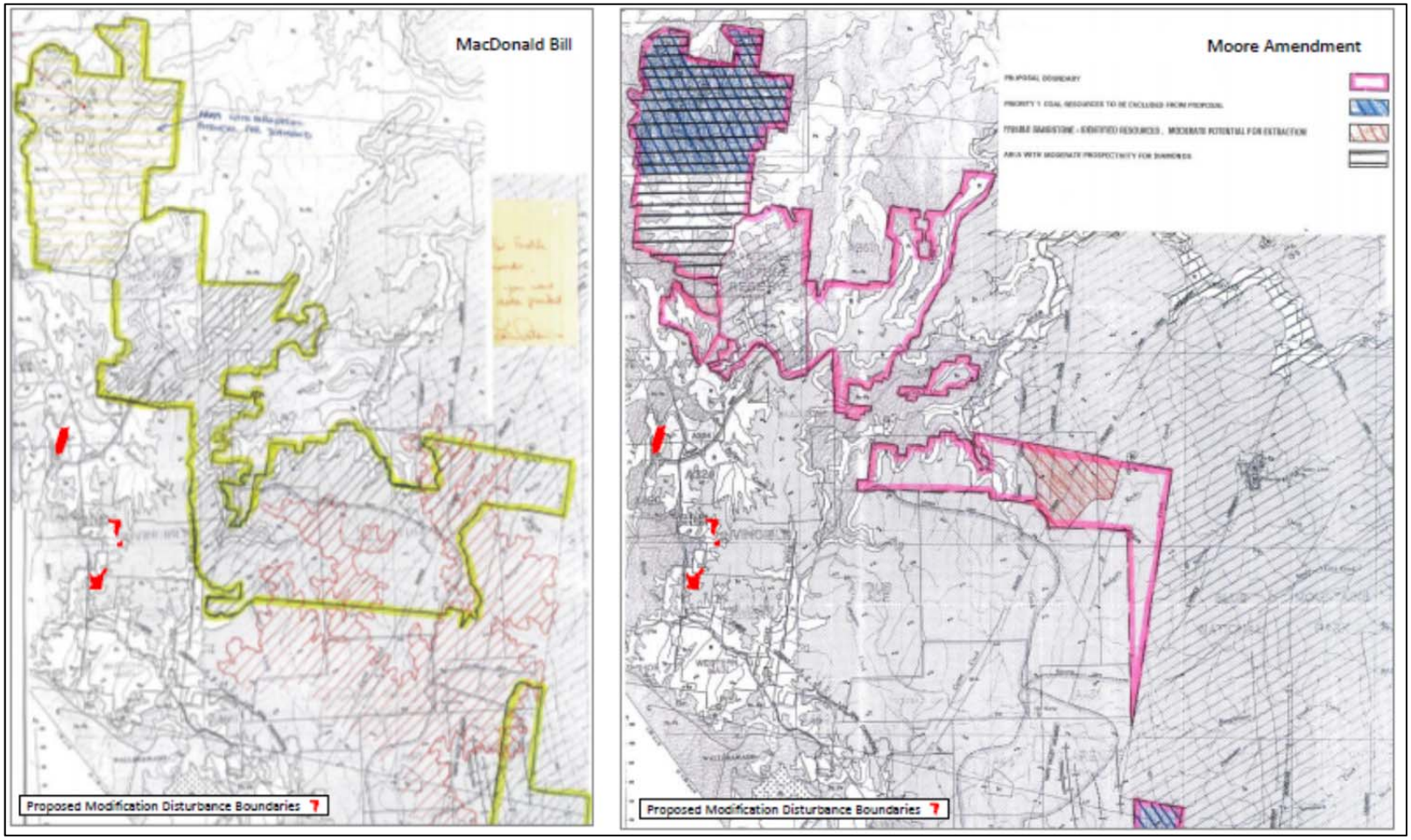


Figure 5

Proposed Gardens of Stone areas for MacDonald Bill and Moore Amendment

Note relative size and location of proposed Modification Disturbance Boundaries to area considered for conservation

A briefing note prepared by the Department of Mineral Resources for the Minister of Resources on the 12th May 1993 states *"..there has been a long held view by both sides of Parliament and at one time (1986) by the NPWS that the "Gardens of Stone" area is already committed to coal mining and that the impact of same makes it inappropriate and unacceptable as a national park…"* and went on to state *"With approximately 75 per cent of the coal resources in the Western Coalfield [2,300 million tonnes] covered by existing national parks the loss of the coal resource in this locality would be likely to adversely impact in the local and regional economy, as well as the long term cost and efficiency of State power generation."*

The briefing note also provided the following recommendation: *"The declaration of a national park within any part of the Gardens of Stone proposal should be strongly opposed by the Government. In particular, every effort should be made to avoid park dedication over areas held by Baal Bone, Invincible, Angus Place and Clarence Collieries and the Airly Project."*

In a letter sent to the Minister for Natural Resources in response to the Bill dated the 12 May 1993 Mr Ruston, General Manager Coalex Pty Ltd, raises the following concerns regarding the newly built Mt. Piper Power Station (MPPS) and local coal supply: *"It is now unlikely that the second units will ever be built because there is insufficient coal available in the district to supply a station of this size. In fact, a close examination of current reserves will show that Mt. Piper Power Station will have limited access to reserves of coal in 20 year's time even at its current size and as you will be aware, 20 years is only 50% of the life span of a power station. From this it can be seen that the demise of the coal industry will cost not only the jobs of the miners but also jobs in the power generation industry."*

In a letter dated 1 October 1993 the Council of the City of Greater Lithgow also noted their concerns: *"Both the Bill, and the amendments to it have serious implications for the long term mining and power generation in the Lithgow district. It is obvious that neither unemployment in the mining industry nor the effect of the viability of power generation here has been considered."*

In response to those and other concerns there was detailed consideration of the Moore proposal by the whole of Government over the next 18 months. Multiple Government departments across a wide range of portfolios including the Department for Mineral Resources, The Department of Conservation and Land Management, National Parks and Wildlife Services and the Forestry Commission worked closely together to define and agree an area that balanced the interests of agriculture, mining, forestry and conservation. In a briefing note prepared by NSW National Parks and Wildlife Service dated 4 September 1994 and signed by Neil Shepherd, Director General NPWS, stated that: *"The negotiations have now been concluded with an agreed boundary for stage one of the Gardens of Stone National Park (see attached map –* **Figure 6***)."*

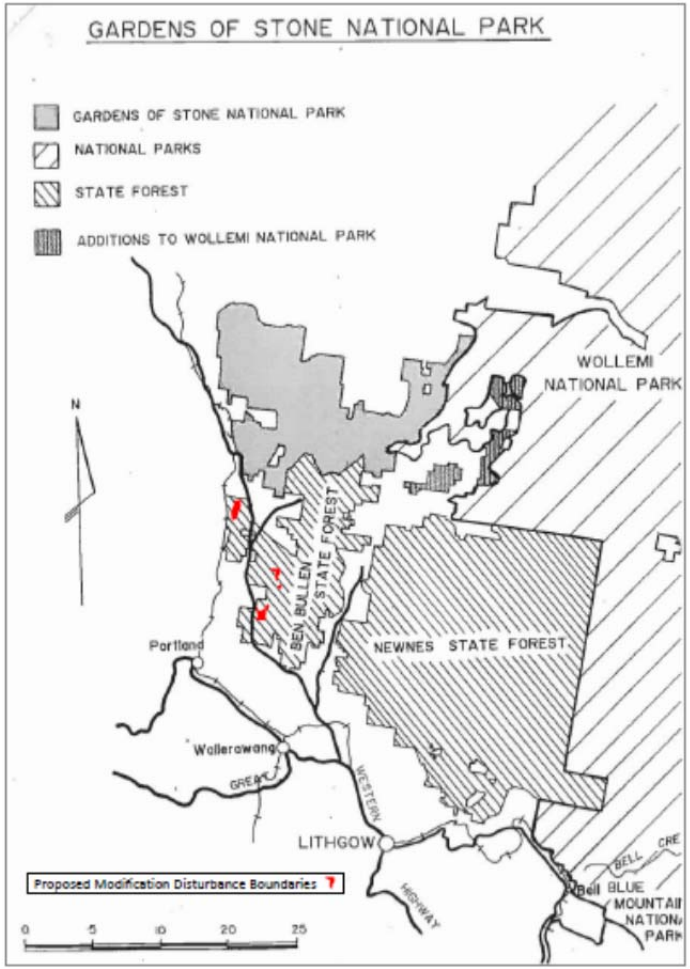


Figure 6

Agreed boundary for Stage One of the Gardens of Stone National Park

Note relative size and location of proposed Modification Disturbance Boundaries to Gardens of Stone National Park

This culminated in an announcement by the Minister of the Environment on 1 December 1994 to the NSW Parliament noting *"Today's announcement will result in 70,000 hectares being added to protected land in New South Wales. It will increase the amount of land being held by National Parks Estate to 5.3 per cent, making it the second largest land-holder in New South Wales. The commitment of the National Parks and Wildlife Service and this Government to the environment is reinforced daily. One of the jewels in today's announcement is the establishment of the Gardens of Stone National Park - a magnificent 12,000 hectare national park - which contains unique rock formations, box and ironbark forests, the habitat of the endangered regent honeyeater and a great diversity of flora and fauna."*

The Colong Foundation for Wilderness lobbied heavily in support of the creation of the Gardens of Stone National Park and supported Moore's proposal. They also lobbied strongly for additional areas to be included. The Minister made the Government's position clear in a letter to the Colong Foundation for Wilderness dated 20th June 1994 stating *"The Director-General of the National Parks and Wildlife Service advises me that the Wolgan Falls is within an existing coal lease and is therefore not included in the current boundaries of the proposed park. However, these boundaries might be expanded at some future date if it can be done without adversely affecting colliery operations."*

The Executive Officer to the Minister for the Environment reiterated this Government position in a letter to the Council of the City of Greater Lithgow dated 24th November 1994 stating *"As Council will no doubt have local employment concerns in mind, Mr Hartcher [Minister for the Environment] can also give his assurance that no areas of identified coal mining interest have been included within these boundaries [proposed Gardens of Stone National Park]. Creation of the new national park will therefore have no foreseeable impact on current or future colliery operations."*

A number of areas were recommended for further review, as noted in a letter from the Minister for Mines to the Minister for the Environment dated 3rd May 1994. On the 22nd of December 1995 Pantoneys Crown Nature Reserve was added to the park. The areas for further review are shown on **Figure 7** together with the current Gardens of Stone National Park boundaries extended by more than 25% (3,000 ha) from its original size to its present 15,080 ha.

There are two important points to be drawn from the above:

- Neither proposal (MacDonald's nor Moore's) nor the subsequent 25% expansion included the main area of BBSF in recognition of current and future mining operations; and
- Government policy was clear that any future expansion of the Gardens of Stone National Park should not impact upon the current or future colliery operations in the area.

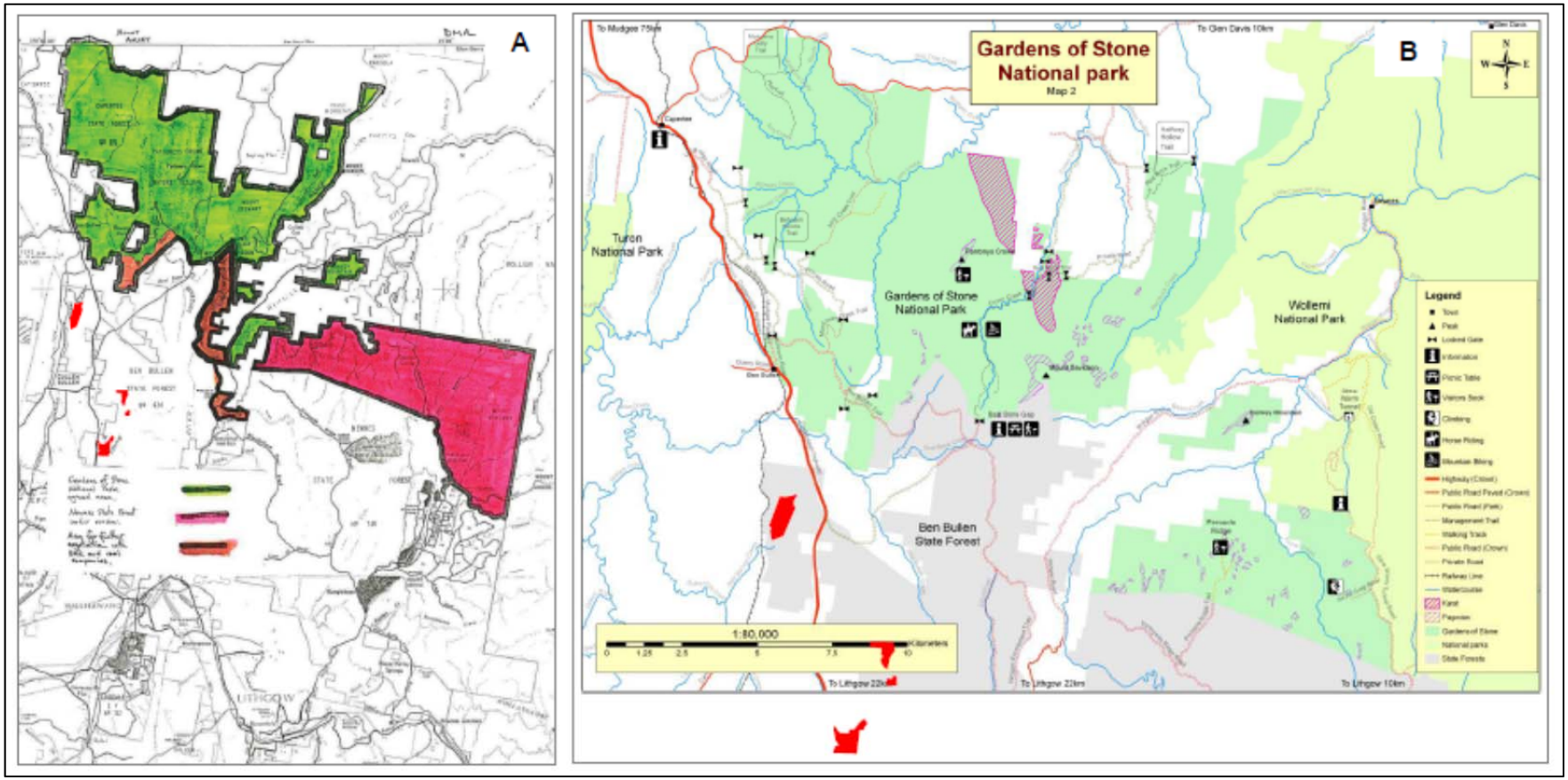


Figure 7
Plan showing original area of Gardens of Stone National Park and areas for review (A)
and Map of current Gardens of Stone National Park (B)
Note relative size and location of proposed Modification Disturbance Boundaries to Gardens of Stone National Park

This Government policy still remains in place as noted in a letter from the Minister for the Environment to the Minister for Planning and Infrastructure dated 21 February 2013 *"The Office of Environment and Heritage has been evaluating the Gardens of Stone Stage 2 proposal and liaising with other government agencies about potential, future options for this land under the National Parks and Wildlife Act 1974. The Coalpac Consolidation Project area has not been included in discussions with the Department of Investment and Trade, Regional Infrastructure and Services, noting that it is subject to a separate planning process that needs to first run its course.*

While the remaining areas subject to the proposal may be worthy additions to the public reserve system, any potential reservation of Gardens of Stone Stage 2 will be complex and will take time to consider, including consideration of the various mining, forestry, recreation, tourism and Aboriginal community interests."

The current Government's policy position regarding consideration of mining projects was further made clear by it taking the step of implementing the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment (Resource Significance) 2013* in November 2013. Schedule 1, Clause 12AA set out below, when taken in its context with the wider planning framework, clearly states that the policy remains that the resource significance and economic contributions are to be key factors in any planning decision.

"12AA Significance of resource

(1) In determining an application for consent for development for the purposes of mining, the consent authority must consider the significance of the resource that is the subject of the application, having regard to:
  (a) 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
  (b) any advice by the Director-General of the Department of Trade and Investment, Regional Infrastructure and Services as to the relative significance of the resource in comparison with other mineral resources across the State.

(2) The following matters are (without limitation) taken to be relevant for the purposes of subclause (1) (a):
  (a) employment generation,
  (b) expenditure, including capital investment,
  (c) the payment of royalties to the State.

(3) The Director-General of the Department of Trade and Investment, Regional Infrastructure and Services is, in providing advice under subclause (1) (b), to have regard to such matters as that Director-General considers relevant, including (without limitation):

(a) the size, quality and availability of the resource that is the subject of the application, and

(b) the proximity and access of the land to which the application relates to existing or proposed infrastructure, and

(c) the relationship of the resource to any existing mine, and

(d) whether other industries or projects are dependent on the development of the resource.

(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.

(6) To avoid doubt, the obligations of a consent authority under this clause extend to any application to modify a development consent."

It was proposed when the original Gardens of Stone National Park was under review that consideration be given to multiple and sequential land use when reviewing areas potentially suitable for future conservation. This approach is clearly compatible with clause 12AA as set out above.

A briefing note prepared for the Shadow Minister for the Environment prepared by the Department of Mineral Resources dated 6 September 1993 stated "*The concept* [multiple and sequential land use] *is not new in the sense that mining and agriculture, forestry and even urban development has been the basis of NSW mining legislation for over a century. What is new in the concept is its application to development and conservation management objectives. This land use concept, while enabling protection of outstandingly important or sensitive areas, recognises that single purpose use is not usually necessary or desirable over substantial areas."*

The briefing note concludes with the statement "The development of multiple land use concepts would help ensure that protection of the diminishing natural environment and heritage need not be at the expense of resource exploration and development. They are mutually essential, not mutually exclusive. Our present system provokes conflict, not solutions."

These comments are as valid today as they were in 1993.

The proposed Modifications have been based on the concept of multiple and sequential land use. The total disturbance area proposed for the Modifications (approximately 150 ha) represents only 1.9% of the area of the BBSF (7,812 ha). The proposed Modifications will have a net positive outcome for the environment.

If the mines were to be closed in their current form, there would be six residual voids (three at each site) in the BBSF resulting in a final landform that is inconsistent with the surrounding landscape in the BBSF.

The proposed Modifications will allow for full mitigation of the six residual voids, and would result in the development of a stable, free-draining final landform and sustainable forest and woodland vegetation communities in the long term. Such net environmental benefits need to be considered when evaluating their environmental impacts and any impacts to future potential for conservation. Further discussion on Coalpac's ability to rehabilitate disturbed areas to create sustainable forest and woodland vegetation in the medium to long term is provided below in **Section 5.2.5** and **Section 5.2.6** in response to issues raised in submissions by a number of SIGs.

In addition to the development of higher quality rehabilitation and final landform outcomes, the Modification mine plans have also been designed to minimise, and where possible avoid, any potential for direct and indirect impacts to Escarpments in the BBSF. This will ensure that the scenic values of the pagodas and sandstone escarpments noted by OEH and the public are minimised by the Modifications. The management and mitigation measures that Coalpac will put in place for these issues are discussed further in **Section 4.2.5** to **Section 4.2.6**.

4.2.4 Impacts to Pagoda and Sandstone Escarpment Landforms

In their submission, OEH reiterated a number of concerns in relation to the potential damage to pagoda and escarpment landforms (previously mapped by the department as "Geodiversity Features") due to the open cut and highwall mining activities proposed for the Modifications. OEH note that the Geodiversity Features located outside of existing Conservation Reserves, are of special significance and form part of a landform of high scenic values that should not be degraded by mining activities.

A key recommendation of OEH is that no open cut mining should occur within 300 m of Geodiversity Features (as supplied to the Planning Assessment Commission [PAC] *for the Coalpac Consolidation Project in 2013).*

Response

No Escarpments will be disturbed by open cut mining. With respect to the stability of the Escarpment, Coalpac have also committed to undertake detailed modelling and a comprehensive review process to maintain a highwall mining design that will not result in any significant surface subsidence or damage to overlying or adjacent Escarpments (see **Section 4.2.6**). Any such designs will also be subject to DRE Approval of a Subsidence Management Plan (now the NSW Extraction Plan Process), prior to commencement of highwall mining.

The mine plans proposed for the Modifications have been designed to avoid and/or minimise any potential for impacts to Geodiversity Features as mapped by OEH. This process included a commitment by Coalpac to undertake additional blast vibration monitoring and management measures consistent with recommendations from independent experts in the field of blast design and control (see **Section 4.2.5**).

In their open cut mine design, Coalpac have also allowed for increased distances between proposed open cut mining areas and Escarpment areas, in accordance with their relative position, visual aspect and significance.

The key recommendation by OEH for a 300 m distance between the open cut and these features was to provide adequate foraging habitat for the Broad-Headed Snake (BHS). This is discussed further in **Section 4.2.7**.

The blast management practices, highwall mining designs (which do not venture under the Escarpments to the east of Invincible Modifications), and buffer zone provided to the Escarpments to the east are sufficient to ensure the protection of these Geodiversity Features.

Buffer zones have been incorporated into both mine plans, and these are discussed separately in the following sections below.

4.2.5 Blasting Impact Management

In their submission, OEH noted that a key management requirement of the Modifications was that blast impacts associated with open cut mining would not cause collapse / subsidence cracks to the sandstone plateau edges, cliff lines and pagodas.

Response

As noted in Section 6.5 of the Modifications EA, blasting in close proximity to rock structures at both Invincible Colliery and Cullen Valley Mine has been assessed by specialist consultants Terrock Consulting Engineers (2013). It was found that blasting has occurred as close as 57 m from the Escarpment, with the Peak Particle Velocity (PPV) predicted to be in excess of 200 mm/s with no discernible impacts. For the Modifications, a conservative limit of 100 mm/s PPV ground vibration is proposed for the Escarpment.

Further, a staged process with an initial limit of 50 mm/s has been recommended where the proposed open cut highwall approaches within 200 m of the Escarpment. The Escarpment areas are not sensitive to impacts from airblast overpressure.

At Invincible Colliery, the open cut limit proposed does not approach within 200m of any Escarpment, however for conservatism a 50 mm/s PPV limit (at the rock structures in the Escarpment) will be adopted for the Modification.

The open cut limit proposed for the Cullen Valley Mine Modification does encroach within 200m of the Escarpment in parts and thus the staged approach for increases in PPV proposed by Terrock Consulting Engineers (2013) will be adopted at the site. As recommended, a geotechnical expert will inspect the Escarpment prior to blasting within 200 m of it.

Coalpac will implement the additional monitoring and management procedures consistent with the recommendations of Terrock Consulting Engineers (2013) and these will be included in the currently approved Blast Management Plans already in place at Cullen Valley Mine and Invincible Colliery, together with the necessary amendments for the Modifications.

Based on the recommendations of Terrock Consulting Engineers (2013), these measures are considered to be more than adequate to ensure that there are no significant blasting related impacts upon the Escarpment.

4.2.6 Highwall Mining Subsidence

In their submission, OEH make reference to the CCP PAC, which reviewed the risk of subsidence caused by highwall mining during its review. The CCP PAC stated that:

> *"The Commission finds that the risks of subsidence-induced damage to the pagodas and escarpments are real and that the level of uncertainty is such that no confidence can be placed in the assertion that the risks can be managed successfully at all times under all operating conditions. The Commission also notes that stability problems arising from highwall mining may only become apparent in the longer term."*

The PAC recommended that "the pagodas and the associated escarpments be considered natural features of special significance and that they be fully protected from any mine-induced impacts".

Given the uncertainty regarding subsidence and other mining impacts OEH considers that no highwall mining should occur beneath geodiversity features identified in the mapping supplied to the PAC during the review process of the Coalpac Consolidation Project.

Response

Section 6.7 of the Modifications EA provides a description of the assessment completed for the open cut highwall stability and highwall mining subsidence impacts relating to the Modifications.

The potential impacts of highwall mining have been incorrectly compared to the impacts of other higher extraction underground mining methods, such as longwall mining and pillar extraction, by both OEH and the CCP PAC, see **Figure 8**.

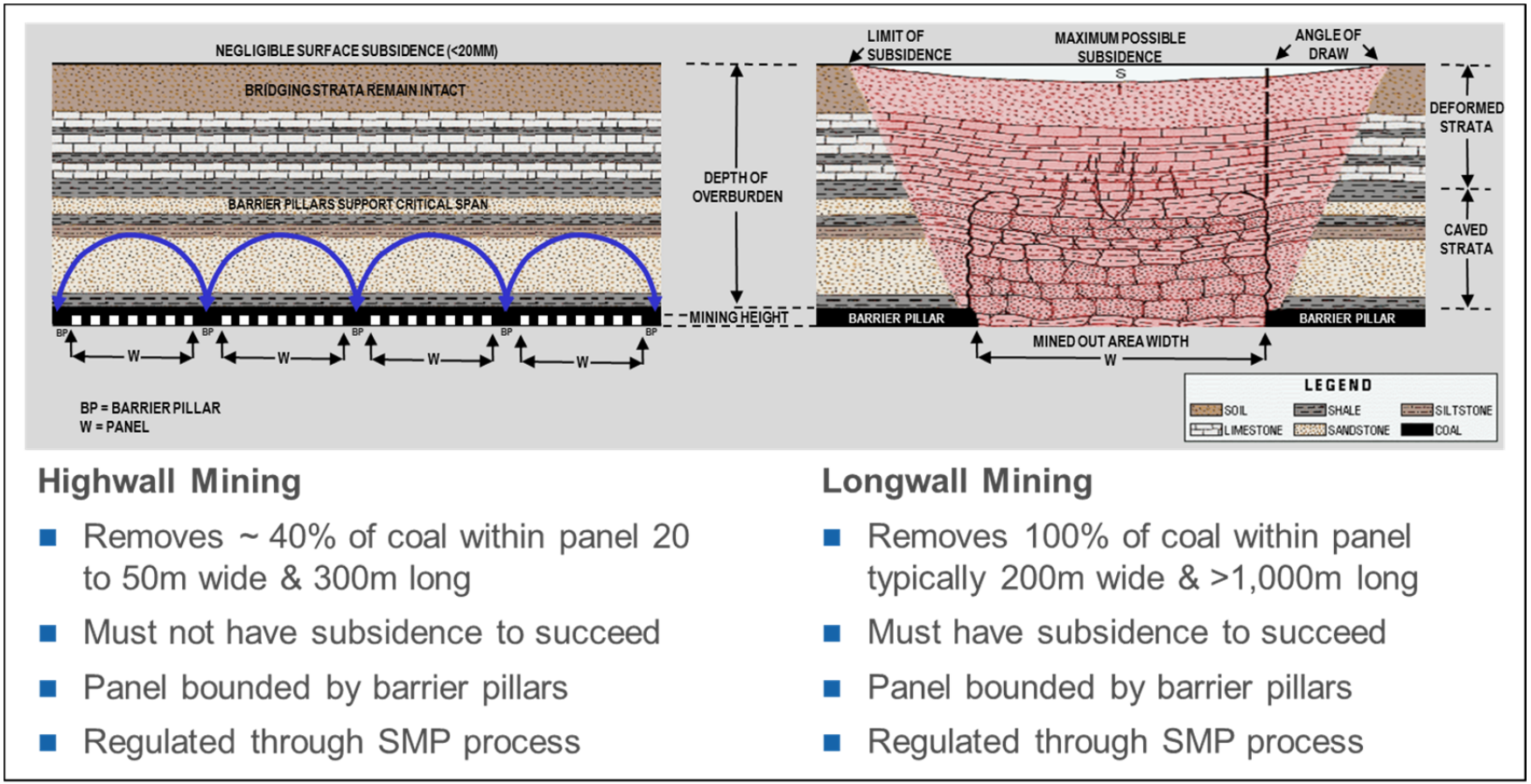


Figure 8
Schematic illustrating differences between highwall and longwall mining method impacts

Longwall and pillar extraction underground mining methods effectively remove surface support from a series of large areas or panels (each from 20 to 40 ha in area) which results in significant fracturing of the overlying strata and surface subsidence. Subsidence must occur for these mining methods to be successfully applied.

In marked contrast to these methods, highwall mining requires the stability of the overlying strata to be maintained at all times in order to be successful.

Low recovery underground mining (commonly known as 'first workings') is routinely undertaken beneath sensitive surface structures based on the same design processes applied to the highwall mining planning for the Modifications.

Highwall mining has already been successfully completed at both Cullen Valley Mine and Invincible Colliery with no discernible surface subsidence evident at either site.

Despite all of the above, as an added measure to address OEH concerns, no highwall mining has been proposed beneath the Escarpment to the east of Invincible Colliery.

The validity and appropriateness of the overall highwall mining design methodology has been independently reviewed by Professor Bruce Hebblewhite (2013) from the University of New South Wales.

In his review, Professor Hebblewhite noted the following:

> "*The PAC makes the statement that "an FOS of 1.3 is used throughout the report". This is simply not correct and may indicate a misunderstanding by the PAC. GEONET have made two key statements; firstly, that a minimum value of 1.3 has been adopted for FOS (emphasis added), such that no pillars have an FOS below 1.3, but certainly some are higher. Secondly, GEONET has also stated, as quoted by the PAC, that 1.3 may not be adequate in some areas of geological variations, to maintain long term stability and hence minimise subsidence. The PAC also appears to mistakenly believe that barrier pillars have been designed to the minimum 1.3 FOS, whereas in fact the relevant barrier pillar FOS values are well in excess of this value, even under hypothetical, extreme overburden loading conditions."*

The original comment by the CCP PAC was based on the flawed understanding that the long term stability of the highwall mining design relied on the smaller web pillars with a FoS of 1.3 (web pillars are those within the panel, between the barrier pillars). In fact, as noted by Professor Hebblewhite, the core stability of the highwall mining design is based on the larger barrier pillars which have been designed with a FoS in excess of 4 under the highest stress levels. As the strongest pillars in the layout design, the barrier pillars will bear the majority of the load from the overlying strata. The design is based on this assumption together with the spacing of the barrier pillars being less than the critical span or maximum bridging capacity of the overlying strata.

In making this assumption, no allowance is made for any support being provided by the smaller web pillars when in fact they will clearly add to the stability. This provides a further level of conservatism to the design methodology.

This means that the overall stability of the highwall mining design is in fact much higher than the CCP PAC incorrectly assumed, and will provide more than adequate long term stability.

The retention of highwall mining beneath the Escarpment for the Cullen Valley Mine Modification was based on the following key differences and reduced sensitivities:

- Additional stand-off distance from the base of the Escarpment outcrops to the limit of open cut mining (average 177m);
- Absence of any prior underground workings, providing greater confidence in the strength of the overlying strata;
- Absence of any aquifers in the overlying strata;
- Lower visual impact to the Escarpment in this area;
- The Escarpment in this area does not provide high quality habitat for the BHS; and
- The Escarpment in this area is a smaller and localised area which is separated from the main area of Escarpments to the east at Invincible Colliery by cleared private land and the Castlereagh Highway. This also creates a lack of continuity in BHS habitat.

DRE have stated their support for the proposed highwall mining activities under the Modifications subject to the preparation of a Subsidence Management Plan, now known as the NSW Extraction Plan process (see **Section 4.6**). In accordance with NSW Government Policy, DRE will review the final design parameters and risk assessment prior to the commencement of mining as part of the highly regulated Extraction Plan process that will be followed by Coalpac for the highwall mining operations proposed for the Modifications.

Further monitoring of highwall mining design performance will also be carried out and the results used to ensure that the design input parameters and outcomes are aligned, and are consistent with the design and predicted performance.

4.2.7 Impacts to the Broad-headed Snake

In their submission, OEH make reference to the occurrence of suitable habitat for the Broad-headed Snake in pagodas and rocky escarpment habitat in the local area and note that the movement of the species between its summer and winter habitat are at least partially the reason behind their recommendation that a 300 m buffer be maintained between the extent of open cut mining and adjacent pagodas and sandstone escarpments.

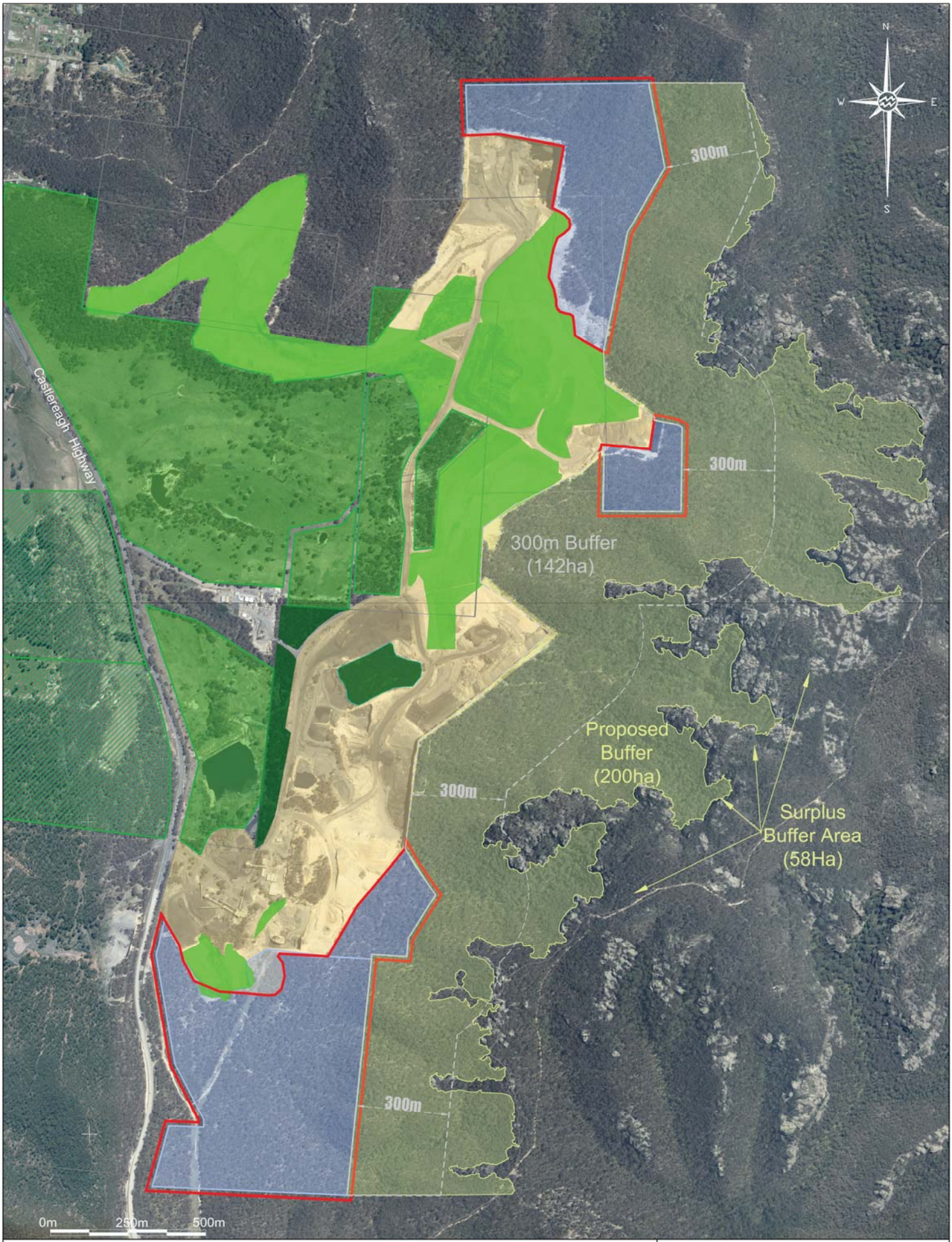
OEH also raise concerns that while the 300 m buffer is achieved in most locations, that there are some areas at Invincible Colliery where the setback distance is as small as approximately 100 m. OEH also note that a large area of the open cut proposed for Cullen Valley Mine is within 100 m or less of sandstone escarpments.

Response

As discussed in **Section 4.2.5** and **Section 4.2.6**, Coalpac has committed to stringent management procedures for blasting and highwall mining to minimise any potential for impacts to Escarpments and adjacent vegetation communities that could be utilised as habitat by the BHS.

In conserving foraging habitat, it is considered that the total area of suitable land (i.e. hectares) available is the more appropriate metric for considering buffer zones than any specific linear distance, given the irregular form of the Escarpments.

Overall, the buffer area between the proposed open cut mining areas at Invincible Colliery and the adjacent escarpment significantly exceeds the area of BHS summer foraging habitat that would be delivered by the strict implementation of a 300 m setback around the Escarpment. This additional area exceeds that provided by a uniform 300 m buffer by 40%, or an area of 58 ha (see **Figure 9** below).



LEGEND

- Existing Disturbance Area
- Proposed Open Cut Limit
- Modification Disturbance Boundary 151Ha
- Existing Offset Areas
- Proposed Offset Areas
- Current Rehabilitation
- Conservation Area
- 300m Buffer From Open Cut (Current and Proposed)
- Proposed Buffer From Open Cut

Invincible Colliery Additional Buffer Area from Escarpments

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 9

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It is considered that these measures will add to the significant areas of summer foraging habitat suitable for the BHS that will remain within the BBSF and in the areas of Conservation Reserve to the north and east of the Modifications. Those locations at Cullen Valley Mine where open cut mining is proposed within 300 m of the Escarpments are not considered to provide suitable habitat for the BHS (White, 2013).

In an assessment of habitat for the BHS undertaken in 2013, Dr. Arthur White of Biosphere Environmental Consultants (a pre-eminent expert on the BHS) mapped potential areas of primary habitat for the species in the local area. Dr. White noted the extensive nature of escarpments in the areas surrounding the Modifications, but noted that despite the sandstone escarpments surrounding the site:

> *"…the amount of potential habitat for the Broad-headed snake was quite modest in comparison. A lot of the sandstone areas were discounted as snake habitat as they are devoid of exfoliating rocks and lacked crevices or cracks."*

The areas of adjacent forest and woodland vegetation below the Escarpments that will be retained as part of the buffers from the Invincible Colliery Modification Disturbance Boundary will provide summer foraging habitat for the species over an area that is 40% larger than that recommended by OEH.

Additionally, the OEH website page describing known habitat and characteristic features of the BHS (http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10413) states that the snake:

> *"Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer."* (Emphasis added).

Further to the inclusion of a larger than recommended buffer zone between open cut mining and potential habitat for the BHS, additional management measures have been included in the EA for the Modifications.

As shown on **Figure 9**, the proposed open cut mining areas at Invincible Colliery are located at a greater distance from the Escarpment and associated rocky outcrops than the 100 m distance calculated and referred to by OEH in its submission.

4.2.8 Permian Sediment Vegetation Impacts

In their submission, OEH (and a number of the SIGs) also made reference to the significance of the vegetation on Permian Sediments in the area and the relatively high conservation significance of these communities due to their location and their generally low level of conservation. These vegetation types included:

1. *Ribbon Gum grassy forest on alluvial flats (equivalent to the Tableland Ribbon Gum Blackwood Apple Box Forest community mapped by Cumberland);*

2. *Mountain Gum Apple Box Blakely's Red Gum grassy forest on small drainage lines and footslopes (equivalent to the Tableland Mountain Gum Broad-leaved Peppermint vegetation type mapped by Cumberland Ecology); and*
3. *Broad-leaved Peppermint Brittle Gum Red Stringybark grassy forest on small rises (equivalent to the Tableland Slopes Brittle Gum Broad-leaved Peppermint vegetation type mapped by Cumberland Ecology).*

OEH's submission also states that one third of the vegetation proposed to be removed for the Modifications consists of these three higher value vegetation types on Permian sediments and that this vegetation is highly cleared and poorly preserved in the region.

Response

None of the three "Permian" vegetation communities listed by OEH are EECs, and as such they are not afforded any additional conservation significance over any other vegetation. Despite the above, the avoidance, and management commitments made by Coalpac in the mine plan design and rehabilitation commitments for the Modifications mitigate and reduce the level of impact to these communities.

There are also extensive areas of Permian geology in the region and the proposed Modifications would only impact a very small proportion of the available Permian landscape with similar vegetation communities.

Like all other vegetation communities to be disturbed by the Modifications, they can also be validly offset and the areas to be cleared will be rehabilitated. This is demonstrated in the independent ELA Assessment (ELA, 2014) (see **Section 4.2.2**) which confirms that all of the impacted Permian vegetation can be offset by the biodiversity offsets proposed for the Modifications. These offsets include the Hillview-Billabong property, the "Additional" offset lands near the Cullen Valley Mine and the Gulf Mountain property. Coalpac will also continue to progressively rehabilitate the disturbed land using local native species and in the long term, many of the plant species that dominate the areas with Permian soils will be regenerated.

4.2.9 Flora Survey Adequacy

The submission from OEH notes their concerns regarding the adequacy of the threatened flora surveys undertaken for the Modifications.

In particular, it was noted that a number of the flora survey quadrats undertaken are located in areas outside of the proposed Modification Disturbance Boundaries and that they felt that there is significant uncertainty that threatened species (including Eucalyptus aggregata, E. cannonii, E. pulverulenta, Grevillea evansiana, G. obtusiflora, Persoonia marginata, and Prostanthera cryptandroides) have been adequately searched for.

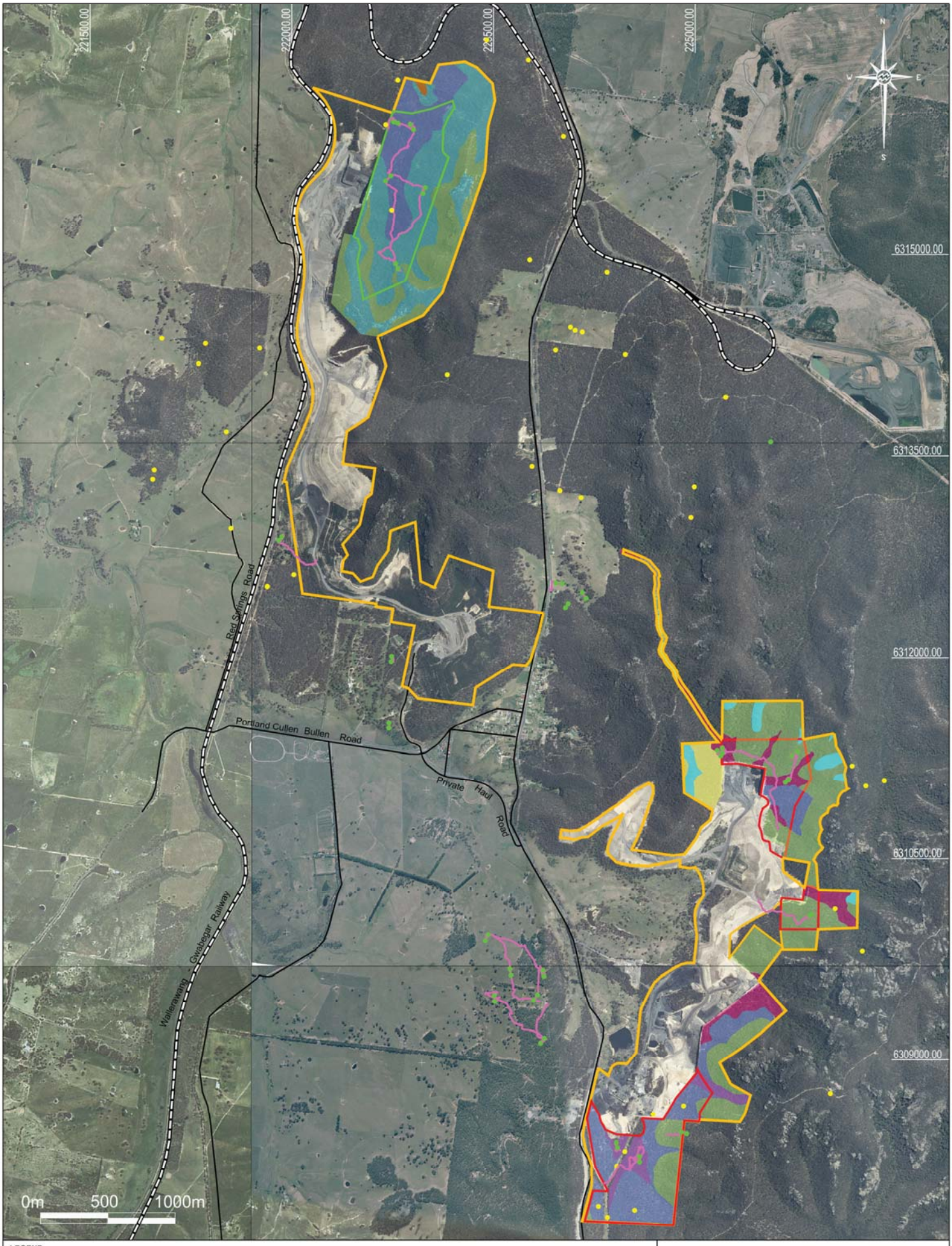
OEH also note the submissions from SIGs in response to the CCP EA [now withdrawn] that refer to the rich diversity of flora in the area and the presence of a number of ROTAP species surrounding the Modifications.

Response

A large survey effort has been undertaken over a five year period to assess the plant diversity present in the Modification Boundaries, with a particular objective of increasing detection rates during known flowering periods and other active life stages of flora species that were predicted to occur in the area. These surveys were undertaken following the completion of a number of desktop assessments, including the review of the NSW Atlas of Wildlife and SEWPaC Protected Matters Search Tool databases, as well as reviews of scientific literature describing threatened species habitat.

Field surveys which informed the ecological impact assessment undertaken for the Modifications EA were undertaken over a period of five years and were conducted during different seasons to increase the level of detection of different flora species. In addition to the field surveys undertaken by Cumberland Ecology (CE), a second team of expert ecologists, EcoLogical Australia (ELA), was independently commissioned to conduct additional field assessment surveys of the proposed impact and offset areas for the Modifications (see **Section 4.2.2**). In total, 57 quadrats have now been completed within the ecological impact assessment Study Area for the Modifications, including 22 quadrats within the Modification Disturbance Boundary (see **Figure 10**). It is considered that the above demonstrates the comprehensiveness of the survey effort undertaken.

A summary of the flora survey effort for the Modifications is presented in **Table 2**. A summary of each of the key threatened flora species and Rare or Threatened Australian Plants (ROTAPs) noted in the submission from OEH is provided below in **Section 4.2.10**.



LEGEND

- Modification Boundaries
- Invincible Colliery Modification Disturbance Boundary
- Cullen Valley Mine Modification Disturbance Boundary
- ELA Meander Transects 2014
- ELA Quadrat Locations 2014
- Cumberland Ecologoy Quadrat Locations 2014
- Road
- Rail

Native Vegetation

- Capertee Rough-barked Apple - Red Gum Yellow Box Grassy Woodland (EEC)
- Exposed Blue Mountains Sydney Peppermint - Silvertop Ash Shrubby Woodland
- Tableland Slopes Brittle Gum – Broad-leaved Peppermint Grassy Forest
- Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest
- Capertee Rough-barked Apple - Red Gum Yellow Box Woodland : Non Grassy
- Tableland Gully Ribbon Gum Blackwood Applebox Forest
- Cox's Permian Red Stringbark Brittle Gum Woodland
- Tableland Slopes Brittle Gum – Broad-leaved Peppermint Grassy Forest Derived Native Grassland
- Tableland Scribbly Gum – Narrow-leaved Stringybark Shrubby Open Forest

Source: Cumberland Ecology 2014

Flora Survey Locations

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 10

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Table 2
Flora Assessment Survey Effort

Survey Technique	Dates	Effort
Vegetation Mapping	• 21-25 September 2009 • 19-23 October 2009 • 28 January 2010 • 2-3 February 2010 • 14-19 October 2010 • 12-16 September 2011 • 11-12 October 2011 • 10-11 December 2013	Minimum 24 days two people plus throughout entire survey period.
Quadrat sampling	• 21-25 September 2009 • 19-23 October 2009 • 28 January 2010 • 2-3 February 2010 • 14-19 October 2010 • 12-16 September 2011 • 7-11 April 2014 • 28 April 2014 • 1 May 2014	44 quadrats (Cumberland CE) 13 quadrats (ELA)
Random meanders	Random meanders undertaken throughout flora survey period during vegetation mapping, quadrat sampling and threatened species searches.	Throughout survey period
Threatened flora searches and population estimates	Surveys undertaken concurrently with vegetation community mapping, random meanders and quadrat sampling with counts and additional searches undertaken on: • 20 April 2011 • 6 and 12 May 2011 • 16 and 22 June 2011 • 12-16 September 2011 • 11-12 October 2011 • 3 – 6 November 2011.	Minimum 16 days for 2 people targeted and throughout survey period

4.2.10 Threatened and ROTAP Flora Species Impacts

In their submission, OEH raised concerns regarding the assessment of specific threatened and ROTAP species with the potential to occur in the disturbance areas proposed for the Modifications.

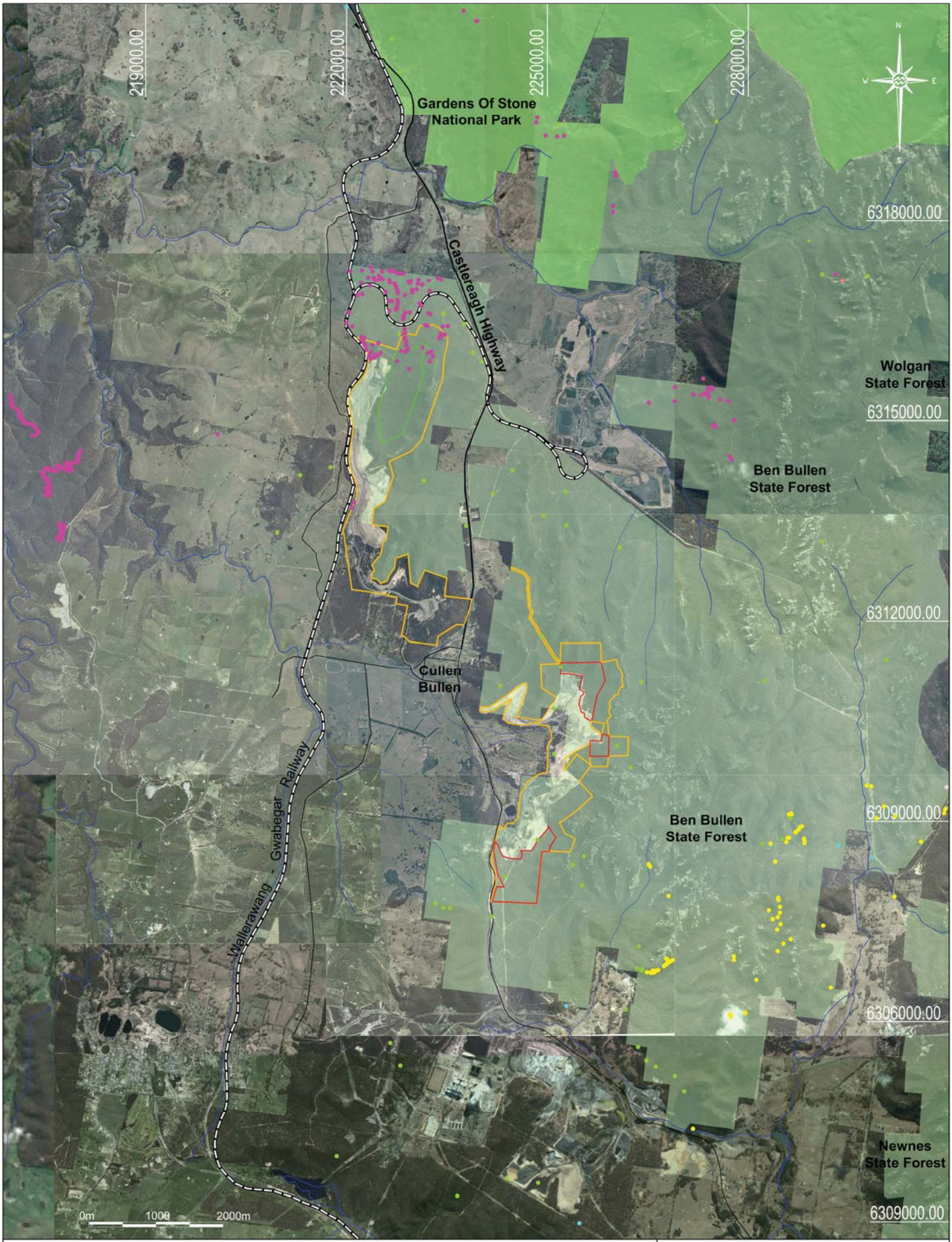
OEH also recommended that additional targeted searches for relevant threatened flora and ROTAP species are undertaken.

Response

A review of the key threatened (under the TSC Act or EPBC Act) and ROTAP species of concern as mentioned in the submissions of OEH and a number of SIGs who made submissions on the Modifications was undertaken by CE. This review was conducted to reassess any potential for significant direct or indirect impacts on these species as a result of the Modifications and considered the following:

- *Persoonia marginata* (Clandulla geebung);
- *Eucalyptus cannonii* (Eucalyptus cannonii);
- *Eucalyptus aggregata* (Black Gum);
- *Thesium australe* (Austral Toadflax);
- *Prostanthera cryptandroides subsp. crytandroides*;
- *Genoplesium superbum*;
- *Derwentia blakelyi*;
- *Leionema lamprophyllum subsp. orbiculare* (ROTAP);
- *Leucochrysum graminifolium* (ROTAP);
- *Philotheca obovalis* (ROTAP);
- *Acacia asparagoides* (ROTAP);
- *Banksia penicillata* (ROTAP);
- *Eucalyptus apiculata* (ROTAP);
- *Prostanthera hindii* (ROTAP); and
- *Pseudanthus divaricatissimus* (ROTAP).

The locations where the above species have been identified are shown on **Figure 11** and **Figure 12**. The CE review found that the Modifications will not result in significant direct or indirect impacts to the species listed in the submissions from OEH and SIGs. A specific discussion on each of these species is presented in **Appendix E**.



LEGEND

- Modification Boundaries
- Invincible Colliery Modification Disturbance Boundary
- Cullen Valley Mine Modification Disturbance Boundary
- State Forest
- National Park
- Road
- Waterway
- Rail

Threatened Flora

- *Eucalyptus cannonii*
- *Derwentia blakelyi*
- *Persoonia marginata*
- *Eucalyptus aggregata*
- *Genoplesium superbum*
- *Prostanthera cryptandroides subspecies cryandroides*

Source:Cumberland Ecology 2014

Threatened Flora Species

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 11

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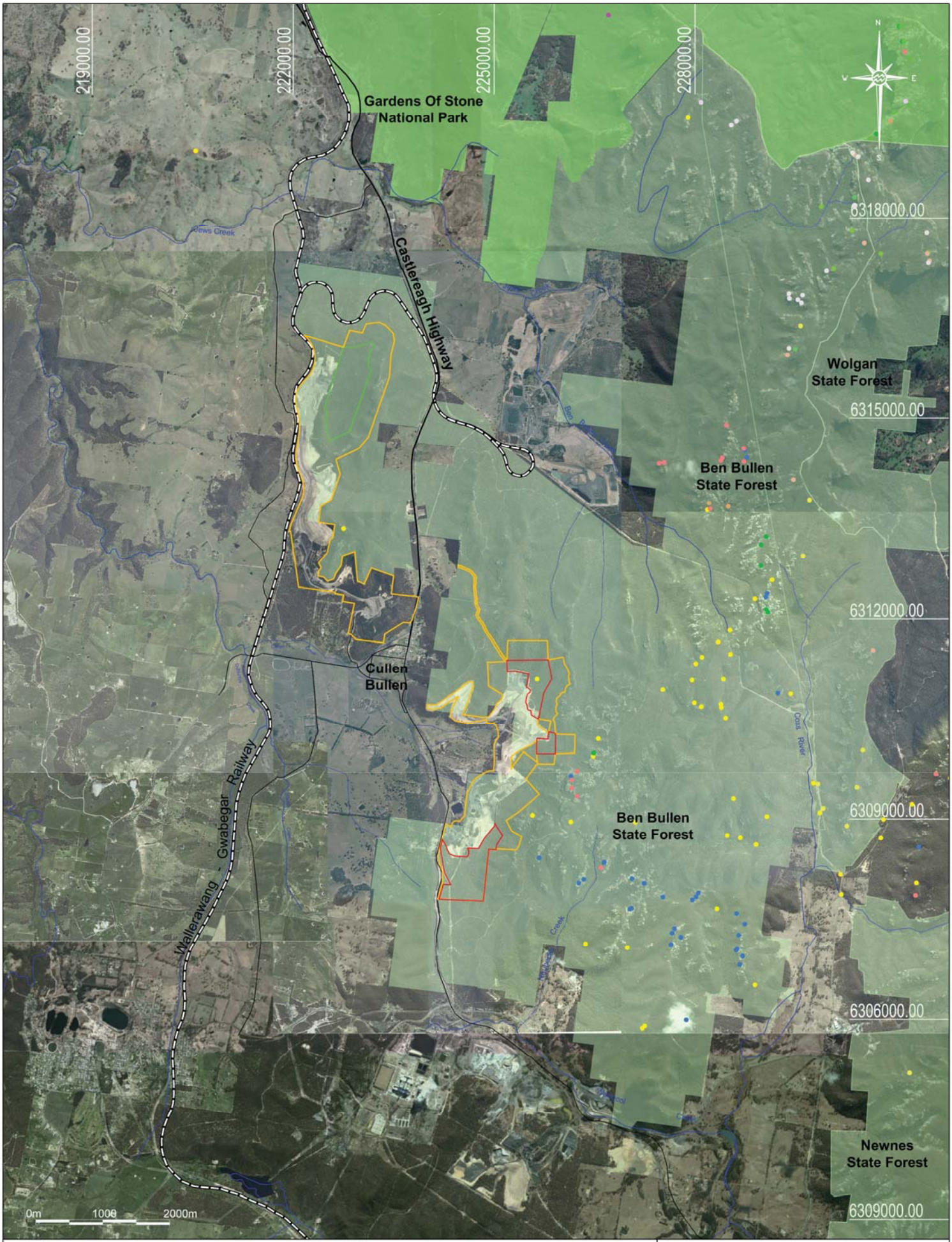

LEGEND

- Modification Boundaries
- Invincible Colliery Modification Disturbance Boundary
- Cullen Valley Mine Modification Disturbance Boundary
- State Forest
- National Park
- Road
- Waterway
- Rail

ROTAP Species

- *Acacia asparagoides*
- *Banksia penicillata*
- *Philotheca obovalis*
- *Eucalyptus apiculata*
- *Leionema lamprophyllum subspecies orbiculare*
- *Leucochrysum graminifolium*
- *Prostanthera hindii*
- *Pseudanthus divaricatissimus*

Source:Cumberland Ecology 2014

ROTAP Species

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 12

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4.2.11 Endangered Ecological Community Impacts

In their submissions, OEH and several SIGs raised concerns in relation to the vegetation mapping presented in the Modifications EA and the presence of Endangered Ecological Communities (EECs) within the Modification Boundaries. In particular, these concerns were related to the mapping of Box Gum Woodland, Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland and Montane Peatlands and Swamps.

Response

A detailed response to these issues is provided in **Appendix E** and is summarised in the sub-sections below.

Endangered Ecological Communities

Box Gum Woodland

A vegetation unit referred to as "MU 20 Capertee Rough-barked Apple - Red Gum - Yellow Box Grassy Woodland (MU 20)" is the local variant of Box Gum Woodland EEC. CE does not consider that MU 20 occurs within the Invincible Colliery Modification Boundary. The community within this area was previously mapped by CE as the Box Gum Woodland EEC, however further analysis has determined that the vegetation in this area better conforms to a variant of the dominant surrounding community, “MU 35 Tableland Gully Mountain Gum - Broad Leaved Peppermint Grassy Forest” (MU35).

A small area (approximately 0.6 ha) of MU 20 Capertee Rough-barked Apple - Red Gum - Yellow Box Grassy Woodland occurs to the north of the Cullen Valley Modification Disturbance Boundary. This community only occurs within areas proposed for highwall mining only and as such, will not be impacted by the Modifications.

Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland (Frost Hollow EEC)

This EEC was not found by CE or OEH when they remapped the vegetation of the earlier CCP (now withdrawn). It has also not been found or referred to within the additional assessment of the proposed impact area undertaken by ELA (2014).

While it is acknowledged that some of the characteristic tree species of this EEC occur within parts of the Modification Disturbance Boundaries, CE note that the presence of tree species alone do not indicate the existence of an EEC.

CE also confirms that in its local form, the Frost Hollow EEC corresponds to “Tableland Hollows Black Gum – Black Sally Grassy Open Forest (MU 15)” and “Tableland Gully Snow Gum – Ribbon Gum Grassy Forest (MU 11)”. It is likely that MU 11 and/ or MU 15 would have once occurred within the existing biodiversity offsets held for Invincible Colliery and as such any Frost Hollow EEC remnants will be conserved and protected in these areas.

Montane Peatlands and Swamps

The Montane and Peatlands Swamp EEC noted in several SIG submissions is located over 3 km to the east of the Invincible Colliery site at its closest point, however concerns were raised in relation to potential impacts of water discharges from site LDP001 to this community. It should be noted that the Long Swamp Bore discharge location LDP001 referred to in the SIG submissions was removed from Invincible Colliery EPL 1095 in November 2012. Coalpac cannot discharge water from this location into Long Swamp and therefore, will not impact on the Montane Peatlands and Swamps EEC.

In conclusion, no EEC communities exist in any of the Modification Disturbance Boundaries.

4.2.12 Indirect Impacts and Edge Effects

In their submission, OEH also raised concerns in relation to the potential edge effects of the Modifications. While it was recognised that the ecological impact assessment prepared for the Modifications EA included a discussion on edge effects, OEH commented that uncertainty remained regarding the potential for blasting vibration and subsidence impacts to pagodas and groundwater aquifers.

Response

As noted by OEH, Appendix C of the Modifications EA (Cumberland Ecology, 2014) included an assessment of biodiversity impacts of edge effects including subsidence, habitat degradation, competition for resources, noise, light, dust, erosion, vehicle strike, weeds, feral animals and overabundance. A number of management measures have been included in the proposed Modifications to minimise the impacts to biodiversity associated with edge effects, including:

- The inclusion of a buffer of at least 15m beyond the proposed open cut highwall crest to the Modification Disturbance Boundary in the mine plan designs;
- The location of the proposed open cut mining areas in the landscape. The forest and woodland vegetation to be retained is upslope of the proposed open cut mining areas, reducing the potential for erosion, weed invasion and water quality impacts from runoff;
- Implementation of erosion and sediment management and control measures in disturbance areas; and
- Continued management of weeds and feral animals on site.

In their submission, OEH also state that they consider that uncertainty remains around the highwall mining stability and blast vibration assessments undertaken by Coalpac to ensure that any potential for impacts to Escarpment areas are minimised. A detailed discussion on these assessments is provided in **Section 4.2.5** and **Section 4.2.6**.

With regard to potential for impacts to groundwater aquifers, this was considered by AGE (2014) in the groundwater impact assessment undertaken for the Modifications EA.

As noted in Section 6.10.3 of the Modifications EA, no significant depressurisation of groundwater aquifers is anticipated to occur as a result of the Modifications and as such, no impacts to Groundwater Dependent Ecosystems (GDEs) are predicted.

4.2.13 Cumulative Impacts

The submission from OEH made reference to the potential for cumulative impacts to biodiversity, habitat, the Ben Bullen State Forest and the local Reserve System as a result of other proposed developments in the region, namely the Pine Dale Stage 2 Extension Project and the Neubeck Coal Project. It was noted by OEH that the Modifications EA had not made an attempt to assess cumulative impacts as a result of the development.

Response

At the time of this response, both the proposed Pine Dale Stage 2 Extension Project (Pine Dale Project) and proposed Neubeck Coal Project (Neubeck Project) had received Director-General's Requirements from DP&I for their environmental assessments on 10 February 2012 and 6 November 2012, respectively. Environmental impact assessment documentation had not been released to the public for either proposal. The most recent publically available documentation for each proposal includes:

- '*Documentation Supporting and Application for Director-Generals Requirements for the Pine Dale Coal Mine Stage 2 Extension – amended December 2011*' (R.W. Corkery, 2011); and
- '*The Neubeck Coal Project Briefing Paper – September 2012'* (Centennial Coal, 2012).

Both the documents above provide a summary of predicted ecological impacts, however the limited nature of this information makes a definitive assessment of cumulative ecological impacts problematic. However, the large distance between the Modifications to the impact areas proposed for the Pine Dale Project and the Neubeck Project (a minimum of 2 km) and the extensive areas of undisturbed forest and woodland in the BBSF and surrounding Conservation Reserves that will remain undisturbed would reduce any potential for cumulative impacts to negligible levels.

The continued progressive rehabilitation of land within the Modification Disturbance Boundaries and the creation of a stable free-draining landform for the Modifications would also reduce any potential for cumulative ecological, water and visual impacts with other mining developments in the region.

This process of continued progressive rehabilitation minimises the total amount of land disturbed at any one time and allows for the development of a forest and woodland landscape that is consistent with surrounding areas in the BBSF.

4.2.14 Conservation Mechanism for Biodiversity Offsets

In their submission, OEH confirmed that the biodiversity offset properties proposed for the Modifications are not suitable for addition to the National Parks and Conservation Reserves System. It was noted that another mechanism to secure these areas for conservation in the long-term was required.

Response

As discussed above in **Section 4.2.2**, the independent ELA Assessment (2014) has confirmed that the revised BOP is adequate to compensate for the residual ecological impacts of the Modifications. The offsets required for the Modifications will be set aside for conservation in perpetuity using an appropriate mechanism, such as a Voluntary Conservation Agreement, BioBanking or a Planning Agreement. The mechanism to be employed will be agreed in consultation with DP&I.

4.3 ROADS & MARITIME SERVICES

4.3.1 Transportation of product coal by road

Given the request to continue to haul up to a total of 2.2 Mtpa by road from both sites, in their submission RMS recommended that consideration be given to a requirement for a code of conduct for transport of materials as per Clause 16 of the State Environmental Planning Policy (Mining, Petroleum production and extractive industry) 2007.

Response

Coalpac has a Transport Management Plan for the currently approved operations at Invincible Colliery and Cullen Valley Mine that includes a code of conduct for hauling coal on public roads. This plan will be reviewed in consultation with RMS prior to the recommencement of haulage, should the Modifications be approved.

4.3.2 Water Pipeline Installation

In their submission, RMS noted that the draft Environmental Assessment refers to a water pipeline connecting Invincible Colliery and Cullen Valley, but that no details are provided for crossing of the Castlereagh Highway. In their submission RMS note that their concurrence is required for a pipeline crossing and that such requirements can be provided to Coalpac upon request. RMS would also require details of the crossing location for assessment.

Response

The Modifications will require the installation of a pipeline from Invincible Colliery to the Pine Lodge property owned by Coalpac (located on the eastern side of the Castlereagh Highway). An existing pipeline is already in place under the Castlereagh Highway from Cullen Valley Mine to the Pine Lodge property which will be utilised for the proposed transfer of water between the two mine sites. No further assessment by RMS should therefore be required.

4.3.3 Invincible Colliery Site Access Intersection

In their submission, RMS notes the previous Coalpac Environmental Assessment (for the CCP application, now withdrawn) *acknowledged existing concerns with overtaking manoeuvres in proximity to the existing Invincible Highway access. It is requested that the applicant assess the intersection in conjunction with Roads and Maritime to determine appropriate treatment to address these concerns.*

Response

Coalpac will assist with the assessment of the intersection in conjunction with RMS to determine the appropriate treatment to address these concerns. During consultation with RMS in April 2014 it was agreed that the road markings should revert back to those in place prior to them being changed for the Centennial Coal Ivanhoe North Project located opposite the front entrance to Invincible Colliery off the Castlereagh Highway. The markings were changed at the commencement of the Ivanhoe North Project to accommodate traffic movements related to its mining activities. The Ivanhoe North Project is now complete. Reverting to the original road markings that were in place prior to the commencement of the Ivanhoe North Project would address the concerns raised. As noted above, Coalpac will consult with RMS to ensure any potential safety matters are addressed for all road users.

4.3.4 Management of Works

In their submission, RMS also required that all arrangements for the control of traffic on a state road be in accordance with the 'Roads and Maritime publication Traffic Control at Work Sites'. It was also noted that a Road Occupancy Licence is required prior to any works commencing within 3m of the travel lanes of the Castlereagh Highway. This can be obtained by contacting Traffic Operations…

Submission of a traffic control plan is required as part of this licence.

Response

Coalpac will consult with RMS Traffic Operations over this requirement.

4.4 DEPARTMENT OF PRIMARY INDUSTRIES - OFFICE OF AGRICULTURAL SUSTAINABILITY & FOOD SECURITY (OASFS)

4.4.1 Visual Impacts

The submission from OASFS notes the high level of visual impacts predicted to result from the Modifications for some rural residences in the vicinity of the Modifications and for road users on the Castlereagh Highway. OASFS recommend that consultation is undertaken with the agricultural community to ensure that the visual impact mitigation treatments described in the Modifications EA are implemented and are reducing visual impacts within an acceptable timeframe.

Response

Coalpac accepts the recommendation of OASFS. Consultation will continue to be undertaken with any surrounding landholders that are predicted to experience high visual impacts associated with the Modifications to ensure that the these impacts are being mitigated in an acceptable timeframe.

4.5 NSW OFFICE OF WATER (NOW)

4.5.1 Groundwater Modelling Parameters

In their submission, NOW note that uncertainty exists as to the dewatering requirement and overall groundwater take for the project, in particular they consider that there is a significant discrepancy between the surface water and groundwater reports. NOW sought further discussion with Coalpac with the aim of confirming these requirements during the public exhibition stage [of the Modifications EA].

Response

A response to each of the issues raised by NOW is provided below in **Section 4.5.2** to **Section 4.5.12**.

4.5.2 Consultation

As requested by NOW, Coalpac arranged two meetings on 3 April and 30 April 2014, to discuss water related matters and provide further clarification on potential groundwater and surface water impacts associated with the Modifications. To assist in this process, Hansen Bailey engaged specialist independent consultants Australasian Groundwater and Environmental Consultants (AGE) and WRM Water and Environment (WRM) to prepare supplementary reports to specifically address the matters raised by NOW in their review of the Modifications EA.

A copy of the supplementary reports to the Environmental Assessment for groundwater and surface water are attached in **Appendix F** and **Appendix G**, respectively. Relevant details from these supplementary reports are included in the responses below.

4.5.3 Water Balance

The approved water management systems at Invincible Colliery and Cullen Valley Mine comprise a number of water management structures including sedimentation ponds, interconnected dams, pipelines, pumps, diversion channels and the abandoned underground mine workings. The approved water management system and associated infrastructure assists Coalpac in controlling water at each site to ensure that any potential adverse impacts are avoided and regulatory compliance is maintained.

The proposed water balance and flow diagram for Invincible Colliery and Cullen Valley Mine is shown schematically in **Figure 13** and has been developed based on the groundwater and surface water assessments undertaken for the proposed Modifications. A general summary of the catchment areas and water classification is provided in **Table 3**.

Table 3
Catchment Areas and General Water Classification

Ref	Water Type	Catchment Description	Water Classification
A	Surface Water	Undisturbed downstream catchment	Clean Water
B	Groundwater	Undisturbed downstream groundwater source	Clean Water
C	Surface Water	Disturbed catchment, approved open cut mining area	Dirty Water
D	Groundwater	Surface water flows from 'C' directed to underground mine workings.	Dirty Water & Contaminated Water
E	Surface Water	Undisturbed upstream catchment	Clean Water
F	Surface Water	Disturbed upstream catchment (subsidence affected)	Clean Water
G	Groundwater	Disturbed groundwater source, underground mine workings	Dirty Water & Contaminated Water

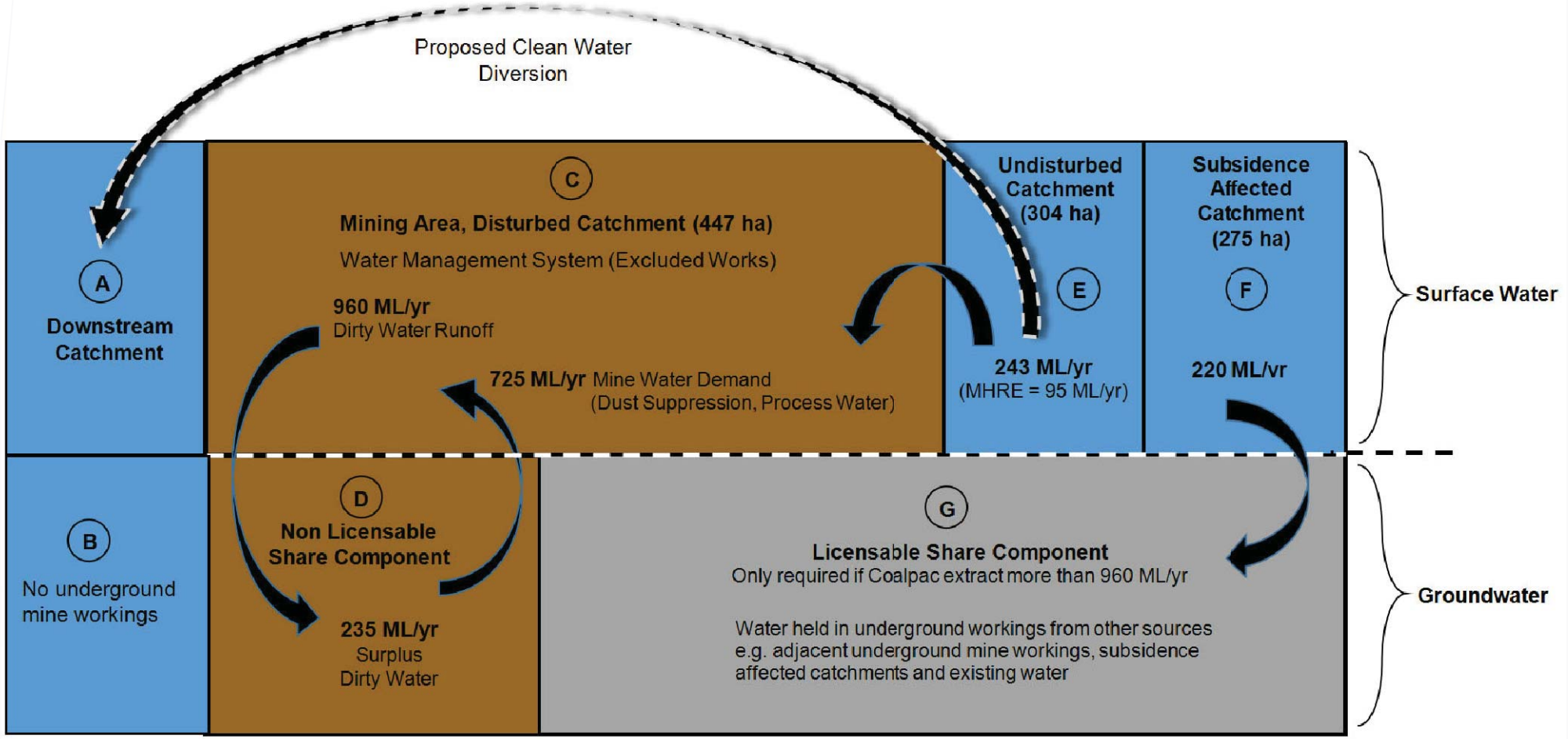
4.5.4 Surface Water Take

It has been estimated that 960 ML/yr of dirty water will be directed to the abandoned underground workings from the existing and proposed disturbance areas at Cullen Valley Mine and Invincible Colliery. This exceeds the 725 ML/yr site water demand requirements. The dirty water estimate was based on the inclusion of mine disturbance and infrastructure areas and relevant rehabilitated areas using recommended runoff coefficients and average annual rainfall (**Appendix G**).

A surplus of 235 ML/yr of 'dirty water runoff' will be stored in the proposed mine water management system and underground workings (see **Figure 13**).

NOW have confirmed that 'dirty water' captured in the water management system from mining activities is exempt from licencing under the *Water Management Act 2000*. As such, Coalpac has access to sufficient water held in its water management system (including the underground workings) to meet its operational water demands (see **Figure 13**). The proposed water pipeline between Invincible Colliery and Cullen Valley Mine will provide the required flexibility to transfer any surplus water between the mining operations.

As demonstrated by the water balance model undertaken for the Modifications EA, the holding capacity of the approved water management system for the proposed Modifications confirms that Coalpac will not need to discharge water on average rainfall predictions to the downstream river system (see **Figure 13**).



LEGEND

- Clean Water
- Dirty Water
- Coal Contract Water

Cullen Valley Mine
Water Balance & Flow Schematic

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 13

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There may be occasions during high rainfall and flood events that some water may be released from licensed discharge points under the conditions of Coalpac's current EPLs, however past experience shows that these volumes are generally small. For example, in 2012 controlled discharges were in the order of 2.2 ML from Invincible Colliery and 1 ML from Cullen Valley Mine. There was no water discharged from Invincible Colliery or Cullen Valley Mine in 2013.

4.5.5 Harvestable Rights

In their submission, NOW also requested further information to confirm the current and predicted surface water take requirements based on water sources and sites. The applicability of Harvestable Rights was also requested for the site, including any exclusions that may apply under the Water Management (General) Regulation 2011.

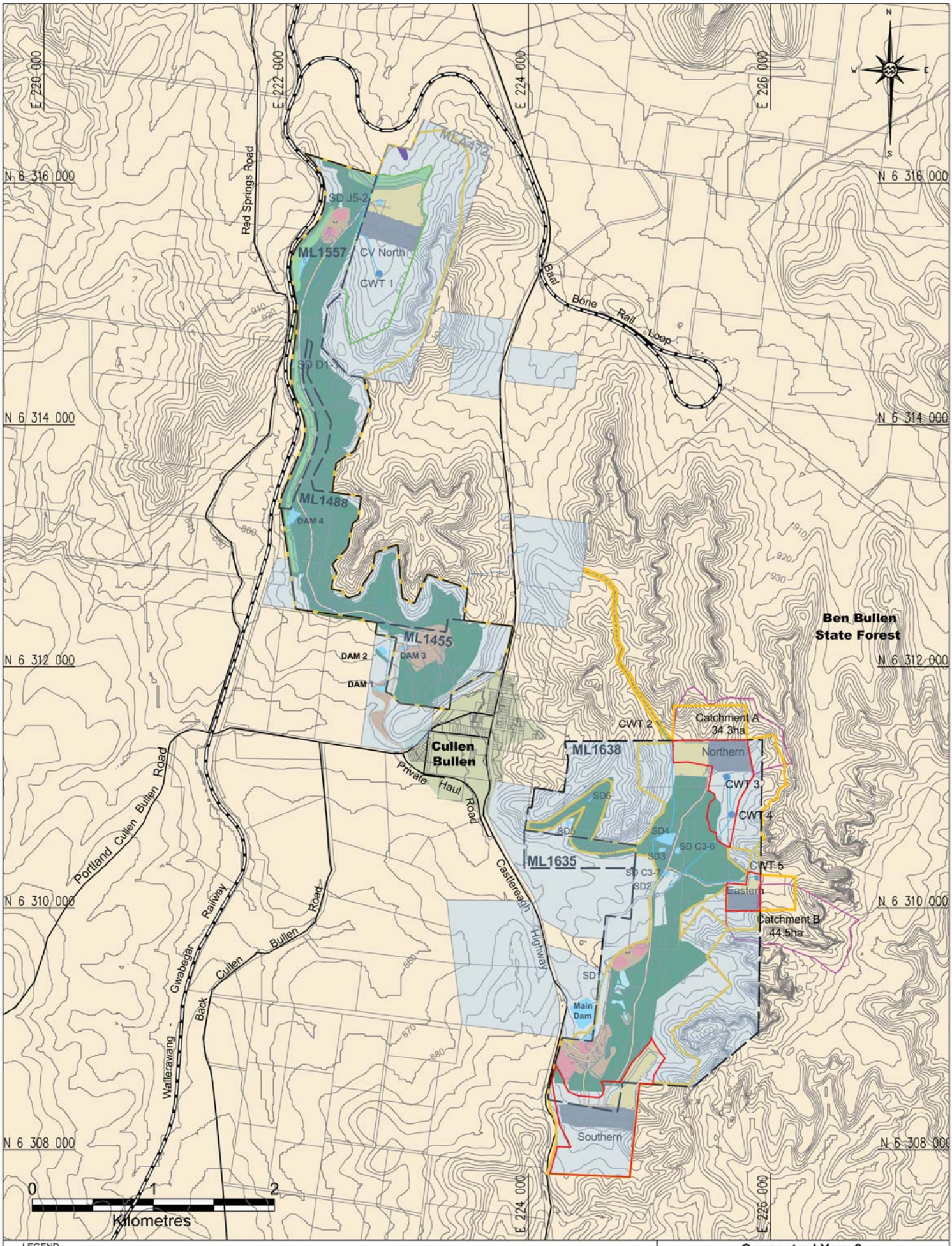
In their submission, NOW also requested that Coalpac provide details of any surface water entitlements required to account for water taken from the Turon Crudine River Water Source of the Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012. It was recommended that Coalpac also demonstrate an ability to source this entitlement, where required.

Response

Coalpac's harvestable rights from its land holdings have been estimated to be 95 ML/yr. The harvestable right was calculated based on the land area of Coalpac landholdings and relevant surface mining authorities held by the company in the vicinity of Invincible Colliery and Cullen Valley Mine (see **Figure 14**).

The volume of clean water runoff from undisturbed catchment areas captured by the mine water management system is estimated to be 243 ML/yr based on an average rainfall year as shown on **Figure 14**. In the absence of appropriate management and mitigation measures, Coalpac would require Water Access Licences for the take of approximately 148 ML/yr (243 ML/yr – 95 ML/yr) of surface water from undisturbed catchment areas under the *Macquarie Bogan Unregulated and Alluvial Water Sources Water Sharing Plan* (see **Figure 15** and **Appendix G**).

However, a number of controls have been identified to manage and mitigate the 148 ML/yr. 85ML/yr of clean water from undisturbed catchments will be diverted around existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine. In catchment areas where diversion is impractical, the remaining 63 ML/yr from these catchments will be diverted and managed within the mine water management system (further explanation is provided in the paragraph below). The indicative locations of proposed diversion channels and pipes are shown on **Figure 14**.



LEGEND

- Modification Boundaries
- Invincible Colliery Modification Disturbance Boundary
- Cullen Valley Mine Modification Disturbance Boundary
- Roads
- Indicative Haul Road
- Water Pipeline
- Rail
- Infrastructure Area
- Tailings Drying Area
- Rehabilitation
- Noise Bunds
- Water Storage
- Coal Stockpile
- Box Gum Woodland
- Active Mining
- Overburden Emplacement
- Residential Area
- Clean Water Transfer Infrastructure
- Catchment
- Coalpac Authorities With Surface Rights
- Harvestable Rights Land Area

Conceptual Year 2 Clean Water Diversions

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 14

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D.E	10/06/14	23.4.6.11.14	A	MGA Zone 56

It is recognised that the proposed clean water diversion infrastructure would not be practical for two catchment areas at Invincible Colliery due to the steep grade of the local topography. These areas are shown as Catchment A (34.3 ha) and Catchment B (44.5 ha) on **Figure 14**. In Year 2 these catchments will be intercepted by open cut mining, and based on an average rainfall year, an estimated 63 ML/yr (0.8 ML/ha), in an average rainfall year, of clean water from the 79 ha of combined undisturbed catchment area is anticipated to be captured in the mine water management system proposed for the Modifications (see **Figure 15**). The mine water management system has sufficient capacity to adopt this mitigation strategy in an above average rainfall year.

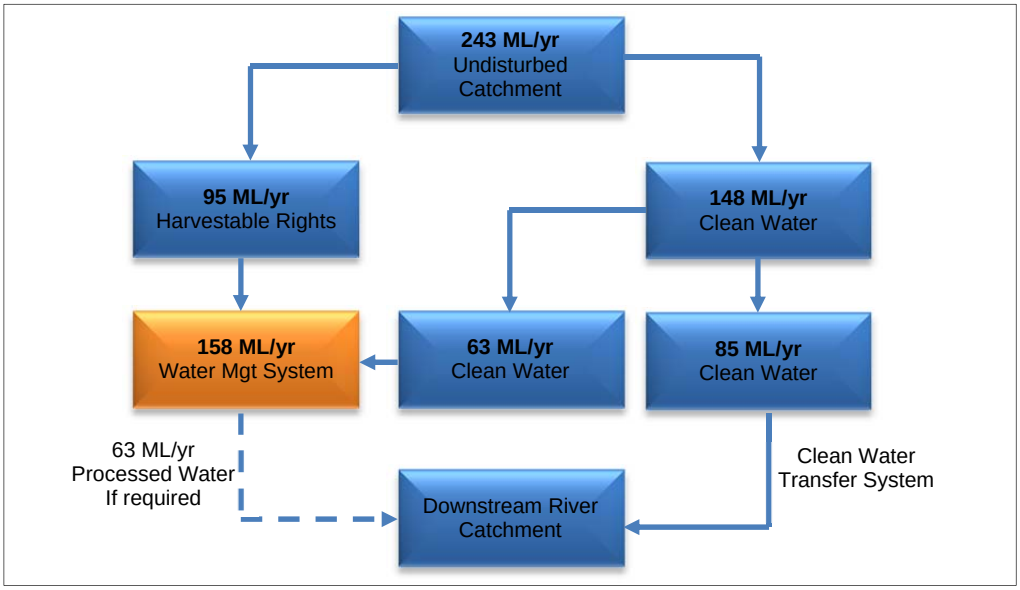


Figure 15
Clean water flows from undisturbed catchment areas
*Note: Volumes in **Figure 15** are based on an average rainfall year*

It should also be noted that this is a maximum catchment area and a temporary situation that is minimised once mining passes these catchment areas, as water would then be returned to the downstream river system following final rehabilitation of the proposed Modification Disturbance Boundaries to a free draining landform.

Coalpac has a number of management options available to minimise and offset the capture of this 63 ML/yr clean water from surrounding catchment areas; including but not limited to:

- Progressive rehabilitation of mining areas. Rehabilitation will be undertaken in each year of the Modifications to progressively create a free draining landform to return clean water to the downstream river system;
- Completion of the mining and rehabilitation of the Eastern Pit void at Invincible Colliery early in the term of the proposed Modification. This will reduce the clean water take from Catchment area B (35.6 ML/yr) in the later years of mining; and

- Releasing up to 63 ML/yr of make up water from licensed discharge points at Invincible Colliery and/or Cullen Valley Mine to compensate for the capture of upstream water, if required. Make up water would be sourced from the mine water management system which could easily provide for this volume. Any release of water would be in accordance with EPL1095, EPL10341 and other relevant water quality regulation criteria.

The above management options demonstrate the flexibility and options available to Coalpac to compensate the take of clean water from upstream catchment areas. As such, Coalpac will not require any additional Water Access Licences under the *Macquarie Bogan Unregulated and Alluvial Water Sources Water Sharing Plan* for the Modifications. Based on the above mitigation measures, Coalpac will not take any additional clean water that would potentially impact downstream water users outside of the 95 ML permitted under its Harvestable Rights.

4.5.6 Groundwater Take

As reported in the Modifications EA, the 125 ML take of sub-surface water (i.e. water held in abandoned underground workings) from the northern portion of the Invincible Colliery Modification Boundary is the estimated maximum volume required to be extracted over a two year period from commencement of mining as proposed for the Modifications. This equates to a volume of approximately 62.5 ML per year (i.e. 50%) on average. Coalpac holds sufficient water access licences under the *NSW Murray Darling Basin Porous Rock Groundwater Sources Water Sharing Plan* (WSP), including a share component of 106 ML/yr which will cover this annual volume of water take, if required.

In the event that neighbouring underground mining operations cease extraction of sub-surface water from their underground workings, water could potentially back up and flow into the northern portion of the Invincible Colliery Modification Boundary. WRM considered this in their assessment as part of the Modifications EA and determined that under a worst case scenario the maximum volume of water would be approximately 1,382 ML (see Appendix D of the Modifications EA).

In the unlikely event that this worst case scenario develops, there would be a number of potential management and mitigation measures available to Coalpac to account for this water take, including:

- Seeking a temporary transfer or acquisition of a suitable water licence from adjacent mining operations, assuming they do not need their allocation for this water at the time;
- Coordinating the continued release of this water by adjacent mining operations to ensure sub-surface water in the underground workings does not back up and impact on Invincible Colliery;

- Releasing this water to the downstream catchment in accordance with licences and other relevant water quality criteria, therefore not holding the water in the Invincible Colliery water management system; and
- Not mining down to the Lithgow Seam in the northern portion of the Modification Disturbance Boundary due to the flooding in the underground workings. As such, Coalpac would not intercept or take this water source.

The above management options demonstrate the flexibility and various options available to Coalpac in the unlikely event that this worst case scenario was to develop.

Based on the above review and the operational flexibilities available to control water in the Invincible Colliery water management system, it is unlikely that Coalpac would require any further water access licences to account for the take of any additional water resources as a result of the Modifications.

4.5.7 Water Licensing

In their submission, NOW requested that references to Water Access Licenses be updated.

Response

Coalpac received the Water Access License numbers for the Washery Bore and Long Swamp Bore in April 2014. An updated copy of the licenses currently held by Coalpac is provided in **Table 4**.

Table 4
Groundwater Licences

WM Act Licence Number	Bore Name	Share Component (ML)	Water Source	Water Sharing Plan
WAL27898	Tillies Bore	80	Sydney Basin Murray Darling Basin Groundwater Source	NSW Murray-Darling Porous Rock Groundwater Sources
WAL35978	Washery Bore	26		
WAL36458	Long Swamp	120	Sydney Basin Coxs River Groundwater Source	Greater Metropolitan Region Groundwater Sources

4.5.8 Groundwater Model

In their submission, NOW concurred that a numerical groundwater flow model may not be warranted due to the relatively small groundwater drawdowns predicted. Despite this, confirmation of the dewatering predictions and associated impact using a tool such as SEEP-W was requested to demonstrate the robustness of the predictions.

Further detail was also requested regarding the source of the key parameters of the groundwater model undertaken for the Modifications. In particular, the regional permeability values used in the modelling are requested, along with information as to how the values were derived (e.g. pump testing or laboratory triaxial testing).

Response

Further clarification of seepage rates, regional permeability values and the application of Darcy's Law are discussed in detail in Section 2.3 of the Supplementary Groundwater Report in **Appendix F**.

NOW indicated in the meetings held in April 2014 (see **Section 4.5.2**) that the additional explanation and information presented by Coalpac was sufficient to provide confidence that the methodology used to assess potential groundwater impacts for the Modifications was appropriate.

4.5.9 Impacts to Box-Gum Woodland from Groundwater Drawdown

Clarification was requested by NOW in their submission as to whether the predicted groundwater draw-downs from the proposed mine extensions could affect any local Box-Gum Woodland communities and proposed steps to avoid/mitigate these impacts (if present).

Response

The majority of the known Box Gum Woodland communities are located to the east of Cullen Valley Mine, outside of the Mining Lease Application area for the proposed Modifications. There is a small pocket of Box-Gum woodland located to the north of the proposed open cut mining areas at Cullen Valley Mine within the Modification Boundary. There are no further occurrences of this vegetation community within the Modification Disturbance Boundary at Invincible Colliery, see **Figure 14**.

There are no saturated aquifers known to occur above the Lithgow Seam. The phreatic groundwater surface has been demonstrated by exploration drilling and the existing monitoring network to occur between 20 to 50m below the locations where Box Gum Woodland occurs (i.e. below their root zone), and the proposed Modifications will not have a significant impact on saturated aquifers which occur below the Lithgow Seam. As such, there is no adverse impact anticipated to occur on the ecologically endangered Box Gum Woodland or other vegetation community as a result of groundwater drawdown from the proposed Modifications.

This is discussed in more detail in Section 2.2 in Appendix E of the Modifications EA and **Section 4.2.12** of this RTS.

4.5.10 Impacts to Registered Bores

Further information was requested by NOW in their submission as to the status of registered bores, and any unregistered bores (if known), within the area (particularly on private land) that could be potentially impacted (including their accessibility for monitoring purposes).

Response

The groundwater impact assessment (AGE, 2014) has demonstrated that the proposed Modifications will have no impact on any existing neighbouring bores. There is a small volume of groundwater (3.2 ML/yr) predicted to be intercepted during mining of the coalesced Lidsdale/Lithgow Seam at the Cullen Valley Mine.

There are no privately registered bores located within the predicted zone of aquifer depressurisation surrounding the Cullen Valley Mine Modification Boundary.

The water bearing zones of the known registered bores are located significantly deeper than the level of the coalesced Lidsdale/Lithgow Seam. Therefore, water levels within the registered bores are not predicted to be impacted by the open cut or highwall mining areas proposed for the Cullen Valley Mine Modification.

The operations proposed for Invincible Colliery will not create a zone of depressurisation as saturated aquifers are located below the Lithgow Seam. Further details on this matter are provided in the supplementary groundwater report (see **Appendix F**).

4.5.11 Groundwater Quality Monitoring

In their submission, NOW noted that annual groundwater quality monitoring is not considered sufficient to establish baseline characterisation and that it was not clear from the Groundwater Impact Study (Appendix E (of the Modification EA)*) what number of annual samples had been collected to date.*

Response

Detailed groundwater sampling has been undertaken over a three year period. During this time, five groundwater quality test events have been undertaken from the groundwater monitoring network surrounding Invincible Colliery and Cullen Valley Mine. Coalpac will continue to undertake further groundwater quality monitoring events during 2014 to ensure a robust background chemistry dataset is available.

The sampling methodology, quality control procedures, storage, transport, submission and analytical laboratory analysis will continue to comply with industry best practice and relevant guidelines and standards. Sampling and analysis are undertaken by independent qualified consultants. Further discussion regarding the groundwater quality assessment and monitoring requirements of NOW is provided in Section 2.4 of **Appendix F**.

Coalpac will continue to consult with NOW to ensure an appropriate water quality dataset is established for the purpose of assessing potential impacts from the Modifications.

4.5.12 Groundwater Model Validation

The submission from NOW also recommended that Coalpac undertake regular groundwater model validation as part of the Groundwater Monitoring Plan.

Response

Groundwater monitoring data is reviewed on an annual basis by an independent, suitably qualified groundwater consultant to ensure any potential adverse impacts and trends can be identified and appropriate management and mitigation measures implemented. Coalpac will increase the scope of this annual review to include a component that considers validation of the groundwater model. Recent mining activities, observations and actual groundwater monitoring data suggest that the model adequately represents the water balance and flow at Invincible Colliery and Cullen Valley Mine. Independent review of the groundwater model on an annual basis against recorded data will provide further confidence in the model and its key findings.

Once the Modifications are approved, Coalpac will review and update the existing Water Management Plans for Invincible Colliery and Cullen Valley Mine. The updated documents will address the water monitoring and management issues identified throughout the EA process for the proposed Modifications. Appropriate trigger action response plans will be incorporated into these plans utilising the groundwater quality chemistry dataset. The management plans will be prepared in consultation with NOW and other relevant stakeholders as required by DP&I.

4.6 NSW DEPARTMENT OF TRADE & INVESTMENT - RESOURCES & ENERGY

4.6.1 Coal Resource Utilisation and Quality

In their submissions, DRE provide their support for the Modifications, confirming that in their view, the proposals represent "…a responsible utilisation of the State's strategic coal resources." DRE also consider the Modifications to be significant in the associated economic benefits they will bring to the region and most significantly, in the maintenance of secure and affordable electricity supply for NSW.

The ideal suitability of the coal resource proposed to be accessed for the Modifications in terms of coal quality, proximity to MPPS, efficiency of coal production and supply and the existing infrastructure available on site is also noted by DRE in their support for the economic significance of the Project to the local area and to NSW more generally.

Response

Coalpac notes DRE's support for the Modifications and the significant positive impacts to the NSW electricity supply that would result from the recommencement of Invincible Colliery and Cullen Valley Mine operations.

4.6.2 Economic Significance of the Modifications

In their submission, DRE also state that there are a number of strategic consequences to NSW if the Modifications do not proceed, including the future state energy security and the operations of MPPS and Wallerawang Power Station. The dependency of other local industries on Coalpac's operations and the positive economic impacts that would result the recommencement of operations at Invincible Colliery and Cullen Valley Mine are also cited by DRE in their support for the Modifications.

Response

Coalpac notes DRE's support for the economic significance of the Modifications. It is also noted that while comments made by DP&I (DP&I Assessment Report 2013) and the CCP PAC (PAC, 2013) identified remaining coal reserves available in the region to supply the power stations, they did not acknowledge that the amount of coal reserves accessible under a planning approval was a much smaller number, and is currently estimated at only 9 million tonnes (Golder Associates, 2014a, 2014b).

This is less than 18 months of supply based on the consumption rates identified by DP&I. DRE have rightly identified an imperative for NSW energy security, and identifying the subsequent economic significance in supporting the Modifications. This is discussed further in **Section 5.3.11**.

It is also noted that Part 12AA of *State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* applies to the Modification Applications. This requires that the consent authority for the determination of the Modifications considers the significance of the coal resource having regard to its economic benefits and any advice provided by DRE.

4.6.3 Subsidence Management Plan

In their submission, DRE note that the use of highwall mining proposed for the Modifications is technically an underground mining method and will therefore require a Subsidence Management Plan to be prepared in the event that Project Approval is granted.

Response

As outlined in Section 6.7.4 of the Modifications EA, Coalpac has committed to a range of mitigation and management measures to minimise the potential for any surface subsidence associated with the Modifications. This will include the preparation of a detailed Extraction Plan (formerly known as a Subsidence Management Plan) for the Modifications, to be prepared in consultation with DRE. This plan will contain information to address the requirement for specific design reports or an extraction plan giving scheduling for each area prior to mining and geotechnical assessment of the highwall stability of the overlying strata.

This information will be supplied for DRE approval before highwall mining operations commence in each area.

4.7 LITHGOW CITY COUNCIL

4.7.1 Proximity to Cullen Bullen

In their submission LCC reiterated its position that mining should not take place within 500 m of the town or the Cullen Bullen General Cemetery.

Response

Coalpac commits that mining operations for the Modifications will not occur within 500 m of Cullen Bullen township or the Cullen Bullen General Cemetery. As noted in Section 6.5.4 of the Modification EA, the closest receivers in Cullen Bullen township are over 1.1 km from the proposed open cut mining operations. The Cullen Bullen General Cemetery is over 1.5 km from the closest open cut mining operations proposed for the Modifications.

4.7.2 Voluntary Planning Agreement

In their submission, LCC stated their intention to approach Coalpac regarding a potential Voluntary Planning Agreement (VPA) that could be entered into should the Modifications be approved.

Response

Coalpac agreed and signed a VPA with LCC for the now withdrawn CPP in November 2012. Coalpac are currently finalising discussions with LCC over a VPA for the Modifications on similar terms.

4.7.3 Air Quality Impacts (bund construction)

In their submission, LCC note the potential increase in dust impacts due to the construction of the bunds proposed to mitigate visual and noise impacts).

Response

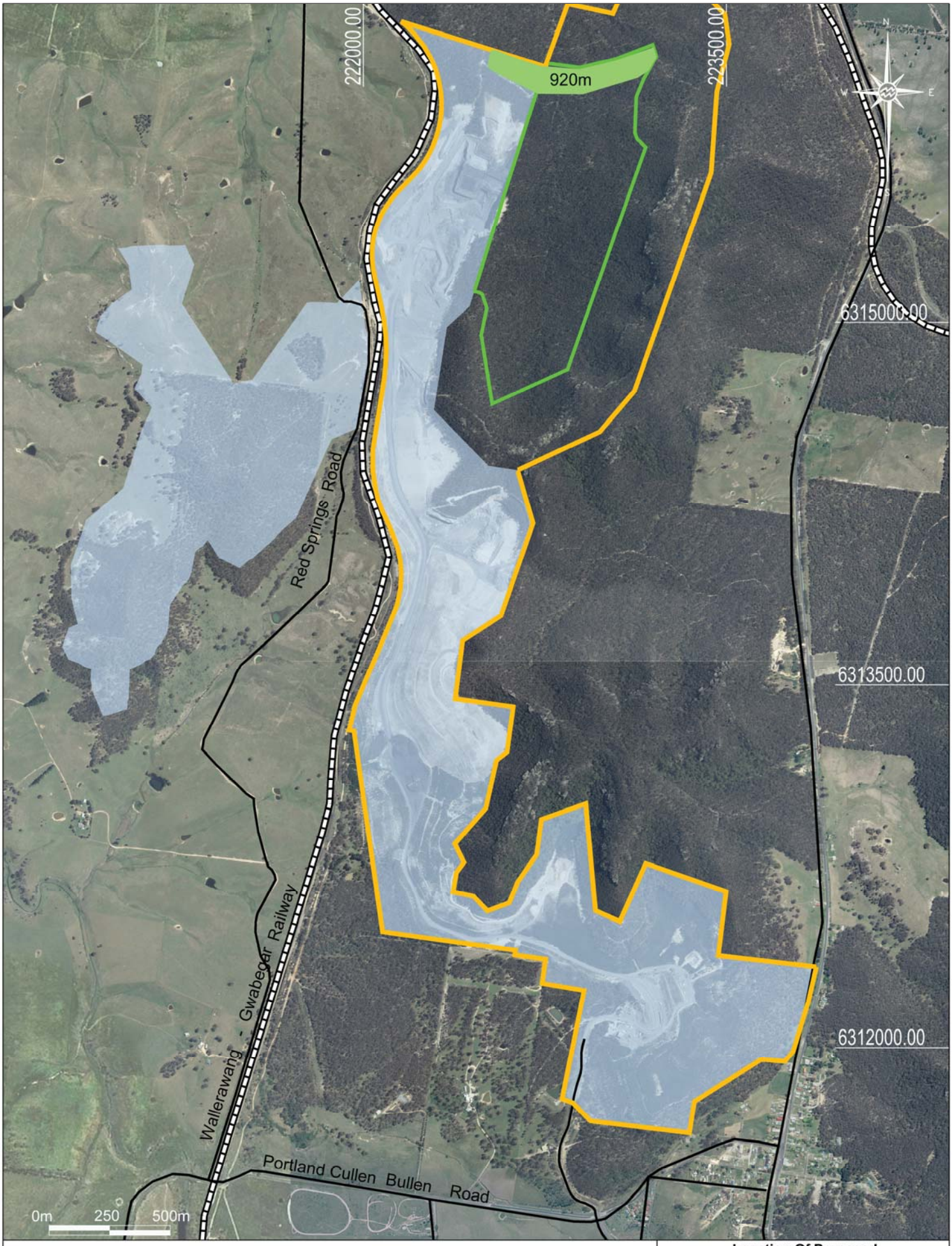
To minimise any additional air quality impacts that may occur during construction of the mitigation bund (see **Section 4.7.4**), Coalpac will implement the management and mitigation measures outlined in Section 6.1.4 of the Modifications EA. This will include minimising the total area disturbed at any given time, watering of haul roads and modifying construction activities during unfavourable weather conditions, as required. The existing air quality monitoring programs at Invincible Colliery and Cullen Valley Mine will also be maintained to confirm that emissions from site operations remain within the relevant regulatory criteria.

4.7.4 Bund Implementation and Design

The submission from LCC on the Modifications sought additional information on the design, construction and management of the bund walls proposed for the Modifications.

Response

The location of the bund proposed to be established for the Modifications is shown on Figure 5 of the Modification EA and is highlighted below in **Figure 16**.



LEGEND

- Modification Boundary
- Cullen Valley Mine Modification Disturbance Boundary
- Cullen Valley Mine Approved Disturbance
- Road
- Rail
- Proposed Noise Mitigation Bund

Location Of Proposed Noise Mitigation Bund

Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine

Figure: 16

Drawn By:	Date:	Drawing No.:	Revision:	
D.E	10/06/14	23.4.6.11-16	A	MGA Zone 56

The primary need for this bund is to minimise noise and visual impacts of the Modifications on surrounding landholders.

The bund is proposed at the northern end of the open cut mining area for the Cullen Valley Mine, and is planned to be constructed to approximately 920 mRL in height and 75 m in width at its base. This bund will be constructed following commencement of the additional open cut mining area proposed for Cullen Valley Mine. A photomontage showing the conceptual layout and rehabilitation of this bund is shown on Figure 20 of the Modification EA.

The surface of the bund will be rehabilitated with a temporary grass cover prior to the area being reshaped and incorporated into the final landform proposed for the Modifications.

The landform and rehabilitation development of the mitigation bund will be included in the process of rehabilitation reviews that will be continued by Coalpac for the Modifications (see **Section 5.2.5**).

Coalpac will consult with LCC on the design and predicted visual impacts of the bund, as requested in their submission prior to the commencement of the works.

4.7.5 Subsurface Heating

In their submission, LCC acknowledged the Subsurface Heating Management Plan in place for Cullen Valley Mine and that the monitoring and mitigation measures in the document would continue to be implemented for the Modifications. LCC also requested that the plan be updated to include a response procedure for any event that the old underground workings were intercepted elsewhere on site.

Response

Coalpac will review (in consultation with DRE) the Subsurface Heating Management Plan and Plan of Works (PoW) for Cullen Valley Mine should the Modification be approved, and update the document as required to include a response procedure where old underground workings are intercepted in the future.

It should be noted that the proposed open cut and highwall mining activities at Cullen Valley Mine are located over 900m from the limit of old underground workings marked on official abandonment records, and as such no underground workings will be intercepted by any form of mining during the Modifications.

4.7.6 Weed Control

In their submission, LCC noted that weed control needs to be ongoing and that a new management plan should be adopted for each site that clearly defines target areas and ongoing active controls.

Response

Coalpac undertakes weed management programs on an annual basis. Typically these programs are undertaken between November and February when plants are in their most active growth phase.

Targeted weed species, which regularly occur on Coalpac owned and managed lands, include Blackberry, St Johns Wart and Sifton Bush. Licensed contractors undertake spaying on an annual basis as required. Coalpac will update the relevant weed management plans, as required, to address the control of noxious weeds as recommended by LCC.

4.7.7 Hours of Truck Haulage

In their submission, LCC noted that the noise of trucks using the haul road outside designated times should be addressed, which may be through the wording of a condition of consent that the haul road cannot be used outside of operating hours.

Response

Under the current planning approval (DA 200-5-2003) mining operations at Cullen Valley Mine are permitted 24 hours a day, 7 days a week within prescribed noise impact limits, this includes the use of internal haul roads. Coalpac engages independent noise consultants to monitor its activities, including coal haulage, on a quarterly basis. Additional noise monitoring is also undertaken as required.

The current planning approval limits the '…*coal haulage from the development' to 'between 7.00 am and 5.30 pm Monday to Friday…*' All other approved activities are permitted outside of these hours. These activities have not contributed to or caused any breaches to noise limits. Under no circumstances has Coalpac transported coal from the site outside of the hours prescribed under Condition 50 of Development Consent DA-200-5-2003.

Coalpac does not support the variation or further restriction of operating hours for coal haulage as described under the existing approvals for either Cullen Valley Mine or Invincible Colliery.

4.7.8 Cleaning of trucks and Covering of loads

In their submission, LCC also stated that the cleaning and covering of loads on the trucks entering the Castlereagh Highway has been raised on numerous occasions and should be controlled through a condition of consent. This is to address that all trucks are to be covered prior to leaving the site and washed off.

Additionally, LCC requested that the Castlereagh Highway is cleaned of debris and coal fines on a regular basis to avoid unsafe incidences on the Castlereagh Highway.

Response

Product coal haulage from Cullen Valley Mine to customers is undertaken by a licensed contractor. The covering of trucks transporting coal to market on public roads is a condition under the haulage contract and is regularly monitored by Coalpac staff. Further to this, coal haulage trucks are road registered vehicles that are subject to safety inspections and vehicle registration checks in accordance with RMS guidelines and NSW road rules.

Coalpac has installed a washdown bay at the Invincible Colliery to ensure all vehicles and coal haulage trucks leaving the site do not transport coal fines or mud onto the highway. This system has been operational since 2011 and has proven effective in minimising this potential impact. Coalpac is supportive of undertaking clean up works of the Castlereagh Highway of any coal debris and fines associated with its operations on an as needs basis.

4.7.9 Support for the Modifications

The submission from LCC notes the support of council for the proposed Modifications on a number of grounds, including:

- *The level of support for the Modifications in the Lithgow community;*
- *The significant benefits of the developments to the local and regional economies; and*
- *The creation of local jobs and associated positive social and economic effects on the local community.*

LCC also confirms that their concerns regarding environmental impacts have been addressed by Coalpac in the Modifications EA or could be addressed through appropriate conditions of development approval.

Response

Coalpac notes this expression of support from LCC and the strong level of support for the Modifications in the local community.

4.8 NSW HEALTH - NEPEAN BLUE MOUNTAINS LOCAL HEALTH DISTRICT

4.8.1 Air Quality Impact Mitigation – Emissions Reduction

The submission from NSW Health notes the health impacts of particulate matter and the increase in health risk associated with increases in exposure. It is recommended that all reasonable and feasible measures are put in place to minimise emissions from the proposed operations at Invincible Colliery and Cullen Valley Mine.

Response

As noted in Section 6.1.4 of the Modifications EA, Coalpac will continue to implement the following dust controls in place at both Invincible Colliery and Cullen Valley Mine:

- Minimising pre-strip areas to the extent practicable;

- Alignment of haulage routes to minimise haulage distances;
- Applying Level 1 watering to unsealed roads and other exposed areas. This will increase to Level 2 for the Modifications (as defined in *'National Pollutant Inventory: Emission Estimation Technique Manual for Mining'* (SEWPaC, 2012);
- Utilising water sprays during drilling;
- Establishing wind breaks around stockpiles; and
- Modifying activities during unfavourable wind conditions.

4.8.2 Air Quality Impact Mitigation – Mine-Owned Residences

Reference was made by NSW Health in their submission to the three Coalpac-owned residences (Receiver IDs 393, 394 and 396) that were predicted to record additional exceedances of the cumulative 24-hour PM_{10} criteria. It was requested that additional reactive dust management procedures be put in place to minimise impacts and that any occupants of these residences be informed about impact levels and practical personal measures to minimise exposure.

Response

As noted above in **Section 4.8.1**, Coalpac have committed to the implementation of reasonable and feasible measures at both Invincible Colliery and Cullen Valley Mine to minimise air quality impacts of the mining operations proposed for the Modifications.

Coalpac will also notify occupants of residences 393, 394 and 396 should there be any exceedance of relevant environmental criteria and provide input on measures to minimise exposure to air quality emissions.

4.8.3 Noise and Vibration Impacts

In their submission, NSW Health referred to increasing evidence of health effects due to noise exposure and the prediction of noise impacts above the NSW Industrial Noise Policy criteria as discussed in the Modifications EA. It was recommended that a Noise Management Plan be required prior to any approval of the Modification applications.

Response

Section 6.4.4 of the Modifications EA confirms the management and mitigation commitments made by Coalpac to minimise potential noise impacts from the Modifications. This section confirms that:

> *"The likelihood of predicted exceedances of the noise criteria has been substantially reduced by limiting the operating hours of the mines as follows:*
>
> - *Invincible Colliery - operations are limited to the day period, and coal transportation is restricted to the day and evening periods;*

- *Cullen Valley Mine - operations are restricted to the day and evening periods, and coal transportation is limited to the day period; and*
- *Neither mine will conduct mining related activities during the night period.*

Coalpac will continue to implement the existing Noise Management Plans, including the noise controls that are currently utilised at Invincible Colliery and Cullen Valley Mine.

Due to the predicted exceedances of the intrusive criteria for construction noise, a Construction Noise Management Plan will be developed for the limited construction period required for the water transfer pipeline.

In the unlikely event that coal processing at the ICPP is required during the evening, an assessment of noise impacts will be undertaken prior to any operations in that time period to determine if additional noise controls are required. This assessment will be undertaken in consultation with EPA and to the satisfaction of DP&I prior to any operation of the ICPP during the evening."

Coalpac will also review all Environmental Management Plans upon approval of the Modifications and amend these documents as required.

5 SPECIAL INTEREST GROUP SUBMISSIONS

This section provides a response to the issues raised in submissions from SIGs that were made during the public exhibition of the Modifications EA.

5.1 BATHURST COMMUNITY CLIMATE ACTION NETWORK

5.1.1 Mining within the Ben Bullen State Forest

In their submission the Bathurst Community Climate Action Network (BCCAN) objected to further mining operations within the Ben Bullen State Forest on a number of grounds, including the high conservation values of the area, the recreational needs of the Western Sydney and Blue Mountains region, the potential for ecological impacts and the proposal for the forest to be incorporated into the Gardens of Stone Conservation Area.

Response

As noted in the Modifications EA, the proposed mine plans have been designed to allow the continuation of mining at Invincible Colliery and Cullen Valley Mine while ensuring that the environmental impacts associated with these activities will be minimised. The Modifications will also result in the development of a higher quality and stable free draining final landform outcome in the existing and proposed mining areas as opposed to what will be possible without additional mining. In the long term, this final landform will support the development of a forest and woodland landscape that is consistent with the surrounding lands within the BBSF.

A further discussion on this issue in response to a submission tabled by OEH is provided in **Section 4.2.3**.

5.1.2 Ecological Impacts

In their submission BCCAN notes that the Modifications will impact on the habitat of a number of species, including the Lyrebird, the Regent Honeyeater, the Tiger Quoll and Powerful Owl, which could not be reinstated by Coalpac. BCCAN are also concerned that the biodiversity offsets are inadequate and cannot replace the ecological values proposed to be disturbed by the Modifications.

Response

The Modifications EA included a detailed assessment of impacts to ecology, including vegetation communities and threatened species. This assessment (CE, 2014) included desktop reviews and field surveys to identify species that occur, or have the potential to occur in the local area. The Regent Honeyeater, Spotted-tailed quoll, were each assessed in the Ecological Impact Assessment and found to have the potential to occur in the Study Area (as described in the Modification EA) due to the presence of suitable habitat in the area.

The Superb Lyrebird (species not listed under the TSC Act or EPBC Act) was assessed previously by CE (2013). In relation to these species CE note that, the proposed disturbance to forest and woodland notwithstanding, large areas of habitat for these species will remain in the Study Area and in the wider locality with Conservation Reserves including the Wollemi National Park, Gardens of Stone National Park, Winburndale Nature Reserve and other large remnant State Forests. The range of avoidance, mitigation and compensatory measures to be implemented for the Modifications will also reduce the potential for impacts to these species and rehabilitate disturbed land in the long term.

Further consideration of individual threatened flora species are considered in **Section 4.2.10**.

The BOP proposed in the Modifications EA has also been independently reviewed post-submission of the Modifications EA, in consultation with OEH. A summary of these discussions and the revisions to the biodiversity offsets proposed for the Modifications is included in **Section 4.2.2**.

5.1.3 Impacts to Pagoda Landforms

In their submission BCCAN note that the open cut mining proposed for the Modifications is in close proximity to very sensitive topographic features, including iconic stone pagodas and sandstone cliffs. The proposal to highwall mine under these features is also a matter of concern for BCCAN and it was noted that it cannot be guaranteed that the effects of mining will be confined solely to the open cut areas proposed.

Response

Sections 6.5, 6.7 and 6.8 of the Modifications EA included detailed assessment of impacts to the Escarpment as a result of potential blasting and stability issues. These assessments recommended a series of operational and management controls to ensure that any potential for impacts to these features are minimised. A summary of these management and mitigation procedures is included in **Section 4.2.5** and **Section 4.2.6**. It should be noted that no highwall mining is proposed beneath the Escarpment to the east of Invincible Colliery.

5.1.4 Water Impacts

Impacts to local surface and groundwater were raised as an issue by BCCAN in their submission, including the potential for downstream salinity and pollution in the Turon and Macquarie Rivers to impact on ecology, agriculture and local communities.

Response

Sections 6.9 and 6.10 of the Modifications EA included assessments that considered the potential impacts of the proposals of surface water and groundwater resources and the local water system.

Further the technical assessments of water impacts presented in the Modifications EA have been reviewed by NOW and supplementary reports prepared to address the residual issues raised, which include the potential for impacts to local aquifers, affectation of local groundwater resources and the capture and storage of surface water flows. A summary of the responses to these matters are presented in **Section 4.5**.

5.1.5 Amenity Impacts

In their submission, BCCAN note that the EPA and NSW Health have raised concerns about noise and health impacts of the proposed mine and state that mining should not be considered in such close proximity to rural communities, schools and residences. In their submission BCCAN note that the noise and health impacts of the Modifications could impact upon Cullen Bullen, citing ghost towns in the Hunter Valley NSW and in Queensland where mining has caused residents to move.

Response

Sections 6.1, 6.4 and 6.5 of the Modifications EA provided a summary of the detailed air quality and acoustic impact assessments undertaken for the proposals. These assessments confirmed that the implementation of appropriate management and mitigation measures will ensure that any air quality and acoustic impacts to receivers in the township of Cullen Bullen would be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments on any issues in relation to the proposals. The EPA has not raised any concerns and is satisfied with the assessments undertaken for the Modifications (see **Section 4.1.1**). A response to their recommendations is provided in **Section 4.1** and **Section 4.8**, respectively.

5.1.6 Climate Change Impacts

The submission from BCCAN raised concerns regarding the nature of the coal industry in general, and the Modifications specifically, in contributing to climate change and note that renewable sources of energy have the potential to fill the vacuum created by any scaling back of the fossil fuel industry.

Response

Recommencement of operations at Invincible Colliery and Cullen Valley Mine as proposed for the Modifications will provide MPPS with the most efficient and suitable supply of coal required by the facility. This supply cannot be made up by contributions from renewable sources in the timeframe contemplated by the Modifications. This is a position which is supported by EnergyAustralia and also by DRE, who note potential adverse strategic consequences to the State and the potential risks for the future of NSW energy security (particularly for MPPS) if the Modifications do not proceed.

The Modifications therefore represent the most efficient option for MPPS to generate power, reducing greenhouse impacts in comparison to other sources currently available.

Section 6.2 of the Modifications EA included an assessment providing an estimate of the Scope 1, 2 and 3 greenhouse gas emissions generated by the Modifications is presented in. This assessment calculated emissions using the methodology specified in the '*National Greenhouse Accounts Factors*' (DCCEE, 2013).

Coalpac has committed to the continuation of a number of management and mitigation measures for the Modifications that reduce greenhouse gas emissions and promote energy efficiency in the operations, including:

- Monitoring and improving energy use and efficiency and reducing greenhouse gas emissions from the mining, and processing of coal;
- Considering the use of alternative fuels where economically and practically feasible;
- Review of mining practices to minimise double handling of materials and ensuring that coal and overburden haulage is undertaken using the most efficient routes;
- Ongoing scheduled and preventative maintenance to ensure that diesel and electrically powered plant operate efficiently; and
- Developing targets for greenhouse gas emissions and energy use onsite and monitor and report against these.

5.2 BLUE MOUNTAINS CONSERVATION SOCIETY

In their submission, the BMCS raise a number of general objections to the Modifications and the potential for future development of Coalpac operations. The objective of this section is to respond to specific issues raised in relation to the Environmental Assessment process and documents prepared in support of the Modification applications.

5.2.1 Modification EPBC Referrals

In their submission, BMCS contend that the Modifications should be a controlled action under the EPBC Act due to impacts to threatened species, ecological communities and water resources.

Response

The decision as to whether the Modifications constitute a controlled action under the EPBC Act is one that was made by the Commonwealth Department of Environment (DoE) on 30 March 2014 and they have confirmed that the Modifications do not constitute a controlled action. With respect to the potential impact on threatened species, DoE have considered the additional information that was submitted by BMCS during the assessment period when the DoE (and the Minister for the Environment) made the determination that the Modifications were not a controlled action.

As such, the determination that the Modifications will not have a significant impact upon matters of national environmental significance remains valid. Further discussion is provided on this issue in **Appendix E**.

5.2.2 Modification Mine Plan and Impacts

In their submission, BMCS raise a number of issues associated with the mine plans proposed for the Modifications, particularly the 'unique' ecological and geological values of the land surrounding the proposed disturbance areas.

This includes the potential for impacts to biodiversity, species richness, vegetation complexity, connectivity and a diminution of conservation values. BMCS also noted that they are unconvinced that Coalpac has the capacity or capability to rehabilitate the site and restore existing values.

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

5.2.3 Vegetation Impacts and BBPLS Mapping

In their submission, BMCS reiterate their assertion that the areas surrounding the Modifications are 'unique' due to the interactions between topography, geological parent material, soils, climate and vegetation. Collectively, this is referred to by BMCS and a number of other respondents as the Ben Bullen Pagoda Land System (BBPLS).

BMCS contends that the most significant example of the Tableland Grassy Woodland Complex Unit (within the BBPLS) will be disturbed by the Modifications.

Response

The BBPLS was proposed by several SIGs during submissions for the CCP EA, and is a combination of the broad scale vegetation types mapped by Benson and Keith (1990). It presents a simplistic view of the 'uniqueness' of the local area around Cullen Bullen, where the Colong Foundation and the BMCS claim that the three formation units, as mapped by Benson and Keith in their regional 1:100,000 scale vegetation map, are to be found nowhere else in close proximity. Colong Foundation and BMCS have incorrectly attributed this mapping data to CE, when in fact CE simply reproduced the Benson and Keith vegetation map in their response to the PAC Review Report for the CCP (Cumberland Ecology, 2013), commenting on its limitations and dated nature. An excerpt from the CE report is below:

> *"The Benson and Keith (1990) mapping referred to by the Colong Foundation is a broad scale vegetation map of the Wallerawang map sheet…published 23 years ago in Cunninghamia Volume 2, Number 2, in 1990. It has been superseded by more accurate mapping prepared by OEH in 2006, …(who) mention the Benson and Keith regional scale mapping (scale 1:100,000) was not appropriate for use in the development of Western Blue Mountains Mapping (scale of 1:25,000) (DEC (NSW) 2006)…The Cumberland Ecology mapping shows 10 different forest and woodland "vegetation communities" across the slopes and valleys, whereas the outdated 1990 mapping only shows one forest type (in the slopes and valleys)."*

The Benson and Keith (1990) vegetation map cannot be relied upon as an accurate representation of the vegetation communities and formations in the area. As such, to describe all vegetation types in the slopes and valleys below the Escarpment, Colong and other SIGs are incorrectly using the name *Tablelands Grassy Woodland Complex*.

Colong Foundation and BMCS in their submissions on the Modifications have published a map of their BBPLS with the CCP mine plan overlaid on it, which incorrectly implies removal of the majority of the Tablelands Grassy Woodland Complex by open cut mining.

The Modifications have a substantially smaller disturbance area (approximately 15% of the area of the Exhibited CCP), and have been designed to have a minor impact on their Tablelands Grassy Woodland Complex through avoidance and mitigation. The Modifications also provide linkage at Invincible Colliery between buffer zones, preserving this land unit in existing and proposed adjacent biodiversity offsets.

In addition, the Modifications will have no direct impact at all on the other two components of their BBPLS, and as a result, the interaction between the three pagoda land system units of their BBPLS will not be significantly impacted.

5.2.4 Flora and Fauna Species Impacts

In their submission, BMCS note a number of flora and fauna species predicted to be impacted by the Modifications. The submission discusses impacts to flora species including the listed Persoonia marginata, Thesium australe, Bursaria spinosa, Eucalyptus pulverulenta, Prasophyllum sp. Wybong and a number of ROTAPs.

In their submission, BMCS refer to the threatened fauna species with the potential to occur in the area, including the endangered Regent Honeyeater, Swift Parrot and Spotted-tailed Quoll, and the vulnerable Broad-headed Snake, Large-eared Pied Bat, Grey-headed Flying-fox and the Bathurst Copper Butterfly. BMCS state the impacts to these species have been dismissed too lightly.

Response

Each of the threatened species noted in the submission by BMCS was discussed by CE (2014) in the ecological impact assessment for the Modifications, either as it had been previously identified in the area, or was considered to have the potential to occur as a result of local conditions, vegetation communities and habitat quality. The potential for impacts to these species was not 'dismissed' as inferred by BMCS and each was assessed in detail to determine potential impacts.

Following submission of the EA, CE has also undertaken an assessment of the ROTAP species of concern to BMCS and other SIGs. This issue is discussed further in **Section 5.10.5**.

5.2.5 Rehabilitation Effectiveness

The submission from BMCS objects to the impacts of open cut mining on native forest and the geological substrate. BMCS contend that any subsequent rehabilitation is a cosmetic veneer that provides vegetation communities with poor structure, diversity and quality or habitat for native fauna species.

Response

The rehabilitation strategy, methods and performance monitoring proposed for the Modifications is discussed in detail in Section 6.17 of the EA. In line with current approval conditions, rehabilitation areas at Invincible Colliery and Cullen Valley Mine are surveyed by independent qualified ecologists on an annual basis to monitor and report on key aspects of the rehabilitation strategy and performance. Observations from ecologist Dan Pederson of Kleinfelder Consultants who has been involved in the ecological surveys of rehabilitated areas at Cullen Valley Mine and Invincible Colliery since 2011 are included in **Appendix I**.

A summary of his main observations from the ecological surveys include that:

- Rehabilitation is currently in an early and pioneering growth form and requires time to develop into mature woodland. Indicators to date suggest this development will occur;

- While the rehabilitation areas will not (in the short to medium term) create a mirror image of the original vegetation communities, they can provide an important habitat and ecological value in the medium to long term;
- The rehabilitation areas provide a diverse range of native flora species with the planned degree of biodiversity;
- The high density of early and successional native species are providing good organic material through root structures and leaf drop accumulation;
- Dominant canopy species and ground cover species will continue to develop over time. This will further assist in providing an organic layer and establishing a soil profile;
- The close proximity of native woodland communities to rehabilitated areas has allowed natural recruitment into these areas. This can be further assisted with manual seed spreading;
- The landform, sediment control structures and vegetation cover in rehabilitated areas are minimising erosion, and ongoing maintenance will be required; and
- There is evidence of regular use of the rehabilitation areas by a range of woodland birds, mammals and reptiles.

Coalpac acknowledge that the ongoing maintenance and monitoring of existing and proposed rehabilitated areas will continue to be required in the early stages of development while native species establish themselves into a diverse and self-sustaining vegetation community.

Additional photos showing the progress of rehabilitated areas at Cullen Valley Mine and Invincible Colliery are included below in **Plate 1** to **Plate 6**. These plates demonstrate what can be achieved by implementing the rehabilitation strategy and methods proposed for the Modifications

Note integration of established rehabilitated areas with adjacent native woodland at Cullen Valley Mine. A diverse range of woodland birds have been observed foraging in rehabilitated areas likely due to the new growth and high insectivore activity.

Plate 1 View of established rehabilitated areas adjacent to native woodland at Cullen Valley Mine

Mammals, reptiles and woodland birds regularly migrate from existing native woodland into established rehabilitated areas at Cullen Valley Mine. The early higher density of planting in the rehabilitated area helps stabilise the slope and provides additional organic material to build the soil profile in the early years of rehabilitation establishment. Natural selection and environmental factors will reduce the density of canopy species in the rehabilitated area over time in line with the adjacent native woodland over time.

Plate 2 Integration of established rehabilitation and native woodland at Cullen Valley Mine

Leaf litter and bark covers the ground on a thick mat of native grasses in ten year old rehabilitation at Cullen Valley Mine. There is little evidence of previous mining activity.

Plate 3 Vegetation understorey in ten year old rehabilitation at Cullen Valley Mine

Native species compete in a 6 year old rehabilitated area at Invincible Colliery. Native grasses planted on a contour drain help stabilise the soil and minimise erosion and will spread through the area as the trees mature and thin out

Plate 4 Native species competition on six year old rehabilitation at Invincible Colliery

A diverse mix of native species including Eucalyptus, Acacia, native grasses and herbs compete for sunlight in a 6 year old rehabilitated area at Invincible Colliery. The higher density of native species in the early years of rehabilitation helps create a competitive environment (natural selection) where the strongest and most robust species will eventually prevail and dominate. Note very few exotic weed species are present.

Plate 5 Mix of Eucalyptus, Acacia, native grasses and herb species in six year old rehabilitation at Cullen Valley Mine

Plate 6
Rehabilitated Eucalyptus species developing a canopy in eight year old rehabilitation as Wattles thin out (Cullen Valley Mine)

5.2.6 Final Void Rehabilitation

In their submission, BMCS note the backfilling and rehabilitation of the existing mine voids at Invincible Colliery and Cullen Valley Mine (three at each site) proposed for the Modifications and confirms that both operations are subject to legal requirement for provision of a bond to ensure that the full cost involved in the rehabilitation of both sites would be covered.

Response

Open cut mining generally creates a surplus of waste rock material due to the swelling of overburden during fragmentation as a result of the mining process, typically by a factor of 20%. At this basic level, it might appear therefore that there will always be sufficient overburden available to refill any final void. However to minimise the disturbance footprint of the operation the mining process has to retain a working void area. The overburden dump profiles are planned and managed in order to accommodate a working void area. The alternative is out of pit dumping which increases the overall environmental disturbance footprint. Maintaining a working void area is common industry practice.

Coalpac experienced unforseen delays in the assessment and determination of its earlier application for the CCP to continue mining which was not aligned with the long term mine plan. As outlined in Appendix H of the Modifications EA, the rehabilitation of the existing mining voids is possible, and provided for, however, it should be noted that this would not provide the best final landform and rehabilitation outcome for the area in the long term.

The proposed mine plan, including the schedule and timing for the Modifications as described in Section 3 of the EA, would allow for material to be handled and placed to ensure no final voids remain at the completion of mining. The Modifications would also provide for a free draining final landform that would be compatible with the surrounding landscape.

In accordance with regulatory requirements, Coalpac maintain a substantial bond in place with the NSW Government until final rehabilitation is completed to the satisfaction of DRE. DRE review the level of bond required on an annual basis.

5.2.7 Biodiversity Offsets

In their submission, BMCS note their opposition to the use of biodiversity offsets as a mechanism for mitigating environmental impacts of development proposals and taking the biodiversity value of offsets into account into the determination process.

Response

Coalpac has put forward a robust revised BOP for the Modifications which has been further enhanced following a completion of an independent ELA Assessment (see **Section 4.2.2**). The use of offsetting as a mechanism to mitigate residual ecological impacts of development proposals remains a current key policy of the relevant NSW and Commonwealth regulatory agencies.

5.2.8 Air Quality, Noise and Health Impacts

In their submission, BMCS notes their firm opposition to the levels of noise, reduced air quality and impacts to health that would be reimposed on the citizens of Cullen Bullen as a result of the Modifications. BMCS also reiterate their opposition to the environmental impact criterion adopted as policy in NSW.

Response

Sections 6.1, 6.4 and 6.5 of the Modifications EA provided a summary of the detailed air quality and acoustic impact assessments undertaken for the proposals. These assessments confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality and acoustic impacts to receivers in the township of Cullen Bullen would be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.2.9 Highwall Mining Impacts

The BMCS submission contends that highwall mining should not be approved for the Modifications and that the proposed 'highwalling' method would inevitably result in minor rock falls that cannot be mitigated or rehabilitated.

Response

An assessment of highwall mining stability is presented in Section 6.7 of the Modifications EA. This assessment provides an outline of the design criterion, operational methodology and mitigation measures that are proposed to be adopted for the Modifications to ensure that any potential for subsidence is minimised. Independent peer reviews completed by Hebblewhite (2013) have also determined that stable highwall mining panels can be mined using the design methodologies proposed.

The erroneous comments made by BMCS on the reliance upon a Factor of Safety of 1.3 have been addressed in the response to OEH (see **Section 4.2.6**). The original comment by the CCP PAC was based on the flawed understanding that the long term stability of the highwall mining design relied on the smaller web pillars with a FoS of 1.3. In fact, as noted by Professor Hebblewhite in his independent review, the core stability of the highwall mining design is based on the larger barrier pillars which have been designed with a FoS in excess of 4 under the highest stress levels.

As the strongest pillars in the layout design, the barrier pillars will bear the majority of the load from the overlying strata. The proposed design is based on this assumption together with the spacing of the barrier pillars being less than the critical span or maximum bridging capacity of the overlying strata.

In making this assumption, no allowance is made for any support being provided by the smaller web pillars when in fact they will clearly add to the overall stability. This provides a further conservatism to the design methodology.

This means that the overall stability of the highwall mining design is in fact much higher than the PAC incorrectly assumed and will provide more than adequate long term stability.

The highwall mining subsidence management process committed to by Coalpac for the Modifications is outlined above in **Section 4.6.3**.

5.3 COLO COMMITTEE

5.3.1 Impacts to Pagoda Landforms

In opposing the Modifications, the Colo Committee submit that the proposed mining operations will adversely impact an internationally significant pagoda landform complex as discussed in Washington and Wray (2011). The Colo Committee is of the view that the area should be fully protected from open cut mining and instead reserved in a State Conservation Area as soon as possible.

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

The potential incorporation of the BBSF into the NSW Conservation Reserve (as a State Conservation Area or as an addition to National Park, etc) is a policy matter for the NSW Government and requires whole-of-Government approval, which is currently not forthcoming. A further discussion on this issue in response to OEH's submission is provided in **Section 4.2.3**.

5.3.2 Highwall Mining Subsidence Impacts

In their submission, Colo Committee notes the additional highwall mining proposed for the Modifications and the high likelihood that this activity will lead to cracking and localised subsidence. Of particular concern to the Colo Committee are the pagoda rock formations and associated Aboriginal heritage sites. In their submission, the Colo Committee also note that:

> *"The talus slopes of this community that stretch up to the cliff-lines act as 'flying buttresses' to support the cliffs and the pagodas found there. Accordingly this area is integral to the physical stability of the pagodas also. Open cut mining can thus have impact on pagoda geodiversity. Removal of the valley bottom woodland will clearly impact negatively on the biodiversity of adjacent areas on the pagodas.*
>
> *The highwall mining of an additional 165 hectares is (given past experience over several decades of researching coal mining in the area) very likely to lead to cracking and localised subsidence (despite repeated assurances). This will impact on the internationally recognised pagoda rock formations. It would also impact negatively on cliffs and on associated Aboriginal heritage, and both are at risk of being damaged through subsidence during and following such coal mining. There is a very good chance that cracking caused by highwall mining will dry out and degrade the moist forests of the pagoda complex. The BMCC 'Save our Swamps' project (Hensen, 2010) identified that the swamps in this area had become desiccated, and that this coincided closely with past mining leases. This desiccation of communities such as the pagoda complex is likely to cause a loss of understorey species, such as orchids and ferns."*

Response

An assessment of highwall mining stability is presented in Section 6.7 of the Modifications EA. This assessment provides an outline of the design criterion, operational methodology and mitigation measures that are proposed to be adopted for the Modifications to ensure that any potential for subsidence is minimised. Independent peer reviewers including Hebblewhite (2013) have also determined that stable highwall mining panels can be mined using the design methodologies proposed.

Concerns regarding the stability of the highwall mining workings have been addressed in the response to OEH in **Section 4.2.6**. The overall highwall mining design has a high factor of safety against any cracking or localised surface subsidence. Further, the talus slopes will not be affected by highwall mining activities adjacent to the Escarpment. GeoTek Solutions (2013) in their stability assessment for the CCP found that the talus slopes are not supporting the Escarpments as 'flying buttresses', as claimed by the Colo Committee.

Analyses conducted by specialist consultant GeoTek Solutions for the CCP showed that the minimum global FoS of the final highwall profile at a distance of only 50 m from the Escarpments was 1.36, which is considered stable. The stable FoS of 1.36 was at a location where the geometrical and geological conditions presented a theoretical worst case scenario, and only occurred for a duration of approximately 8 to 12 weeks before the highwall would be backfilled with spoil. The backfilled material acts as a support against the exposed highwall, diminishing any risk of instability. The normally accepted industry best-practice FoS for short term mining slopes is 1.2, and for slopes carrying critical infrastructure required for the life of the mine, the design FoS would be 1.3.

The mine plans for the Modifications have moved the open cut limit back further away from the Escarpments. This will act to increase the standoff from the talus slopes and will significantly increase the FoS against highwall instability beyond the already adequate worst case figure of 1.36.

The desiccation effects referred to in the Colo Committee submission relate to high extraction underground mining methods and the impact of the associated failure of the strata to surface impacting perched aquifers. There are no aquifers, perched or otherwise, in the strata overlying the highwall mining areas proposed in the Modifications EA (see **Section 5.3.4**). Therefore, there cannot be any associated desiccation of the overlying ecology.

The highwall mining subsidence management process committed to by Coalpac for the Modifications is outlined above in **Section 4.6.3**.

5.3.3 Highwall Mining Safety

In objecting to the proposed used of highwall mining methods, the Colo Committee submission also notes their views regarding the alleged spurious claims made in relation to highwall mining safety. In particular, their objection relates to the cumulative impact of the old workings in the area and the sequential process of the highwall mining process in successive coal seams.

Response

Concerns regarding the stability of the highwall mining workings have been addressed in the response to OEH in Section **4.2.6**. The highwall mining design methodology steps through a process that takes careful account of the underlying mine workings where they are present.

There are no underlying mine workings in the area proposed for highwall mining at Cullen Valley Mine.

Where underlying mine workings are present at Invincible Colliery, they are large stable pillars with no history of instability (first workings only with no secondary extraction). The impact of the underlying mine workings is modelled in 3 dimensions in the design process and any weakening effects upon the overlying strata are taken into account. The highwall mining activity is then introduced sequentially in each horizon (where multiple horizons are accessed). As a result of this design process both the impacts of pre-existing mine workings and any interaction between highwall mining horizons is fully taken into account. It should also be noted that Coalpac does not propose to highwall mine all seven coal seams under the Modifications.

In his independent review of the proposed highwall mining method Professor Hebblewhite (2013) concluded:

> "*As an overall conclusion of the geotechnical design methodology and results of the GEONET design studies, it is considered that the approach that has been adopted is highly appropriate, and is well founded in good geotechnical practice. The use of multiple design methodologies to confirm or refine design parameters is highly commendable. The results of the design work are therefore considered to be suitable for a project study at this stage of an operation. Clearly these results and design parameters should be further refined once actual operating experience is gained and geotechnical performance feedback can be achieved. Such an approach is standard good geotechnical practice."*

Coalpac has already committed to further monitoring of design performance with the results used to ensure that the design input parameters and outcomes are aligned, and are consistent with the design and predicted performance (see **Section 4.6.3**).

5.3.4 Impacts to Groundwater Dependent Ecosystems

In addition to impacts to significant pagoda landforms, the Colo Committee submission also noted that subsidence cracking associated with highwall mining for the Modifications had a very good chance of drying out and degrading the moist forests in the area. It was noted that this desiccation caused by highwall mining is likely to cause a loss of understorey species such as orchids and ferns.

Response

Impacts to groundwater aquifers were considered by AGE (2013) in the groundwater impact assessment undertaken for the Modifications EA. As noted in Section 6.10.3 of the Modifications EA, no significant depressurisation of groundwater aquifers is anticipated to occur as a result of the Modifications and as such, no impacts to GDEs are predicted.

The issue of potential impact upon overlying aquifers was addressed in **Section 5.3.2** above.

As such, no desiccation of vegetation communities is predicted in those areas which overlie areas of highwall mining proposed for the Modifications.

5.3.5 Air Quality Impacts

In their submission, the Colo Committee note the adverse impacts that are likely to occur for the residents of Cullen Bullen, noting that the dust generated the activities proposed for the Modifications will increase morbidity and mortality in the community. The Colo Committee also state that, in their view, impacts from operational noise, truck movements and blasting will adversely impact Cullen Bullen residents.

Response

Sections 6.1, 6.4 and 6.5 of the Modifications EA provided a summary of the detailed air quality and acoustic impact assessments undertaken for the proposals. These assessments confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality and acoustic impacts to receivers in the township of Cullen Bullen would be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.3.6 Greenhouse Gas Impacts

The Colo Committee submission note errors made in previous greenhouse gas assessments commissioned by Coalpac and that the assessment of the issue for the Modifications EA seeks to downplay the significance of the proposals on climate change. Colo Committee note that the Modifications would represent a significant contribution to Australia's annual CO_2 emissions and would have a significant negative impact on climate change overall.

Colo Committee also state that carbon (such as the coal resource proposed to be extracted for the Modifications) should be kept sequestered in the ground and that a transition should be made to renewable sources of energy.

Response

Coalpac has committed to the continuation of a number of management and mitigation measures for the Modifications that reduce greenhouse gas emissions and promote energy efficiency in the operations, including:

- Monitoring and improving energy use and efficiency and reducing greenhouse gas emissions from the mining, and processing of coal;
- Considering the use of alternative fuels where economically and practically feasible;
- Review of mining practices to minimise double handling of materials and ensuring that coal and overburden haulage is undertaken using the most efficient routes;

- Ongoing scheduled and preventative maintenance to ensure that diesel and electrically powered plant operate efficiently; and
- Developing targets for greenhouse gas emissions and energy use onsite and monitor and report against these.

Recommencement of the coal extraction at Invincible Colliery and Cullen Valley Mine as proposed for the Modifications will provide MPPS with the most efficient and suitable supply of coal required by the facility. This is a position which is supported by EnergyAustralia and also by DRE, who note potential adverse strategic consequences to the State if the and the potential risks for the future of NSW energy security (particularly for MPPS) if the Modifications do not proceed.

The Modifications therefore represent the most efficient option for MPPS to generate power, reducing greenhouse impacts in comparison to other sources that are currently available.

5.3.7 Rehabilitation Effectiveness

In their submission, Colo Committee also objected to the claims made by Coalpac regarding the ability for viable ecosystems to be rehabilitated to mature woodland following the completion of mining. Colo Committee also made reference to the findings of the CCP PAC that rehabilitated areas cannot be returned to their pre-existing landforms and biodiversity characteristics.

It is also stated that Coalpac's claim that there is not enough existing waste material to fill these six mine voids is nonsense on the basis that open-cut mining creates a surplus of mine overburden waste material that can be used reshaped to fill the mining voids.

Response

The ability to ultimately rehabilitate areas proposed to be disturbed for the Modifications to mature forest and woodland communities is described in Section 6.17 of the Modifications EA, with a further discussion included in **Section 5.2.5** of this RTS.

A response to the issues raised by the Colo Committee on the availability of suitable volumes of material to infill the six voids currently on site and impacts of rehabilitating these in the current form is summarised in **Section 5.2.6**.

5.3.8 Adequacy of Biodiversity Offsets

In their submission, Colo Committee note that the Modifications' biodiversity offsets are inadequate, and cannot replace a Gardens of Stone Stage 2 reserve over Ben Bullen State Forest (as proposed by a wide range of community groups). These objections are due to the distance between some of the proposed offsets to the Modification disturbance areas and the need to extensively rehabilitate areas of other properties.

Response

The BOP proposed in the Modifications EA has also been reviewed post-submission of the Modifications EA, in consultation with OEH. A summary of these discussions and the revisions to the biodiversity offsets proposed for the Modifications is included in **Section 4.2.2**.

5.3.9 Mine Plan and Mining Method

Submissions from the Colo Committee, Colong Foundation and ELO make the following assertions:

- *"The proposed approach to mining differs from a typical open cut coal mine, due to the high relief and steep slopes. The terrain is unsuited to open-cut mining operations because it requires intricate and inefficient operations with truck and shovel machines* (Colo Committee);
- *The proposed approach to mining differs from a typical open-cut coal mine, due to the high relief and steep slopes. The terrain is unsuited to open-cut mining because it requires intricate and inefficient operations with truck and shovel machines* (Colong Foundation); and
- *Further, the high relief and steep slopes of the modification areas are unsuited to large-scale open-cut mining technology, and instead mining requires intricate and inefficient operations with truck and shovel machinery* (ELO)."

Response

The above assertions made in multiple SIG submissions (identical for Colo Committee, Colong, and ELO) are without proper basis.

The terrain proposed to be mined by the Modifications places no greater constraint on the truck and shovel method of moving waste rock when compared to any other truck and shovel operation in the Australian coal industry.

In the open cut mining method proposed, the coal is selectively mined to remove thin shale bands from between individual coal seams, in order to maximise product quality. The resultant historical cost profile of the Coalpac mines is amongst the lowest in the Australian coal industry for mines that utilise similar equipment, demonstrating its efficient application for the proposed Modifications.

The pit design proposed for the Modifications moved further away from the higher relief and steeper areas included in the now withdrawn CCP proposal. This was done to:

- Minimise visual impacts;
- Provide for a greater buffer zone against the escarpment at Invincible Colliery, resulting in surplus foraging habitat being retained for the potential presence of the BHS over that recommended by OEH (see **Section 4.2**);

- Utilise highwall mining in place of open cut mining to avoid the main *Persoonia marginata* population in the northern limit of the Modification Disturbance Boundary proposed for Cullen Valley Mine and minimises impacts upon the local *Eucalyptus cannonii*; and
- Minimise the boundary length of the open cut areas relative to their area, to limit the impact of edge effects.

The mine plan proposed for the Modifications was developed to provide the best balance between accessing the remaining coal resources adjacent to approved mining areas while concurrently avoiding areas in proximity to the site that are deemed to be most sensitive to environmental impacts (by total avoidance or the use of highwall mining methods).

The mine plan proposed for the Modifications has also been specifically designed to enable the development of a stable, free-draining final landform and a higher quality rehabilitation outcome for Invincible Colliery and Cullen Valley Mine.

The open cut and highwall mining methods proposed will create sufficient surplus overburden material to enable the six mine voids currently present (three at Invincible Colliery and a further three at Cullen Valley Mine) to be fully rehabilitated and incorporated into a free draining final landform at the completion of mining operations under these Modifications. This final landform will be consistent with the surrounding landscape and capable of sustaining a native forest vegetative cover of similar composition to that in existence prior to mining.

This mitigates the current issue of the potential for partially rehabilitated final voids. The Modifications propose to rehabilitate the residual final voids at both mines that would otherwise remain as water retaining structures in the long term.

5.3.10 Quality of the Coal Resource

The Colo Committee, Colong Foundation, NCC and ELO raise a number of questions in their submissions in relation to the quality of coal proposed to be extracted for the Modifications, including:

- *"Coal resources are very poor compared to nearby alternatives. The coal proposed to be mined has high-ash (14 to 30%) content. It is full of shale bands, and has weathered, thin and discontinuous coal seams. Such poor quality coal is neither essential (nor good) for the on-going operation of Mt Piper Power Plant at Lidsdale.*
- *Compared to the Ulan, Lithgow and Katoomba coal seams, the Lidsdale and Irondale seams in the Invincible and Cullen Valley Mines are inferior in quality, and the others, the Middle River and Moolarben seams, are hardly worth mining* (Colo Committee)*;*
- *Coalpac's remnant of high-ash (14-30% ash), high-shale, weathered, thin and discontinuous coal seams are not essential for the on-going operation of Mt Piper Power Plant at Lidsdale. Compared to the Ulan, Lithgow and Katoomba coal seams,*

the Lidsdale and Irondale seams in the Invincible and Cullen Valley Mines are inferior in quality, and the others, the Middle River and Moolarben seams, are hardly worth mining (Colong Foundation);

- *Coalpac also reasons that its coal resource is strategic, essential for power generation and necessary to keep energy prices low in NSW. The remnant coal resource in the modification areas are found in high-ash (14 to 30% ash), high-shale, weathered, thin and discontinuous multi-layered coal seams. This poor-quality resource is not essential for the on-going operation of Mt Piper Power Plant. The quality coal in the Lithgow Seam under the Ben Bullen State Forest was removed by underground mining for over a century. The proposal to mine the remaining coal pillars from these flooded old workings must be seen as a desperate measure proposed by Coalpac so as to enrich an otherwise unsuitable resource* (ELO)*; and*
- *The coal in this proposal is of poor quality and there are better quality substitute resources that can provide at least 25 years electricity generation by the two power plants in the Lithgow Region. The claim of increased costs to electricity consumers if the Coalpac proposal does not proceed is a wild exaggeration* (NCC)*."*

Response

MPPS was built in 1993 and as such it is the youngest coal fired power station in NSW, and was designed to handle coal with ash contents in the ranges available in product coal from the Modifications. Submissions from the Colo Committee, Colong Foundation, ELO and NCC correctly state that the coal quality produced by Coalpac ranges from 14-30% ash and as such there is no issue in the product coal from the Modifications meeting MPPS coal quality requirements.

This is confirmed by EnergyAustralia in their submission, which states:

> *"Some commentators have suggested the coal quality available from Coalpac is of inferior quality compared to other local suppliers, however the Mt Piper Power Station has been designed to deal with coal from these local seams and so it is appropriate for Power Station usage. This is demonstrated by the fact that coal has been supplied from the Invincible Colliery and Cullen Valley Mine for more than 10 years."*

The submission from DRE also notes that the operations proposed for the Modifications are ideally placed to efficiently provide coal of appropriate quality to MPPS (see **Section 4.6**).

5.3.11 Alternative Sources of Coal for Power Stations

The Colo Committee and Colong Foundation raise a number of questions in relation to the ability of other developments in the region to provide alternate sources of coal for local power stations. These submissions note the following:

- *The Springvale Colliery was specifically developed by an Electricity Commission subsidiary for the needs of the Mt Piper Power Plant with a coal conveyor belt built directly to the plant. The Angus Place Colliery was also developed by an Elcom subsidiary and it has a purpose built haul road to the power plant. The Springvale and Angus Place coal mines can produce 8.5 million tonnes of coal a year. In 2006-07 the combined resources for these mines were 325.5 million tonnes of coal. These mines alone can provide sufficient coal to the power plant for the foreseeable future* (Colo Committee)*; and*
- *The Springvale Colliery was specifically developed by an Electricity Commission subsidiary for the needs of the Mt Piper Power Plant with a coal conveyor belt built directly to the plant. The Angus Place Colliery was also developed by an Elcom subsidiary and it has a purpose built haul road to the power plant. The Springvale and Angus Place coal mines can produce 8.5 million tonnes of coal a year. In 2006-07 the combined resources for these mines were 325.5 million tonnes of coal. These mines alone can provide sufficient coal to the power plant for the foreseeable future. The Airly Colliery and the mines of the Rylstone District, combined with the Clarence Colliery could extend these resources for the foreseeable future* (Colong Foundation)*.*

Response

Environmental Impact Statement (EIS) documents for the extension of both Angus Place Colliery and Springvale Colliery were on public display until 26 May 2014. MPPS has approximately 2 years of approved coal supply remaining, without further mining approvals being granted that can provide coal supply. Springvale Colliery and Angus Place Colliery will exhaust approved mining areas in 2015 and 2016, respectively. Unless current applications to extend these operations are approved they will not be able to provide any coal to the local power stations beyond 2016.

The stated view of the Colong Foundation is in direct conflict with their current actions in campaigning strongly against these other mines being granted the necessary new mining approvals (see http://www.colongwilderness.org.au/stop-centennial-coal-wrecking-gardens-stone-region).

The Angus Place Colliery and Springvale Colliery applications are promoted by the SIGs as having the ability to provide sufficient coal reserves for the local power stations, which were specifically built in this location to permit access to these local coal reserves. Whilst these submissions by the Colo Committee and the Colong Foundation quote the large volumes of coal reserves that remain in the district, it is noted that both groups are actively trying to prevent them from gaining the necessary approvals to access these reserves based on their high environmental impacts.

Under current approvals Angus Place Colliery will run out of coal reserves in March 2016, as noted in their Angus Place Extension Project EIS in Section 12.1 of the main report, which states that *"Scheduled longwall mining in approved mining areas will end in March 2016 …"*. Based on their current production of approximately 3Mtpa, it is estimated that Angus Place has approximately 5.5 Mt remaining to mine.

At Springvale Colliery, a new application for Development Consent is also in progress. The EIS for the Springvale Mine Extension Project states in Section 1.1 *"…the (existing) development consent would have expired on 28 September 2014. However, a modification to the consent (DA 11/92 Mod 4), approved on 5 December 2013, allows mining operations at Springvale Mine to be undertaken until 30 September 2015."* On this basis it is estimated there is approximately 3.5 Mt of coal remaining at Springvale Colliery under current approvals.

The actual underground coal reserves in the district with an approved means to supply the local power stations amount to approximately 9 Mt; far short of the 325 Mt claimed by the Colo Committee and the Colong Foundation.

It is also noted that the MPPS does not currently have an ability to receive coal from suppliers other than those in the immediate area by road haulage or conveyor belt. A significant lead time and expense would be required to implement the capability to receive coal by rail (the only viable delivery methods for mines located outside the immediate area).

Clearly there is an imperative for local coal supply to continue beyond 2015/2016 and if approved, the Coalpac Modifications will supply 60% of the coal supply needed by MPPS for several years allowing time for MPPS to secure long term coal supply.

A letter sent from DRE to DP&I in May 201 regarding the Significance of the Coal Resource also refers to the significant contributions that were made by Coalpac in efficiently supplying coal to MPPS in 2011/12, the last year of full production at Invincible Colliery and Cullen Valley Mine (see Section 4.6). DRE also note the potential for Centennial Coal to have a *"virtual monopoly"* on coal supply to MPPS if the Modifications are not approved, which *"…would be expected to lead to further electricity price increases and be in conflict with NSW Government policy with respect to lower electricity pricing for consumers*."

5.3.12 Economic Impacts

In their submission, the Colo Committee object to the economic analysis undertaken for the Modifications, stating that the assessment is based purely on a neoclassical cost benefit analysis which ignores all externalities and environmental values and focuses solely on 'values' associated with selling coal on the market.

Response

A response to the concerns raised about the methodology utilised in the Economic Impact Assessment for the Modifications is summarised below in **Section 5.16** and provided in full as **Appendix J**. This response confirms that the economic impact assessment methodology adopted for the Modifications is appropriate.

5.3.13 Aboriginal Archaeology and Cultural Heritage

In their submission, the Colo Committee state that the Aboriginal cultural heritage assessment lacks credibility because it did not find a cave art site in the highwall disturbance area for the Cullen Valley Mine Modification.

Response

A response to this has been provided in detail in **Section 5.10.1**.

5.4 COLONG FOUNDATION FOR WILDERNESS

5.4.1 Impacts to Pagoda Landforms

The Colong Foundation (Colong) and Blue Mountains Conservation Society (BMCS) makes reference to the Ben Bullen Pagoda Land System [BBPLS] *(as described by Colong and BMCS) composed of three vegetation units that are present in the local area.*

Colong and BMCS contends that the most significant example of the Tableland Grassy Woodland Complex Unit (within the BBPLS) will be disturbed by the Modifications.

Response

A response to this has been provided in **Section 5.2.3**.

5.4.2 Impacts to Threatened Flora Species and Ecological Communities

In their submission the Colong Foundation believes that at least two vegetation communities listed as EECs will be impacted by these modifications: a Box Gum Woodland and a Frost Hollow Woodland.

Colong also note the impacts to the threatened Capertee Stringybark and Persoonia marginata that will occur as a result of the Modifications and register their concern regarding the quality of the vegetation survey work undertaken by Cumberland Ecology.

Response

The Box Gum Woodland community referred to by the Colong Foundation has been avoided by the proposed Modifications and will not be disturbed by open cut mining. OEH have previously stated, in their submission to the CCP PAC (OEH 2012), that the vegetation unit “MU20 Capertee Rough-barked Apple - Red Gum - Yellow Box Grassy Woodland" is the local variant of Box Gum Woodland. This vegetation unit is not considered to occur within the Modification Disturbance Boundaries and is shown in the vegetation map provided in Figure 4.2 of the ecological impact assessment for the Modifications EA (CE, 2014).

The Frost Hollow EEC is not likely to occur within the Modification Disturbance Boundaries. This EEC was not found during previous mapping in the area by CE or by OEH (OEH, 2012). It has also not been found or referred to within the independent ELA Assessment of the impact area (ELA, 2014). Further explanation is provided in **Appendix E**.

The regional Capertee Stringybark (*E. cannonii*) population will not be significantly impacted as a result of the Modifications. A recent decision by the Commonwealth Government to remove *Eucalyptus cannonii* as a Vulnerable species under the EPBC Act supports this position. Advice to the Federal Minister of the Environment in December 2013 noted that the species occurs in 67 locations, with at least 30 populations and that there are no major current threats. The Commonwealth Government Scientific Committee concluded that:

> *"…based on available information for this species' population size and geographic distribution (including no evidence of decline), the species does not meet any of the required criteria for listing as a threatened species under the EPBC Act.*
>
> *'…the species is well represented in the existing National Park estate including the Gardens of Stone and Wollemi National Parks which provides a high level of protection."*

The Modifications will not result in a significant impact to *Eucalyptus cannonii* populations due to:

- The number of individuals to be cleared relative to the number of individuals that will remain in the locality is not significant;
- The species has been recorded regenerating within current biodiversity offset areas. It is proposed to be included in future rehabilitation; and
- The loss of individuals from the proposed Modifications can be offset within the BOP and within rehabilitation.

LEG recently located a number of *Persoonia marginata* individuals inside and outside of the Modification Disturbance Boundary at Cullen Valley Mine. Eleven individual plants were identified within the proposed Modification Disturbance Boundary.

The significance of 11 individuals being directly impacted by the proposed Modifications is shown in a regional context of the populations of *Persoonia marginata* in the surrounding area in **Figure 11**, which shows the extensive nature of their occurrence in the local area. This figure also presents results from targeted searches for the species, which have identified thousands of individuals occurring in dense populations several kilometres to the west of the Cullen Valley Mine Modification Boundary. The species is also found within the existing National Park Reserve System including the Gardens of Stone, Wollemi and Goulburn River National Parks.

The mine plan design has avoided more than 99% of individual *Persoonia marginata* plants in the populations immediately surrounding the Cullen Valley Mine Modification Disturbance Boundary.

The small number of individual plants that will be disturbed if the Modifications are approved will not make a significant impact upon the known local or regional populations. All individuals occurring in the immediate proximity of the proposed open cut disturbance areas will be protected from mining related edge effects by a site based Species Management Plan.

5.4.3 Ineffective Fauna Impact Mitigation

In their submission, the Colong Foundation note:

> *"Coalpac admits that at least eight threatened fauna species in Ben Bullen State Forest would be further impacted if these modification proposals are approved (EA, page 76). The Broad-headed Snake, Large-eared Pied Bat and Eastern Bent-wing Bat habitat would also be impacted based on OEH advice to the PAC dated Nov 6th, 2012.*
>
> *Coalpac has not provided scientific evidence in this EA that contradicts the OEH recommended 500 metre setback for these species or rebuttal of the PAC 2012 recommendation of 300 metre setback to provide 70-75 per cent of the foraging area for these species."*

Response

The setback distance of 300m referenced by Colong is based on an assumed foraging habitat and range for the BHS (by the PAC, 2012), and presumably is therefore only required where suitable habitat for the BHS is found to exist on adjacent Escarpments. It is noted that the OEH website states a smaller foraging distance of 200 m, (see: http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10413), which states that the BHS: *"…Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer."*

As noted by OEH (on their website and in their submission; see **Section 4.2.11**), potential habitat for the BHS includes rock crevices and exfoliating sheets of weathered sandstone that they utilise during the cooler months.

An independent herpetology expert consulted on the subject of the BHS, Dr Arthur White (2013), found that despite the extent of the sandstone exposures in the study area, the amount of potential habitat for the BHS was minimal in comparison. He considered many of the sandstone areas not to be snake habitat as they are devoid of exfoliating rocks and lack suitable crevices or cracks (White, 2013). In these areas the sandstone is fine-grained and as this sandstone weathers, it does not crack or peel, but sheds sandstone grains as loose dust.

Consequently, there were no associated surface rocks to be found, nor any talus scree suitable for BHS habitat, and the lack of exfoliation and the absence of surface rocks is considered to be a major habitat deficiency.

Furthermore, the relative lack of prey species along most of the sandstone areas also implies that the snakes are likely to be very scarce in this area (White 2013). For this reason, a blanket 300 m buffer zone to allow for potential foraging habitat from all sandstone areas is not considered to be warranted, particularly in areas that provide poor quality habitat for the BHS.

There are no verified local populations of the BHS known to occur in or adjacent to the Modification Boundaries. Dr Jonathon Webb, who has surveyed the BBSF for the snake in the past, agrees that the BHS habitats of this area are in poor condition. Dr Webb also notes from past experience that past collections of the species made by illegal reptile collectors has diminished occurrences in the region. As such we believe there is no verified local population of the species in the Modification Boundaries.

Despite a lack of suitable habitat and no verified local population of the species in or near the Modification Boundaries, Coalpac has applied the precautionary principle in maintaining a substantial potential foraging habitat zone adjacent to the Escarpment at Invincible Colliery. The Escarpment area at Invincible Colliery has the highest potential to provide suitable habitat for the BHS, and has connectivity to likely habitat further to the east on the sandstone plateaux. As such the Modifications have maintained a suitable buffer zone between open cut mining and the Escarpment at Invincible Colliery which is significantly larger than the OEH recommended 200m or 300 m setback would provide (see **Figure 9**). This increased buffer zone will provide 200 ha of potential foraging habitat for the BHS.

If the 300 m setback were to be applied, only 142 ha of potential foraging habitat for the BHS would be preserved. As such, the buffer zone resulting from the mine plans proposed for Invincible Colliery under the Modifications includes 58 ha of additional foraging habitat for the BHS than a strict 300 m buffer zone would provide. The commitment to the proposed buffer zone will also substantially increase the connectivity of habitats provided by the Escarpment area to the east of Invincible Colliery that will remain available for the BHS and other threated species such as the Brush-tailed Rock Wallaby, Large-eared, Pied Bat and Eastern Bentwing-bat.

In areas of the open cut mine plan that are adjacent to Escarpment areas that are unlikely to provide suitable BHS winter habitat, such as those adjacent to the Cullen Valley Mine Modifications, a smaller buffer area has been provided.

5.4.4 Adequacy of Biodiversity Offsets

In their submission Colong Foundation is of the view that the offsets proposed for the Modifications lack credibility, being inadequate to replace a Gardens of Stone Stage 2 reserve over Ben Bullen State Forest due to a lack of overall connectivity, the distance between some of the proposed offsets to the Modification disturbance areas and the need to extensively rehabilitate portions of other properties.

Response

In consultation with OEH, the BOP proposed in the Modifications EA has also been independently reviewed post-submission of the Modifications EA. A summary of these discussions and the revisions to the biodiversity offsets proposed for the Modifications is included in **Section 4.2.2**. The use of the BioBanking Assessment Methodology in this review includes a range of measures to ensure that factors associated with vegetation and habitat quality, connectivity, distance and rehabilitation values into account.

As noted in **Section 5.2.5** and **Section 5.2.6**, Coalpac will continue to establish and support existing rehabilitation and offset areas for the Modifications. The proposal also provides for the backfilling of the residual final voids at the site which will ultimately allow for a final landform consistent with the surrounding landscape to be developed and considered for inclusion in any future proposal for the Gardens of Stone Stage 2.

5.4.5 Aboriginal Archaeology and Cultural Heritage

The Colong Foundation state that the Aboriginal cultural heritage assessment lacks credibility because it did not find a cave art site in the highwall disturbance area for the Cullen Valley Mine Modification.

Response

A response to this has been provided in detail in **Section 5.10.1**.

5.4.6 Rehabilitation Effectiveness

The Colong Foundation object to the claims made by Coalpac that viable ecosystems can be re-established in areas of native forest or farmland or after open cut mining has been undertaken. It is also noted that mature woodland has never been re-established by mine rehabilitation.

Response

The current condition of the abandoned Renown open cut mining area at Invincible Colliery provides a local example which demonstrates that areas disturbed by open cut mining can be re-established to mature native woodland communities. The abandoned Renown open cut was mined between 1946 and 1954 by various parties but most notably the Australian Army during the 1949 coal miners' strike.

It should be noted that at that time it was not common practise to attempt any rehabilitation and the mature woodland community at abandoned Renown open cut has re-established without any reshaping, direct seeding, fertilising or other rehabilitation assistance as is used today. The mature woodland community now present on the site has re-established on its own accord over time and was identified as having such a high level of ecological value that, at the request of DP&I, the area was included in the Invincible Colliery BOP in 2008 (see **Plate 7**). The Capertee Stringybark has also re-established itself as part of this vegetation community.

There are other historic mining areas located in the Lithgow LGA that have recovered in a similar way to the abandoned Renown open cut. One such example is the long abandoned mining and oil refining operation located at Newnes in the Wolgan Valley (see **Plate 8**). Industrial operations at the site largely ceased during the 1920s, with minor works occurring opportunistically up until the 1950's.

The Wollemi National Park was formed in 1978. This included most of the land surrounding Newnes, including all the old mining leases, the abandoned mines and the industrial works. In 1994, extensions to the National Park saw further areas at Newnes taken up, although the hotel and some land to the north and south of the town are still privately owned. The inclusion in the Wollemi National Park highlights that the former industrial area at Newnes is slowly returning to pre-mining forest and woodland vegetation.

It is reasonable to conclude that, based on the extensive work undertaken at Invincible Colliery and Cullen Valley Mine in the initial establishment of existing rehabilitation, the long term ecological value of the rehabilitated areas will return to vegetation communities to levels comparable to these abandoned mining sites. There is already early evidence of native vegetation communities developing to reclaim the existing rehabilitated areas at Invincible Colliery and Cullen Valley Mine, as shown on **Plate 1** to **Plate 6** in **Section 5.2.5**.

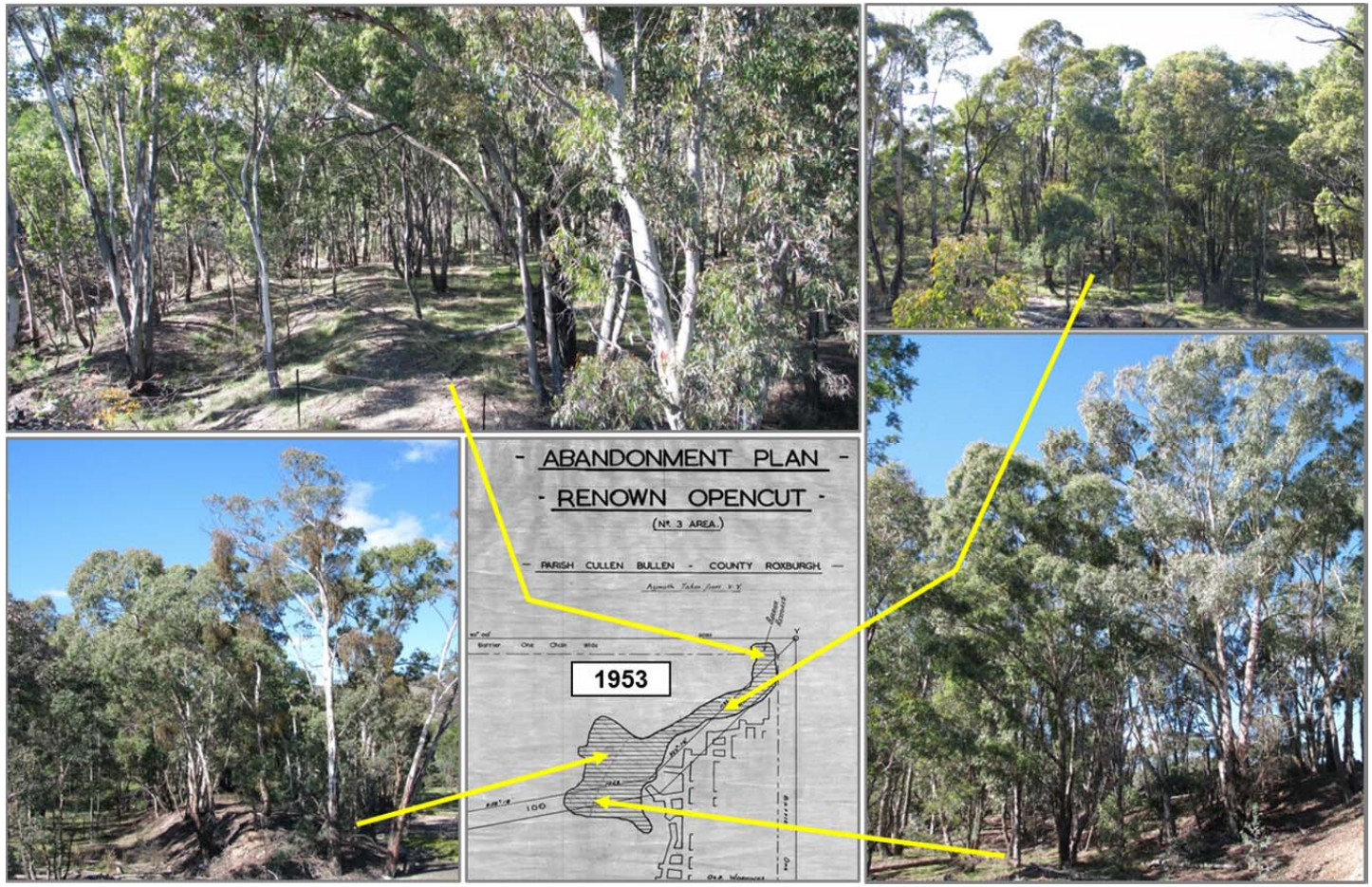


Plate 7

Mature woodland vegetation at the abandoned Renown Colliery open cut mine site that was last worked in 1953

Plate 7 *shows how woodland species, including Capertee Stringybark, have re-established over the previous open cut mining area over the last 60 years. The area is also well used by wombats with a healthy colony in residence.*

Plate 8

The site of the Newnes historical mining and oil refining operation

Once denuded of vegetation, the area has returned to a forest and woodland community. The vegetation communities naturally re-colonised themselves from adjacent woodland areas; the site was not rehabilitated as it was not common practice at the time.

Coalpac has offered up 118 ha of land as biodiversity offsets for its currently approved mining operations at Invincible Colliery. Part of this land included previously cleared sheep and cattle grazing properties such as Renown Farm and "Lots 112 and 113". Global Soil Systems, specialist land management consultants, were commissioned in May 2013 to review the status of the biodiversity offset land. The review found that of the 118 ha of land only 12 ha (10%) was recommended for supplementary tree planting. This recommendation was largely due to of the extensive natural regeneration of native trees that are re-establishing themselves throughout the biodiversity offset property.

Livestock has been removed from the properties for the past six years (since 2008) and ongoing weed management including spraying and slashing has enabled native trees and grasses to regenerate. Evidence of the successful natural regeneration and the early stages of the reclamation of these farmland areas by native vegetation communities can be seen in **Plate 9** and **Plate 10** below. It is not unreasonable to expect these species would also ultimately re-establish their dominance of this area and would mature into a woodland community that is consistent with others in the local area.

A further example of woodland being established on previously mined areas is the rehabilitation area at MPPS which demonstrates 18 year old rehabilitated land. There is evidence of strong growth of native species including Eucalypt and acacia species which occur locally in adjacent native woodland forest. The size class of over story species is progressing towards comparable sizes with adjacent forest areas. The diversity and varying age class of the rehabilitated area provides a range of habitat for native fauna. A compilation of photos of the rehabilitation at MPPS is included in **Appendix L**.

More generally, the ability of lands proposed to be disturbed for the Modifications to ultimately be rehabilitated to mature forest and woodland communities is described in Section 6.17 of the Modifications EA, with a further discussion included in **Section 5.2.5** of this RTS.

Plate 9
Regeneration of Eucalyptus species on farmland at Invincible Colliery (Lot 112 offset)

Plate 10
Capertee Stringybark and saplings at Invincible Colliery (Lot 112 offset)

5.4.7 Quality of the Coal Resource

The Colong Foundation raise a number of concerns in their submission regarding the coal resource proposed to be extracted for the Modifications and its overall economic viability.

Response

A response to this issue is provided above in **Section 5.3.10**.

5.4.8 Alternative Sources of Coal for Power Stations

The Colong Foundation submission notes that the Modifications are not required for the ongoing supply for MPPS, stating that there are alternative resources available in the region to supply MPPS in the long term.

Response

A response to this issue is provided above in **Section 5.3.11**.

5.4.9 Groundwater Assessment Information

In their submission, Colong Foundation note apparent contradictions between statements made in the surface and groundwater reports for the Modifications, noting the potential for discharge of toxic mine water to surrounding surface waters.

Colong Foundation also notes the potential implications for Coalpac of the cessation of groundwater pumping at Baal Bone Colliery (to the north of Invincible Colliery), intercepting the old underground workings during mining proposed for the Modifications. Colong Foundation also recommends that the Long Swamp bore (previously in operation for Invincible Colliery) should be decommissioned.

Response

A summary of the supplementary reports on the management of surface water and groundwater for the Modifications undertaken post-submission of the Modifications EA is presented in **Section 4.5**.

The Long Swamp Bore discharge location referred to in the submission from LEG has been removed from EPL 1095 since November 2012. Coalpac cannot discharge water from this location into Long Swamp.

In relation to the potential for discharge of water from Invincible Colliery and Cullen Valley Mine, the EPA has confirmed that the existing conditions of the respective EPLs held for each operation are appropriate for the ongoing management of this issue (see **Section 4.1.2**).

5.4.10 Subsidence Impacts

In their submission the Colong Foundation objects to the proposed use of highwall mining for the Modifications due to potential damage to geological features. Colong Foundation contend that the impact assessment undertaken for the Modifications EA does not consider the cumulative impact of the old workings and the effects of sequential highwall mining.

Response

Coalpac has undertaken a detailed design and modelling process for the highwall mining activities proposed for the Modifications. A summary of this process and discussion on potential for surface subsidence impacts is provided in **Section 4.2.6**.

5.5 CULLEN BULLEN LIFESTYLE GROUP

5.5.1 Modification EPBC Referrals

In their submission the Cullen Bullen Lifestyle Group (CBLG) note that from their reading of the EPBC Referral documents submitted to DoE, it appears the Modifications are part of a larger project and note their concern that Cullen Bullen could find itself surrounded by open cut coal mines as a result.

Response

CBLG's interpretation of the EPBC Referral documents is not correct. Coalpac is currently only seeking approval for the extensions to Invincible Colliery and Cullen Valley Mine as described and assessed in the Modifications EA.

5.5.2 Alternative Sources of Coal for Power Stations

The CBLG submission notes that the Modifications are not required for the ongoing supply for MPPS, stating that there are alternative resources available in the region to supply MPPS in the long term, including Baal Bone Colliery and existing Centennial Coal operations.

Response

A response to this issue is provided above in **Section 5.3.11**.

5.5.3 Impacts to Pagoda Landforms

The CBLG submission notes that the Modifications will impact on pagodas that have previously been identified by the NSW PAC as worthy of protection due to their unique landform values. CBLG also note that Coalpac has guaranteed that these features will not be damaged by the Modifications.

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

5.5.4 Blast Assessment Procedure

In their submission, CBLG note the dissatisfaction in the local community with the process of investigating blast damage claims by the independent assessment process.

Response

Coalpac commissions such independent assessments in response to requests from landowners in accordance with regulatory requirements. This includes Coalpac following a procedure as part of its Blast Management Plan to ensure any claims are investigated by an independent, suitably qualified assessor which can be selected from an approved list by the landowner. This ensures a fair and reasonable assessment is undertaken. Any changes to the process for investigation of blast damage claims are a matter for the relevant regulatory agencies.

Where the operations of either of the mines are found to be the likely cause, repairs are affected at Coalpac's cost. Coalpac does not pay for repairs where damage is found to be due to the construction of the property, its age or its foundations. This is in accordance with the conditions of our current approvals under PA 07_0127 and DA 200-5-2003.

5.5.5 House Pricing

In their submission, CBLG note the apparent correlation between value of properties in the area assets with and without mining at Invincible Colliery and Cullen Valley Mine.

Response

Noted.

5.5.6 Health Impacts

In their submission, CBLG confirm that their most significant concern for objection to the Modifications is the potential for impacts to the health of Cullen Bullen residents. CBLG also note that regulatory compliance criteria may be out of touch with local impacts at Cullen Bullen.

Response

Sections 6.1, 6.4 and 6.5 of the Modifications EA provided a summary of the detailed air quality and acoustic impact assessments undertaken for the proposals. These assessments confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality and acoustic impacts to receivers in the township of Cullen Bullen would continue to be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.6 CULLEN BULLEN TIDY TOWNS

5.6.1 Economic Impacts

In their submission, Cullen Bullen Tidy Towns (CBTT) notes the importance of the Modifications in their view in providing a source of income in the local district. In providing their support, CBTT also cite Coalpac's prior contributions to local community projects and efforts in rehabilitating existing disturbed areas of their operations.

Response

Coalpac notes the CBTT's support for the Modifications.

5.7 ENERGYAUSTRALIA

5.7.1 Coal Supply to MPPS

In supporting the Modifications, EnergyAustralia note in their submission that the Modifications are critical in providing a short term supply of competitively priced coal to MPPS while alternative longer term options are secured. EnergyAustralia go on to note that any alternative supplies currently available for MPPS are likely to result in an increase to the coal price, which could lead to increased costs for retail customers and to the local economy more generally.

EnergyAustralia also noted that other potential sources of coal supplies for MPPS require further planning approvals to continue supply in the short to medium term.

Response

It is noted that the position of EnergyAustralia as the owner of MPPS is at odds with a number of submissions from other SIGs that contend that other sources of coal for MPPS are available to replace any shortfall that may occur if the Modifications were not approved (see **Section 5.3.11**). This reiterates the economic importance of the Modifications to the region and the State of NSW and is consistent with advice provided to DP&I from DRE.

5.7.2 Coalpac's Impact on the Regional Economy

In their submission, EnergyAustralia also note the significance of the mining sector to the economy of the Lithgow region and the net socio-economic benefit that Coalpac would provide to the local, regional and NSW economy of if the Modifications were approved.

Response

Coalpac notes the EnergyAustralia's support for the Modifications.

5.7.3 Maximising Value of Regional Coal Reserves

In their submission EnergyAustralia note that the Modifications represent an efficient use if a known coal resource, being in such close proximity to its primary end user in MPPS. The beneficial economic and environmental outcomes achieved by the extension of the existing Coalpac operations in comparison to the development of a new mining project of a similar nature is also outlined.

In their submission, EnergyAustralia also confirm that the quality product coal produced by the Modifications is of appropriate quality for use by MPPS.

In their submission, EnergyAustralia also state that the provision of coal from the Modifications to MPPS would not occur at the expense of other potential coal suppliers in the region as these operations have the required approvals and infrastructure in place to allow sale of their product coal to export markets.

Response

Coalpac notes the EnergyAustralia's support for the socio-economic benefits of the Modifications. It is noted that confirmation by EnergyAustralia that coal proposed to be provided by the Modifications to MPPS is of appropriate quality is at odds with a number of submissions from other SIGs (see **Section 5.3.10**).

5.8 ENVIRONMENT LIAISON OFFICE

5.8.1 Impacts to Pagoda Landforms

A key point raised by the ELO in their submission to the Modifications is that the Modifications will result in a significant adverse impact to the nearby pagoda landform within the western portion of the Ben Bullen State Forest. ELO consider that the area should also be protected due to the potential for impacts to vegetation communities and threatened flora species which form an integral part of these landforms.

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

5.8.2 Inadequacy of Biodiversity Offsets

In their submission ELO contend that the biodiversity offsets are inadequate to compensate for the impacts of open cut mining proposed for the Modifications. These objections were raised based on the perceived due to the fragmented nature of the offset properties, vegetation types present in the offset properties and the lack of habitat and records for threatened species predicted to be impacted.

Response

The BOP proposed in the Modifications EA has also been independently reviewed post-submission of the Modifications EA, in consultation with OEH. A summary of these discussions and the revisions to the biodiversity offsets proposed for the Modifications is included in **Section 4.2.2**.

5.8.3 Rehabilitation Effectiveness

In their submission ELO also make reference to the views of the CCP PAC review that found that the biodiversity characteristics of the area proposed to be disturbed cannot be replicated by rehabilitation and note that Coalpac's claims are at odds with this conclusion.

Response

The ability to ultimately rehabilitate areas proposed to be disturbed for the Modifications to mature forest and woodland communities is described in Section 6.17 of the Modifications EA, with a further discussion included in **Section 5.2.5** of this RTS.

5.8.4 Quality of the Coal Resource

In their submission ELO note that in their view, the poor quality of the coal resource proposed to be provided to MPPS for the Project is unsuitable for MPPS and not required for the ongoing operation of that facility.

Response

A response to this issue is provided above in **Section 5.3.10** and **Section 5.3.11**.

5.8.5 Aboriginal Archaeology and Cultural Heritage

ELO state that the recent identification of an Aboriginal cave art site in an area where no such site had previously been located raises serious questions as to the thoroughness of the environmental assessments commissioned by Coalpac.

Response

A response to this has been provided in detail in **Section 5.10.1**.

5.9 HAWKESBURY ENVIRONMENT NETWORK

5.9.1 Opposition to the Modifications

The Hawkesbury Environment Network strongly object to the proposed Modifications due to the potential for permanent damage to the unique natural resource qualities of the local area, local biodiversity and the unsustainable nature of the coal mining industry.

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

5.10 LITHGOW ENVIRONMENT GROUP

5.10.1 Aboriginal Archaeology and Cultural Heritage

LEG also objects to the Aboriginal archaeological and cultural heritage assessment for the Modifications, stating:

> *"The Aboriginal cultural heritage assessment lacks credibility because it did not find a cave art site in the highwall disturbance area for the Cullen Valley Mine proposed modification. The claim (EA, p. 109) that no Aboriginal archaeological sites or artefacts have been located in the Modification Disturbance Boundary at Cullen Valley Mine is incorrect. (Colo, Colong, NCC, NSW Heritage Network, Stop Coal Seam Gas Blue Mtns).*
>
> *The recent discovery of an Aboriginal cave art site that was not previously recorded in Coalpac's archaeological survey raises serious questions about the thoroughness of the company's environmental assessment. Coalpac incorrectly claimed that there are no Aboriginal art sites in the modification areas. (Environment Liaison Office).*
>
> *This Cave Art site is clearly within the proposed Disturbance Area of Cullen Valley Mine, and LEG has serious concerns that mine subsidence induced by highwall mining beneath this escarpment will destabilise the cliffs and collapse this cave, resulting in the permanent loss of irreplaceable Cave Art and potentially other yet to be reported/recorded habitation sites, cave art sites, and aboriginal artefacts.*
>
> *Further, LEG has been approached by members of the aboriginal community in the Windy Gully Road area of Cullen Bullen. They have raised concerns about a cave art site in that vicinity, as well as a trail of 'white rocks' which apparently mark a traditional walking path. This area is likely to be impacted by highwall mining in the proposed Invincible Open-cut area. Yet LEG can find no mention of either of these aboriginal heritage items in the EA?*
>
> *LEG questions the veracity of the Aboriginal Heritage Assessment for the Proposal, and formally requests –*

- *An independent Aboriginal Archaeological and Cultural Heritage Impact Assessment of the Aboriginal Cave Art Site within the proposed Disturbance Area and including edge-effects of Cullen Valley Mine at Latitude -33.265050°, Longitude 150.028320°;*
- *A comprehensive re-assessment of other unidentified Potential Habitation sites, rock shelters, and caves within the proposed Disturbance Area of Cullen Valley Mine;*
- *A comprehensive re-assessment of all potential Archaeological & Cultural Heritage Sites, including edge-effects, in the Windy Gully Road area of Cullen Bullen; and*
- *A comprehensive re-assessment of all potential Aboriginal Heritage Sites within the proposed Disturbance Area's, including edge-effects, of Modification 4 – Invincible Mine (07_0127 MOD 4), and Modification 2 – Cullen Valley Mine Extension (DA 200-5-2003 MOD 2)."*

Response

In its submission, LEG provides a detailed description and photographs of what is claimed to be an 'Aboriginal Hand Stencil' in a cave located in the Modification Boundary at Cullen Valley Mine during an inspection of the area on 6 April 2014. A number of other organisations including the Colo Committee, Colong Foundation for Wilderness, NSW Heritage Network, Stop Coal Seam Gas Blue Mountains, ELO and the NCC also make reference to this site in their submissions and question the credibility of Coalpac's Aboriginal archaeological and cultural heritage impact assessment (AACH Impact Assessment). In addition to this, a number of submissions from individuals also refer to this site and the credibility of the AACH Impact Assessment.

Aboriginal Archaeological Assessment

A comprehensive AACH Impact Assessment over the proposed Modification Boundary at Cullen Valley Mine and Invincible Colliery has been undertaken by AECOM Australia Pty Ltd (AECOM) and documented in their report dated 9 November 2011. The assessment was undertaken in accordance with the Department of Environment, Climate Change and Water (now OEH) *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (2005) and *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010) (Aboriginal Consultation Guidelines 2010).

The AACH Impact Assessment involved the cooperation of five local Aboriginal stakeholder groups represented by 10 Aboriginal community members that were involved throughout the process, including the 21 days of field survey work undertaken.

Given the level of assessment and high degree of input from the local Aboriginal community representatives, it is disappointing that a number of groups and individuals have openly criticised this assessment. Coalpac does not support these claims and stands by the findings and recommendations made for the protection and preservation of Aboriginal archaeology and cultural heritage at Invincible Colliery and Cullen Valley Mine. It is considered that a comprehensive and thorough assessment of the area has been made, as documented by AECOM, and that any criticisms of the credibility of these survey efforts are unfounded.

Cullen Valley Cave Art Site 1

Based on the findings from the AACH Impact Assessment 2010 by AECOM, Coalpac is not aware of any Aboriginal cave art site located in the Modification Boundary at Cullen Valley Mine.

Despite this original finding and in light of the claim made by LEG and numerous other organisations and individuals, Coalpac engaged AECOM to re-survey the site in May 2014. A copy of the investigation and assessment of this site is included in full in **Appendix K**.

The AECOM assessment of the Cullen Valley Cave Art Site 1 found that:

- The site is characterised by an overhang which is typical of the area;
- This overhang has limited potential for habitation;
- The site was inspected by two qualified archaeologists and three representatives of the Aboriginal community on 9 December 2010 as part of the AACH Impact Assessment, and the stencil was not there at this time;
- The image is a modern replica of a traditional Aboriginal hand stencil that has been made within the last 3.5 years (maximum) (AECOM, 2014);
- It is a questionable hand stencil which does not exhibit any of the hallmarks of a traditional Aboriginal hand stencil (choice of pigment, application of pigment, choice of canvas, etc). The entire cave overhang area was reassessed by AECOM and again found not to contain any definitive traditional Aboriginal rock art; and
- The site should not be considered to be of heritage significance.

Based on the investigation and findings from the assessment, AECOM have recommended that Cullen Valley Art Site 1:

- Does not require any specific or additional management or mitigation measures be applied to the Modification to protect the site;
- Should not be added to the AHIMS database as representing a traditional Aboriginal cave art site and hand stencil.

It should be noted that Aboriginal stakeholders have previously requested that Coalpac not disclose the locations of cave art sites in public documentation. As such, the locations of sites of this type have not been included on any publically available plans within technical reports and other related documentation.

Coalpac is concerned that the publication of the exact locations of known and newly discovered Aboriginal cave art sites can lead to increased visitors to the area, potentially contributing to the degradation of these sites.

The Aboriginal archaeology and cultural heritage impact assessment methodology adopted for the Modifications is therefore considered appropriate and has been effectively conducted.

Based on the findings and recommendations from Archaeological specialists as outlined in their assessments discussed above, Coalpac does not agree that the AACH Impact Assessment lacks '*veracity*' or '*credibility*' as claimed by LEG, other organisations and some individuals in their submissions on the Modifications EA.

The reporting of Cullen Valley Cave Art Site 1 by LEG as a traditional Aboriginal cave art site of heritage significance and its attempt to register this site on the AHIMS database has likely contributed to the number of submissions referring to this matter. Unfortunately these organisations and individuals that have commented on this matter appear to have been provided with inaccurate and incorrect information about the site.

In any event, as discussed in **Section 4.2.6**, highwall mining will be conducted in a manner that will not impact on the Cave Art Site 1 regardless of its heritage status.

The Windy Gully area is located to the west of Invincible Colliery. Highwall mining will be more than 800m away from Windy Gully at its closest point, and open cut mining will be greater than 1 km away. There are no recognised Aboriginal cultural heritage sites registered in the AHIMS database in the vicinity of Windy Gully (AECOM, 2011). Any potential Aboriginal cultural heritage sites will not be impacted by the Modifications. As noted above, Coalpac have consulted with local Aboriginal community stakeholders as part of the AACH Impact Assessment to ensure that any potential impacts to significant Aboriginal archaeology and cultural heritage sites are identified and mitigated.

Mining activities for the Modifications will continue to be carried out in accordance with the approved Aboriginal Cultural Heritage Management Plans for Invincible Colliery and Cullen Valley Mine, in consultation with Aboriginal community groups and OEH to the satisfaction of DP&I.

5.10.2 Non-Aboriginal Heritage

In their submission, LEG makes reference to several sites and items of Non-Aboriginal heritage in the area surrounding the Modifications. These items include the Tyldesley Trig, several historic open mineshafts [locations not specified by LEG] *and a potentially historic saddle in a cave in the Invincible Colliery area* [location not specified by LEG].

LEG questions the veracity of the Non-Aboriginal heritage impact assessment and how the location of these sites corresponds to the statement that "no impacts to known items of non-Aboriginal heritage will occur in as a result of the Modifications."

Response

The Non-Aboriginal heritage desktop and field surveys assessments of the areas within the Modification Project Boundaries proposed for Invincible Colliery and Cullen Valley Mine were undertaken with the objective of locating any items or sites of significance that have the potential to be directly or indirectly impacted for by the proposed Modifications.

No such sites were identified within the respective Modification Disturbance Boundaries. The Tyldesley Trig lies outside of the proposed Modifications Disturbance Boundary and has not been previously undermined by highwall mining as stated.

Regular surveys are undertaken of all recorded mine shafts which occur on Coalpac tenements. Where necessary, stabilisation or infill works have been undertaken. During a meeting with the LEG in February 2014 the comment was made by LEG representatives that additional unrecorded mineshafts were present in proximity of our operations. LEG declined to provide the location of such features and Coalpac have not been able to locate any additional mine shafts in the Modifications Disturbance Boundary. As such, the above statement from Section 6.16.4 of the Modifications EA as referred to in LEGs' submission remains accurate.

Further to the above, Section 6.16.4 of the Modifications EA also confirms that Coalpac will consult with relevant authorities to determine appropriate management actions in the unlikely event that additional heritage items are located within the areas of disturbance proposed for the Modifications.

5.10.3 Inadequacies in the Flora Assessment

In their submission, LEG (who also include Colong, BMCS and the NSW PAC in their allegations) raised concerns regarding the quality, adequacy and accuracy of the ecology assessment for the Modifications. LEG also allege that the work done by the Modifications ecology consultant is wrong at other high profile projects in NSW.

Response

Coalpac and Hansen Bailey are confident that the flora survey effort for the Modifications is of a high standard. The vegetation of the impact areas has now been mapped not only by Cumberland Ecology, but also by OEH officers (Shepherd et al, 2012). Moreover, the vegetation of both the Modifications and the proposed biodiversity offsets has been independently examined and surveyed by ELA for the purposes of the informal BioBanking Assessment (ELA, 2014).

Although some minor differences in the mapping of the various vegetation groups have been identified as the knowledge base has been further developed, there is good agreement about the vegetation within the proposed impact areas and proposed biodiversity offsets.

A discussion on the ecology survey effort undertaken for the Modifications is provided in **Section 4.2.9**.

5.10.4 Impacts to Endangered Ecological Communities

In their submission LEG comment that three vegetation communities listed as EECs will be impacted by the Modifications, including Box Gum Woodland, Frost Hollow Woodland, and Montane Peatlands and Swamps.

Response

A response to this issue is provided above in **Section 4.2.11**.

5.10.5 Impacts to Threatened Flora Species and ROTAP

In their submission, LEG allege that the Modifications EA fails to consider the assessment of specific threatened and ROTAP species with the potential to occur in the disturbance areas proposed for the Modifications. LEG request additional targeted searches for relevant threatened flora and ROTAP species are undertaken.

Response

A review of the key threatened (under the TSC Act or EPBC Act) and ROTAP species listed by LEG and a number of SIGs who made submissions on the Modifications was undertaken by CE (see **Appendix E**). This review was conducted to reassess any potential for significant direct or indirect impacts from the proposed Modifications on the following species:

- *Persoonia marginata* (Clandulla geebung);
- *Eucalyptus cannonii* (Eucalyptus cannonii);
- *Eucalyptus aggregata* (Black Gum);
- *Thesium australe* (Austral Toadflax);
- *Prostanthera cryptandroides subsp. crytandroides*;
- *Genoplesium superbum*;
- *Derwentia blakelyi*;
- *Leionema lamprophyllum subsp. orbiculare* (ROTAP);
- *Leucochrysum graminifolium* (ROTAP);
- *Philotheca obovalis* (ROTAP);
- *Acacia asparagoides* (ROTAP);

- *Banksia penicillata* (ROTAP);
- *Eucalyptus apiculata* (ROTAP);
- *Prostanthera hindii* (ROTAP); and
- *Pseudanthus divaricatissimus* (ROTAP).

The key threatened (under the TSC Act or EPBC Act) and ROTAP species were appropriately considered and it was found that the proposed Modifications will not result in significant direct or indirect impacts to the species listed in the submissions from SIGs. The known locations of threatened flora and ROTAP species in the area are shown above in **Figure 11** and **Figure 12**, respectively.

5.10.6 Impacts to Threatened Fauna

In their submission LEG note the presence of at least eight threatened fauna species in the Ben Bullen State Forest that would be impacted by approval of the Modifications, including the Broad-headed Snake, Large-eared Pied Bat and Eastern Bent-wing Bat. LEG also assert that no evidence was presented in the Modifications EA to justify mining within the 500 m setback distance for these species as recommended by OEH in their submission to the CCP PAC.

Response

Each of the threatened species noted in the LEG submission was discussed by CE (2014) in the ecological impact assessment for the Modifications, either as it had been previously identified in the area, or was considered to have the potential to occur as a result of local conditions, vegetation communities and habitat quality.

A discussion on the proposed buffer zone between the existing and proposed open cut mining areas at Invincible Colliery and the Escarpment to the east (provided to avoid the significant habitat areas for threatened fauna noted by OEH) is provided in **Section 4.2.4**.

5.10.7 Inadequate Biodiversity Offsets

In their submission, LEG object to the BOP proposed for the Modifications on a number of grounds, chiefly that the proposed package is not 'like for like', that the ecological impact assessment does not provide adequate data to allow an assessment of its adequacy (as noted by the CCP PAC review).

Response

ELA (2014) were engaged to conduct an independent informal BioBanking assessment covering both the proposed impact areas and the proposed offset properties. This assessment was undertaken in line with the current BioBanking Assessment Methodology (BBAM) guidelines (OEH, 2011) to quantify the biodiversity losses from the Modifications compared to the biodiversity gains which will be realised from the proposed biodiversity offset strategy. The additional work undertaken in line with OEH guidelines provides more

than sufficient data to assess the adequacy of the BOP. Coalpac has put forward a robust BOP for the Modifications, which has been further enhanced following a completion of a preliminary informal BioBanking assessment by ELA (2014). The ELA assessment utilised a recognised metric as an indicator to quantify the biodiversity losses from the Modifications compared to the biodiversity gains which will be realised from the proposed biodiversity offsets strategy.

A summary of these discussions and the revisions to the biodiversity offsets proposed for the Modifications is included in **Section 4.2.2**.

5.10.8 Subsidence and Blast Impacts to Pagoda Landforms

In their submission LEG also notes that:

> *"The highwall mining of an additional 165 hectares will dry out and degrade the moist forests of this complex located below the escarpments. This desiccation will cause a loss of understorey species, such as orchids and ferns. Highwall mining will place cliffs, pagodas and Aboriginal heritage at risk of damage through subsidence and blasting during and following such coal mining."*

Response

A response to the issues raised regarding the potential for blast impacts and instability of the highwall mining workings proposed for the Modifications have been addressed in the response to OEH (see **Section 4.2.5** and **Section 4.2.6**). A response to the concerns raised by LEG regarding the potential for desiccation of overlying areas has been addressed in the response to the Colo Committee in **Section 5.3.4**.

5.10.9 Inadequate Rehabilitation

LEG's submission also rejects Coalpac's claim that viable native forest and woodland ecosystems can be re-established on farmland or after open-cut mining. LEG also noted that no mature woodland has ever been established on a mine rehabilitation area and refer to the findings of the CCP PAC that also noted that areas cannot be returned to their pre-existing landforms and the biodiversity characteristics of rehabilitated areas cannot replicate the existing characteristics and will inevitably be less diverse and less species rich.

Response

Local examples of the rehabilitation of forest and woodland communities following the completion of active agricultural or open cut mining operations are described above in **Section 5.2.5**.

The ability to ultimately rehabilitate areas proposed to be disturbed for the Modifications to mature forest and woodland communities is described in Section 6.17 of the Modifications EA, with a further discussion included in **Section 5.2.5** of this RTS.

5.10.10 Impacts to World Heritage Values

In their submission, LEG refers to the support of a proposal for the establishment of the Gardens of Stage 2 proposal from the NSW Department of Environment and Conservation (2006) in 2006. Under this proposal, in incorporation of the Ben Bullen State Forest into the Conservation Estate was considered.

It is the view of LEG that the protection of the geodiversity, cultural heritage and scenic values of the Ben Bullen State Forest is an important initial step in the re-nomination process for World Heritage status and that the mining operations proposed for the Modifications would be contrary to NSW, Commonwealth and GBMWHA Committee plans for the area.

Response

The potential incorporation of the BBSF into the NSW Conservation Reserve (as a State Conservation Area or as an addition to National Park, etc) is a policy matter for the NSW Government and requires whole-of-Government approval, which is currently not forthcoming. A further discussion on this issue in response to OEH's submission is provided in **Section 4.2.3**.

5.10.11 Water Impacts

In their submission, LEG make reference to a series of earlier water impact assessment and management studies from several other mining operations in the region and notes the significant impacts to downstream water quality that occurred as a result of metal leachates and acid rock drainage. LEG finds that these reports confirm that the conclusions drawn on water quality impacts of the Modifications are therefore a cover-up and that the proposed management measures are inappropriate, having failed at other sites in the local area.

Response

The assertions of LEG that the findings and recommendations for the management of water quality in the groundwater (AGE, 2014) and surface water (WRM, 2014) impact assessments undertaken in support of the Modifications EA are strongly rejected. These studies are considered to provide a detailed, site specific assessment of the potential impacts to water quality and resources as a result of the Modifications. A response to the issues raised by NOW (the relevant NSW regulatory agency) in their review of the draft Modifications EA is provided in **Section 4.5**.

In addition the allegations of the potential for Acid Mine Drainage (AMD) are not valid, as the supporting information is based on test results from an adjacent development to the north of Cullen Valley Mine (at the Baal Bone Junction with the main railway line) that was excavating rocks below the Lithgow Seam (which will not occur for the Modifications). As such, these rocks will not be exposed by mining for the Modifications and cannot therefore lead to any AMD potential.

5.10.12 Intensification of Mining Approvals and Weakening of Consent Conditions

The submission from LEG also objects to the reduced nature of the Modification applications in light of earlier decisions made by the NSW PAC and DP&I on the CCP Application (now withdrawn). LEG seeks clarification whether the CCP will be revisited in a series of "…numerous small bites."

Response

If approved, the Modification applications would only allow the continuation of mining operations at Invincible Colliery and Cullen Valley Mine as described in the Modifications EA. Any future applications submitted by Coalpac or any other proponent would be subject to the State planning assessment process and would be judged on their individual merits at that time.

5.10.13 Dust, Noise and Blasting Impacts

In their submission, LEG note that in their view, the impacts to the amenity of Cullen Bullen due to dust, noise and blasting have been poorly managed, referring to the prosecution of Cullen Valley Mine in 2003 for dust emissions and the proximity of operations to the town.

LEG recommends that a minimum buffer of 3 km is established between Cullen Bullen and any open-cut mining operations to ensure that amenity impacts are appropriately managed.

Response

Sections 6.1, 6.4 and 6.5 of the Modifications EA provided a summary of the detailed air quality and acoustic impact assessments undertaken for the proposals. These assessments confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality and acoustic impacts to receivers in the township of Cullen Bullen would continue to be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.11 NATURE CONSERVATION COUNCIL

5.11.1 Vegetation and Flora Species Impacts

In their submission, NCC note that the proposal will destroy a Grassy Box Woodland – a nationally endangered ecological community, many nationally endangered Clandulla geebung (Persoonia marginata) shrubs, 2,300 threatened Capertee Stringybark (Eucalyptus cannonii) trees and the Leek Orchid.

Response

A response to this issue is provided above in **Section 5.4.2**.

5.11.2 Fauna Species Impacts

In objecting to the disturbance of vegetation communities and threatened flora species that would occur as a the Modifications, NCC note the associated impacts to habitat for fauna species including Lyrebirds, Regent Honeyeaters, Powerful Owls, Spotted-tail Quolls, Squirrel Gliders and the Grey-headed Flying Fox.

Response

Each of the threatened species noted in the submission by NCC was discussed by CE (2014) in the ecological impact assessment for the Modifications, either as it had been previously identified in the area, or was considered to have the potential to occur as a result of local conditions, vegetation communities and habitat quality. The potential for impacts to these species was carefully assessed to determine potential impacts. It was concluded that impacts would not be significant.

5.11.3 Impacts to Pagoda Landforms

In their submission, NCC also notes the adverse impacts that would occur as a result of the Modifications to the Ben Bullen State Forest and the Ben Bullen State Forest area. NCC draws attention to the internationally significant pagoda landform complex in this area and the proposal that the Ben Bullen State Forest be added to the NSW Conservation Reserve.

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**.

The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

The potential incorporation of the BBSF into the NSW Conservation Reserve (as a State Conservation Area or as an addition to National Park, etc) is a policy matter for the NSW Government and requires whole-of-Government approval, which is currently not forthcoming. A further discussion on this issue in response to OEH's submission is provided in **Section 4.2.3**.

5.11.4 Quality of the Coal Resource

In their submission, NCC note that in their view, the poor quality of the coal resource proposed to be provided to MPPS for the Project is unsuitable that there are better substitute resources available in the region that could provide at least 25 years of electricity generation for local power stations.

Response

A response to this issue is provided above in **Section 5.3.10** and **Section 5.3.11**.

5.11.5 Amenity Impacts

In their submission, NCC also object to the proposal on the grounds that the Modifications are less than 2 km from Cullen Bullen and would therefore result in adverse amenity impacts due to poor air quality and noise emissions and negative health outcomes for residents of the township.

Response

Sections 6.1, 6.4 and 6.5 of the Modifications EA provided a summary of the detailed air quality and acoustic impact assessments undertaken for the proposals. These assessments confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality and acoustic impacts to receivers in the township of Cullen Bullen would continue to be limited and would fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.11.6 Aboriginal Archaeology and Cultural Heritage

In their submission, NCC also question the credibility of the Aboriginal cultural heritage assessment presented in the Modifications EA because it did not find a cave art site in the proposed disturbance area for the Cullen Valley Mine Modification.

Response

A response to this has been provided in detail in **Section 5.10.1**.

5.12 NSW HERITAGE NETWORK

5.12.1 Impacts to Pagoda Landforms

In their submission, the NSW Heritage Network strongly objects to the Modifications on the grounds that the proposals would adversely impact a significant pagoda landform complex on the western edge of the Great Dividing Range in the Ben Bullen State Forest. This area should be protected in a state conservation area for nature conservation, recreation and tourism.

It is also noted that the Modifications fail to provide a 300 m buffer zone between the proposed open cut area and nearby rock formations, as recommended by the PAC for the CCP Application [now withdrawn]*.*

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken by Coalpac in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations at Invincible Colliery and Cullen Valley Mine and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

The potential incorporation of the BBSF into the NSW Conservation Reserve (as a State Conservation Area or as an addition to National Park, etc) is a policy matter for the NSW Government and requires whole-of-Government approval, which is currently not forthcoming. A further discussion on this issue in response to OEH's submission is provided in **Section 4.2.3**.

5.12.2 Impacts to Vegetation Communities

In their submission, the NSW Heritage Network also object to the destruction of unique biodiversity as a result of the open cut mining proposed for Modifications, including impacts to a Grassy Box Woodland and nationally endangered plants including the Clandulla geebung and Capertee Stringybark.

Response

A response to these issues is provided above in **Section 4.2.10** and **Section 4.2.11**.

5.12.3 Coal Supply to MPPS

In their submission, the NSW Heritage Network submission notes that the Modifications are not required for the ongoing supply for MPPS, stating that there are alternative resources available in the region to supply MPPS in the long term, including Baal Bone Colliery and existing Centennial Coal operations.

It is also noted that the poor quality of the coal resource proposed to be provided to MPPS for the Project is unsuitable for MPPS and not required for the ongoing operation of that facility.

Response

A response to these issues is provided above in **Section 5.3.10** and **5.3.11**.

5.12.4 Subsurface Heating Management

In their submission, the NSW Heritage Network note the increase in extraction from the underground workings proposed for the Modifications and the failure to address the ongoing fires underground and in waste heaps.

Response

As noted in Section 6.3.4 of the Modifications EA, Coalpac is committed to the ongoing implementation of the existing approved PoW for the management of the existing subsurface heating issue at Cullen Valley Mine. Independent assessment by an approved consultant determined that the PoW has determined that Coalpac has progressed the implementing of the PoW as agreed, to reduce potential impacts to the community and the environment (see **Appendix H**).

The management of the transfer of water between the underground workings proposed for the Modifications at the two mine sites will act to ensure that the water levels in the abandoned Tyldesley Colliery underground workings will be maintained as a key mitigation measure under the PoW.

5.12.5 Health Impacts

In their submission, the NSW Heritage Network also notes that dust from the Modifications will lead to increased morbidity and mortality in the Cullen Bullen community due to dust emissions.

Response

Section 6.1 of the Modifications EA provides a summary of the detailed air quality impact assessment undertaken for the proposals. This assessment confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality impacts to receivers in the township of Cullen Bullen would continue to be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.12.6 Rehabilitation Effectiveness

The NSW Heritage Network in their submission also objects to Coalpac's claim that native forest ecosystems can be rehabilitated on farmland or after open cut mining. It is also noted that no mature woodland has ever been established through mine rehabilitation.

Response

The ability to ultimately rehabilitate areas proposed to be disturbed for the Modifications to mature forest and woodland communities is described in Section 6.17 of the Modifications EA, with a further discussion included in **Section 5.2.5** of this RTS.

5.12.7 Aboriginal Archaeology and Cultural Heritage

The NSW Heritage Network note in their submission that the Aboriginal cultural heritage assessment presented in the Modifications EA lacks credibility because it did not find a cave art site in the proposed disturbance area for the Cullen Valley Mine Modification.

Response

A response to this has been provided in detail in **Section 5.10.1**.

5.13 PARRAMATTA CLIMATE ACTION GROUP

5.13.1 Impacts to Pagoda Landforms

The Parramatta Climate Action Group in their submission object to the Modifications on the grounds that the proposed mine plans ignore the 300 m exclusion zone between open cut operations and pagodas, as recommended by the PAC for the CCP Application [now withdrawn].

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

5.13.2 Impacts to Threatened Vegetation Communities and Flora Species

In their submission, Parramatta Climate Action Group also objects to the destruction of unique biodiversity as a result of the Modifications, including impacts to a Grassy Box Woodland and nationally endangered plants including the Clandulla geebung and Capertee Stringybark.

Response

A response to this issue is provided above in **Section 4.2.10** and **Section 4.2.11**.

5.13.3 Health Impacts

The submission from the Parramatta Climate Action Group also notes that dust emissions generated from the Modifications will lead to increased morbidity and mortality in the Cullen Bullen community.

Response

Section 6.1 of the Modifications EA provides a summary of the detailed air quality impact assessment undertaken for the proposals. This assessment confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality impacts to receivers in the township of Cullen Bullen would continue to be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.13.4 Poor Quality of Product Coal

In their submission, Parramatta Climate Action Group also object to the poor quality of coal proposed to be extracted for the Modifications and the other sources available in the region that could be accessed at a lesser environmental cost.

Response

A response to these issues is provided above in **Section 5.3.10** and **5.3.11**.

5.14 RIVERS SOS ALLIANCE

5.14.1 Impacts to Pagoda Landforms

Rivers SOS Alliance object to the Modifications on the grounds that the proposed mine plans ignore the 300 m exclusion zone between open cut operations and pagodas, as recommended by the PAC for the CCP Application [now withdrawn]*. The proposal will also impact on wildlife and habitats surrounding these features.*

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);

- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

5.15 STOP COAL SEAM GAS BLUE MOUNTAINS

5.15.1 Impacts to Pagoda Landforms

Stop Coal Seam Gas Blue Mountains Alliance object to the Modifications on the grounds that the proposed mine plans ignore the 300 m exclusion zone between open cut operations and pagodas, as recommended by the PAC for the CCP Application [now withdrawn]*. The proposal will also impact on wildlife and habitats surrounding these features.*

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken by Coalpac in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations at Invincible Colliery and Cullen Valley Mine and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

5.15.2 Impacts to Threatened Flora and Fauna Species

Stop Coal Seam Gas Blue Mountains also object to the Modifications on the grounds that it will result in the destruction of unique biodiversity values. Impacts of specific concern to the group include disturbance of Grassy Box Woodland EEC, Clandulla geebung, Capertee Stringybark, the Super Lyrebird, Regent Honeyeater and Powerful Owl.

Response

A response to these issues is provided above in **Section 4.2.10** and **Section 4.2.11**.

5.15.3 Alternate Supply of Product Coal

The Stop Coal Seam Gas Blue Mountains Alliance submission notes that the Modifications are not required for the ongoing supply for MPPS, stating that there are alternative resources available in the region to supply MPPS in the long term.

Response

A response to this issue is provided above in **Section 5.3.11**.

5.15.4 Health Impacts

The submission also objects to the proposal on the grounds that dust emissions generated from the Modifications will lead to increased morbidity and mortality in the Cullen Bullen community.

Response

Section 6.1 of the Modifications EA provides a summary of the detailed air quality impact assessment undertaken for the proposals. This assessment confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality impacts to receivers in the township of Cullen Bullen would continue to be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.15.5 Aboriginal Archaeology and Cultural Heritage

The submission also notes that the Aboriginal cultural heritage assessment presented in the Modifications EA lacks credibility because it did not find a cave art site in the proposed disturbance area for the Cullen Valley Mine Modification.

Response

A response to this has been provided in detail in **Section 5.10.1**.

5.15.6 Water Quality Impacts

A further point of objection is raised that developments such as the Modifications will be likely to produce acid mine drainage and release damaging heavy metals into local streams.

Response

The assertions of the Stop Coal Seam Gas Blue Mountains Alliance that the findings and recommendations for the management of water quality in the groundwater (AGE, 2014) and surface water (WRM, 2014) impact assessments undertaken in support of the Modifications EA are strongly rejected.

These studies are considered to provide a detailed, site specific assessment of the potential impacts to water quality and resources as a result of the Modifications. A response to the issues raised by NOW (the relevant NSW regulatory agency) in their review of the draft Modifications EA is provided in **Section 4.5**.

Detailed surface and groundwater assessment have been undertaken for the Modifications have found that there are no significant water quality issues that would occur as a result of the proposed operations, provided that the management and mitigation recommendations outlined in the Modifications EA are adopted. Impacts on water quality including acid mine drainage and heavy metals have been assessed in Section 6.10.3 of the Modifications EA.

Any discharge of water from either Invincible Colliery or Cullen Valley Mine would be undertaken in accordance with the conditions of the respective EPLs held for each operation.

5.15.7 Adequacy of Biodiversity Offsets

In their submission, Stop Coal Seam Gas Blue Mountains Alliance is of the view that the offsets proposed for the Modifications lack credibility, being inadequate to replace a Gardens of Stone Stage 2 reserve.

Response

The BOP proposed in the Modifications EA has also been independently reviewed post-submission of the Modifications EA, in consultation with OEH. A summary of these discussions and the revisions to the biodiversity offsets proposed for the Modifications is included in **Section 4.2.2**.

5.15.8 Subsurface Heating Management

In their submission, Stop Coal Seam Gas Blue Mountains Alliance note the increase in water extraction from the underground workings proposed for the Modifications and the failure to address the ongoing fires underground and in waste heaps.

Response

As noted in Section 6.3.4 of the Modifications EA, Coalpac is committed to the ongoing implementation of the existing approved PoW for the management of the existing subsurface heating issue at Cullen Valley Mine.

Independent assessment by an approved consultant determined that the PoW has been successful in significantly reducing the size of the area affected and the impacts upon the local community and the environment (see **Appendix H**).

The management of the transfer of water between the underground workings proposed for the Modifications at the two mine sites will act to ensure that the water levels in the abandoned Tyldesley Colliery underground workings will be maintained as a key mitigation measure under the PoW.

The management of the transfer of water between the underground workings proposed for the Modifications at the two mine sites will ensure that it will not impact on Coalpac's ability to manage this issue in any future operations and in fact will enhance it.

5.15.9 Rehabilitation Effectiveness

In their submission, Stop Coal Seam Gas Blue Mountains Alliance also object to Coalpac's claim that native forest ecosystems can be rehabilitated on farmland or after open cut mining. It is also noted that no mature woodland has ever been established through mine rehabilitation.

Response

The ability to ultimately rehabilitate areas proposed to be disturbed for the Modifications to mature forest and woodland communities is described in Section 6.17 of the Modifications EA, with a further discussion included in **Section 5.2.5** of this RTS.

5.16 THE AUSTRALIA INSTITUTE

5.16.1 Economic Impact Assessment Methodology

The submission from The Australia Institute (TAI) makes a number of objections to the Economic Impact Assessment undertaken by Gillespie Economics (2014) prepared in support of the Modifications EA. TAI assert that the economic assessment does not provide a strong case for the Modifications through overstating its benefits and understating its costs. Key issues raised by TAI in objecting to the Economic Impact Assessment include that:

- *The coal price used is either inaccurate or assumes the proponents behave irrationally;*

- *If prices are accurate, many benefits will accrue to international interests and should not be included in the assessment;*
- *Discussion of benefits passing through to electricity consumers is simplistic and ignores the nature of the National Electricity Market;*
- *Royalty, profit and tax estimates appear likely to be overstated;*
- *Environmental costs are assigned a zero value, contrary to the positions of the Department of Planning and Infrastructure (DPI) and the Planning and Assessment Commission (PAC) on impacts to this area;*
- *Non-market value of employment is based on thoroughly discredited studies; and*
- *Input output modelling results overstate the impacts of the project.*

Response

Specialist consultant Gillespie Economics has reviewed the TAI submission in order to respond to the issues raised in the TAI review. Gillespie Economics' response to the each of the issues raised by TAI is provided in full in **Appendix J**.

In summary, Gillespie Economics states that the claims made by TAI are not credible and reflect a misunderstanding of both economic theory and practice and a misrepresentation of the views of others. Accordingly, Gillespie Economics hold to the view that the Economic Impact Assessment undertaken for the Modifications was conducted in accordance with NSW Government guidelines and appropriately considered the specific issues noted in the TAI submission. The Economic Impact Assessment for the Modifications is therefore considered to provide a reasonable estimation of the net benefit to Australia and NSW from the proposed Modifications and the economic activity that would be generated in the regional economy if they were to be approved.

It should also be noted that the position of Gillespie Economics is supported by the submissions on the Modifications made by DRE (see **Section 4.6**).

5.17 PORTLAND NEWSAGENCY

5.17.1 Socio-economic Impact of the Modifications

In their submission Portland Newsagency notes their support of the Modifications as a way of creating jobs and boosting the economy on a local level and reversing a trend of families leaving the area.

Response

Coalpac notes this support from a local small business directly impacted by the proposed Modifications.

5.18 PORTLAND DISTRICT MOTOR SPORTS CLUB

5.18.1 Socio-economic Impact of the Modifications

In their submission, Portland District Motor Sports Club provides their support of the Modifications due to the decline in attendance at their events in the previous year due to the level of unemployment and workers being retrenched from mines in the local area. Coalpac's support for the club in sponsorship is also noted in their submission.

Response

Coalpac notes this support from a local small business directly impacted by the proposed Modifications.

5.19 PORTLAND AUTOMOTIVE SERVICES

5.19.1 Socio-economic Impact of the Modifications

In their submission, Portland Automotive Services support the Modifications and refer to a significant downturn in their business during the past year due to a lack of work at local coal mines and note the flow-on effects to their business due to high unemployment as a result.

Response

Coalpac notes this support from a local small business directly impacted by the proposed Modifications.

5.20 THE GREENS NSW

5.20.1 Threatened Vegetation Impacts

In their submission, NSW Greens strongly objects to the impacts of the Modifications on the environment, including the disturbance of Grassy Box Woodlands which are a nationally significant endangered ecological community.

Response

A response to this issue is provided above in **Section 4.2.11**. This confirms that the Modifications will not impact on any listed EECs.

5.20.2 Threatened Flora Species Impacts

In addition to an objection on impacts on the vegetation communities, NSW Greens in their submission also object to impacts on threatened flora species such as the Clandulla geebung and the Capertee Stringybark tree.

Response

A response to this issue is provided above in **Section 4.2.10**, with discussion of the impacts to the Clandulla geebung and Capertee Stringybark included in **Appendix G**.

5.20.3 Impacts to Pagoda Landforms

The submission from the NSW Greens refers to the international significance of the pagodas within the Ben Bullen State Forest.

The submission also notes that the Modifications as proposed would not provide the 300 m buffer between open cut mining and the pagoda rock formations recommended by the CCP PAC.

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**.

The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

5.20.4 Health Impacts

The NSW Greens submission also objects to the proposal on the grounds that dust emissions generated from the Modifications will lead to increased morbidity and mortality in the Cullen Bullen community. NSW Greens also object to the adverse impacts of noise, truck movements and blasting on Cullen Bullen residents.

Response

Section 6.1 of the Modifications EA provides a summary of the detailed air quality impact assessment undertaken for the proposals.

This assessment confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality impacts to receivers in the township of Cullen Bullen would continue to be limited and would continue to fall within relevant NSW regulatory criteria. Both the EPA and NSW Health have reviewed the Modifications EA and provided comments that confirm their issues in relation to the proposals. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

5.20.5 Reservation Status of Ben Bullen State Forest

The OEH proposal for the future reservation of the Ben Bullen State Forest in the Gardens of Stone as an area of high conservation value is referred to in the NSW Green's submission. The NSW Greens state that the Gardens of Stone needs to be protected for nature conservation and for the purposes of ecologically responsible recreation and tourism and that the extension of mining proposed for the Modifications would have an irreversible impact on this high value conservation area.

Response

The potential incorporation of the BBSF into the NSW Conservation Reserve (as a State Conservation Area or as an addition to National Park, etc) is a policy matter for the NSW Government and requires whole-of-Government approval, which is currently not forthcoming.

A further discussion on this issue in response to a submission tabled by OEH is provided in **Section 4.2.3**.

5.21 BIG RIM CONTRACTING PTY LIMITED

5.21.1 Support for the Modifications

Big Rim Contracting provides their support for the Modifications due to the proposal's ability to provide a threefold benefit to the regional communities and to the State of NSW if approved. These points of support including:

- *The approval of the Modifications providing a "clear line of site to the final rehabilitation at both sites"* [Invincible Colliery and Cullen Valley Mine] *and the best possible final landscape;*
- *The continued support of Coalpac, their employees and contractors to the NSW energy sector. Big Rim contend that approval of the Modifications would allow for a suitable transition period for the companies, workers and contractors who are part of the supply chain to MPPS and Wallerawang Power Station to diversify into other employment areas or look toward other business opportunities; and*

- *The benefit of the Modifications in providing a lower cost operation and supply to MPPS, which would ultimately flow on to the people of NSW.*

Response

Coalpac notes this expression of support from a local business which will be directly impacted by the Modifications and has first-hand knowledge of the local mining industry.

6 PRIVATE INDIVIDUALS

This section provides a response to the issues raised in submissions from private individuals that were made during the public exhibition of the Modifications EA.

6.1.1 Impacts to Pagoda Landforms

Submissions: Form 1, Form 2, P1, 2, 5-6, 18, 20-24, 27, 31-32, 43, 56, 64, 67-8, 71-72, 77, 81, 85, 90, 93, 95, 101-2, 109-11, 117, 120, 126, 130-31, 133, 137, 141, 145, 157, 159, 167, 173, 205, 207, 211-12, 214, 218, 222, 224-27, 233, 235-36, 241, 245, 248, 250-52, 256-57, 263-66, 270, 272-73, 277, 280, 288-89, 292-94, 303-06, 311-12, 314-21, 323, 334-36, 345-49, 353, 356-57, 371, 384, 388, 395, 399, 404, 408, 411, 414-15, 421, 424, 444, 452, 459, 464, 468

A number of objections from the private stakeholders were related to the potential for adverse impacts that the Modifications would have on the highly significant pagoda complex within the Ben Bullen State Forest.

Response

As a primary measure Coalpac has sought to avoid environmental features. Detailed design works were undertaken in the preparation of the mine plans proposed for the Modifications to provide a balance between the continuation of mining operations and the minimisation of disturbance to surrounding areas of the BBSF.

Key aspects of the proposed mine plan include the following:

- The incorporation of a buffer zone between the proposed open cut mining areas at Invincible Colliery and the Escarpment in excess of that recommended by OEH (see **Section 4.2.4**);
- The avoidance of significant impacts to known populations of threatened species and communities (see **Section 4.2.7** to **Section 4.2.12**); and
- The commitment to specific management procedures for blast vibration and subsidence impacts to minimise potential impacts to the Escarpment (see **Section 4.2.6**, **Section 5.3.2** and **Section 5.3.3**).

Coalpac is committed to the continued establishment and support of rehabilitation at both Invincible Colliery and Cullen Valley Mine to provide high quality forest and woodland vegetation communities in the long term on a final free-draining landform which is consistent with the surrounding landscape. This is discussed further in **Section 5.2.5**. The completion of high quality rehabilitation of existing and proposed disturbance areas at Invincible Colliery and Cullen Valley Mine as proposed will also promote the re-establishment of connectivity between the forest and woodland communities and fauna habitat of the Escarpments and the existing and proposed biodiversity offsets at both sites.

6.1.2 Open Cut Buffer Zone to Pagoda Landforms

Submissions: Form 1, Form 2, P1, 2, 5-6, 18, 20-24, 27, 31-32, 43, 56, 64, 67-8, 71-72, 77, 81, 85, 90, 93, 95, 101-2, 109-11, 117, 120, 126, 130-31, 133, 137, 141, 145, 157, 159, 167, 173, 205, 207, 211-12, 214, 218, 222, 224-27, 233, 235-36, 241, 245, 248, 250-52, 256-57, 263-66, 270, 272-73, 277, 280, 288-89, 292-94, 303-06, 311-12, 314-21, 323, 334-36, 345-49, 353, 356-57, 371, 384, 388, 395, 399, 404, 408, 411, 414-15, 421, 424, 444, 452, 459, 464, 468

Concern was raised in a number of submissions that the 300 m buffer between open cut mining and the local pagoda features (as recommended by the CCP PAC) had been ignored in the Modifications EA. It was noted that this buffer was identified by the CCP PAC review as a significant measure to minimise impacts to the pagoda and sandstone escarpment formations within the Ben Bullen State Forest and ensure vegetation communities and habitat of high conservation significance would be retained.

Response

The key recommendation by OEH to the PAC for a 300 m distance between the open cut and the Geodiversity Features was to provide adequate foraging habitat for the BHS. This is discussed in **Section 4.2.7**.

The inclusion of a significant buffer area between the proposed open cut mining areas at Invincible Colliery in response to recommendations of the CCP and the escarpment was a major consideration in the development of the mine plans for the Modifications. The buffer zone between the Escarpment and the eastern extent of any surface disturbance for Invincible Colliery covers an area of is 200 ha and will maintain the areas of concern as identified by CCP PAC and by OEH. In total, the proposed mine plan for Invincible Colliery therefore maintains a buffer area that is 40% larger than that recommended in the submission by OEH.

As noted in **Section 4.2.4**, the inclusion of the buffer will minimise any potential for indirect impacts to the Escarpment areas and will allow for the scenic impacts of the area to ultimately be reinstated through the ability for Coalpac to deliver higher quality rehabilitation outcomes.

6.1.3 Reservation Status of Ben Bullen State Forest

Submissions: Form 1, Form 2, P2, 6, 18, 20-21, 23,-24, 27, 32-33, 56, 64, 67-8, 71-72, 77, 81, 85, 93, 95, 101-2, 109, 120, 131, 157, 167, 205, 207, 214, 222, 226-27, 235, 241, 250-51, 257, 263-66, 269-70, 273, 277, 294, 304-06, 311-12, 314, 320, 323, 331, 334, 348-52, 357, 371, 381, 387, 404, 421, 424, 444, 459, 464

Many private objectors were of the view that the Ben Bullen State Forest should be fully protected from open-cut mining by being declared a State Conservation Area, National Park, or by another mechanism that would secure the area for nature conservation, recreation and tourism.

Response

The potential incorporation of the BBSF into the NSW Conservation Reserve (as a State Conservation Area or as an addition to National Park, etc) is a policy matter for the NSW Government and requires whole-of-Government approval, which is currently not forthcoming. A further discussion on this issue in response to OEH's submission is provided in **Section 4.2.3**.

6.1.4 Visual Impacts

Submissions: Form 1, Form 2, Form 3, P2, 6, 18, 20-21, 23,-24, 27, 32-33, 56, 64, 67-8, 71-72, 77, 81, 85, 93, 95, 101-2, 159, 167, 173, 207, 212, 226-27, 235, 241, 250, 257, 269, 285-86, 288, 294, 305, 317, 335, 336, 349, 371, 381, 387, 395, 402, 444

The highly scenic nature of the pagoda landforms and vegetated slopes of the Ben Bullen State Forest were noted in a number of private submissions. A number of other private submissions also noted objections to the continued views of open cut mining that would adversely impact on road users of the Castlereagh Highway who were travelling to or through the area.

Response

Section 6.14 of the Modifications EA included an assessment that considered the visual impacts of the proposal, including the likely impacts to local residents, recreational users of the BBSF and to road users on the Castlereagh Highway. This assessment found that without mitigation, there will continue to be a high visual amenity impact to these receivers when they view active open cut mining areas. This impact would ultimately be reduced over a number of years as existing and proposed disturbance areas are rehabilitated back to forest and woodland communities in the longer term.

To minimise the predicted level of visual impact of the Modifications, Coalpac has committed to the following mitigation measures:

- Retaining an area of existing native vegetation on the eastern side of the Castlereagh Highway adjacent to the Southern Mining Area proposed for Invincible Colliery to maintain current visual screening of that area. This screening will be enhanced by the establishment and maintenance of additional plantings by Coalpac;
- Development and rehabilitation of the bund on the northern side of the Cullen Valley Mine Modification Disturbance Boundary to provide screening of active mining operations in this area;

- Continued successful progressive rehabilitation of existing disturbance areas as part of the Modifications; and
- The early establishment and progressive development of rehabilitation within additional areas disturbed by open cut mining at Invincible Colliery and Cullen Valley Mine due to the Modifications.

The mine plans proposed for the Modifications will also ensure that the visual impact of the current approved mining areas at Invincible Colliery and Cullen Valley Mine are further reduced through continued high quality rehabilitation and the avoidance of residual final voids. The current six final voids (three at Invincible Colliery and three at Cullen Valley Mine) that would otherwise result at each site will be fully rehabilitated to a stable free draining landform comparable with the surrounding woodland under the Modifications. The Modifications mine plan therefore represents a significant reduction in long term visual impact to local residents and recreational users of the BBSF when compared to rehabilitation of Invincible Colliery and Cullen Valley Mine under existing approvals.

6.1.5 Impacts to Grassy Box Woodland Endangered Ecological Community

Submissions: Form 1, Form 2, P1-2, 5-6, 10, 18, 20-24, 27, 31, 33, 43, 47, 56-58, 64, 66, 67-68, 71-72, 82-83, 85, 93, 95, 101-02, 108-11, 117, 126, 130-31, 145, 157, 176-78, 191, 205, 207, 214, 218, 222, 224, 226-27, 233-36, 245, 247-48, 250-53, 256, 258, 261, 264-65, 267, 269, 270, 272-73, 278-79, 288-89, 293-94, 301, 303, 305-06, 317-20, 323, 332, 334-50, 353-55, 371, 381, 384, 387-88, 395, 399, 404, 488, 411, 415, 421, 444, 452, 454, 457, 468

The destruction of areas of the Grassy Box Woodland EEC was noted in a range of private individual submissions objecting to the Modifications.

Response

A response to this issue is provided above in **Section 4.2.11**. This confirms that the Modifications will not impact on any listed EECs.

6.1.6 Impacts to Threatened Flora and Fauna

Submissions: Form 1, Form 2, Form 3, P1-2, 5-6, 10, 18, 20-24, 27, 31, 33, 43, 47, 56-58, 64, 66, 67-68, 71-72, 82-83, 85, 93, 95, 101-02, 108-11, 117, 126, 130-31, 145, 157, 176-78, 191, 205, 207, 214, 218, 222, 224, 226-27, 233-36, 245, 247-48, 250-53, 256, 258, 261, 264-65, 267, 269, 270, 272-73, 278-79, 288-89, 293-94, 301, 303, 305-06, 317-20, 323, 332, 334-50, 353-55, 371, 381, 384, 387-88, 395, 399, 404, 488, 411, 415, 421, 444, 452, 454, 457, 468

A number of private individual submissions also raised concerns regarding ecological impacts of the Modifications to impact on threatened flora, fauna and ROTAP species. The majority of such submissions regarding flora impacts objected to impacts to the Clandulla geebung (Persoonia marginata) and the Capertee Stringybark (Eucalyptus cannonii).

Impacts to a range of threatened and common fauna species including the Spotted-tailed quoll, Squirrel glider, Broad-headed Snake, Superb Lyrebird, Brush-tailed rock wallaby, Large-eared pied bat and Eastern bent-wing bat were also raised as a point of objection in submissions from private individuals.

Response

A response to the issue of impacts to listed and ROTAP flora species provided above in **Section 4.2.10**, with discussion of the impacts to the Clandulla geebung and Capertee Stringybark included in **Appendix G**.

Each of the threatened species noted in submissions from individuals was discussed by CE (2014) in the ecological impact assessment for the Modifications, either as the species had been previously identified in the area, or were considered to have the potential to occur as a result of local conditions, vegetation communities and habitat quality.

6.1.7 Rehabilitation Effectiveness

Submissions: Form 1, P6, 18, 20, 23, 27, 56, 66-68, 93, 110, 145, 177, 178, 207, 222, 226-27, 235, 250-51, 263-65, 288-89, 294, 305-06, 311-12, 315-16, 331, 346-49, 315, 355, 371, 381, 387, 444, 459, 468

A number of private individual submissions objected to Coalpac's claims that the existing and proposed open cut mining areas can be rehabilitated to a suitable level consistent with surrounding areas. Many of such objections also noted that there are no examples of the rehabilitation following mining disturbance to mature, biodiverse and sustainable forest and woodland communities.

Response

Coalpac remains committed to the continued establishment and support of high quality rehabilitation at Invincible Colliery and Cullen Valley Mine. Examples of Coalpac rehabilitation performance to date and a discussion of the management and monitoring measures proposed for the Modifications is provided above in **Section 5.2.5**. Examples of mature and sustainable forest and woodland communities established following mining and farming disturbance are included in **Section 5.4.6**.

6.1.8 Adequacy of Biodiversity Offsets

Submissions: Form 1, P6, 18, 27, 56, 64, 67, 68, 85, 93, 157, 207, 226-27, 250, 288, 294, 305-06, 421, 444, 468

The inadequacy of Coalpac's proposed offsets to replace the highly significant Ben Bullen State Forest communities and the future Gardens of Stone 2 reserve was a common issue raised in objections from private individuals.

Response

In response to the recommendations of OEH that the proposed biodiversity offset strategy be verified, ELA (2014) completed an independent ELA assessment using the NSW OEH Biobanking Assessment Methodology (OEH, 2011) tool to quantify the biodiversity losses from the Modifications compared to the biodiversity gains which will be realised from the proposed biodiversity offset strategy.

The ELA assessment demonstrated that if the entire Gulf Mountain property were to be incorporated into the biodiversity offset strategy for the Modifications, then the BOP would provide the adequate quantum of ecosystem credits, with the required number of credits retired. This is discussed further in **Section 4.2.2**, with a copy of the ELA report included as **Appendix D**.

6.1.9 Quality and Availability of Coal Reserves

Submissions: Form 1, P2, 5, 18, 20, 22, 27, 33, 46, 56-58, 66-68, 85, 93, 109-10, 119, 145, 157, 159, 162, 177-78, 188, 191, 205, 207, 214, 222, 224-27, 232, 248, 250, 252-53, 256, 258, 261, 270, 272-73, 277-78, 287-89, 293-94, 304-06, 311-12, 314, 318, 320, 323, 331, 345, 357, 318, 388, 397, 411, 421, 444, 452

The poor quality of the coal proposed to be extracted by the Modifications for supply to MPPS and the ability of other mines in the area to provide adequate fuel supply for MPPS was noted by a number of private individual submissions.

Response

Response to these objections concerns is provided in **Section 5.3.10** and **Section 5.3.11**. These sections confirm that the justification of the Modifications from a coal quality and supply perspective is valid, a position which is supported by DRE and EnergyAustralia.

6.1.10 Air Quality Health Impacts

Submissions: Form 1, Form 2, Form 3, P1-2, P18, P20-23, 32, 43, 56-58, 64, 66-68, 72, 85, 93, 95, 109-10, 117, 126, 145, 157, 177-78, 181, 188, 191, 207, 224, 226-27, 233, 235-36, 245, 248, 250-53, 256, 258, 261, 278, 280, 294, 305-06, 314, 318, 334, 345-47, 371, 381, 384, 387, 399, 415, 421, 444

The proximity of the Modifications to Cullen Bullen and dust emissions resulting from the proposed operations was a major concern to a number of private individual many submissions from the community. It was noted that the Modifications would lead to increased morbidity and mortality in the community from respiratory and cardiovascular disease. It was noted that several specific concerns in relation to the health effects of the Modifications were raised by private stakeholder's individuals in the local area, including Cullen Bullen.

These issues are provided below and included the following comments:

"The dust created in the past when Cullen Valley Mine was in operation, meant that residents of Cullen Bullen had to constantly clean their homes and cars to keep them dust free. That created work and added to the cost of living for all residents. I don't want that to happen again…"; and

"I have health issues which seem to be linked to the operations of the mine. I also know of many other residents who have itchy skin or breathing difficulties which they believe are linked to the operations of the mine. I don't want to expose myself or my family to the dust particles produced by the operation of the mine and put our health at risk. I also don't understand why this anecdotal evidence is not valued; and

Many residents are tired of having to "keep an eye" on Coalpac Pty Ltd (Administrators Appointed). Why do residents have to interrupt their daily activities to report possible dust and noise concerns? This creates stress that we just don't need or want."

Response

Concerns regarding air quality in Cullen Bullen are taken very seriously by Coalpac and air quality is closely monitored at a number of approved locations around the town. Coalpac's monitoring results over the period 2011 - 2012 when both mines were in full production show that dust levels are significantly below the long term Impact Assessment Criteria (IAC) of 30 µg/m^3 for <10 µm (PM_{10}) (see **Figure 17**). To provide context, the PM_{10} air quality monitoring results from Coalpac monitoring stations are plotted against the NSW EPA monitoring data for Bathurst and Randwick (see **Figure 18**).

It is clear from EPA monitoring data that the air quality in Bathurst and Randwick is comparable with, and in many cases poorer than Coalpac air quality monitoring results for Invincible Colliery and Cullen Valley Mine.

The air quality impacts from other sources are also noted in a number of supporting submissions from the local community. The photograph in **Plate 11** below was taken at 10.11am on Sunday 18 May 2014 (over 12 months from when Invincible Colliery and Cullen Valley Mine were last in active operations) and clearly shows a plume of smoke over the town of Cullen Bullen. This indicates that there are other local sources that contribute to poor air quality in Cullen Bullen, as noted by several local submissions. It is noted that this plume appears to be generated by the burning of wood and coal in domestic heaters by residents in the town.

Section 6.1 of the Modifications EA provided a summary of the detailed air quality assessments undertaken for the proposals. This assessment confirmed that the implementation of appropriate management and mitigation measures by Coalpac will ensure that any air quality impacts to receivers in the township of Cullen Bullen would continue to be limited and would continue to fall within relevant NSW regulatory criteria.

Both the EPA and NSW Health have also reviewed the Modifications EA and provided comments. A response to their recommendations is provided in **Section 4.1** and **Section 4.8**.

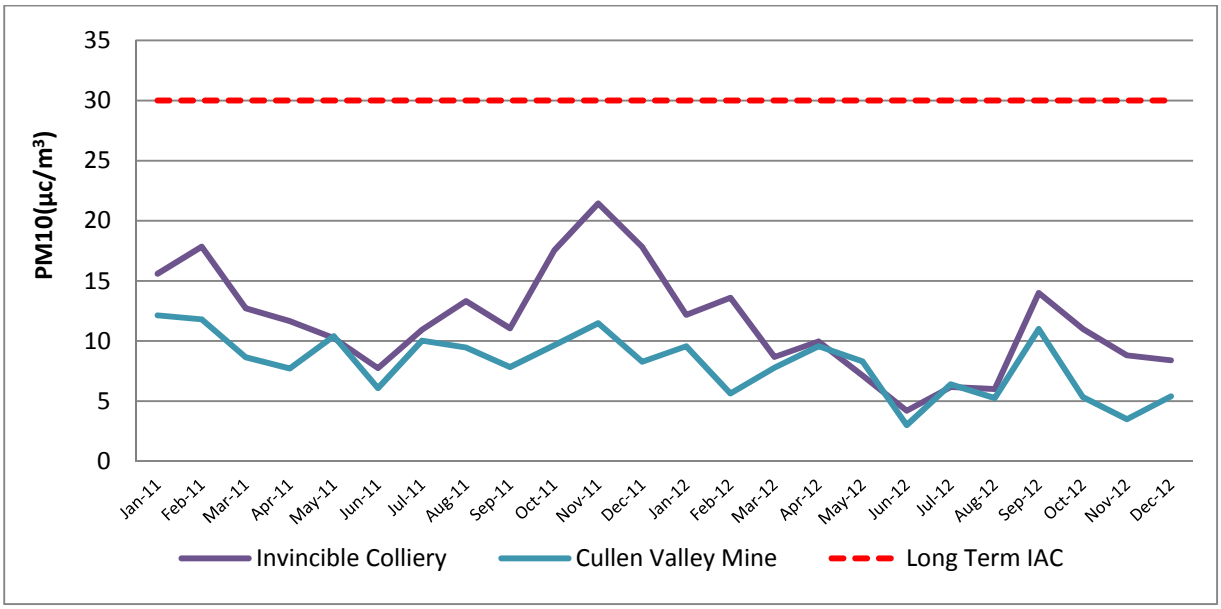


Figure 17
Coalpac Monthly Average PM_{10} Monitoring Results

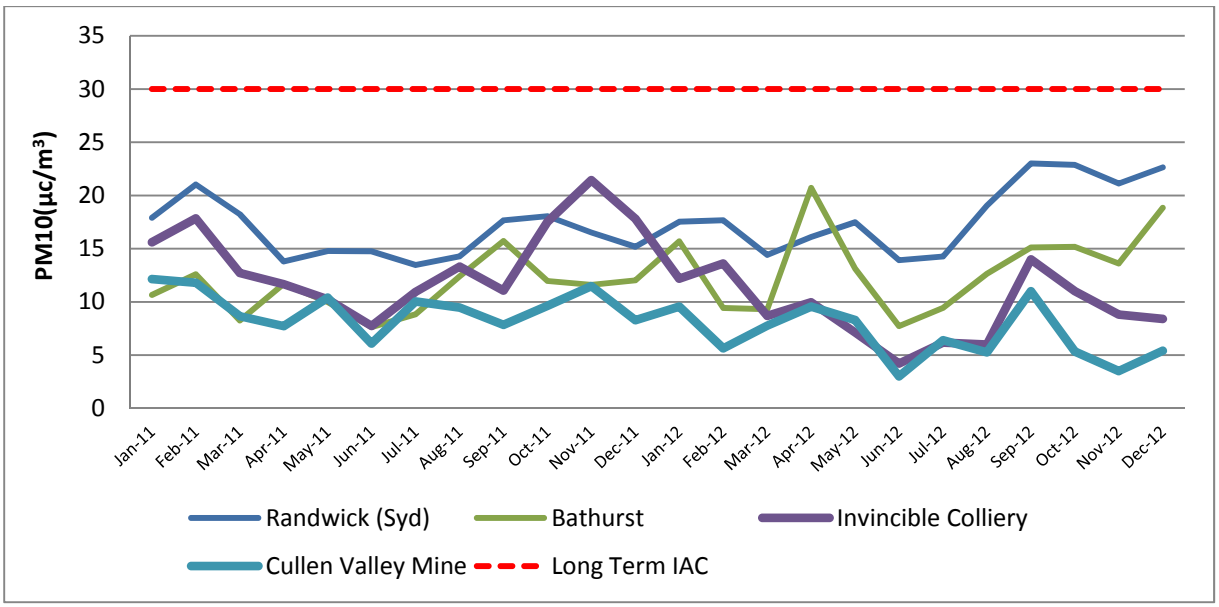


Figure 18
Comparison of Monthly Average PM_{10} Monitoring Results

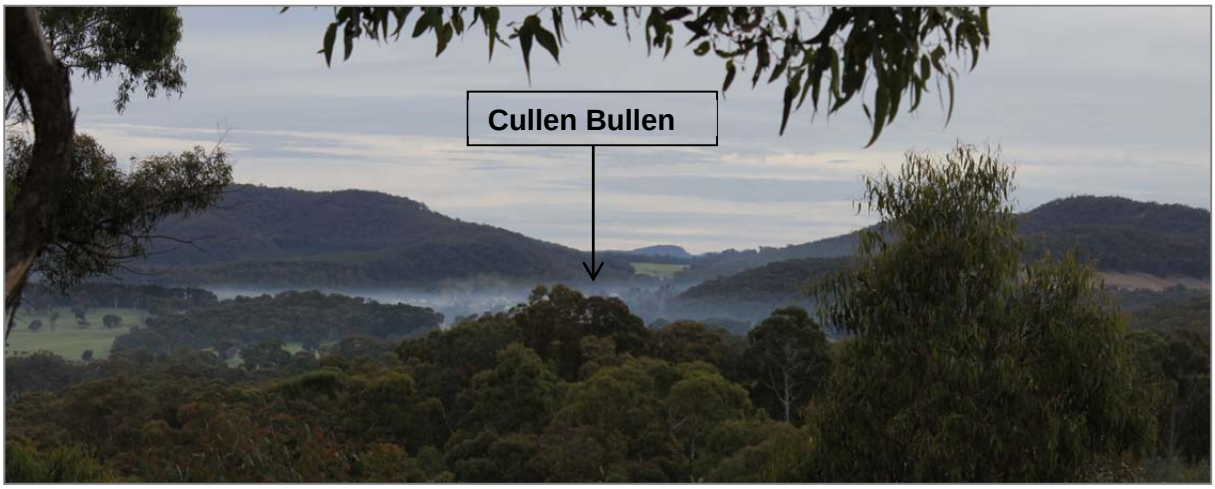


Plate 11
View looking north toward Cullen Bullen showing smoke plume

Photograph was taken at 10:11am on 18th May 2014, more than 12 months after mining had ceased at Coalpac mines

6.1.11 Larkin Property Impacts

Submission: P181

The main concerns raised in a letter from a resident in Ben Bullen to the west of the existing Cullen Valley Mine are noted below and include:

> *"As we are full time Farmers and are outside the majority of the daylight hours most days we are subject to Dust (closest dust monitor is about 4 kms away to the north). About two years ago the Bund wall along the railway was being constructed my Wife suffered an attack of Pleura-Pneumonia (this trouble is caused by Dust) and had to be put on an antibiotic drip at Lithgow Hospital for 5 days.*
>
> *I have had major Heart Surgery in the last few years. No previous member of the family has had to have any operation of this nature.*
>
> *Pacific Environment Ltd Report modeling figure 10-2 shows Forest Lodge property subject to Dust of 50 µg/m which if near a receptor would be subject to acquisition with a larger area 25 µg/m. As my Wife and I are outside working in the area we would like Coalpac to use their existing Crusher site, well away from people.*
>
> *As the affected area is in Paddocks which are frequently used for Lambing and Calving of Heifers (Because it is handy to yards) my wife & myself have spent a lot of time in this area.*

On Wednesday 16th April Messrs.' Leisman & Goodwin are from Coalpac were good enough to take us to the proposed site of the Coal Crusher – dump they intend to install if approval is given. They assured us by placing the Coal crusher Etc. as shown in the EA was the best possible Position. By placing it in this position Forest Lodge Property would receive very little Noise and Dust? Better than where current Crusher is placed.

When approached regarding dust & noise monitors being placed on the property, they indicated provided the EPA agreed they would be quite happy to the installation of these on Forest Lodge. These would have to be placed in an acceptable position.

In view of our past Health issues we are still very concerned despite the assurance."

Response

Concerns regarding air quality impacts to neighbours are taken very seriously by Coalpac and we closely monitor air quality at 12 locations around the area. The closest air quality monitoring unit is depositional dust gauge CDD1 located 1.5 km to the north of the residence located on the Larkin property. A summary of the 2012 depositional dust results from this unit are presented in **Figure 19**. The annual average depositional dust for the 2012 calendar year was 0.5 g/m^2/month, well below the long term Impact Assessment Criteria (IAC) of 4 g/m^2/month. This level is consistent with the nine other depositional dust gauges monitored by Coalpac. It should also be noted that this result includes emissions from all land uses and is not associated solely with mining related activities.

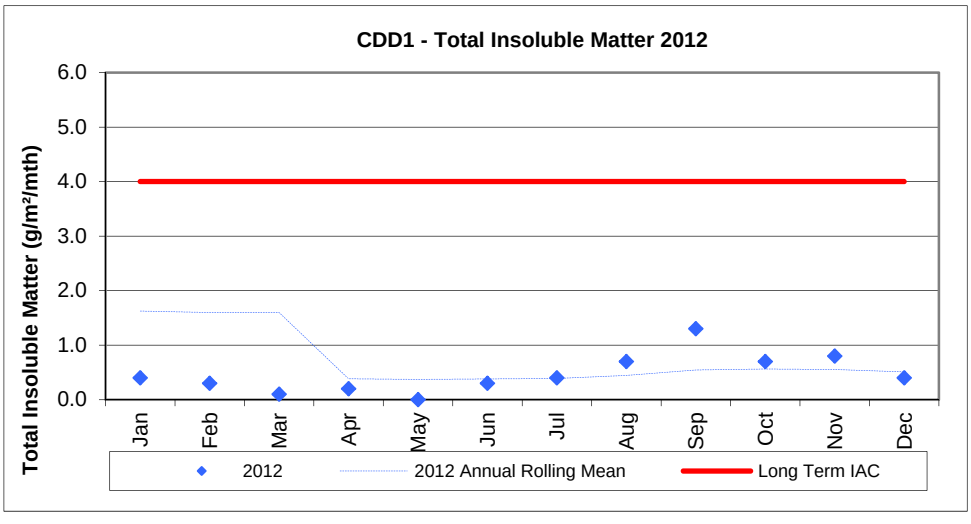


Figure 19
Summary of the 2012 depositional dust results for dust gauge CDD1

Further to this, the PM10 air quality monitoring results show that airborne dust levels around the mining operations are typically lower than that in Bathurst and many Sydney suburbs according to the EPA monitoring data, see **Section 6.1.10**.

As part of the mine development under the existing approval for Cullen Valley Mine, a noise bund was constructed in 2012 which is approximately 10m high and is located on the western boundary of the open cut mining operations, adjacent to the railway line, and the Larkin property. Since the completion of the noise bund, which was constructed primarily for the benefit of this resident, the noise and air quality impacts on the Larkin property have been reduced considerably, as evidenced from discussions with the resident during the site visit on the 16 April 2014.

The proposed site for the re-location of the coal crusher lies behind this bund and also allows for the crusher to be located at a lower elevation to further limit any air quality and noise impacts. Under the cumulative worst case conditions a small section on the eastern side of the Larkin property (and adjacent to the railway line) around 250m wide will exceed the criteria for Total Suspended Particulates (TSP) and PM_{10}. The levels will be below this level for the majority of the term of the proposed Modification operations as mining progresses further away to the south and east. The residence on the Larkin property lies approximately 1.3 km away from the proposed location of the crusher.

Coalpac have committed to Level 2 watering of haulage routes, establishing wind breaks around stockpiles and modifying activities during unfavourable wind conditions. In addition, as noted in the submission, Coalpac has indicated its preparedness to undertake noise and air quality monitoring on the property in question subject only to the agreement of the EPA.

6.1.12 Fitzgerald Property Impacts

Submission: P108

The main concerns raised in a letter from a resident in Cullen Bullen to the south of the existing Cullen Valley Mine are noted below and include:

> *"Cullen Valley Mine is situated on two of our boundaries. We oppose the approval of the development application. We cannot see them improving their work ethics this time around when they couldn't do it the last time for example; dust on the haul road which runs directly behind us, noise before 7am, trucks not covering loads when exiting the mine, the ongoing smell of where the coal is on fire underground from where they previously opened it up.*
>
> *The dust which comes directly off the haul road into our property makes working on the back half of our property near impossible. The dust is resulting into less enjoyment of recreational activities on our property also. An enjoyable walk is being disturbed by their dust. Regular movement of vehicles and machinery also makes the dust worse. They have a water truck which never seems to be used, upon enquiries directly to the mine from ourselves has resulted in numerous*

excuses as to why it is not operating. These excuses consist of no employee to operate the truck, the truck is broken down, forgetful staff, usage of the Haul road prior to the water truck being used.

Cullen Valley Mine's environmental impact statement stated that there would be minimal noise prior to 7am on working days but has not been abided by at all times. Movement of trucks & vehicles operate prior to this time, which on many occasions is above the allowable decibels (35). Revving of trucks prior to 7am is on a regular basis.

Trucks which exit the mine are by law required to cover each and every load. On numerous occasions trucks leaving the mine have not been covered, creating more dust and coal falling out of the trailer and directly onto the road & following vehicles.

The smell of which comes from the underground workings is a frequent occurrence. The smell is so overpowering at times, our home has to have all windows & doors closed, working or enjoyable activities have to cease until the smell has subsided. Cullen Valley Mine should fix all underground heating prior to getting more leases. The smell & fumes which come from the underground workings is not healthy for the environment."

The above issues are the main concerns raised in a letter from Mr and Mrs Fitzgerald who are neighbours to the immediate west of the Cullen Valley Mine entrance.

Response

Concerns regarding air quality in the proximity of the town are taken very seriously by Coalpac and we closely monitor the air quality levels at a number of locations around the area. All of our results show that recent air quality data levels are significantly below the long term Impact Assessment Criteria (IAC) of 30 µg/m^3 for PM_{10}, see **Section 6.1.10**. The Cullen Valley Mine air quality data (PM_{10}) presented in **Figure 17** is for a high volume air sampler located 300 m from the Fitzgerald's residence. Monitoring to date at this location has not identified any adverse results or trends in air quality impacts at this location.

Both current and proposed open cut mining operations are located more than 2km to the north of the Fitzgerald's property boundary but traffic is still required to use the Cullen Valley Mine haul road to transport coal to market and to access the workshop. The localised air quality impacts noted in the submission relate to traffic on the internal haul road located close to the northern boundary of the Fitzgerald's property. The section of the haul road from the Cullen Valley Mine workshop to the intersection with the Castlereagh Highway, part of which is located to the east of the property in question, has been laid with asphalt. In addition, Coalpac have committed to Level 2 watering of unsealed roads as part of the proposed Modifications. Coalpac will also continue to implement the existing air quality monitoring program to proactively manage operations at both Invincible Colliery and Cullen Valley Mine.

Under the current planning approval (DA 200-5-2003) mining operations at Cullen Valley Mine are permitted 24 hours a day, 7 days a week within prescribed noise impact limits, this includes the use of internal haul roads.

Coalpac engages independent noise consultants to monitor its activities, including coal haulage, on a quarterly basis. Additional noise monitoring is also undertaken as required.

The current planning approval limits the '*coal haulage from the development' to 'between 7.00 am and 5.30 pm Monday to Friday…*'. All other approved activities are permitted outside of these hours. These activities have not contributed to or caused any breaches to noise limits. Under no circumstances has Coalpac transported coal from the site outside of the hours prescribed under Condition 50 of Development Consent DA-200-5-2003.

Product coal haulage from Cullen Valley Mine to customers is undertaken by a licensed contractor. The covering of trucks transporting coal to market on public roads is a condition under the haulage contract and is regularly monitored by Coalpac staff.

Coalpac have consulted with the Fitzgerald's on a regular basis and have put in place a relevant landowner agreement, which goes beyond that which is required under current approval conditions, to ensure they are adequately compensated and provided for in the event that any potential adverse impacts are experienced. In addition, access to grazing land owned by Coalpac is provided to the Fitzgerald's at nominal cost.

Coalpac has been working closely with the Fitzgerald's over the past 2 years to mitigate the impacts of subsurface heating at Cullen Valley Mine with substantial earthworks undertaken adjacent to their property to completely remove the main source of the odours experienced on their property. The odour impacts of the underground heating have been significantly reduced as a result. The works undertaken were in line with the PoW approved by the DRE and works are ongoing to continue to improve the situation. The effectiveness of the work undertaken to date has been confirmed by an independent specialist consultant approved by DRE (**Appendix H**).

6.1.13 Filla Property Impacts

Submissions: P101, 102

The main concerns raised by Mr and Mrs Filla (whose property is located to the north west of the proposed Modification to Invincible Colliery) are noted below and include:

> *"As this open cut mine will be only app. 400-500 meters from the entire length of my small hobby farm's rear fence I will be exposed to increased threats to my health because of damaging particles released into the air from open cut mining as is already happening for the past 12 years from the current active open cut coal mines on 3 sides of me.*

There will be increased threats to the health and well-being of children living in town and the children attending Cullen Bullen Public school from even more open cut mining and blasting only 1 000,meters away, as proposed.

I currently back onto pristine state forest which I walk and use regularly to enjoy the many rare animals and their biodiversity, should this open cut coal mine go ahead it will degrade land in every direction and impact on the value of my home badly. I expect at least a 1000 meter buffer zone from all our rear fences to protect my and the town of Cullen Bullen's social values and amenities.

It is unreasonable for mining activity to continue 24hrs a day, 7 days per week so close to the town

The beautiful pagoda escarpment along the Great Dividing Range will be irreparably degraded by open cut mining which approaches to within 50 metres. I and the community will be locked out from a very large part of public land for at least 21 years. I expect to be able to access public land freely."

Mr and Mrs Filla also requested Coalpac purchase their property in the event the Modifications are approved.

Response

The proposed Modification to open cut mining at Invincible Colliery does not approach within 900m of the rear of the Filla's property and the majority of the activity is multiple kilometres away. The closest open cut mining operations for the proposed Modification are almost three times further away than previous operations under the current approval and the Filla's property is the closest Cullen Bullen property boundary to the proposed extension to Invincible Colliery.

The proposed Modification for Invincible Colliery is more than 1.5 km away from the Cullen Bullen School at the closest point and a large ridgeline approximately 100 m high separates Cullen Bullen from the closest proposed open cut. This places the proposed open cut operations beyond the range of influence for significant blasting effects from either air blast or ground vibration even at their closest point.

Concerns regarding air quality in the proximity of the town are taken very seriously by Coalpac and they closely monitor air quality at 12 locations around the area including Cullen Bullen. All of the results show that air quality levels are significantly above the long term Impact Assessment Criteria (IAC) of 30 $\mu g/m^3$ for PM_{10} and in fact the PM_{10} air quality monitoring results show that air quality dust levels around the mining operations are typically lower than that in Bathurst and many Sydney suburbs according to the EPA monitoring data, see **Section 6.1.10**.

Coalpac are proposing to limit Invincible Colliery mining operations to day time only with coal processing and coal transportation restricted to the day and evening periods only. Cullen Valley Mine mining operations are proposed to be restricted to the day and evening periods only with coal processing and coal transportation limited to day time only.

Neither mine will conduct mining activities during the night period. Some maintenance works and other ancillary activities, as approved, will continue to be undertaken during the night.

Based on the findings from the Modifications EA, there is no basis for compulsory acquisition of this property.

The proposed open cut mining in the proximity of the pagoda escarpment along the Great Dividing Range maintains a buffer zone in excess of that recommended by OEH, see **Section 4.2.4**.

Public access will not be significantly impacted by the proposed Modifications, with existing access preserved in the BBSF and only small areas of the forest proposed to be temporarily affected by mining operations. The proposed Modifications only have a maximum life of six years, so any local impacts on access to areas of the BBSF will be relatively short term.

6.1.14 DiMauro Property Impacts

Submissions: P82, 83

The main concerns raised by residents on a Ben Bullen property to the north of the proposed Modification to Cullen Valley Mine are noted below and include:

> *"The new boundary positions are again proposed to encroach northwards and eastwards effecting the health and well-being of myself and my family and consequently I oppose the approval of these new boundaries, for open cut mining. In Addition to the above I point out that we are on Tank Water which is effected by excessive dust and pollutants, and our trees are wind pollinated which are also effected by excessive dust and pollution.*
>
> *Our Water Source comes from deep underground and running in sandstone crevices developed over millions of years. Blasting can cause fracture of the sandstone due to high energy waves travelling large distances in dense rock areas, which could de-pressurise and or change direction of this precious natural resource for which our orchard relies on, and we use best practice dripper irrigation on our trees.*
>
> *There is much concern also with the blasting done that the water levels could be changed and that damage would be irreversible because of fractures running in the sandstone. We are worried about lowering of the water tables leading to a dryer landscape. We are improving our soils yearly and this is a long term commitment."*

Response

The proposed extension to Cullen Valley Mine does not get any closer to the DiMauro property than the currently approved operations and there have been no complaints or reports received of adverse impacts from these operations in terms of air quality, blast vibration or groundwater. Further, the proposed operations will start at the most northern point and progress away to the south progressively reducing any adverse impacts.

Concerns regarding air quality in the proximity of the town are taken very seriously by Coalpac and they closely monitor air quality at 12 locations around the area including Cullen Bullen. All of the results show that air quality levels are significantly above the long term Impact Assessment Criteria (IAC) of 30 µg/m^3 for PM_{10} and in fact the PM_{10} air quality monitoring results show that air quality dust levels around the mining operations are typically lower than that in Bathurst and many Sydney suburbs according to the EPA monitoring data, see **Section 6.1.10**.

The closest air quality monitoring unit (dust gauge CDD1) is located 500 m to the west of the to the DiMauro property. A summary of the 2012 depositional dust results from this unit are presented in **Figure 20**. The annual average depositional dust for the 2012 calendar year was 0.5 g/m2/month, well below the long term impact assessment criteria of 4 g/m2/month.

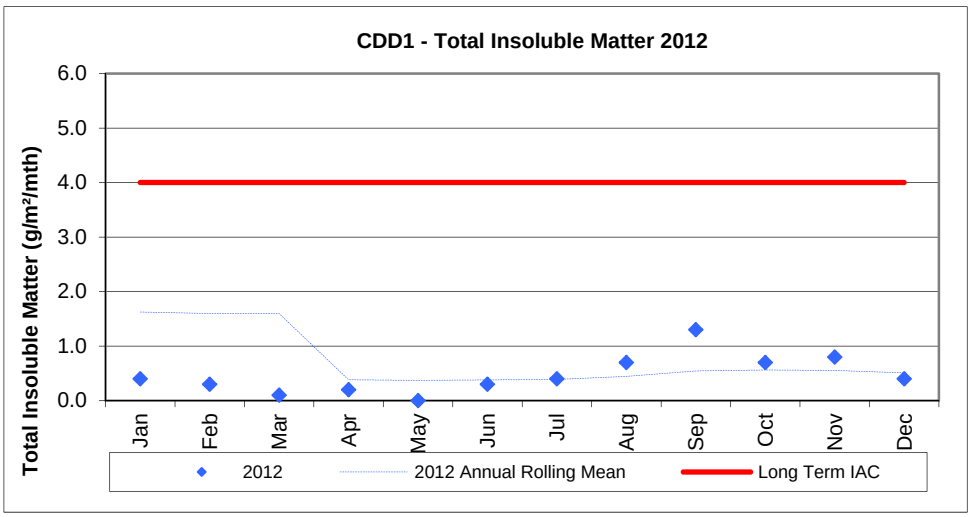


Figure 20
Summary of the 2012 depositional dust results for dust gauge CDD1

In addition to the extended history of low dust levels around the mine, air quality modelling undertaken for the Environmental Assessment predicted that the properties to the north of the proposed Cullen Valley Mine extension will not experience significant elevation of dust levels. As added measures Coalpac have committed to increasing the watering rate for unsealed roads to Level 2 and modifying activities during unfavourable wind conditions.

The groundwater impacts of the proposed extension Modification to Cullen Valley Mine have been modelled and it was concluded that there will only be localised depressurisation of aquifers to the northwest (down dip of the strata) for a maximum distance of 500m, see **Section 4.5.6**. This effect would not impact the DiMauro property to the north.

The level of de-watering associated with the proposed activities will be very low and the DiMauro property is effectively shielded due to the existing rock excavation for the Baal Bone Colliery Rail Siding which passes between the property and the mine, see **Figure 21**. The result of the AGE modelling are borne out by the lack of any significant impact upon groundwater being experienced from the current mining operations located at a similar distance from the property in question.

The impacts of the proposed blasting activity will not generate sufficient ground vibration to have any effect upon the condition of the strata beneath the DiMauro property to the north. Not only is the distance too great for the ground vibration to propagate at any detectable level, but the excavated depth of the Baal Bone Rail Siding will also act to significantly reduce the transmission of ground vibration to the north. Again this is borne out by the lack of any significant blasting impacts being experienced from the current mining operations located at a similar distance from the property in question.

6.1.15 Cullen Bullen Noise Impacts

Submissions: Form 1, Form 3, P18, 20, 64, 85, 101-2, 108, 117, 181, 235, 285-6, 331, 349, 371, 387

The adverse impacts of noise from mining, truck movements and blasting were also frequently raised in private individuals' submissions. It was noted that these effects would create further negative impacts on local residents in and around Cullen Bullen.

Response

Sections 6.1, 6.4 and 6.5 of the Modifications EA provided a summary of the detailed air quality and acoustic impact assessments undertaken for the proposals. These assessments confirmed that, with continued management and mitigation, Coalpac will ensure that any acoustic impacts to receivers in the township of Cullen Bullen and surrounds could be limited and would continue to fall within relevant NSW regulatory criteria.

A response to their recommendations from the EPA and NSW Health in response to the Modifications EA is provided in **Section 4.1** and **Section 4.8**.

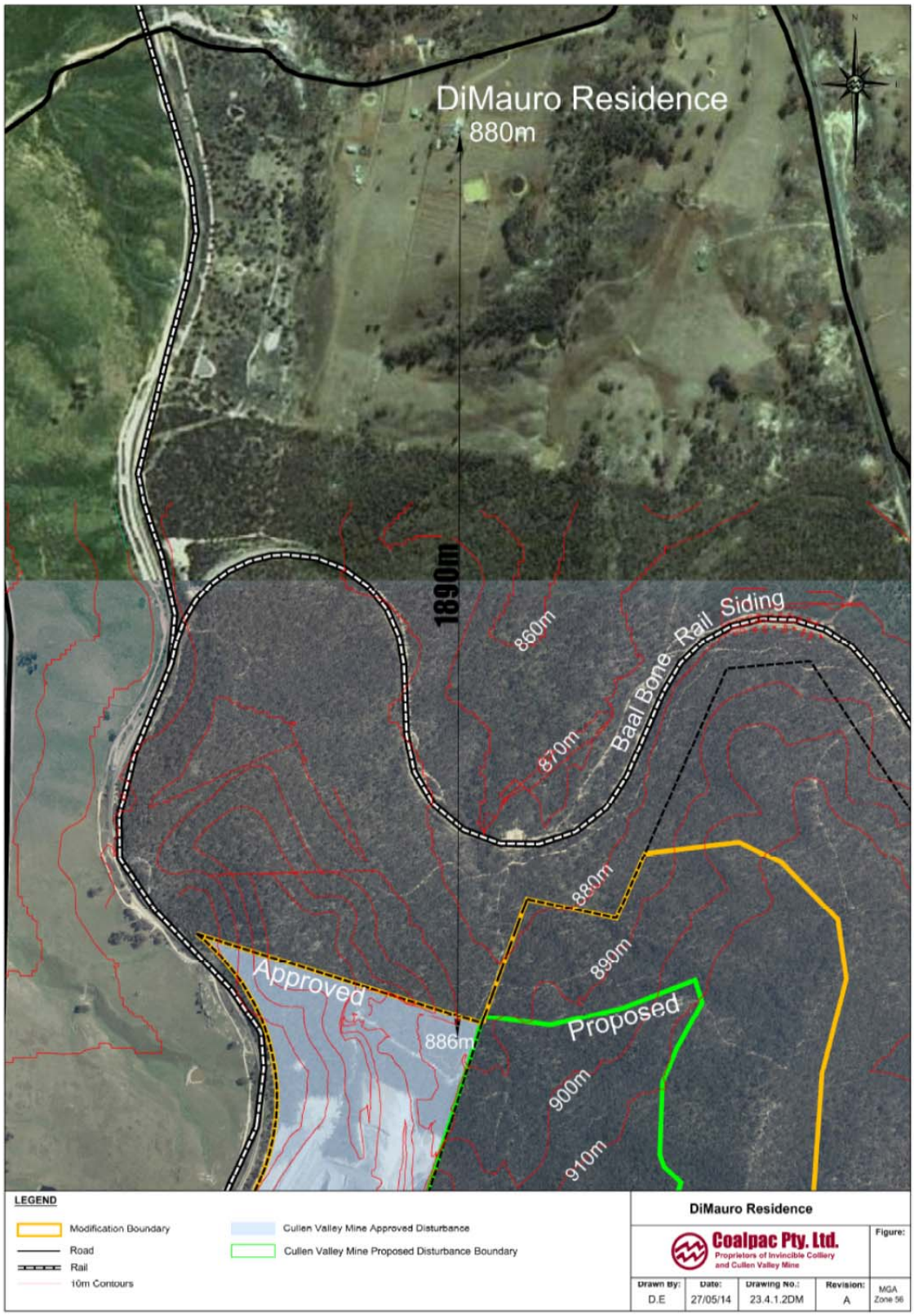


Figure 21
DiMauro Property Location

6.1.16 Blast Impacts and Assessment Process

Submissions: Form 3, 101-2

A number of Cullen Bullen residents stated that their homes or the houses of other residents in the town had been damaged by Coalpac's blasting and that the process to assess any damage was unsatisfactory.

Response

Coalpac commissions independent assessments in response to requests from landowners in accordance with regulatory requirements. This includes Coalpac following a procedure as part of its Blast management Plan to ensure any claims are investigated by an independent, suitably qualified assessor which can be selected from an approved list by the landowner. This ensures a fair and reasonable assessment is undertaken. Any changes to the process for investigation of blast damage claims are a matter for the relevant regulatory agencies.

Concerns regarding damage to houses in the town are also taken seriously by Coalpac. Any local residents who request an inspection are able to select from a panel of qualified and approved consultants who will inspect their property and report on the damage claims and their likely cause.

Where the operations of either of the mines are found to be the likely cause, repairs are effected at Coalpac's cost. Coalpac does not pay for repairs where damage is found to be due to the construction of the property, its age or its foundations. This is in accordance with the conditions of our current approvals under PA 07_0127 and DA 200-5-2003.

6.1.17 Environment Impact Compliance

Submissions: Form 3

A group of Cullen Bullen residents who objected to the Modifications noted in their submissions that:

> *"Many residents are tired of having to "keep an eye" on Coalpac Pty Ltd (Administrators Appointed). Why do residents have to interrupt their daily activities to report possible dust and noise concerns? This creates stress that we just don't need or want."*

Response

Coalpac receive a minor number of complaints regarding noise or dust concerns from the local community and all are promptly followed up with the complainant, see **Table 5** and **Table 6**.

Table 5
Cullen Valley Mine Community Complaints (2012-2013)

Complaint Type	Number Received 2012	Number Received 2013
Noise	9	1
Air Quality (Dust)	5	2
Blasting	5	0
Traffic	13	0
Water	0	0
Other	4	2
Total	**36**	**5**

Source: Cullen Valley Mine AEMRs 2012-13

Table 6
Invincible Colliery Community Complaints (2012-2013)

Complaint Type	Number Received 2012	Number Received 2013
Noise	0	0
Air Quality (Dust)	0	0
Blasting	1	0
Traffic	5	0
Water	0	0
Other	1	3
Total	**7**	**3**

Source: Invincible Colliery AEMRs 2012-13

6.1.18 Access to Ben Bullen State Forest

Submissions: Form 1, Form 3, P101-102

Concern was raised in individual submissions regarding the ability of the local community to continue to access the Ben Bullen State Forest for the gathering of firewood and recreation.

Response

Public access will not be significantly impacted by the proposed Modifications, with existing access preserved in the BBSF and only small areas of the forest proposed to be temporarily affected by mining operations. The proposed Modifications only have a maximum life of six years, so any local impacts on access to areas of the BBSF will be relatively short term.

6.1.19 Increase in Water Impacts

Submissions: Form 1, P56, 82-3, 101-02, 178, 207, 226-7, 250, 294, 305-06, 356, 371, 381, 444, 469

A number of individual submissions private stakeholder objections also raised concerns regarding the potential impacts to water as a result of the Modifications. These objections were generally related to the following issues:

- *"The proposal intends to vastly increase water extraction from underground workings from 26Ml/year to 750Ml/year…"*
- *"…fails to address the ongoing fires underground and in waste heaps"*
- *"Where 2Ml/day of water pumped from old workings is to be released in not explained."*

Response

The Modifications EA included a detailed assessment of groundwater and surface water impacts. In addition, Australasian Groundwater and Environmental Consultants (AGE) and WRM Water and Environment (WRM) have prepared supplementary reports to specifically address the matters raised by NOW in their review of the Modifications EA which provide further detail on water management issues.

Predicted groundwater take, the management of the existing subsurface underground fire and use of water from the older underground workings are discussed further in **Section 4.5.3**, **Section 4.5.6** and **Section 4.7.5** of this RTS.

6.1.20 Local Employment

Submissions: Form 3

A number of individual submissions suggested that Coalpac's statements regarding employment in the local community were misleading.

Response

Coalpac maintains a policy of employing local people wherever possible. Prior to entering Care and Maintenance on both sites, more than 91% of the 100 strong Coalpac workforce was drawn from the local community, as shown on **Figure 22**.

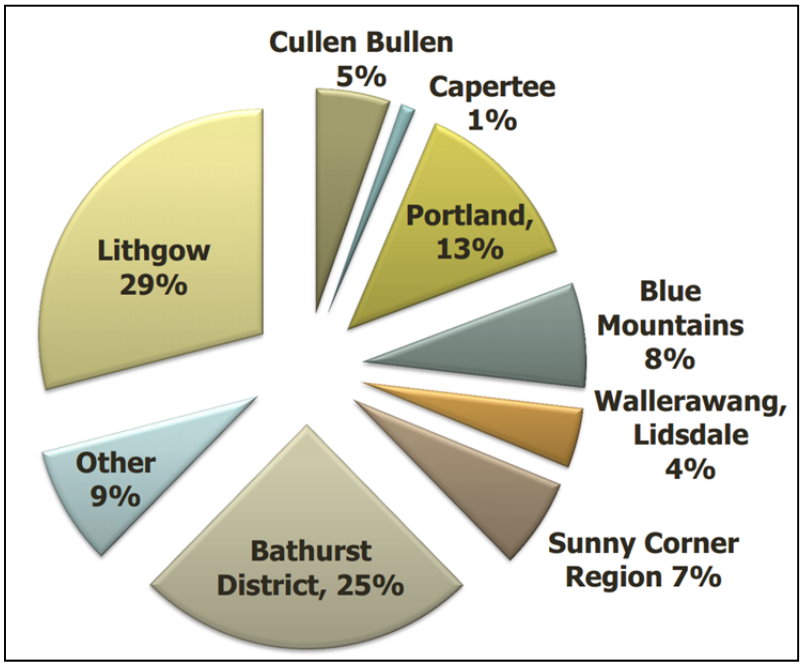


Figure 22
Home address for Coalpac employees prior to Care and Maintenance (both sites)

6.1.21 Aboriginal archaeology and cultural heritage assessment

Submissions: Form 1, P2, 6, 18, 20, 23, 27, 56, 64, 67-8, 93, 207, 222, 226-7, 250-51, 294, 305, 349, 381, 388, 399, 444

The credibility of the Aboriginal archaeological and cultural heritage impact assessment was questioned by a number of private individual submissions stakeholders. This was due to the identification of an Aboriginal heritage rock art site that had not been located in surveys of the Modification Boundaries.

Response

A response to this has been provided in detail in **Section 5.10.1**.

7 REVISED MANAGEMENT AND MONITORING SUMMARY

This section provides a summary of the additional management and monitoring commitments from this RTS.

A revised Statement of Commitments for the Modifications is presented below in **Table 7** and **Table 8**. Revisions to any commitments following the public exhibition of the Modifications EA are shown in red text.

Table 7
Invincible Colliery Statement of Commitments

Ref	Description	EA / RTS Section(s)
1.	The water transfer pipeline and pumping infrastructure will be constructed on the alignment shown on **Figure 4**, being placed on existing access tracks to limit surface disturbance, wherever practical. Construction of the water transfer pipeline will occur during the day period only.	**3.3.3**
2.	Site operations during the evening period will be restricted to the crushing and haulage of product coal. No coal mining activities, coal processing or haulage will be undertaken during the night period.	**6.4**
3.	In the event that coal processing at the ICPP is required during the evening period, an assessment of noise impacts will be undertaken prior to any operations in that period to determine if additional noise controls are required. This assessment will be undertaken in consultation with EPA and to the satisfaction of DP&I prior to any operation of the ICPP during the evening.	**6.4.4**
4.	Open cut and highwall mining operations will be undertaken within the areas as discussed in **Section 3**, with the conceptual final landform shown on **Figure 6** to be reinstated at the conclusion of the Modification.	**3.3.1 and 6.17**
5.	A Highwall Mining Management Plan will be prepared to the satisfaction of DRE prior to the commencement of highwall mining operations, detailing highwall design, monitoring and management measures.	**6.7.4**
6.	Coalpac will prepare an Extraction Plan in consultation with DRE and to the satisfaction of DP&I prior to the commencement of highwall mining in each distinct mining area.	**6.7.4, 4.6.3**
7.	EPL 1095 will be amended to include the transfer of water between Invincible Colliery and Cullen Valley Mine, if required.	**4.3.2**
8.	Coalpac will develop a Construction Noise Management Plan for the limited construction period required for the water transfer pipeline.	**6.4.4**
9.	Coalpac will implement the additional blast monitoring and management procedures described in **Section 6.5.4**.	**6.5.4**
10.	Coalpac will implement the revised Biodiversity Offset Strategy as described in the Modifications EA and this RTS.	**6.6.4, 4.2.2**

Ref	Description	EA / RTS Section(s)
11.	Coalpac will increase the watering rate for unsealed roads from Level 1 to Level 2, as defined in '*National Pollutant Inventory: Emission Estimation Technique for Manual for Mining'* (SEWPaC, 2012).	**6.1.4**
12.	Coalpac will implement the visual impact treatments as described in **Section 6.14.4**.	**6.14.4**
13.	Coalpac will update the existing AHMP for Invincible Colliery to reflect the predicted impacts of the Modifications, in consultation with relevant regulators and the local Aboriginal community.	**6.15**
14.	Coalpac will review and submit an updated EMP and EMS to DP&I for approval, which will include a consideration of the activities described in the Invincible Colliery Modification.	**2.1.6**

Table 8
Cullen Valley Mine Statement of Commitments

Ref	Description	Section
1.	Coal mining and processing activities will be undertaken at Cullen Valley Mine during the day and evening periods. Coal transportation will be undertaken during the day period only. Cullen Valley Mine will not conduct any activities during the night period.	**6.4**
2.	Open cut and highwall mining operations will be undertaken within the areas as discussed in **Section 3**, with the conceptual final landform shown on **Figure 8** to be reinstated at the conclusion of the Modification.	**3.4.1 and 6.17**
3.	A Highwall Mining Management Plan will be prepared to the satisfaction of DRE prior to the commencement of highwall mining operations, detailing highwall design, monitoring and management measures.	**6.7.4**
4.	Coalpac will prepare an Extraction Plan in consultation with DRE and to the satisfaction of DP&I prior to the commencement of highwall mining in each distinct mining area.	**6.7.4, 4.6.3**
5.	Coalpac will review and submit an updated EMP and EMS to DP&I for approval, which will include a consideration of the activities described in the Cullen Valley Mine Modification.	**2.2**
6.	EPL 10341 will be amended to include the transfer of water between Cullen Valley Mine and Invincible Colliery, if required.	**4.3.2**
7.	Coalpac will increase the watering rate for unsealed roads from Level 1 to Level 2, as defined in '*National Pollutant Inventory: Emission Estimation Technique for Manual for Mining'* (SEWPaC, 2012).	**6.1.4**

Ref	Description	Section
8.	Coalpac will implement the additional blast monitoring and management procedures described in **Section 6.5.4**.	**6.5.4**
9.	Coalpac will implement the revised Biodiversity Offset Strategy as described in the Modifications EA and this RTS.	**6.6.4, 4.2.2**
10.	Coalpac will implement the visual impact treatments as described in **Section 6.14.4**, including the construction of the bund located to the north of the proposed open cut mining area.	**6.14.4**

8 CONCLUSION

This section provides a summary of the responses to the key issues raised in submissions received in relation to the proposed Modifications.

By adopting the principle of '*avoidance*', the proposed open cut disturbance under the Modifications has been designed to avoid the main populations of threatened and endangered species.

The impacts of the Modifications are very minor in nature, with only 150ha of native vegetation to be disturbed of which none is C/EEC in a bioregion where 29% of the land surface is already protected within the NSW conservation estate.

The benefits from the Modifications, however, remain very material in nature to NSW by providing for the short term continuity of fuel supply to MPPS whilst other fuel supply options are investigated.

The Modifications will result in the direct employment of 121 people and the indirect employment of 124 people in a region that has an unemployment rate of 7.9% (which is 30% higher than the State average).

The Modifications have been specifically designed to result in a better net environmental outcome by creating a stable, free-draining fully revegetated final landform.

This final landform created will be of a standard and quality which will complement the existing Conservation Reserves in proximity and will be compatible with any potential future additional reservation initiatives.

In consultation with OEH, an enhanced BOP has been developed which, with the entire Gulf Mountain property included would exceed the offsetting requirements for ecosystem credits.

The BioBanking Assessment Methodology has been independently applied with the effects on threatened species, landscape type and site viability duly considered.

Pre-eminent experts have confirmed that the Modifications will not impact on, or detract from, the protection of the significant Escarpments distributed throughout the region and found adjacent to the proposed 150 ha of disturbance proposed.

The Modifications will not materially impact on the potential habitat of the Broad-headed Snake through the provision of a significant buffer area (200 ha) between the proposed Invincible Colliery open cut mining area and the Escarpments to the east.

This RTS addresses all of the outstanding matters raised by the relevant regulatory authorities and in consultation with OEH has resulted in a significantly improved BOP to compensate for any residual environmental impacts.

Responses to the Modification Application as publically exhibited have confirmed overwhelming support from the local community who live and work in the Lithgow and Bathurst region and are familiar with the company's commitment to them and the environment and the criticality of MPPS operations to local job security and the regional economy.

When put in context, the submissions received over the Modifications have confirmed that the Modifications have carefully considered the objects of the EP&A Act and provide a balanced consideration of all environmental, social and economic impacts.

* * *

for
HANSEN BAILEY

Dorian Walsh
Senior Environmental Scientist

James Bailey
Director

9 ABBREVIATIONS

Table 9 provides a list of abbreviations used in this RTS.

Table 9
Abbreviations

Abbreviation	Description
AEMR	Annual Environmental Management Report
AHIMS	Aboriginal Heritage Information Management System
AMD	Acid mine drainage
BBSF	Ben Bullen State Forest
BMCS	Blue Mountains Conservation Society
CCP	Coalpac Consolidation Project Application (now withdrawn)
CE	Cumberland Ecology
CIS	Community Information Session
Coalpac	Coalpac Pty Limited (Subject to Deed of Company Arrangement)
Colong Foundation	Colong Foundation for Wilderness
DGRs	Director-General's Requirements
DoE	Commonwealth Department of the Environment
DP&I	NSW Department of Planning & Infrastructure
OASFS	NSW Department of Primary Industries – Office of Agricultural Sustainability & Food Security
DRE	NSW Division of Resources and Energy (within the Department of Trade & Investment, Regional Infrastructure and Services)
EA	Environmental Assessment
EEC	Endangered Ecological Community
EMP	Environmental Management Plan
EP&A Act	Environmental Planning & Assessment Act 1979
EPA	NSW Environment Protection Authority
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
EPL	Environmental Protection Licence
GDEs	Groundwater Dependent Ecosystems
ha	Hectares
Hansen Bailey	Hansen Bailey Environmental Consultants
ICPP	Invincible Colliery Coal Preparation Plant
km	Kilometre

Abbreviation	Description
LCC	Lithgow City Council
LGA	Local Government Area
LEG	Lithgow Environment Group
ML	Megalitres
mm	Millimetre
mm/s	Millimetres per second
MNES	Matters of National Environmental Significance
Modifications EA	Invincible Colliery & Cullen Valley Mine Environmental Assessment. Modifications to PA 07_0127 and DA 200-5-2003.
MPPS	Mount Piper Power Station
Mt	Million tonnes
Mtpa	Million tonnes per annum
NCC	Nature Conservation Council
NOW	NSW Office of Water
NSW Health	NSW Department of Health
OEH	NSW Office of Environment & Heritage
PAC	NSW Planning Assessment Commission
PM_{10}	Particulate Matter <10 microns
PPV	Peak Particle Velocity
RL	Reduced Level
RMS	Roads and Maritime Services
ROM	Run-of-mine
RTS	Response to Submissions
SEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (now Department of Environment)
SIG	Special Interest Group
SSD	State Significant Development
TAI	The Australia Institute
TSC Act	*Threatened Species Conservation Act 1995*
TSP	Total Suspended Particulates
WAL	Water Access Licence
WM Act	*Water Management Act 2000*
WSP	Water Sharing Plan

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APPENDIX A

Key Issues Summary

Appendix A
Key Issues Summary

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
REGULATORY AGENCIES																										
Environment Protection Authority	RA1	•		•						•																
Office of Environment and Heritage	RA2					•	•													•	•	•		•		
Roads & Maritime Services	RA3															•										
Department of Primary Industries - Office of Agricultural Sustainability & Food Security	RA4				•																					
NSW Office of Water	RA5									•	•															
NSW Department of Trade & Investment - Resources & Energy	RA6											•			•							•			•	
Lithgow City Council	RA7	•		•	•							•			•	•							•		•	
NSW Health - Nepean Blue Mountains Local Health District	RA8	•		•															•							
SPECIAL INTEREST GROUPS																										

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Bathurst Community Climate Action Network	SIG1	•	•	•	•	•				•	•				•				•	•	•	•				
Blue Mountains Conservation Society	SIG2				•	•	•	•		•	•				•			•	•	•	•	•		•		
Colo Committee	SIG3	•	•	•		•	•	•				•	•		•			•	•	•	•	•		•		
Colong Foundation for Wilderness	SIG4					•	•	•		•	•	•			•			•		•	•	•		•		
Cullen Bullen Lifestyle Group	SIG5	•		•		•						•	•			•			•		•					
Cullen Bullen Tidy Towns	SIG6											•	•		•										•	
Energy Australia	SIG7											•													•	
Environmental Liaison Office	SIG8					•	•	•				•									•					
Hawkesbury Environment Network	SIG9					•															•					
Lithgow Environment Group	SIG10	•			•	•	•	•	•	•	•				•			•		•	•					
Nature Conservation Council	SIG11	•	•			•		•				•								•	•					
NSW Heritage Network	SIG12	•				•		•				•			•					•	•					
Parramatta Climate Action Group	SIG13	•				•						•							•		•					
Rivers SOS Alliance	SIG14					•														•	•					
Stop Coal Seam Gas Blue Mountains	SIG15	•			•	•		•		•		•			•					•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Portland Newsagency	SIG16											•	•											•	
Portland District Motorsports Club	SIG17											•	•											•	
Portland Automotive Services	SIG18											•												•	
The Greens NSW	SIG19					•	•												•	•	•				
The Australia Institute	SIG20											•	•												
Big Rim Pty Limited	SIG21											•	•		•									•	
PUBLIC SUBMISSIONS																									
Public Objections																									
Alchin, Barry	P1					•						•							•		•				
Anderson, John	P2	•				•		•											•	•	•				
Anderson, B	P3	•			•	•	•	•		•	•	•			•				•	•	•				
Anderson, N	P4	•			•	•	•	•		•	•	•			•				•	•	•				
Andrei, J	P5					•						•									•				
Arrell, T	P6					•	•	•							•					•	•				
Baigent, R	P7	•				•						•							•		•				

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Baillie, R	P8	•				•						•							•		•					
Baird, I	P9	•				•						•							•		•					
Banks, J	P10					•																				
Barrow, D	P11	•			•	•	•	•		•	•	•			•				•	•	•					
Baruch, V	P12	•				•						•							•		•					
Bayer, M	P13	•		•		•						•	•						•	•						
Beech, B	P14	•				•						•							•		•					
Beeche, G	P15	•			•	•	•	•		•	•	•			•				•	•	•					
Bennett, G	P16	•			•	•	•	•		•	•	•			•				•	•	•					
Bennett, P	P17	•			•	•	•	•		•	•	•			•				•	•	•					
Bettington, C	P18	•		•		•	•	•			•	•			•				•	•	•					
Bidder, T	P19	•			•	•	•	•		•	•	•			•				•	•	•					
Blackband, P	P20	•		•		•		•			•	•			•					•	•					
Blackburn, E	P21	•				•													•	•	•	•				
Blair, S	P22	•				•						•							•		•					•

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Bolotin, Y	P23	•				•		•			•				•				•	•	•					
Booth, J	P24					•														•	•					
Borbely, P	P25	•			•	•	•	•		•	•	•			•				•	•	•					
Bowman, A	P26	•			•	•	•	•		•	•	•			•				•	•	•					
Bowskill, D & S	P27					•	•	•				•			•					•	•					
Boyton, H	P28	•				•						•							•		•					
Brander, D	P29	•		•		•						•	•						•	•						
Brander, R	P30	•		•		•						•	•						•	•						
Breen, L	P31					•															•					
Brock, S	P32	•																	•	•	•					
Brown, I	P33					•						•								•						
Brown, R	P34	•			•	•	•	•		•	•	•			•				•	•	•					
Bruce-Allen, K	P35	•			•	•	•	•		•	•	•			•				•	•	•					
Buchanan, T	P36	•			•	•	•	•		•	•	•			•				•	•	•					
Burke, T	P37	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Cairnes, L	P38	•			•	•	•	•		•	•	•			•				•	•	•					
Campbell, J	P39	•			•	•	•	•		•	•	•			•				•	•	•					
Cannon, D	P40	•			•	•	•	•		•	•	•			•				•	•	•					
Cantwell, R	P41	•				•						•							•		•					
Carpenter, A	P42	•			•	•	•	•		•	•	•			•				•	•	•					
Carr, A	P43	•				•													•		•					
Carr, M	P44	•			•	•	•	•		•	•	•			•				•	•	•					
Carrad, G	P45	•			•	•	•	•		•	•	•			•				•	•	•					
Carrard, G	P46		•									•														•
Carroll, M	P47					•													•							
Carter, B	P48																									•
Cave, J	P49	•				•						•							•		•					
Chadwick, J	P50	•			•	•	•	•		•	•	•			•				•	•	•					
Chat, B	P51	•			•	•	•	•		•	•	•			•				•	•	•					
Chatman, J	P52	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Clarke, J	P53	•				•						•							•		•					
Cole, M	P54	•			•	•	•	•		•	•	•			•				•	•	•					
Cole, R	P55	•		•		•						•	•						•	•						
Coley, T	P56	•				•	•	•		•	•	•			•			•	•	•	•					
Colvin, B	P57	•				•						•							•		•					
Colvin, L	P58	•				•						•							•		•					
Conomos, E	P59	•			•	•	•	•		•	•	•			•				•	•	•					
Cooper, M	P60	•				•						•							•		•					
Corrigan, S	P61	•			•	•	•	•		•	•	•			•				•	•	•					
Corrigan, S	P62	•			•	•	•	•		•	•	•			•				•	•	•					
Cottle, J	P63	•			•	•	•	•		•	•	•			•				•	•	•					
Cox, A	P64	•		•		•	•	•			•								•	•	•					
Coyne, S	P65																									•
Crawford, D	P66	•				•						•	•		•	•			•		•					
Crawford, J	P67	•				•	•	•				•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Cullis, R	P68	•				•	•	•				•			•				•	•	•					
Curry, A	P69	•			•	•	•	•				•			•				•	•	•					
Cutherbertson, J	P70	•			•	•	•	•				•			•				•	•	•					
Dailey, P	P71					•														•						
Daly, G	P72	•				•													•	•	•					
Dargan, M	P73	•			•	•	•	•		•	•	•			•				•	•	•					
Darrnauin, B	P74	•			•	•	•	•		•	•	•			•				•	•	•					
Darrnauin, D	P75	•			•	•	•	•		•	•	•			•				•	•	•					
Davies, M	P76	•			•	•	•	•		•	•	•			•				•	•	•					
Davies, M	P77																			•	•					
de Brabander, D	P78	•			•	•	•	•		•	•	•			•				•	•	•					
de Noigme, N	P79	•		•		•						•	•						•	•						
Dean, S	P80	•		•		•						•	•						•	•						
Devaux, B	P81																			•	•					
DiMauro, C	P82	•				•				•	•								•							

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
DiMauro, P	P83	•				•				•	•								•							
Dorman, R	P84	•			•	•	•	•		•	•	•			•				•	•	•					
Douglas, J	P85	•		•		•	•					•							•	•	•					
Douglas-Henry, J	P86	•				•						•							•		•					
Drinkwater, E	P87	•			•	•	•	•		•	•	•			•				•	•	•					
Druce, C	P88	•			•	•	•	•		•	•	•			•				•	•	•					
Dundler, E	P89	•			•	•	•	•		•	•	•			•				•	•	•					
Duruz, J	P90																				•					
Eastmead, J	P91	•			•	•	•	•		•	•	•			•				•	•	•					
Edwards, I	P92		•																							
Eggington, L	P93	•				•	•	•				•			•				•	•	•					
Ellwood, C	P94	•				•						•							•		•					
Engelen,K	P95	•				•													•	•	•					
Ernst, I	P96	•			•	•	•	•		•	•	•			•				•	•	•					
Ernst, S	P97	•				•						•							•		•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Faria, E	P98	•			•	•	•	•		•	•	•			•				•	•	•					
Faura, G	P99	•			•	•	•	•		•	•	•			•				•	•	•					
Field, C	P100	•			•	•	•	•		•	•	•			•				•	•	•					
Filla, S	P101			•		•				•	•	•	•		•	•			•	•	•			•		
Filla, H	P102			•		•				•	•	•	•		•	•			•	•	•			•		
Finter, D	P103	•			•	•	•	•		•	•	•			•				•	•	•					
Fisher	P104	•			•	•	•	•		•	•	•			•				•	•	•					
Fisher, H	P105	•			•	•	•	•		•	•	•			•				•	•	•					
Fisher, M	P106	•				•						•							•		•					
Fisher, M	P107	•				•						•							•		•					
Fitzgerald, B&J	P108	•		•		•										•			•							
Forde, J	P109	•				•						•	•							•	•					
Foster, J	P110	•				•						•			•				•		•					
Foster, K	P111					•															•					
Gahan, B	P112	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Gardiner, L	P113	•			•	•	•	•		•	•	•			•				•	•	•					
Gardner, J	P114	•			•	•	•	•		•	•	•			•				•	•	•					
Garland, L	P115	•			•	•	•	•		•	•	•			•				•	•	•					
Garthwin, S	P116	•				•						•							•		•					
Gaut, M	P117	•		•		•													•		•					
Goldthorpe, K	P118	•			•	•	•	•		•	•	•			•				•	•	•					
Golles, B	P119											•														•
Golles, K	P120																			•	•					
Goosen, C	P121	•			•	•	•	•		•	•	•			•				•	•	•					
Gordon, L	P122	•			•	•	•	•		•	•	•			•				•	•	•					
Gotham, J	P123	•			•	•	•	•		•	•	•			•				•	•	•					
Gould, H	P124	•			•	•	•	•		•	•	•			•				•	•	•					
Gould, P	P125	•			•	•	•	•		•	•	•			•				•	•	•					
Granger, M	P126	•				•													•		•					
Granzien, K	P127	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Green, R	P128	•			•	•	•	•		•	•	•			•				•	•	•					
Grover, F	P129	•			•	•	•	•		•	•	•			•				•	•	•					
Haines, D	P130					•															•					
Haines, D	P131					•														•	•					
Hanlon, B	P132	•		•		•						•	•						•	•						
Hardwick, D	P133																				•					•
Harris, R	P134	•		•		•						•	•						•	•						
Harris, R	P135	•		•		•						•	•						•	•						
Harris, S	P136	•		•		•						•	•						•	•						
Harrison, Y	P137																				•			•		
Hart, L	P138	•		•		•						•	•						•	•						
Hartley, E	P139	•			•	•	•	•		•	•	•			•				•	•	•					
Harvey, B	P140	•			•	•	•	•		•	•	•			•				•	•	•					
Hayes, S	P141																				•					•
Herbert, G	P142	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Heydt, S	P143	•			•	•	•	•		•	•	•			•				•	•	•					
Hickson, J	P144	•			•	•	•	•		•	•	•			•				•	•	•					
Higgins, I	P145	•				•						•	•		•				•		•					
Hilder, R	P146	•			•	•	•	•				•			•				•	•	•					
Hilder, M	P147	•			•	•	•	•		•	•	•			•				•	•	•					
Hill, I	P148	•			•	•	•	•		•	•	•			•				•	•	•					
Hinterding, J	P149	•				•						•							•		•					
Hocking, D	P150	•			•	•	•	•		•	•	•			•				•	•	•					
Holliday, J	P151	•			•	•	•	•		•	•	•			•				•	•	•					
Howden, J	P152	•			•	•	•	•		•	•	•			•				•	•	•					
Howden, G	P153	•		•		•						•	•						•	•						
Hoyle, G	P154	•			•	•	•	•		•	•	•			•				•	•	•					
Hughes, D	P155	•			•	•	•	•		•	•	•			•				•	•	•					
Hull, H	P156	•			•	•	•	•		•	•	•			•				•	•	•					
Humble, G	P157					•	•				•	•							•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Humphreys, A	P158																									•
Hutchison, J	P159				•							•									•					
Jackson, C	P160	•			•	•	•	•		•	•	•			•				•	•	•					
Jacobson, R	P161	•			•	•	•	•		•	•	•			•				•	•	•					
Johnson, G	P162											•														•
Johnston, I	P163	•			•	•	•	•		•	•	•			•				•	•	•					
Johnston, S	P164	•			•	•	•	•		•	•	•			•				•	•	•					
Jones, A	P165	•			•	•	•	•		•	•	•			•				•	•	•					
Jones, F	P166	•			•	•	•	•		•	•	•			•				•	•	•					
Katz, L	P167				•															•	•					
Kay, L	P168	•			•	•	•	•		•	•	•			•				•	•	•					
Keats, M	P169	•			•	•	•	•		•	•	•			•				•	•	•					
Kemister, L	P170	•				•						•							•		•					
Khatra, K	P171	•		•		•						•	•						•	•						
Khatra, K	P172	•		•		•						•	•						•	•						
Khaut, T	P173				•																•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Kinney, L	P174	•				•						•							•		•					
Knittel, A	P175	•			•	•	•	•		•	•	•			•				•	•	•					
Ko, H	P176					•													•							
Korpa, L	P177	•				•						•			•				•		•					
Laclchere, G	P178	•				•				•	•	•			•				•		•					
Lane, N	P179																									•
Langford, R	P180	•				•						•							•		•					
Larkin, R & A	P181	•		•															•							
Leadbetter, K	P182																									•
Lee, G	P183																									•
Litchfield, K	P184	•			•	•	•	•		•	•	•			•				•	•	•					
Lodewyhe, S&J	P185	•			•	•	•	•		•	•	•			•				•	•	•					
Lodewyhe, T	P186	•			•	•	•	•		•	•	•			•				•	•	•					
Lollback, Y	P187	•			•	•	•	•		•	•	•			•				•	•	•					
Luke, S	P188	•										•							•							
Lyall, L	P189	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Lyle-Stirling, A	P190																									•
Main, M	P191	•				•						•							•		•					
Maltby, C	P192	•			•	•	•	•		•	•	•			•				•	•	•					
Martin, J	P193	•			•	•	•	•		•	•	•			•				•	•	•					
Martin, R	P194	•			•	•	•	•		•	•	•			•				•	•	•					
Mason, R	P194	•			•	•	•	•		•	•	•			•				•	•	•					
Maxwell, H	P195	•			•	•	•	•		•	•	•			•				•	•	•					
Mayer, J	P196	•			•	•	•	•		•	•	•			•				•	•	•					
McCann, D	P197	•		•		•						•	•						•	•						
McCann, G	P198	•		•		•						•	•						•	•						
McGlashan, N	P199	•			•	•	•	•		•	•	•			•				•	•	•					
McKay, G	P200	•			•	•	•	•		•	•	•			•				•	•	•					
McKay, M	P201	•			•	•	•	•		•	•	•			•				•	•	•					
McKinley, M	P202	•			•	•	•	•		•	•	•			•				•	•	•					
McManus, E	P203	•		•		•						•	•						•	•						

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
McQuarrie, B	P204	•			•	•	•	•		•	•	•			•				•	•	•					
McVie, J	P205					•						•								•	•					
Meera, S	P206	•			•	•	•	•		•	•	•			•				•	•	•					
Middlebrook, D	P207	•			•	•	•	•		•	•	•			•				•	•	•					
Milford, J	P208	•			•	•	•	•		•	•	•			•				•	•	•					
Milne, J	P209	•			•	•	•	•		•	•	•			•				•	•	•					
Milne, S	P210	•			•	•	•	•		•	•	•			•				•	•	•					
Minard, D	P211																		•		•					
Mitchelle, B	P212				•																•					
Moore, C	P213	•				•						•							•		•					
Morita, H	P214					•						•								•	•					
Morris Wieland, A	P215	•			•	•	•	•		•	•	•			•				•	•	•					
Morris, S	P216	•			•	•	•	•		•	•	•			•				•	•	•					
Morton, P	P217	•			•	•	•	•		•	•	•			•				•	•	•					
Mosley, G	P218					•															•					
Mosman, R	P219	•				•						•							•		•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Mosman, W	P220	•			•	•	•	•		•	•	•			•				•	•	•					
Mougenot, A	P221	•			•	•	•	•		•	•	•			•				•	•	•					
Muhlisimmer, S	P222					•		•				•			•					•	•					
Mukherjee, S	P223	•			•	•	•	•		•	•	•			•				•	•	•					
Mulder, K	P224	•				•						•							•		•					
Mullaney, B	P225											•							•		•					
Mulroney, K	P226	•			•	•	•	•		•	•	•	•		•				•	•	•					
Mulvogue, G	P227	•			•	•	•	•		•	•	•			•				•	•	•					
Murphy, S	P228	•			•	•	•	•		•	•	•			•				•	•	•					
Murray, A	P229	•			•	•	•	•		•	•	•			•				•	•	•					
Murray, R	P230	•				•						•							•		•					
Nadolny, A	P231	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Cullen Bullen	P232											•														
Name withheld Alexandria	P233	•				•				•											•					
Name wthheld Bentley	P234					•							•													
Name withheld Lithgow	P235	•		•	•	•							•		•					•						

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Moorooka	P236					•													•		•					
Name withheld Blackheath	P237	•				•						•							•		•					
Name withheld Buff Point	P238	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Darlington	P239	•				•						•							•		•					
Name withheld Neutral Bay	P240	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Potts Point	P241				•															•	•					
Name withheld St Clair	P242																									•
Name withheld Wallacia	P243	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Blackheath	P244	•				•						•							•		•					
Name withheld Bundanoon	P245	•				•													•		•					
Name withheld Kandos	P246	•				•						•							•		•					
Name withheld Leura	P247					•																				
Name withheld Marwickville Sth	P248	•				•						•							•		•					
Name withheld Randwick	P249	•				•						•							•		•					
Name withheld Bathurst	P250	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Bolotin	P251	•				•		•			•				•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Bonnells Bay	P252	•				•						•							•		•					
Name withheld Hazelbrook	P253	•	•			•						•							•		•					
Name withheld Leura	P254	•				•						•							•		•					
Name withheld Leura 2	P255	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Mt Pleasant	P256	•				•						•							•		•					
Name withheld Paddington	P257				•															•	•					
Name withheld Tuncurry	P258	•				•						•							•							
Name withheld 2777	P259	•				•						•							•		•					
Name withheld Alexandria	P260	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Ashfield	P261	•				•						•							•		•					
Name withheld Avondale Heights	P262	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Bateau Bay	P263														•					•						
Name withheld Bathurst	P264					•									•					•	•					
Name withheld Bathurst 2	P265					•									•					•	•					
Name withheld Bathurst 3	P266																			•	•					
Name withheld Bellingen	P267					•																				

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Benowa	P268	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Bilpin	P269				•	•														•						
Name withheld Blackheath	P270					•						•								•	•					
Name withheld Blackheath 2	P271	•				•						•							•		•					
Name withheld Blackheath 3	P272					•						•									•					
Name withheld Blackheath 4	P273					•						•								•	•					
Name withheld Blackheath 5	P274																									•
Name withheld Blackheath 6	P275	•				•						•							•		•					
Name withheld Blackheath 7	P276	•				•						•							•		•					
Name withheld Blaxland	P277					•						•								•	•					
Name withheld Bondi	P278	•				•						•							•							
Name withheld Cambridge Gardens	P279	•				•						•							•		•					
Name withheld Cammeray	P280	•																	•		•					
Name withheld Caringbah 1	P281																									•
Name withheld Caringbah 2	P282	•				•						•							•		•					
Name withheld Cremorne Point	P283	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name wittheld Croydon Park	P284	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Cullen Bullen	P285			•	•							•	•		•											
Name withheld Cullen Bullen 2	P286			•	•							•	•		•											
Name wittheld Cullen Bullen 2 (CV)	P287											•	•													
Name withheld Dargan	P288				•	•	•					•			•				•		•	•				
Name withheld Dargan 2	P289					•						•			•				•		•					
Name wittheld Darlinghurst	P290	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld East Maitland	P291	•				•						•							•		•					
Name withheld Eastwood	P292																				•					•
Name withheld Enmore	P293					•						•							•		•					
Name withheld Faulconbridge	P294	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Five Dock	P295	•				•						•							•		•					
Name withheld Forestville	P296	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Gerrigong	P297																									•
Name withheld Gerrigong 2	P298																									•
Name withheld Glebe 3	P299	•				•						•							•		•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Glebe	P300																									
Name withheld Glenelg	P301					•																				
Name withheld Glenorchy	P302	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Goonellabah	P303					•															•					
Name withheld Hazelbrook	P304											•								•	•					
Name withheld Hazelbrook 2	P305	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Hazelbrook 3	P306	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Helensvale	P307	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Highett	P308																									•
Name withheld Hobartville	P309																									•
Name withheld Ireland	P310	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Kalorama	P311											•			•					•	•					
Name withheld Katoomba 2	P312											•			•				•	•	•					
Name withheld Katoomba 3	P313	•				•						•							•		•					
Name withheld Katoomba 4	P314	•										•							•	•	•					
Name withheld Katoomba 5	P315														•						•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Katoomba 6	P316														•						•					
Name withheld Katoomba 7	P317				•	•															•					
Name withheld Katoomba 8	P318	•				•						•							•		•					
Name withheld Katoomba 9	P319					•															•					
Name withheld Katoomba	P320					•						•								•	•					
Name withheld Kensington Gardens	P321																				•					
Name withheld Kings Langley	P322																									•
Name withheld Kingsford	P323					•						•								•	•					
Name withheld Lane Cove	P324	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Lawson	P325	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Leura 2	P326	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Leura	P327	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Leura 4	P328	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Lidsdale	P329																									•
Name withheld Lithgow	P330	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Manly	P331			•								•			•				•	•						

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Maroubra	P332					•																				
Name withheld Minchinbury	P333	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Morooka	P334	•				•													•	•	•					
Name withheld Morwell	P335				•																•					
Name withheld Mt Glorious	P336				•																•					
Name withheld Nth Bondi	P337																									•
Name withheld NSW	P338	•				•						•							•		•					
Name withheld Old Toongabbie	P339	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Ourimbah	P340	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Potts Point	P341	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Redfern	P342	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Sassafras	P343	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Shoalhaven Heads	P344	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Singleton	P345	•				•						•							•		•					
Name withheld Springwood 2	P346	•				•									•				•		•					
Name withheld Springwood 3	P347	•				•									•				•		•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Springwood 4	P348					•									•					•	•					
Name withheld Springwood	P349			•	•	•		•		•					•					•	•					
Name withheld St Clare 2	P350		•			•														•						
Name withheld St Clare 3	P351														•					•						
Name withheld St Clare	P352																			•						
Name withheld Sydney 2	P353					•															•					
Name withheld Sydney 3	P354					•						•									•					
Name withheldSydney 4	P355					•									•											
Name withheld Sydney 5	P356									•	•										•					
Name withheld Sydney 6	P357											•								•	•					
Name withheld Sydney	P358	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Terrey Hills	P359	•				•						•							•		•					
Name withheld Thornleigh 5	P360	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Thornleigh	P361	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Wahroonga 2	P362	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Wahroonga	P363	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Wallerang	P364	•				•						•							•		•					
Name withheld Warnsveld	P365	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Warrimoo	P366	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Wentworth Falls 3	P367	•				•						•							•		•					
Name withheld Wentworth Falls 4	P368	•			•	•	•	•		•	•	•			•				•	•	•					
Name withheld Wentworth Falls no 2	P369	•				•						•							•		•					
Name withheld Wentworth Falls	P370	•				•						•							•		•					
Name withheld West Bathurst	P371	•	•	•	•	•				•	•				•					•	•	•					
Name withheld Benowa	P372																									•
Name withheld NSW	P373	•			•	•	•	•		•	•	•			•				•	•	•					
Newman, J	P374	•				•						•							•		•					
Niklaus, A	P375	•			•	•	•	•		•	•	•			•				•	•	•					
North, G	P376	•				•						•							•		•					
Oates, E	P377	•			•	•	•	•		•	•	•			•				•	•	•					
O'Donovan, M	P378	•			•	•	•	•		•	•	•			•				•	•	•					
O'Leary, J	P379	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Oliver, L	P380																									•
Olling, W	P381	•			•	•		•		•	•	•			•				•	•						
Olsen, I	P382																									•
Onyx, J	P383	•				•						•							•		•					
Orme, A	P384	•	•			•															•					
Palma, L	P385	•			•	•	•	•		•	•	•			•				•	•	•					
Park, J	P386	•			•	•	•	•		•	•	•			•				•	•	•					
Perrers, C	P387	•		•	•	•									•				•	•						
Pritchard, M	P388					•		•				•									•					
Quinn, K	P389	•			•	•	•	•		•	•	•			•				•	•	•					
Read, W	P390	•			•	•	•	•		•	•	•			•				•	•	•					
Reynolds, W	P391	•			•	•	•	•		•	•	•			•				•	•	•					
Rich, K	P392	•			•	•	•	•		•	•	•			•				•	•	•					
Rich, S	P393	•			•	•	•	•		•	•	•			•				•	•	•					
Rich, D	P394	•			•	•	•	•		•	•	•			•				•	•	•					
Rix, R	P395				•	•															•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Rix, S	P396	•				•						•							•		•					
Rizana, E	P397											•							•							
Sanchez, A	P398	•			•	•	•	•		•	•	•			•				•	•	•					
Sanchez, C	P399	•	•			•		•											•		•					
Sanday, GW	P400	•			•	•	•	•		•	•	•			•				•	•	•					
Sanday, V	P401	•			•	•	•	•		•	•	•			•				•	•	•					
Sander, M	P402				•																					
Saramel, L	P403	•			•	•	•	•		•	•	•			•				•	•	•					
Schmid, R	P404					•														•	•					
Scully, A	P405	•				•						•							•		•					
Shanley, J	P406	•				•						•							•		•					
Sheppard, J	P407	•				•						•							•		•					
Simpson, H	P408					•															•					
Sinclair, L	P409																									•
Siovaw, F	P410	•			•	•	•	•		•	•	•			•				•	•	•					
Sley, B	P411					•						•									•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Smith, C	P412	•			•	•	•	•		•	•	•			•				•	•	•					
Smith, D	P413	•			•	•	•	•		•	•	•			•				•	•	•					
Smithers, M	P414		•																		•					
Southers, D	P415	•				•													•		•					
Spencer, J	P416	•			•	•	•	•		•	•	•			•				•	•	•					
Spurway, I	P417	•			•	•	•	•		•	•	•			•				•	•	•					
Stephenson, K	P418	•			•	•	•	•		•	•	•			•				•	•	•					
Sterry, R	P419	•				•						•							•		•					
Stewart, R	P420	•				•	•					•							•		•					
Stiles, R	P421	•				•	•					•							•	•	•					
Stone, J	P422	•				•						•							•		•					
Stone, K 2	P423	•			•	•	•	•		•	•	•			•				•	•	•					
Stuart, L	P424																			•	•					
Tanner, I	P425	•			•	•	•	•		•	•	•			•				•	•	•					
Taylor, J	P426																									•
Taylor, N	P427	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Terry, A	P428	•				•						•							•		•					
Thomas, W	P429	•			•	•	•	•		•	•	•			•				•	•	•					
Thompson, B	P430																									•
Thompson, O	P431	•			•	•	•	•		•	•	•			•				•	•	•					
Timmerman, J	P432	•			•	•	•	•		•	•	•			•				•	•	•					
Tingate, C	P433	•			•	•	•	•		•	•	•			•				•	•	•					
Toms, B	P434	•			•	•	•	•		•	•	•			•				•	•	•					
Tooth, I	P435	•			•	•	•	•		•	•	•			•				•	•	•					
Tyssen, S	P436	•				•						•							•		•					
Ulvesund, L	P437	•			•	•	•	•		•	•	•			•				•	•	•					•
Vale, P	P438	•				•						•							•		•					
van den Heuvel, H	P439	•			•	•	•	•		•	•	•			•				•	•	•					
Van Gils	P440	•			•	•	•	•		•	•	•			•				•	•	•					
Vendramini	P441	•				•						•							•		•					
Versely, E	P442	•			•	•	•	•		•	•	•			•				•	•	•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Vincent, J	P443	•			•	•	•	•		•	•	•			•				•	•	•					
von Behrens, D	P444	•			•	•	•	•		•	•	•			•				•	•	•					
Wagstaff, K	P445	•			•	•	•	•		•	•	•			•				•	•	•					
Wakefield, B	P446	•				•						•							•		•					
Wall, D	P447	•			•	•	•	•		•	•	•			•				•	•	•					
Wall, M	P448	•			•	•	•	•		•	•	•			•				•	•	•					
Wall, Z	P449	•			•	•	•	•		•	•	•			•				•	•	•					
Walsh, T	P450	•			•	•	•	•		•	•	•			•				•	•	•					
Warburton, R&M	P451	•				•						•							•		•					
Water, T	P452					•						•									•					
Watson, I	P453	•				•						•							•		•					
Watt, G	P454					•																				
Weekes, A	P455	•				•						•							•		•					
White, K	P456	•				•						•							•		•					
Wicks, A	P457					•																				
Williams, C	P458	•				•						•							•		•					

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Williams, C	P459														•					•	•					
Wilson, D	P460	•				•						•							•		•					
Wilson ,C&L	P461	•				•						•							•		•					
Witney-Cochrane, Hal	P462	•			•	•	•	•		•	•	•			•				•	•	•					
Woodward, C	P463	•				•						•							•		•					
Woolley, N	P464																			•	•					
Wray, S	P465	•			•	•	•	•		•	•	•			•				•	•	•					
Wright, R	P466	•			•	•	•	•		•	•	•			•				•	•	•					
Yorston, J	P467	•				•						•							•		•					
Young, A	P468					•	•			•	•				•						•	•				
Young, R	P469	•			•	•	•	•		•	•	•			•				•	•	•					
Young, T	P470	•				•						•							•		•					
Yoxall, H	P471	•			•	•	•	•		•	•	•			•				•	•	•					
Public Support																										
Abylkassov, I	P472												•	•												
Anthes, S	P473												•	•												

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Aughterson, M	P474											•	•													
Battersby, K	P475																									
Kyle Battersby	P476											•	•													
Baynham, E	P477											•	•													
Baynham, G	P478											•	•													
Blackley, R	P479												•													
Bone, M	P480												•													
Boydell, A	P481											•	•													
Boydell, B	P482											•	•													
Boydell, V	P483											•	•													
Bulkeley, M	P484											•	•								•					
Channon, M	P485											•	•													
Colvin, A	P486											•	•													
Cullen, J	P487												•													
Cullen, M	P488												•												•	
Cullen, M 2	P489											•	•													

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Cunningham, R	P490											•	•												
Dann, D	P491											•	•												
Dann, K	P492												•												
Davis, M	P493											•	•		•										
DeHaan, M	P494																							•	
Dodds, G	P495											•	•												
Duffy, E	P496											•	•												
Eagles, B	P497												•											•	
Flor, N	P498											•	•												
Ford, C	P499												•												
Fredericks, E	P500											•	•												
Fulwood, K	P501											•	•												
Fulwood, M	P502											•	•												
Golden, S	P503											•	•												
Goodman, C	P504											•	•												
Grant, D	P505											•	•												

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Grant, Deborah	P506											•	•												
Gurney, R	P507																							•	
Hadson, T	P508												•												
Hanrahan, Brad 2	P509											•	•												
Hanrahan, Brad	P510											•	•												
Hanrahan, C	P511											•	•		•										
Harvison, D	P512												•												
Jewell, K	P513											•	•												
Jewell, K	P514											•	•												
Johnson, B	P515											•	•												
Johnson, C	P516											•	•												
Maconochie, P	P517											•			•							•			
Malafant, A	P518																							•	
Malafant, B	P519																							•	
Martin, S	P520											•	•												
Mazzotti, R	P521											•	•												

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
McDonald, G	P522											•	•		•											
McRobert, K	P523											•	•		•											
Medlock, G	P524											•	•													
Milne, B	P525											•	•													
Minns, M	P526											•	•													
Mosley, F	P527											•	•													
Mosley, I	P528											•	•													
Nadalin, M	P529												•													
Name wittheld Portland	P530											•	•													
Name wittheld 2 Lithgow	P531											•	•													
Name wittheld 4 Lithgow	P532											•	•													
Name withheld 6 Lowther	P533												•													
Name wittheld 7 Wallerwang	P534												•													
Name wittheld Lithgow	P535												•													
Name wittheld Lowther	P536												•													
Name wittheld Wallerawang	P537												•													

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name wittheld Lithgow	P538												•													
Name wittheld Portland	P539											•	•		•											
Name wittheld Perthville	P540											•	•		•											
Name wittheld Perthville 2	P541																								•	
Name wittheld Brisbane 2	P542											•	•		•		•									
Name wittheld Brisbane	P543											•	•													
Name wittheld Cullen Bullen 3	P544											•	•													
Name wittheld Cullen Bullen	P545	•										•	•	•	•											
Name wittheld Graceville	P546											•	•													
Name wittheld Katoomba 2	P547											•	•													
Name wittheld Lithgow	P548												•													
Name wittheld Lithgow 2	P549												•		•											
Name wittheld Lithgow 3	P550												•		•											
Name withheld Lithgow	P551												•	•												
Name withheld Muswellbrook	P552											•	•													
Name withheld Portland	P553											•	•													

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Name withheld Taringa	P554											•	•													
Name withheld Wynnum	P555											•	•													
Neaves, B	P556											•	•													
O'Neill, K	P557											•	•													
Osland, T	P558												•													
Peachers, M	P559											•	•													
Philpott, A	P560											•	•													
Portland District Motorsports Club	P561											•	•													
Portland Newsagency	P562											•	•													
Quinn, P	P563											•	•													
Quinn, S	P564																								•	
Rachel	P565											•	•													
Reeve, S	P566											•	•													
Richardson, H	P567											•	•													
Riggle, E	P568	•										•	•													
Robinson, P	P569											•	•													

Submissions Received	Submission ID	Air Quality	Greenhouse Gases	Noise and Blasting	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology & Cultural Heritage	Non-Aboriginal Heritage	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Geochemistry (water quality)	Health	Ben Bullen State Forest Conservation	Geology / Pagodas	Highwall Mining and Subsidence	Subsurface Heating	Cumulative Impacts	General Support	General Objection
Schneider, T	P570											•	•												
Schurr, G	P571											•	•												
St Clair, J	P572											•	•		•										
Turnbull, G	P573												•												
Turnbull, K	P574											•	•												
Turnbull, M	P575											•	•												
Turnbull, M	P576																							•	
Wakeling, T	P577											•	•												
Wouters, L	P578											•	•												
Wright, N	P579											•	•												
Wynne, M	P580																								

Note: Private individuals who submitted the same submission to both Modification Applications have been allocated one ID number in the table above

APPENDIX B

Regulatory & SIG Submissions

Appendix B
Summary of Regulatory and SIG Issues

Stakeholder	ID	Category	Issue
Regulatory Agencies			
Environment Protection Authority (EPA)	RA1	N/A	I refer to the draft Environmental Assessment (EA) for the modification of the Invincible Colliery and Cullen Valley Mine, received by the Environment Protection Authority (EPA) on 3 March 2014, and the Department of Planning and Infrastructure's request for comment.
		Air quality, noise, surface water	The EPA has reviewed the draft EA and considers that it has generally been prepared in accordance with the Director-General's requirements as provided by the EPA. The EPA is satisfied that the draft EA adequately assesses the potential impacts of the proposals on the existing environment with respect to air, noise and surface water quality.
		Surface water	The Invincible Colliery and Cullen Valley Mine currently operate under environment protection licences (EPL) 1095 and 10341 respectively. The EPA considers that the conditions stipulated within those licences are appropriate for the proposed modification of operations as described in the EA and no variation of EPL's 1095 and 10341 will be required. If you have any questions in relation to this matter please contact Mr Andrew Helms at the EPA's Central West (Bathurst) Office by telephoning (02) 6332 7604.
Office of Environment and Heritage (OEH)	RA2 RA2 RA2	N/A	I refer to your email dated 26th February 2014 inviting comment from the Office of Environment and Heritage (OEH) on a draft Environmental Assessment for the above proposal. OEH staff have inspected the proposed mining areas and proposed offset areas in conjunction with the Proponent. OEH has previously provided the Department of Planning and Infrastructure and the Planning Assessment Commission with submissions regarding the potential impacts of the Coalpac Consolidation Project (10_0178), since withdrawn by the Proponent. OEH would like to refer DP&I to these previous submissions, as many of the comments within these submissions remain relevant to the current proposal.
		N/A	OEH retains considerable reservations regarding the assessment of impacts. These include:
		Ecology	• Impacts on biodiversity resulting from the removal, by open cut mining, of 150.5 ha of native vegetation comprising 148.1 ha of native woodland and 2.4 ha of derived native grassland
		Ecology, Ben Bullen State Forest	• Further encroachment on Ben Bullen State Forest, which previously has been identified by OEH as being of suitably high conservation value for future reservation under the *National Parks and Wildlife Act 1974*
		Biodiversity Offsets	• An inadequate Biodiversity Offset Proposal in terms of the expected gain of biodiversity credits produced compared with the loss at the impact site

Stakeholder	ID	Category	Issue
		Pagodas	• Potential damage to pagoda and escarpment landforms caused by mining activities
		Ecology	• Incomplete application of setback distances for threatened species associated with pagoda and escarpment landforms.
		Biodiversity Offsets	**Biodiversity Offset Proposal (BOP)** <u>Background</u> The Proponent has proposed three main offset areas: 1. "Hillview – Billabong" adjacent to the Invincible Mine, 2. Part of "Gulf Mountain" approximately 22 km to the northwest of the Cullen Valley Mine, and 3. "Additional Offset Areas" adjacent to the Cullen Valley Mine. OEH notes that the potential offset properties "Hillcroft" and "Hyrock Hartley", presented in the Coalpac Consolidation Project (CCP) have been omitted from the current proposal. <u>Interpretation of Offset to Impact Ratios</u> The Proponent has not used a recognised metric to calculate biodiversity losses and gains from the proposal, but simply presents an offset strategy which is based on hectares cleared and hectares offset. The ratio of offset to clearing for each vegetation type identified by the Proponent is presented in Table 16 of the EA (p 83). Overall the ratio given is 4.3:1. There are a number of problems with this approach: • No evidence is presented as to the adequacy of this ratio, • No allowance is made for the condition of vegetation at the impact sites or at the offset sites, • Failure to use a recognised metric such as the Biobanking Assessment Methodology (BBAM) means that aspects of offsetting such as effects on threatened species, effects of landscape type or viability of sites are not considered, • The majority (62.5%) of the offset vegetation is contained in one vegetation type at one location, namely Tableland Scribbly Gum – Narrow-leaved Stringybark Shrubby Open Forest at the "Gulf Mountain" offset, • Derived native grassland within the offset sites is treated as equivalent to the mature vegetation type even though it will need management to restore it. On the plus side much of this derived native grassland has been described in the EA as part of the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland), which is listed as an Endangered Ecological Community (EEC) (p 77).
		Biodiversity Offsets	An absence of data that can accurately and readily be used under the Biobanking Assessment Methodology (BBAM) precludes a definitive quantitative estimate of the credits required to offset biodiversity impacts arising from the Project. OEH has nevertheless used simulated vegetation condition data applied to the vegetation types identified in the EA to calculate estimated biodiversity credits which would be lost through the impacts arising from the project and those which would be

Stakeholder	ID	Category	Issue
			gained through the BOP. From this analysis OEH has calculated a total impact of 11,597 biodiversity credits if the impact sites are considered to be at benchmark condition and 7,706 if the impact sites are considered to be at approximately 70% of benchmark condition. The total credits generated by the offset properties based on simulated data are 4,673. This leaves a deficit of 6,924 credits or 3,033 credits depending whether the higher or lower figure is used. At an average gain in biodiversity credits of 7.2 per ha (the lower end of the offset gain spectrum) at the offset sites this would require a further 955.6 or 418.6 ha respectively. This information is included in Attachment 2. These calculations should not be relied on too closely as they are based on simulated data as defined plot data was not presented in the EA. However, they demonstrate the degree of inadequacy of the currently proposed offsets.
		Biodiversity Offsets	The proposed "Gulf Mountain" offset constitutes approximately 53% of the "Gulf Mountain" property which was purchased by the Proponent in 2012-13. The property consists entirely of native forest and woodland and, from the information presented in the EA and the site visits by OEH staff, would appear to be a suitable property in terms of vegetation types and threatened species habitat. However, OEH believes that the property would be best managed as a single block. It is difficult to see how a portion of this block can be managed in isolation without detracting from the presumed benefits to biodiversity.
		Biodiversity Offsets	<u>Recommendations</u> 1.1. The BOP is assessed using a credible and transparent metric using actual plot data. 1.2. The Proponent provides further offset sites to ensure that the BOP adequately addresses the losses caused by the proposed impacts. 1.3. The Proponent demonstrates how the management of the proposed "Gulf Mountain" offset is not impacted upon by the management of the remainder of the property.
		Ecology, Ben Bullen State Forest	**Reservation Considerations** <u>Loss of Land with High Potential for Incorporation in the National Parks and Reserves System</u> The proposed project footprint encroaches further on Ben Bullen State Forest, which previously has been identified by OEH as being of suitably high conservation value for future reservation under the *National Parks and Wildlife Act 1974*. Proposals for future reservation of part of Ben Bullen State Forest also have the support of numerous environment groups including the Colong Foundation for Wilderness and the Blue Mountains Conservation Society. OEH has been working with other agencies to maximise positive reservation outcomes in the Gardens of Stone area, including Ben Bullen State Forest. One aspect of the suitability of Ben Bullen State Forest for inclusion in the Reserve System is the outstanding scenic value of the sandstone pagodas and escarpments. The current proposal has increased buffer distances between these features and open cut mining areas compared with the CCP. Notwithstanding this, OEH remains concerned that blast and vibration impacts and subsidence impacts caused by highwall mining could irretrievably damage these features. These concerns were shared by

Stakeholder	ID	Category	Issue
			the PAC. Further information on sandstone features is contained in Section 4.
		Biodiversity Offsets	Suitability of Proposed Offset Sites for Incorporation in the National Parks and Reserves System OEH notes that the Proponent on this occasion does not propose to 'gift' the offsets for inclusion into the NSW reserve system. However, OEH has sought internal advice from its Parks and Wildlife Group (PWG) regarding the suitability of the current proposed offset properties in the BOP for future reservation in the National Parks and Wildlife Estate. PWG advise that at this point in time, none of the properties would be suitable for this purpose. Consequently, OEH recommends that another form of in perpetuity conservation mechanism would be required over all potential offsets.
		Biodiversity Offsets, Ben Bullen State Forest	Recommendations 2.1. DP&I note that this proposal would reduce the area of Ben Bullen State Forest suitable for any future inclusion in the National Parks and Reserves System. 2.2. DP&I note the potential for damage to scenic features associated with the proposal further reducing suitability for inclusion in the National Parks and Reserves System. 2.3. The Proponent recognises that the offset areas proposed are not suitable for addition to the National Parks and Reserves System and that some other mechanism of in-perpetuity conservation will be required.
		Pagodas, visual	**Pagodas, Escarpments and Associated Features** The sandstone pagodas around the top of the edges of the plateaus in the area are significant geodiversity features which provide a range of crevice, cave and other refugia habitat types for biodiversity. The pagodas on the boundary of the proposed mining area are good examples of a distinctive landform found only in the "Pagoda country", a 50 kilometre long (600 km2) belt centred on the western edge of Wollemi National Park, Gardens of Stone National Park and Ben Bullen State Forest. A substantial part of the main pagoda area is not reserved within parks. The pagodas in the Blue Mountains are recognised as distinctive features (with limited distribution) that are significant on a national level. In recognition of the high scenic values of the plateau edge and pagodas it is important that mining operations do not degrade the scenic amenity/vistas of the prominent line of dissected sandstone cliff lines and pagodas in Ben Bullen State Forest as well as the sandstone plateau on the western side of the Castlereagh Highway north of Cullen Bullen. It is also important that mining operations/blasting will not cause collapse/subsidence cracks to the sandstone plateau edges, cliff lines and pagodas.
		Pagodas	OEH supplied the PAC with mapping of "Geodiversity Features" (sandstone outcrops, pagodas and cliffs and associated high relief areas) and options for standoff zones. The mapping of "Geodiversity Features" by OEH closely resembles the mapping of "Sandstone Escarpments and Pagodas" produced by the Proponent during the Coalpac Consolidation Project (Figure 5, Coalpac Consolidation Project Environmental Assessment, Hansen Bailey 2012). OEH notes that based on mapping undertaken by OEH and the Proponent the proposed open-cut will encroach within the previously recommended 300m set back and highwall mining will reach up to 200 m beneath these pagodas, cliff lines and associated features particularly in the case of the Cullen Valley Mine.

Stakeholder	ID	Category	Issue
		Pagodas, Subsidence	The Planning Assessment Commission reviewed the risk of subsidence caused by highwall mining during its assessment of the Coalpac Consolidation Project. It stated: *"The Commission finds that the risks of subsidence-induced damage to the pagodas and escarpments are real and that the level of uncertainty is such that no confidence can be placed in the assertion that the risks can be managed successfully at all times under all operating conditions. The Commission also notes that stability problems arising from highwall mining may only become apparent in the longer term."* The PAC recommended that *"the pagodas and the associated escarpments be considered natural features of special significance and that they be fully protected from any mine-induced impacts"*. Given the uncertainty regarding subsidence and other mining impacts OEH considers that no highwall mining should occur beneath geodiversity features identified in the mapping supplied to the PAC during the review process of the Coalpac Consolidation Project.
		Ecology	<u>Broad-headed Snake</u> The EA states that the impact area avoids pagoda and rocky escarpment areas and "summer and winter habitat for the Broad-headed Snake (located to the east of Invincible Colliery)" (p 81). Further, the Proponent states that they "utilise rock crevices and exfoliating sheets of weathered sandstone during the cooler months and tree hollows during summer within 200 m of their winter habitat (DEC (NSW), 2005b)" (EA Appendix C p 3.35). OEH notes that such movements by the Broad-headed Snake have been measured at up to 780 m, with a mean of 318 m (Webb and Shine 1997). This was, at least partly, the reasoning behind the PAC recommending "a minimum setback distance of 300 m be maintained from the open-cut highwall to the pagodas and the escarpments" (NSW Planning and Assessment Commission 2012, Recommendation 47). This would protect approximately 70-75% of the habitat requirements prescribed in the Threatened Species Profile Database for the Broad-headed Snake and other threatened and non-threatened fauna of the pagoda landform. In most cases the proposed modifications achieve this 300 m setback. However, there are some small areas in the northern part of the Invincible modification where the setback is as small as approximately 100 m. More pertinently, much of the open-cut area proposed for the Cullen Valley modification is within 100 m or less of sandstone escarpments.
		Pagodas,Subsidence, Ecology	<u>Recommendations</u> 3.1. DP&I note the potential for damage to scenic features associated with the proposal. 3.2. That no open cut mining occurs within 300 m of mapped "Geodiversity Features" as supplied to the PAC. 3.3. That no underground highwall mining occurs beneath the mapped "Geodiversity Features" as supplied to the PAC.
		Ecology	**The Significance of the Vegetation on Permian Sediments** OEH produced a report for the PAC on the significance of the vegetation on Permian sediments during the deliberations on the previous CCP. A fine scale map of the vegetation types occurring on undulating Permian sediments was produced. The following vegetation types were determined to be of higher conservation significance due to a high level of clearing, and

Stakeholder	ID	Category	Issue
			low level of reservation: 1. Ribbon Gum grassy forest on alluvial flats (equivalent to the Tableland Ribbon Gum Blackwood Apple Box vegetation type mapped by Cumberland Ecology); 2. Mountain Gum Apple Box Blakely's Red Gum grassy forest on small drainage lines and footslopes (equivalent to the Tableland Mountain Gum Broad-leaved Peppermint vegetation type mapped by Cumberland Ecology); and 3. Broad-leaved Peppermint Brittle Gum Red Stringybark grassy forest on small rises (is equivalent to the Tableland Slopes Brittle Gum Broad-leaved Peppermint vegetation type mapped by Cumberland Ecology). The significance of vegetation on Permian sediments is shown by examination of 1:250 000 geological map sheets of the region. Permian geology largely occurs on a north-south line from Rylstone to Katoomba, predominantly on the valley floors and slopes. This landscape is largely cleared in the region and poorly represented in the National Parks and Reserves System (most of which is Triassic sediments). Consequently, the vegetation types to be cleared have a higher conservation status than might otherwise be expected in a region which is otherwise relatively well reserved. Whilst the current proposal is much smaller than the previous proposal it remains the case that most of the vegetation impacted has been mapped by OEH as occurring on Permian sediments (100 ha out of 150.5) and that 45 ha of this is comprised of the three higher conservation value vegetation types outlined above. Permian geology is represented in the "Hillview – Billabong" and "Additional Offset Areas" but not represented in the larger "Gulf Mountain" offset area.
		Ecology	<u>Recommendations</u> 4.1. DP&I note that approximately one third of the vegetation to be removed is comprised of the three higher conservation value vegetation types on Permian sediments and that these vegetation types on Permian geology are highly cleared and poorly reserved in the region.
		Ecology	**Flora Survey** In its submissions to DP&I and the PAC on the CCP application, OEH raised concerns over the adequacy of threatened flora surveys. These concerns remain. OEH maintains that the probability of detecting any species, and in particular cryptic species, is greatly improved through dedicated targeted surveys. The EA cites the following threatened flora species that were targeted during surveys: *Derwentia blakelyi*, *Eucalyptus aggregata*, *E. cannonii*, *E. pulverulenta*, *Grevillea evansiana*, *G. obtusiflora*, *Persoonia marginata*, and *Prostanthera cryptandroides*. While it is stated in the EA that "random meander searches were employed within areas considered to provide suitable habitat for these species" (EA App C, p 2.4) the extent of random meander searches has not been reported. Presumably they were conducted in close proximity to other flora survey effort.
		Ecology	The flora survey presented in the EA is essentially a reproduction of that presented in the original CCP application with some information changed to reflect the boundaries of the current proposal. The flora survey was conducted for the earlier CCP application during 2009-11. Locations of flora survey quadrats are shown in the EA (Appendix C, Figure 2.1, p 2.7). From

Stakeholder	ID	Category	Issue
			Figure 2.1 it can be seen that only 9 of the 44 quadrats conducted were performed within the impact sites of the current proposal (7 of which are within one proposed open cut area) with a further quadrat within the footprint of the highwall operations. A similar situation has occurred with the Capertee stringybark / tree hollow quadrat locations where 3 out of 19 occur with the modification footprint. The proposal boundaries were drawn to avoid the *Persoonia marginata* quadrat locations hence none of these occur within the proposed open cut areas. Therefore, the great majority of the flora survey effort was employed in areas which are now not part of the proposed area. This has provided information on flora in the local area generally and has informed the drawing on the boundaries of the new proposal. However, it has provided little surety that the aforementioned threatened species, and others potentially in the proposal area, have been adequately searched for.
		Ecology	OEH notes that community groups raised during submissions on the CCP the rich flora diversity of the region and the presence of many plants species that are recognised as rare and threatened (ROTAP).
		Ecology	<u>Recommendations</u> 5.1. DP&I note that OEH's previous concerns regarding the adequacy of flora surveys have not been addressed. 5.2. The Proponent provides complete data regarding the random meander surveys and other targeted species effort in the survey area. 5.3. Further targeted surveys for relevant threatened flora and RoTAP species are conducted within and around the areas proposed for open cut operations.
		Ecology	**Indirect Impacts and Edge Effects** In addition to the direct impacts resulting from the removal of native vegetation and habitats, the following indirect impacts on biodiversity are discussed in the EA; subsidence, edge effects, habitat degradation, competition for resources, noise, light, dust, erosion, vehicle strike, weeds, feral animals and overabundant native species. These are discussed in Appendix C, section 4.3, p 4.24. The effect of blasting and vibration are not discussed in this section.
		Ecology, subsidence	Subsidence is dismissed as the Proponent expects no surface subsidence greater than 20 mm. However the PAC stated that this was uncertain and could not be relied on, particularly where operations are in close proximity to pagodas and other sandstone features (see above in section 4).
		Ecology	Regarding edge effects the Proponent alludes to abiotic edge effects (noise, light, nutrient run-off), and the low likelihood that such edge effects would have a significant impact on retained vegetation upslope of mined areas. However, OEH reiterate that edge effects also include the promotion of edge-tolerant species, including feral predators and native competitors. In general indirect and edge effects are acknowledged to be present by the Proponent but few, if any, measures are proposed to minimise the effect of these on neighbouring biodiversity. In most cases it is simply stated that the effect is real but that it will diminish as areas are progressively rehabilitated and will return to normal following cessation of mining activities.

Stakeholder	ID	Category	Issue
			The Proponent states that edge effects will be mitigated by the implementation of "appropriate surface water management practices" (p 4.29) and a "weed and feral animals control program" (p. 4.30).
			Recommendations 6.1. That the effects of blasting and vibration and potential draining of groundwater acquifers on biodiversity and their habitats in close proximity to the area of mining operations are addressed. 6.2. That DP&I note the uncertainty regarding subsidence identified by the PAC.
		Ecology	**Cumulative Impacts** In its review of the CCP the Planning Assessment Commission recommended "that the cumulative impacts on the biodiversity values of Ben Bullen State Forest and the region of this project, together with the proposed Pine Dale Stage 2 Extension, be considered before any assessment of this project is finalised." There has been no attempt in the EA to address the cumulative impacts on biodiversity of other mining applications in the local area, particularly the Pine Dale Stage 2 Extension Project and the Neubeck Coal Project. Any analysis of cumulative impact also needs to include not just areas currently being impacted, but those areas that have already been impacted from past activity in terms of impacts on fragmentation in the landscape and the loss of habitat for threatened and nonthreatened species.
		Ecology	Recommendations 7.1. The proponent addresses the cumulative impact of existing mining areas and other known proposals in the area along with this proposal. Aspects which may be affected are; fragmentation, loss of habitat on the local area, effect on Ben Bullen State Forest and the loss of potential for reservation in the area.
Roads & Maritime Services	RA3	N/A	Thank you for your email received 26 February 2014 referring a draft Environmental Assessment for Coalpac Expansion Modifications to Roads and Maritime Services for submissions. It is noted that the modification will not generate additional traffic from existing approved levels. However both mines have been in care and maintenance since February 2013 and as such no road haulage has taken place.
		Traffic and transport	• Given the request to continue to haul up to 2.2Mtpa by road, Roads and Maritime recommends that consideration be given to a requirement for a code of conduct for transport of materials as per Clause 16 of the *State Environmental Planning Policy (Mining, Petroleum production and extractive industry) 2007*.
		Traffic and transport	• The draft Environmental Assessment refers to a water pipeline connecting Invincible and Cullen Valley however no details are provided for crossing of the Castlereagh Highway. Roads and Maritime concurrence is required for a pipeline crossing, requirements can be provided upon request. Details of the crossing location would be required for assessment.
		Traffic and transport	• Roads and Maritime notes the previous Coalpac Environmental Assessment acknowledged existing concerns with overtaking manoeuvres in proximity to the existing Invincible Highway access. It is requested that the applicant assess the

Stakeholder	ID	Category	Issue
			intersection in conjunction with Roads and Maritime to determine appropriate treatment to address these concerns.
		Traffic and transport	• All arrangements for the control of traffic on a state road shall be in accordance with the Roads and Maritime publication *Traffic Control at Work Sites*. A Road Occupancy Licence is required prior to any works commencing within 3m of the travel lanes of the Castlereagh Highway. This can be obtained by contacting Traffic Operations on 02 6861 1686. Submission of a traffic control plan is required as part of this licence.
Department of Primary Industries - Office of Agricultural Sustainability & Food Security	RA4	N/A	Thank you for your email of 26 February 2014 concerning the review of the draft Environmental Assessment (EA) for the proposed Coalpac Expansion Modifications (DA-200-5-2003 MOD 2 and PA 07 _0127 MOD 4) Production Modification The Office of Agricultural Sustainability & Food Security (0 AS&FS) has reviewed the draft EA provided by Hansen Bailey dated February 2014. The only agricultural related issue is the high visual impact for road users and some of the rural residents in the Cullen Valley. Attachment 1 outlines the issue and recommended response. This advice from the Office of Agricultural Sustainability & Food Security is forwarded direct to the Department of Planning & Infrastructure in accordance with agreed arrangements for mining applications that affect agricultural land. It includes comments provided by Officers in Agriculture NSW and NSW Trade & Investment. Additional advice from the other divisions within the Department of Primary Industries may be forwarded by separate letter.
		Visual, Rehabilitation	<u>Socio-economic assessment of the Coalpac Expansion Modifications (Invincible Colliery and Cullen Valley Mine Modifications) Draft Environmental Assessment</u> The Coalpac Expansion Modifications propose to modify current planning approvals for Invincible Colliery and Cullen Valley Mine. The Draft Environmental Assessment (EA) is adequate for public exhibition and for assessing the socio-economic impacts of the proposed modifications on agricultural resources and the agricultural community. However, it is recommended that the Draft EA be revised prior to going on public exhibition to address the concerns below regarding the mitigation and ma·nagement of high visual mpacts. In Section 6.14.3 of the Draft EA, the proponent indicates that the proposed modifications would result in high visual impacts for road users travelling on limited sections of the Castlereagh Highway (see page 113) and for some rural residences in the Cullen Valley (see page 115). The proponent has committed to implementing visual impact treatments as described in Section 6.14.4 (see Section 7, Statement of Commitments). These mitigation and management measures include the implementation of bunding and tree screening. There would be a time lag before these measures would effectively reduce the identified high visual impacts. It is recommended that the Draft EA be revised to provide evidence that this time lag is acceptable to the agricultural community, including rural residential landholders and nearby agricultural businesses.
		Visual, Rehabilitation	<u>Recommended response to this issue</u> It is recommended that the Statement of Commitments (Section 7) be revised for both modifications to require the proponent to

Stakeholder	ID	Category	Issue
			consult with the agricultural community to ensure that the visual impact treatments described in Section 6.14.4 are implemented in a way that would effectively reduce the identified high visual impacts within an acceptable time frame.
NSW Office of Water (NOW)	RA5	N/A	The NSW Office of Water (Office of Water) appreciates the opportunity to review the draft EIS for the proposed Coalpac Expansion Modifications (MODs 2 and 4). Key issues identified by the Office of Water are outlined below, with further detail provided in Attachment A. Broadly, the water related impacts should be manageable; however there are some points that require some clarification.
		Groundwater, Surface water	Key Issues • Uncertainty exists as to the dewatering requirement and overall groundwater take for the project, in particular a significant discrepancy between the surface water and groundwater reports. This will require further discussion between the NSW Office of Water and the proponent with the aim of confirming these requirements during the public exhibition stage.
		Groundwater	• NOW concurs that a numerical groundwater flow model may not be warranted in view of the relatively small groundwater drawdowns predicted. Despite this, confirmation of the dewatering predictions and associated impact using a tool such as SEEP-W is requested to demonstrate the robustness of the predictions.
		Groundwater	• Further detail is requested regarding the source of the key parameters of the groundwater model. In particular the regional permeability values used in the modelling are requested along with information as to how the values were derived (e.g. pump testing or laboratory triaxial testing).
		Groundwater	• Clarification is requested as to whether the predicted groundwater draw-downs from the proposed mine extensions could affect any local Box-Gum Woodland communities and proposed steps to avoid/mitigate these impacts (if present).
		Groundwater	• Further information is requested as to the status of registered bores, and any unregistered bores (if known), within the area that could be potentially impacted (including their accessibility for monitoring purposes). This includes bores on neighbouring private land.
		Groundwater	• Annual groundwater quality monitoring is not considered sufficient to establish baseline characterisation and it is not clear from the Groundwater Impact Study (Appendix E) what number of annual samples has been collected to date.
		Groundwater	• The proponent should undertake regular groundwater model validation as part of the Groundwater Monitoring Plan.
		Groundwater	Groundwater
		Groundwater	1.1 Model Calibration Assessment • Whilst it is accepted that detailed numerical flow modelling is not appropriate given the relatively small draw-downs predicted, it would be appropriate to use a relatively simple seepage model such as SEEP-W to verify that the predictions are reasonable. The key aspects of the predictions include the predictions of inflows into the mines, estimates of water

Stakeholder	ID	Category	Issue
			required to dewater the flooded workings and the rate at which this will be performed, and to estimate the zone of influence and the likely drawdowns at the nearest externally owned water supply work.
		Groundwater	1.2 Groundwater Monitoring • The standing water level within the flooded workings of the Old Tyldesley Colliery (Cullen Valley Mine area) has been recorded within the Tyldesley Colliery Drainage Bore (GW804393) since 2000. Similarly, the standing water level within the flooded workings of the Invincible Colliery has been recorded within LD001 since 2010. • An expanded groundwater monitoring bore network was installed in early 2011 to augment the existing bores at each mining area. Five monitoring bores (CP114, CP115, CP116, CP119, and CP123) were constructed in exploration drill holes. The sites were selected to provide sufficient spatial coverage over the area proposed to be mined for the CCP. Two more monitoring bores (CP131 and CP132) were installed in 2012 and one bore (BHW1) was installed in 2013. • Although Appendix E of the EA states that groundwater levels in all monitoring wells are continuously monitored, it appears that only a single round, or at most three rounds, of water quality monitoring has been collected in these monitoring wells. It thus appears that baseline water quality has not yet been established.
		Groundwater	1.3 Groundwater Monitoring • According to Appendix E of the EA, Coalpac currently holds three groundwater licences. The licences entitle Coalpac to take 106 ML/year from the Sydney Basin MDB Groundwater Source and 120 ML/year from the Sydney Basin Coxs River Groundwater Source. Of these, the 106ML entitlement may be most relevant, however no information is provided in the EA about how much of the entitlements are currently used and from which water source. Further detail is requested on the water sources where water take is currently occurring and predicted to occur, and associated volumes. This will need to also consider the volumes of surface water entering the underground workings to enable the surface water and groundwater components to be considered separately. • The licences held by Coalpac are summarised in the table below which is extracted from Section 16 of Appendix E of the EA. • Monitoring bores may require licensing under Part 5 of the Water Act 1912 unless the bores meet the criteria for exempt monitoring bores as defined in the *Water Management (General) Regulation 2011*.
		Groundwater	• Appendix E states that approximately 2.2 ML/a will be required to dewater the expanded mining zones. An additional volume of around 125ML will be dewatered from the flooded workings in the Northern mining area over an unspecified period, but this is not included in the predicted “water take”. Further to this an additional 1382ML of dewatering requirement is referred to in the Surface Water Assessment Report (Appendix D). The range of dewatering values indicates the water take requirements for the project will require further discussion between the NSW Office of Water and the proponent, to ensure that all water take is adequately accounted for and licensed.

Stakeholder	ID	Category	Issue
			• For clarity it is recommended that the water licence details table is updated with consistent format licence numbers, as it is currently a mix between "AL" and "WAL" numbers (both under the Water Management Act 2000) and "BL" numbers (under the Water Act 1912). It is recommended that WAL (water access licence) numbers are used. The Office of Water's records indicate that the relevant numbers are WAL27898 (80 shares), WAL35978 (26 shares) and WAL36485 (120 shares). The Water Act 1912 numbers are no longer applicable for these volumetric licences as they have all been converted to the Water Management Act 2000.
		Groundwater	1.4 Aquifer Impact Assessment • The only aquifer likely to be intercepted by the proposed works is the Lithgow Seam, which lies within the otherwise very low-permeability units of the Illawarra Coal Measures. The Lithgow seam daylights at the mine but becomes confined as it falls gently to the east beneath the cliffforming Narrabeen Group. • Appendix E of the EA provides a tabulated summary of the project impacts against the Aquifer Interference Policy (AIP) criteria for each of the two mine extension areas. Using the AIP assessment guidelines, Appendix E suggests that as water levels are unlikely to be lowered by any significant drawdown at the nearest water supply works, the impacts meet the Level 1 minimal impact considerations for both sites. This is deemed acceptable by the AIP. Although the location of the nearest water supply work is not stated, it is inferred to be the nearest private well which is located approximately 650m from the boundary of the Modification Area. Based on the information presented at this stage, this appears to be a reasonable conclusion but additional seepage analysis and information about the private wells would help to confirm the inference.
		Surface water	2. Surface Water Assessment and Licencing • The Office of Water requests the proponent estimate the Maximum Harvestable Right Dam Capacity (MHRDC) applicable to the project site and any volumes of surface water take that may be excluded from harvestable rights under Schedule 5 of the *Water Management (General) Regulation 2011*. Any surface water taken above the MHRDC and any exemptions or exclusions need to be accounted for and detailed. Further detail on calculating MHRDC can be accessed at the following link: http://www.water.nsw.gov.au/Water-Licensing/Basic-waterrights/Harvesting-runoff/default.aspx
		Surface water	• The proponent is requested to provide details of any surface water entitlement required to account for water taken from the Turon Crudine River Water Source of the *Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012*. It is recommended the proponent demonstrate an ability to source this entitlement where required.
		Surface water	• The Office of Water advises that any requirement by the proponent to trade surface water entitlements to account for surface water take will need to be consistent with the Access Licence Dealing Principle Order 2004 and the relevant trading rules in the water sharing plan.
		Groundwater, Surface	3. Recommendations

Stakeholder	ID	Category	Issue
		water	The NSW Office of Water recommends the proponent complete the following: • Commit to liaise with the Office of Water to ensure that the volume of surface and groundwater taken for the modification proposals are accounted for by holding sufficient shares (entitlement) from each water source.
		Surface water	• Further information is requested to confirm the current and predicted surface water take requirements based on water sources and sites. The applicability of Harvestable Rights is also requested for the site, including any exclusions that may apply under the *Water Management (General) Regulation 2011*.
		Groundwater, Surface water	• Modifies the Environmental Assessment (EA) to reflect the understanding that water removed from or seeping into mine workings and water removed via evaporation does constitute water take. Clarification is requested over what time-frame the active pumping and any ongoing water take via groundwater seepage and any evaporative loss is predicted to occur. The key groundwater take figures referred to in the EA that need clarification include the 2.2ML/a at Cullen Valley mine and the 125ML and 1382ML at the Invincible Colliery.
		Groundwater	• Further justification is required of how the hydrogeological impacts, and in particular the likely drawdown at the nearest groundwater supply work is calculated. Information on how the flooded mine dewatering volumes have been estimated and calculations of likely dewatering rates, and associated cone of influence in the water table during the dewatering, are required.
		Groundwater	• Provide details regarding the source of the key parameters of the groundwater model. In particular the regional permeability values used in the modelling are requested, along with information as to how the values were derived (e.g. pump testing or laboratory triaxial testing).
		Groundwater	• Whilst the Office of Water concurs that a numerical flow model appears unwarranted in view of the relatively small groundwater takes predicted by the consultants, confirmation is requested of the dewatering predictions using a tool such as SEEP-W to demonstrate the robustness of the predictions.
		Groundwater	• Undertake regular model validation as part of the Groundwater Monitoring Plan. Further, it should be recognised that the monitoring and evaluation of the residual groundwater level drawdown, and model validation, will be required until groundwater levels have stabilised post-mining. This is critical in informing future licensing requirements at the site.
		Groundwater	• Further information is requested on the status of the registered bores, and any unregistered bores if known, within the area that could be potentially impacted. It appears from Appendix E of the EA that at least two private wells may exist just outside the zone of predicted depressurisation, but no information is provided on the status of these or other local bores. In particular, the Office of Water would like to understand whether these wells will be accessible for monitoring and whether suitable baseline groundwater level and quality data is known or will be collected prior to commencement if the proposal is

Stakeholder	ID	Category	Issue
			approved.
		Groundwater	• The current groundwater monitoring system appears to be adequate provided it is fully functional (further details on the status and construction details of these wells would be helpful to include in the EA). Continuous monitoring of the groundwater levels is considered appropriate, but the annual quality monitoring is not considered sufficient for baseline characterisation and it is not clear what number of annual samples has been collected to date. Adequate baseline characterisation of water quality would normally require at least 8-10 rounds prior to commencement of the operation, and for this reason quarterly monitoring for a suitable period is recommended. Further information on the sampling and analysis methodologies and QA/QC procedures for water quality assessment are also requested.
NSW Department of Trade & Investment - Resources & Energy (DRE)	RA6	Economics, general support	I refer to your recent invitation for NSW Trade & Investment- Division of Resources & Energy (DRE) to review and provide comments on the draft Environmental Assessment (EA) prepared by the proponent for these Modifications. DRE is supportive of the Modifications, as a responsible utilisation of the State's strategic coal resources. The Modifications are considered significant because they will bring economic benefits to the region, which has been facing substantial economic challenges from recent business closures, and are critical for maintaining secure and affordable electricity supplies for NSW.
		Subsidence	DRE has reviewed the draft EA and provides the following comments which are directed at specific areas of ORE's responsibility for this proposal: <u>Mine Safety</u> There are no objections to the mining methods to be re-introduced at the Coalpac sites. The operator has successfully and safely extracted the various coal seams mentioned using both open-cut and high wall technology.
		Rehabilitation	<u>Environmental</u> In regard to mine voids and rehabilitation works, the final land use and landform has been previously addressed in the original approvals and the proposed Modification is in keeping with the spirit of those approvals.
		Subsidence	As the proposed mining methods at Invincible include high wall mining (technically underground mining) a subsidence management plan will be required if the proposal is given development approval. DRE supports the proposed Modifications and considers that the EA is adequate for exhibition. Subject to appropriate environmental approvals, DRE would be supportive of the Coalpac Modifications.
DRE Submission 2	RA6	Economics, support	Thank you for the opportunity for NSW Trade & Investment- Division of Resources & Energy (DRE) to provide advice on the significance of the resource for the Coalpac Modifications project (Modification) to assist in your Department's assessment of the proposal. DRE's assessment concludes that the significance of the Modification relates to allowing both Cullen Valley and Invincible Mines to reopen and to operate for a further four years and for Coalpac to potentially develop an expanded project to continue production after this time.

Stakeholder	ID	Category	Issue
			There are a number of strategic consequences to the State if the Modification does not proceed. Potentially significant risk exists for future NSW energy security, especially in regard to Mt Piper and Wallerawang power stations. A copy of DRE's assessment is enclosed. DRE is supportive of the Coalpac Modifications as a responsible utilisation of the State's strategic coal resources.
		Economic	<u>Size, quality and availability of the resource</u> Coalpac Pty Ltd (Coalpac) an Australian owned company owns the Invincible Mine and the Cullen Valley Mine. Coalpac is seeking approval for modifications to these existing mines on land located to the north-west of Lithgow. According to the Environmental Assessment Report the Modification would allow the extraction of a 9 (Mt) million tonne resource from areas adjacent to the existing operations of Invincible and Cullen Valley Mines. It is proposed to extract up to 2.2 Mt per annum of run-of-mine (ROM) coal over a four year period, as the ROM coal does not require further significant beneficiation it would provide around 9 Mt of product coal. All product coal would be delivered to either Mt Piper or Wallerawang power stations, both of which are located within close proximity to Cullen Valley and Invincible. The quality of the coal in the Modification area is of an ash content that makes it ideally suited for use in these local power stations. Coal quality at Cullen Valley and Invincible is comparable to other operating mines in the Western coalfield in the Lithgow area. Other mines in this area deliver unwashed coal to the local power stations or wash their ROM coal for railing to Port Kembla for export to east Asian markets. Cullen Valley and Invincible mines are both medium scale coal mines in comparison to existing coal mines in the Western coalfield around Lithgow, and small compared to other New South Wales mines. Based on 2011/12 production data (the last year of full production for both mines), the combined production from Cullen Valley and Invincible mines was 1.5 Mt of saleable coal (a level similar to the proposed modification of a maximum of 2.2 Mt). There were six underground mines operating in 2011/12 in the Western coalfield around Lithgow of which three had significantly highe·r production rates than Cullen Valley and Invincible mines, two underground mines had smaller production rates and one was the same. However, of the five operating open cut mines in 2011/12 both Cullen Valley and Invincible were by far the highest producing mines. Over the life of the Modification, with all production sold domestically, the total value would be worth around $450 million in current dollars.
		Economics	<u>Proximity to existing infrastructure</u> The Cullen Valley mine will use the existing private haul road to transport coal to Mt Piper power station. The existing coal crushing and sizing plant, stockpiling and surface facilities will also be used. The Cullen Valley mine is located 5 km from Mt Piper power station. The Invincible mine will use its existing coal preparation plant, coal crushing and sizing plant, and surface facilities. Product coal from Invincible mine is transport via the Castlereagh Highway to the nearby Mt Piper or Wallerawang

Stakeholder	ID	Category	Issue
			power stations.
		Economics	Relationship of the resource to any existing mine, petroleum production facility or extractive industry The majority of the existing mines that are within close proximity to both Cullen Valley and Invincible mines also supply coal to Mt Piper and Wallerawang power stations, these nearby mines in general use the same local roads to transport coal. It is likely that the Modification may utilise some of the workforce of nearby mines in future years as the skill sets from these mines are interchangeable. Both of the mines included in the Modification are stand alone operations which utilise their own equipment, coal handling and preparation facilities, operational and administrative buildings.
		Economics, Social	Dependency of other industries on the resource project Many local industries in the area relied on the Cullen Valley and Invincible coal mines and hence would be able to expand further if these mines recommenced production, these industries include; mine equipment maintenance firms, mining equipment supply firms, coal preparation plant maintenance and supply firms. These firms are mainly local industries which employ locally and would rely on the Modification for either their continued existence or expansion.
		Economics	Other Factors Mineral Resources Branch also notes from the Environmental Assessment the Modification will bring provide for the following economic benefits: • $149 million in annual direct and indirect gross regional output; • $46 million in annual direct and indirect regional value added; • $19 million in annual direct and indirect household income; and • 245 direct and indirect jobs. Mineral Resources has estimated that as a result of the total product tonnes from the Modification gaining approval the total additional royalty to the State will be of the order of $36 million in direct revenue in dollars of the day over the life of the Modification.
		Economics	NSW energy security- impact on electricity supply and pricing The major significance of the Modification relates to allowing both Cullen Valley and Invincible mines to reopen and to operate for a further four years and for Coalpac to potentially develop an expanded project to continue production after this time period. There are a number of strategic consequences to the State of the Modification not proceeding. Potentially significant risk exists for future NSW energy security, especially in regards to coal supply to Mt Piper and Wallerawang Power Stations. In April 2014 the Wallerawang power station was put on "care and maintenance" by its owner EnergyAustralia. EnergyAustralia has stated that Wallerawang can return to service should demand increase. Very limited options exist for sourcing replacement coal to supply these generators if this Modification does not proceed. The viability of both generators, but particularly Wallerawang, is

Stakeholder	ID	Category	Issue
			dependent on access to local domestic coal at competitive prices. If electricity demand did increase then Wallerawang may recommence generation if EnergyAustralia has access to competitively priced coal. Prior to the closure of Invincible and Cullen Valley mines Mt Piper and Wallerawang Power Stations sourced most of their coal supply from either Centennial Coal or from Coalpac. In 201/12 Coalpac supplied nearly 25% of all coal used in these power stations. The permanent closure of the Coalpac mines, which is likely if this Modification is not approved, would result in Centennial Coal having a virtual monopoly on coal supply to these generators. This would come at a time when some of the Centennial Coal contracts are starting to wind down and would increase the negotiating power of Centennial Coal in future coal pricing contract negotiations and may result in future supply being priced closer to export parity prices. This would be expected to lead to further electricity price increases and be in conflict with NSW Government policy with respect to lower electricity pricing for consumers. The estimation of electricity price impacts requires complex modelling and is necessarily imperfect, however coal supply costs, which is the main variable cost for power stations, could potentially increase from the current level of around $50/tonne to possible $70/tonne.
Lithgow City Council (LCC) – Submission 1	RA7	Air quality, noise	I refer to the email 26 February 2014 expressing the opportunity for Council to comment on the abovementioned proposals. Council has reviewed the documentation with the following comments: <u>Proximity</u> When considering the matter at its meeting of the 24 March 2014, Council wishes to ensure that its previous submissions in relation to buffer distances were reiterated. In this regard Council's submission is that mining should not to take place within 500 metres of the village, residences outside of the village and the cemetery.
		Socio-economics	<u>Voluntary Planning Agreement (VPA)</u> Council intends to approach Coalpac Pty Ltd regarding a potential VPA that would be entered into should the proposal gain approval. These contributions would be used for facilities and projects for Cullen Bullen township.
		Air quality	<u>Air Quality</u> It is also considered that the process of constructing the bund walls (which will help mitigate visual and noise impacts) will have the potential to create additional dust impacts that will need to be appropriately mitigated.
		Visual, rehabilitation	<u>Bund Walls</u> The EA provides minimal information on the proposed bund walls heights, widths, rehabilitation and construction material. It is considered that further detail will need to be provided on the final design and location of the bund walls. Council would like to be consulted prior to the final approval of the proposed walls especially in relation to visual impacts from residential areas and the Castlereagh Highway. Council considers that the timing of the bund wall construction should either be

Stakeholder	ID	Category	Issue
			conditioned or included within the Statement of Commitments including revegetation and stabilisation of soils.
		Subsurface heating	Subsurface heating Council acknowledges that a management plan already exists for subsurface heating which will continue to be implemented as part of the project. Council considers that it would be appropriate for such a management plan to include a procedure in the event that old workings are opened up (due to inaccuracies in the old plans showing the existing workings) that may result insubsurface heating elsewhere on site.
		Ecology	Ongoing issues raised by the Community Consultative Committee • Weeds control needs to be ongoing and that a new management plan should be adopted for each site the clearly defines target areas and ongoing active controls
		Acoustics	• The noise of trucks using the haulroad outside designated times should be addressed, which may be through the wording of a condition of consent that the haulroad cannot be used outside of operating hours
		Traffic and transport	• The cleaning and covering of loads on the trucks entering the Castlereagh Highway has been raised on numerous occasions and should be controlled through a condition of consent. This is to address that all trucks are to be covered prior to leaving the site and washed off. Additionally, that the Castlereagh Highway is cleaned of debris and coal fines on a regular basis to avoid unsafe incidences on the Castlereagh Highway
Lithgow City Council (LCC) – Submission 2	RA7	N/A	Please find attached a further Council submission in relation to the Coalpac Consolidation Project that has been forwarded to the Minister for Planning, The Hon Pru Goward. Please do not hesitate to contact me should you have any queries in relation to the matter.
		Support, air quality, acoustics	The Coalpac Consolidation Project is a proposal to consolidate and expand upon two existing coal mines, Cullen Valley and Invincible, in the Lithgow local government area. This mining project is located near the village of Cullen Bullen. I wish to provide my support for this project. In the past Council had concerns in relation to aspects of the development and subject to appropriate controls being put in place it supports the development of this project. The concerns that Council had previously were in relation to noise, dust, blasting and a regime of building inspections 'pre' and 'post' blasting. Also, on the basis that mining is not to take plac within 500 metres of the village, residents residing outside of the village and the cemetery itself. I understand that the developer has now put forward yet another reviewed proposal that will see the amount of coal extracted from the site significantly reduced from the earlier applications that were put forward. Previously these concerns had been addressed or would have been addressed through appropriate conditions if the development were to be approved. It is now our understanding that as a result of these concessions by the developer that these impacts will now be reduced further or even removed.
		Support, economics,	It is my view that this development has very strong support within the community. No doubt there are those detractors,

Stakeholder	ID	Category	Issue
		social	including those from outside the area, but on the whole I strongly feel that there is very strong support within the Lithgow community. With this support I too feel very passionate about the project and of the need for the project to be approved and commenced at the earliest opportunity. If approved the development would have significant economic benefits to the local area and the region. As you would be aware Mining across NSW generates a multibillion dollar spend on wages and salaries, ongoing purchases of goods and services, as well as contributions to local communities. Council's Economic Development Strategy acknowledges the crucial role that the mining sector has in underpinning the vitality of the Lithgow LGA economy.
		Economics, social	The 2011 Census revealed that 11.6 % of total employment within the Lithgow LGA was provided through the mining industry compared to just 0.6% across NSW. This indicates that any reduction in mining industry employment will have a very significant impact on the Lithgow LGA economy and community well-being. The recent report 'NSW Mining Economic Impact Survey 2011/12 prepared by Lawrence Consulting in conjunction with the University of Newcastle reveals the magnitude of the spending by mining companies and their ongoing positive contribution to NSW and its regional economies. The report identifies that the direct total spend by full member companies of the NSW Mineral Council was in the order of $9.32B across NSW and $858.4M within the Central West statistical division. The same report also identified that 3,232 direct full time jobs and 11,097 total direct and indirect employee jobs were generated within the Central West through the member companies it surveyed. It noted that out of all the jobs generated by mining in NSW, the Central West had the second highest proportion of the total number of jobs. Estimates of spending and job creation ansmg from the proposed Consolidation Project at Cullen Bullen further demonstrates the very significant positive economic benefits this project will deliver to the NSW, Central West region and Lithgow LGA economies. The previous Coalpac operation at Cullen Bullen, when in full operation, provided a snapshot of the actual spend and employment generated within in the Lithgow LGA and there was a spend of some $8M on wages to employees residing within the Lithgow LGA alone and another $34M total expenditure was made to locations within the Lithgow LGA The figures above reveal the significant scale of the previous Coalpac operation and its importance as a key economic driver for Lithgow and the Central West region. The cessation of production at the Cullen Bullen mine in December 2012 resulted in the termination of 49 positions. Coal recovery ceased at the Invincible Colliery in March 2013 with both mines being placed into care and maintenance mode resulting in the termination of a further 46 Coalpac employee positions. The multiplier effect arising from the major reductions in Coalpac operational spend and 95 terminated positions is becoming evident in other locally operating businesses. The recent closure of mines within the Lithgow area is directly and indirectly increasing unemployment and significantly reducing spending into regional and local businesses. This is leading to an uncertain investment environment and diminishing community confidence. Continuing loss of local employment opportunities will erode population growth in Lithgow and further

Stakeholder	ID	Category	Issue
			reduce demand for local goods and services. This is not a sustainable scenario for the future of Lithgow. The advancement of the proposed Coalpac Consolidated project with its now significantly reduced lifespan would provide an opportunity to grow the local economy, provide ongoing employment and ensuring the well-being and resilience of our community into the future. Whilst the project is not a large project in terms of State development it is a development that will have a significant impact on the Lithgow Local Government Area and the Bathurst Electorate. The project will provide over 100 direct jobs to the area and this of course will provide a very significant flow on affect to the community.
NSW Health - Nepean Blue Mountains Local Health District	RA8	N/A	I am writing in regard to the development applications currently on pulic exhibition for the extension of the respective mining areas of the Invinicible Colliery and Cullen Valley Mine, both owned by Coalpac Pty Ltd locatated on Castlereagh Highway, Cullen Bullen NSW 27890. Officers from the Publci Health uit have reviewed the documents available on your website with regard to the development proposal and provide the following comments for your consideration. These comments are contingent upon the measurements and modelling fulfilling the requirements of the approved methods and policies.
		Air quality, health	<u>Air quality issues due to mining activities</u> The health effects of particulate matter are well established. Any increase in exposure is associated with some increase in health risk. I note that the proposed project is expected to cause a small increase in particulate matter concentrations at a number of sensitive receptors. To minimise any potential health impacts it is recommended that, should the project be approve, the proponent is required to do all that is reasonable and feasible to mininmise particulate matter emissions. I note that exceedances of the DECCW 24hr PM_{10} assessment criterion are predicted for three mine-owned residences. If there is any expectation that these residences will be occupied, it is recommended that additional consideration is given to reactive dust meanagemnet systes that could reduce the probability of exuh exceedances. Should the residences be occupied, occupants should be informed of the lack of compliance with environmental criteria and provided with information abput personal measures that can be taken to minimise exposure.
		Acoustics	<u>Noise and Vibration</u> There is increasing evidence that exposure to noise is associated with health effects. I note tha the EIS predicts noise impacts above the Industrial Noise Policy's intrusive criteria for a number of residences. However, there is no description of noise mitigation measures. We recommend that a noise management plan be required prior to any approval to ensure there are minimal impacts in the local communit from noise.
Special Interest Groups			
Bathurst Community Climate Action	SIG1	Ecology, economics	The Bathurst Community Climate Action Network (BCCAN) is opposed to any further expansion of the coal industry in the Central West and urges the government instead to create a State Conservation Area on the site of the current Ben Bullen State Forest to protect the high conservation values of the area, to serve the recreational needs of the expanding population in

Stakeholder	ID	Category	Issue
Network			western Sydney, the Blue Mountains and the Central West, and to create sustainable local employment.
		Ecology, Ben Bullen State Forest	BCCAN objects to the mining in the Ben Bullen State Forest for the following reasons. Ben Bullen State Forest is publically owned land set aside for the harvesting of a renewable resource (timber). The recently modified proposal threatens a section of State Forest public land which is part of the proposed Gardens of Stone State Conservation Area. It sets a disturbing precedent as, if approved, it is difficult to see how similar mining applications in the State Forest could be rejected in future.
		Ecology, pagodas	The mine threatens the outstanding geology and the habitat of a number of species including the lyrebird, the Regent Honeyeater, the Tiger Quoll and the Powerful Owl. There is no way that Coalpac would be capable of restoring this habitat. The biodiversity offsets are inadequate and cannot replace the unique biodiversity, landscape and geological values of the pagoda landform. The damage will be permanent. This permanent environmental destruction will be all for the sake of a short term economic gain.
		Subsidence	The proposed open cut is close to very sensitive topography of iconic stone pagodas and sandstone cliffs, under which it is proposed to high-wall mine. A small surface buffer zone around the pagodas and sandstone cliffs cannot guarantee that the effects of mining will be confined to the open cut itself.
		Surface water, groundwater, agriculture	The proposed mine will affect watercourses, fracture aquifers, block and pollute surface and groundwater, adding to salinity and pollution downstream in the Turon and Macquarie Rivers. Not only would this have costs to native species dependent on the water quality, but could have permanent implications for agriculture downstream and for communities which draw up on the Macquarie.
		Health, socio-economics	We note the EPA and the Department of Health have raised serious concerns about the noise and health impacts of the proposed mine. A mine should not be considered this close to rural communities with nearby school and residences. The impact on the Cullen Bullen community would be devastating.
			There are a number of precedents of ghost towns near coal mines in the Hunter Valley and Queensland where noise, dust, water and light pollution 24/7 have forced residents to move. The strong westerly winds of late winter-early spring will carry dust from the mine onto forested areas and into the nearby Greater Blue Mountains World Heritage Area, to cloak these areas and impact wildlife and habitat further.
		Rehabilitaiton, visual, subsidence	Recently a group of BCCAN members visited parts of the Newnes Plateau & the eastern perimeter of the Ben Bullen State Forest which had been undermined by long-wall coal mines. We noted numbers of drained swamps, the dessication of a major Indigenous occupation and art site, Mayinygu Marragu, substantial cracking across beautiful sandstone features and shearing off of cliff faces in a number of places.(See included photos) We did not see, but were informed about, substantial contamination of creeks fed from the run-off from the mines. This can never be rehabilitated and the damage is unavoidable. Off-setting does not avoid the permanent damage. Viewing the damage caused by underground mining in this area makes us sceptical of the value of environmental consultants' predictions about the impact open cut mining on the surrounding area's ecology and the capacity of the government to ensure

Stakeholder	ID	Category	Issue
			that undertakings by mining companies will be honoured. Past breaches of environmental regulations at the Invincible Colliery are further evidence of the likelihood that large coal companies may breach the conditions of their mining approvals.
		Socio-economics	However, equally important is the long term impact that this policy of burning fossil fuel will have on biodiversity over future generations through contributing to climate change. If, indeed, the Mount Piper and Wallerawang power stations are running out of local sources of coal this must be a good time to rapidly phase in a move to renewable sources of energy and explore means of energy efficiency. At a national level, wind, solar, geothermal, wave and tidal energy have the potential to fill any vacuum caused by the scaling down of the burning of fossil fuel. The Central West is not a quarry. The coal industry juggernaut does not have the right to destroy the finest sections of our local environment and jeopardise the future climate of our grandchildren. This is a good place and time to call a stop to the unfettered expansion of coal. The coal industry is heavily indirectly subsidised and the economic benefits are often over- stated and short term whereas the costs are long term since most of the damage is irremediable. (Too much of a good thing? The macroeconomic case for slowing down the mining boom.Richard Dennis and Matt Grudnoff Policy Brief No 37, March 2012 The Australia Institute.) The supply of low ash coal from the Lithgow seam is finite and those companies which presently depend upon it will inevitably have to transition to other energy sources. . We note the recent observations by Professor Tim Flannery that Investment in renewable energy has increased six fold since 2004 and for the first time businesses around the world are investing more in renewables than coal, oil, and gas. In many parts of Australia solar and wind energy have reached `grid parity' and are more cost effective than fossil fuels (Sydney Morning Herald, 14/8/2012). If mines like this are approved Australia will be trapped in the energy economy of the twentieth century and transition will be made even harder. To conclude. 'The devastating damage being done by mining in the Hunter Valley surely proves that open cut mining is just not to be tolerated by Australians. The licence to proceed with the devastation of close to 315 hectares of timbered land next to the village of Cullen Bullen should not be countenanced by us, since we are responsible to pass this land on to our descendants in the best possible condition. Restoration of what now exists in Ben Bullen State Forest is obviously impossible. One hundred year old, two hundred year-old trees cannot be replaced, nor the topsoil that has taken aeons to form. You cannot replace a stream of pure clean water if you collapse its base. You destroy the flora and fauna and damage magnificent sandstone outcrops forever. This is what will occur to the environment if mining is approved, and that is without considering the dangers to the health of nearby residents and the complete destruction of their particular lifestyles. This is not a time for figures and statistics. This is a time for emotion, forethought and foresight. We share the views of Mr Ian Kiernan `As a species we have a finite time on the planet and have a responsibility to leave it in as good a shape as we found it or better.' However if this project is approved it will sadly demonstrate that ` We have the attitude that we are some kind of supreme being and we own the earth.' Western Advocate August 22,2012.
Blue Mountains	SIG2	General objection	BMCS is strongly opposed to these modifications and rejects them in their entirety.

Stakeholder	ID	Category	Issue
Conservation Society (BMCS)			The original Coalpac Consolidation Proposal (CCP), of which the current modifications are part, was rejected by the Planning Assessment Commission Review Report, and by the Director-General's Report (NSW Department of Planning & Infrastructure – DP&I). It was also deemed a Controlled Action under the federal government's EPBC Act. The Coalpac Modifications (C-Mods) are a component of the original CCP and contain all the elements (except the number of hectares impacted) which made the CCP so convincingly unacceptable. In the Society's view, it is outrageous that the C-Mods have not been classified as a Controlled Action under the EPBC Act. Indeed, either the Federal Department of Energy (DoE) seemingly has no regard for its duties under the EPBC Act, or it has been mesmerized by the C-Mods' reduced size (compared with the CCP) and by the apparent invitation in the Director-General's Report[1]. The Society firmly contends that should the C-Mods be approved, it will make a mockery of the DP&I assessment processes. Let's just make the proposal smaller; it will be approved and nudge-nudge/wink-wink further small extensions will be granted should that become necessary. A total farce.
		General objection, socio-economics	2. <u>General comments and concerns</u> 2.1 Coalpac's miscalculations This C-Mods gambit is an attempt by Coalpac to rescue itself from the gross miscalculations related to its handling of the CCP. The miscalculations involved Coalpac: • Initially presenting an inadequate Environmental Assessment which was returned to it by the Department of Planning for rectification – the amount of much-needed additional work resulted in a major delay before the revised documents were submitted; • Then using a new consulting group which was charged with subcontracting specialised consulting organizations to produce the voluminous documents which comprised the revised EA – Brisbane- and Singleton-based Hansen Bailey2, with a history of zealously favouring the coal industry3, adopted the costly saturation principle aimed at submerging government and non-government organizations in electronic paper; • Failing to appreciate the strength of the environmental and social opposition to the CCP and the role of the Minister in referring the decision (in what was termed a 'hands-off' process) to the NSW Planning Assessment Commission; • Failing to understand the amount of time needed for all the stages in the process of: (i) having the federal government decide whether or not the CCP constituted a controlled action (ref. no 2010-5776), (ii) the documents going on public exhibition and submissions being made by a vast number of organizations and state government departments, (iii) Coalpac (through its spectrum of consultants) responding to the various submissions and the time needed for the originators of the submissions to consider and reply to Coalpac's responses and any new material, (iv) the Planning Assessment Commission carrying out its investigations and public hearings as a prelude to completing its review, (v) submissions to the Department of Planning by all concerned (including Coalpac) in relation to the outcomes from the PAC Review, (vi) further

Stakeholder	ID	Category	Issue
			submissions to Planning in relation to various modifications to its CCP by Coalpac, and (vii) awaiting the Director-General's report to the second stage of the PAC, the latter being charged with making a decision on the Minister's behalf; • Extracting its previously approved tonnage at too rapid a rate and attempting to use arguments that haste was needed because the existing mines were exhausting the approved coal resource and would need to shut down; • Persisting with this form of economic and social blackmail and then actually having to shut down, lose the associated revenue stream, and seemingly default on its rehabilitation commitments; • In the face of a rejection of the proposal in the Director-General's report, opting to withdraw the CCP application rather than face absolute rejection by the second PAC; and then, • Entering voluntary administration so that it can effectively defer or avoid commitments while working towards a new proposal (C-Mods – the 'son of CCP') which will benefit a foreign-owned company (Energy Australia) to the detriment of the environment, resident's well-being, and ecotourism. There is little doubt that this history of miscalculation, partly reflecting a belief that superficial economics will always trump the opposing environmental and social impacts, has brought Coalpac to its present somewhat desperate position of voluntary administration. But let's not rock the boat and notice that Coalpac miscalculated and blames everyone but itself for the protracted assessment of the CCP. Let's sugar-coat everything and disregard Coalpac's responsibility for failing to better manage its affairs. Hansen Bailey provides a prime euphemistic example4: "Due to the delay in obtaining a major new planning approval for the long term continuation of mining, both mines have recently been placed on care and maintenance, placing pressure upon the Mount Piper Power Station which relies on the mines for a significant proportion of its competitively priced fuel supply requirements. Further to this, the unforseen objections to the continuation of both mining operations have reduced the ability to create an optimal free draining final landform in rehabilitating the existing disturbed areas." What utter 'pap'! And by the way, as well as Centennial (the power station's principal supplier) not welcoming the opportunity to fill the minor loss of supply, we were so inconvenienced as to be unable to meet rehabilitation requirements. The big question is whether government will squander the good will achieved through its rejection of the CCP, by capitulating to the poorly founded 'needs' of these local coal and power industries?
		N/A	2.2 Inadequate antisocial public exhibition periods Coalpac, the Administrators and the big creditors (ANZ and Energy Australia) have had months to evaluate the company's position and decide on the plan of action which resulted in the Referral (by Cumberland Ecology, 28 February 2014) to the federal DoE, and the Environmental Assessment (by Hansen Bailey, March 2014). DP&I treated the matter expeditiously and opened it for public exhibition over the period 4 – 28 April, 2014. It seems standard practice for companies to take months to prepare documents which, in the sheer volume of electronic paper, take weeks for government to digest and check. Yet companies feel hard done by and castigate government for inefficiency. They have also created an apparent acceptance by government that a protracted exhibition period is an onerous imposition

Stakeholder	ID	Category	Issue
			upon them. Such a view has little regard for the facts that: (i) most non-government organizations (NGOs), principally environmental and community-based groups, are run by volunteers with differing degrees of expertise, (ii) many claims made by companies and their consultants necessitate field-checking, and (iii) finding and organizing independent consultants to field-check and evaluate aspects of the proposed actions is extremely time-consuming and difficult within the allocated exhibition period. For the reasons itemised, the Society has called, and continues to call for longer more realistic exhibition periods. But money talks and government listens, so NGOs continue to scramble to make submissions in the allocated periods. The Society has previously complained about exhibition periods over public holidays. In the case of the C-Mods, the exhibition period embraces two public holidays. The DP&I will be aware that with Easter and the Anzac Day holiday close to each other, many have elected to turn the period into a 10-day break. It may be argued that as volunteers and with many of us retired, this should not be a problem. Well strange as it may seem, we do have extended families (children, grandchildren, etc.) which work and see this period as an opportunity to visit. Furthermore, having independent consultants complete work, write reports and prepare hard copies is also impacted. BMCS again calls for the DP&I to adopt longer and less antisocial exhibition periods5 rather than bowing to the dictates of business.
		Ecology	2.3 The C-Mods should have been a Controlled Action The one-stop shop bilateral agreement6 between the NSW and Federal governments creates a single environmental assessment process which will supposedly satisfy the New South Wales and Federal requirements for environmental regulation. The agreement was signed on December 20, 2013 and is due to come into force by September 2014. Although the bilateral agreement is not finalised, the Federal government's finding that the C-Mods are not a Controlled Action might conceivably influence the NSW government's assessment. The Society will therefore list its principal contentions below. Contentions: *"BMCS is firmly of the view that this proposal should be a controlled action under the EPBC Act. The original Coalpac Consolidation Proposal was found to be a controlled action (ref. no 2010-5776); the latest modifications warrant being a controlled action based on their impacting significant portions of the same area.* *BMCS contends that Coalpac's response to Referral document Section 5.1 (Do you THINK your proposed action is a controlled action?) should in all conscience be YES!* *The Society therefore contends that Section 5.3 should be changed accordingly by placing an 'X' against:* *Listed threatened species and communities (sections 18 and 18A)* *A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)."* An abridged version of the submission to the DoE is in Appendix A. It attempts to show why the contentions are justified and provides an assessment pertinent to Section 3 of the present submission.
		General	3. <u>CCP versus C-Mods – is there a difference?</u>

Stakeholder	ID	Category	Issue
			The Director General's Assessment Report indicated that the DP&I might be amenable to *"…allowing a smaller extension that avoids the most sensitive parts of the site. This would enable some of the remaining coal resources to be extracted, the existing mining voids to be filled and appropriately rehabilitated, and a suitable final landform created that integrates with the surrounding landscape"*7. To what extent do the C-Mods conform with this loophole touted by DP&I? To answer this, BMCS will firstly refer to the principal values on which the PAC Review Report (PACRR)8 and the DP&I Director General's Assessment Report9 (DGAR) rejected the CCP (Section 3.1), and then evaluate the C-Mods in terms of its impact on those values (Section 3.2).
		Ecology, pagodas	3.1 CCP Rejection – principal values and concerns 3.1.1 PAC Review Report (PACRR) The PACRR p157 stated: *"… when the merits of the project are considered as a whole, the benefits of the project are substantially outweighed by the breadth and potential magnitude of the impacts. The Commission therefore recommends that the project should not be approved."* This is elaborated upon in relation to impacts on the pagoda landforms and the biodiversity in PACRR Executive Summary piii (as abridged): *"Biodiversity impacts are divided into those affecting the pagoda landform and those affecting other aspects of the ecology of the project area…No mining induced damage should be permitted to these features. The Commission recommends that highwall mining in the vicinity of the pagodas be prohibited and that the minimum setback for mitigating blasting risk to the pagodas be increased significantly from the proposed 50m… a setback of 300m would provide 70-75% of the foraging area required and should be adopted as an absolute minimum."* Similarly, PACRR p77 recommendation 45 is that: *"…the pagodas and the associated escarpments be considered natural features of special significance and that they be fully protected from any mine□induced impacts."* In relation to the extent of the destruction of Ben Bullen State Forest PACRR, Executive Summary, piii notes that: *"The project will clear 957.98ha of vegetation – mostly in Ben Bullen State Forest. There is sufficient doubt over the accuracy of the biodiversity assessment for there to be uncertainty about levels of impact, the significance of impacts and the suitability of proposed offsets. Edge effects, have not generally been factored into the impacts. Given the very fragmented nature of the project site this will mean that the real impact of the project on native vegetation will be much greater than the area to be directly impacted by clearing."* *"The project area contains numerous species listed under the State and Commonwealth threatened species legislation…the real value of the area from a biodiversity perspective is that it contains a wide diversity of vegetation associations and a very high species richness."*
		Ecollogy, biodiversity offsets	The need for better baseline biodiversity data and concerns over the nature of the proposed biodiversity offsets were registered in PACRR p104, Recommendation 55: *"The Commission recommends that, until the baseline biodiversity characteristics of the site have been resolved to the satisfaction of OEH, assessment of the adequacy or otherwise of the revised offset package should not proceed. The Commission also recommends that particular attention be given in the*

Stakeholder	ID	Category	Issue
			assessment to the essential nature of the trade-off being proposed, i.e. it is a proposal designed to exchange a number of fragmented areas that generally require extensive rehabilitation work and are currently not considered suitable for reservation, for a single area of high quality habitat that adjoins other areas of high quality habitat and is already proposed for reservation." The Commission also addressed concerns it had with rehabilitation. In PACRR pp98 and 101, recommendations 53 and 54, it stipulated that: (i) rehabilitation cannot restore the current habitat and its ecological balance; and (ii) rehabilitation to mature woodland has yet to be proved in NSW; whilst in PACRR, Executive Summary, piii it noted that *"The Proponent has placed substantial emphasis on rehabilitation as a mitigation strategy for impacts on biodiversity. There is considerable uncertainty about the validity of the claims."*
		Cumulative impacts	The issue of cumulative impacts in relation to past, current and proposed open-cut and underground cumulative impacts in the context of other open-cut proposals was also considered. PACRR p97 recommendation 52 required that the cumulative impacts on the biodiversity values from the CCP, the proposed Pine Dale Stage 2 Extension, and other envisaged projects be considered before any assessment of the CCP was finalised.
		Ecology, pagodas	3.1.2 Director General's Assessment Report (DGAR) The DGAR p2 concluded that issues of air quality, noise, blasting, and water resources can be adequately managed and controlled through appropriate conditions. However, it conversely found that *"…the conservation values of the site as a whole are significant, and that the project (in its current form) would essentially destroy these values, and significantly compromise the conservation significance of surrounding areas. The Department considers these impacts to be unacceptable and cannot be mitigated."* In the DGAR Initial Addendum10 it is noted that (p9): *"…the majority of the site for the Coalpac Consolidation Project is fundamentally unsuitable for an open cut coal mining operation; from a use planning perspective, the highest and best use of the site should be for conservation purposes; the mitigation and rehabilitation measures proposed by Coalpac do not overcome the inherent incompatibility of open cut mining with preserving the significant conservation values of the site; and the environmental consequences of extracting the 86 million tonnes of coal from the site are proportionally much more significant than extracting the same volume of coal from a mine with a more conventional open cut design or from an underground mine."* This question of environmental values is further considered in the DGAR Final Addendum11 where it is indicated that (pp3-4): *"…there has been considerable focus on the impacts on the pagoda rock formations and associated habitat in the assessment of the project. While the Department believes the pagodas on the site should be protected, it considers that it is more appropriate to consider the conservation significance of the site as a whole. In this regard, the Department believes the conservation values of the site are significantly higher than the values of other sites in NSW where open cut mining is being proposed."* *"Overall, the Department believes that the project in its current form would essentially destroy the conservation value of the site, and significantly compromise the conservation significance of the surrounding areas."*

Stakeholder	ID	Category	Issue
			"…the Department notes that the project involves 'contour strip' mining along the base of the area's relatively steep topography that is not typical of conventional or contemporary open cut mine plans in NSW. This would remove the vegetation from the base of the large pagoda rock formations on the site, and create a series of fragmented vegetation remnants or habitat islands that would have limited biodiversity value." *"…the Department's assessment in this case is based on the project's impacts on the conservation significance of the site as a whole, not solely its impacts on the pagoda rock formations. In the Department's view, the site has unique characteristics that make it largely unsuitable for large scale open cut mining proposals."*
		Ecology, pagodas, rehabilitation, water	3.1.3 Values / concerns summary Based on the information in 3.1.1 and 3.1.2 above, it is clear that the PACRR and the DGAR were of a similar view in that both of them: • appreciate the 'uniqueness' of the CCP site and its surrounds; • recognise the importance of the pagodas and cliff lines, but go beyond this to acknowledge the conservation values of the entire CCP site and recognise that the impacts on these values could not sensibly be mitigated; • emphasise the area's biodiversity in terms of the numerous listed species, the overall species' richness, and the diverse vegetation communities as a function of landform changes; • have concerns about diminishing conservation values through fragmentation and destruction of habitat and the associated ecological communities; and, • are unconvinced about the capacity to rehabilitate the site in terms of truly re-establishing its landforms, hydrologic regime and complex values. The PACRR expressed additional concerns about the inadequacy of the flora assessment, the identification of vegetation communities, and the poor quality of the proposed offsets.
		Pagodas, ecology	Ben Bullen Pagoda Land System (BBPLS) The 'uniqueness' of the CCP site and its surrounds, as largely encompassed in item (c) dot-points1-3 above, is best expressed in terms of a 'land system' in which each of a limited set of land units comprises a tract of country showing a high degree of uniformity in landform, parent material, soil, climate, and vegetation12. The advantage of this approach is that the many environmental factors, such as topography, geology, pedology, climate and vegetation, are integrated to the extent that their interaction yields distinctive and mappable patterns. In essence, the pagodas and their lithology, scenic value and ecosystems, together with the overlying rock type and ecosystems of the plateau areas, and the underlying rock types and ecosystems of the slopes leading down to the valley floors can collectively comprise a 'land system' termed the Ben Bullen Pagoda Land System (BBPLS)13. The BBPLS has three well-defined land units which, from top downwards, are the Cullen Plateau Unit, Ben Bullen Range Pagoda Unit, and Tablelands Grassy Woodland Complex Unit. The details of these are available in the reference in footnote

Stakeholder	ID	Category	Issue
			13. Cumberland Ecology attempted to discredit the scarcity of the BBPLS by presenting a map of what it termed the BBPLS and concluding that the mapping shows (p10-12, Fig. 3) 14 "…the Permian geology co-occurs with Triassic sandstones and pagoda outcrops in many areas of the region, and confirms that it is far more widely spread than just in close proximity to the Project Boundary." This implication was comprehensively rejected15. Indeed, as per Figure 1 on p8, a simple glance at Cumberland Ecology's map affirms that the three land units are only juxtaposed in the vicinity of the CCP. Of the three units, the Tablelands Grassy Woodland Complex Unit is poorly reserved, so three points are made: • The Tablelands Grassy Woodland Complex should and must be protected as it is poorly reserved in its own right and, at a more detailed scale, contains many poorly reserved vegetation mapping units16. • The Tablelands Grassy Woodland Complex Unit is an essential component of the BBPLS, of which little remains, so any loss of the Tablelands Grassy Woodland Complex Unit correspondingly compromises the BBPLS. • Any destruction of the Tablelands Grassy Woodland Complex Unit and the 'unique' BBPLS is tantamount to environmental vandalism.
		Ecology	3.2 C-Mods – are they an improvement? 3.2.1 Reduced destruction of vegetation and its implications It is noteworthy that the C-Mods are in accordance with a suggestion made in the DGAR Initial Addendum (p9)17: *"…it may be possible to obtain approval for a more modest extension involving limited mining to the east of the Invincible Colliery and to the west of the Castlereagh Highway. Such a proposal has some merit in that it would largely avoid the pagoda landform complex, enable the existing mining voids on the site to be appropriately filled and rehabilitated, and create a suitable final landform."* Clearly, Coalpac has acted on the suggestion from the DP&I, so despite the 'spin' placed on the C-Mods in the current proposal (p4 and Section 3 pp18-21)18, the reality is very much a case of taking what was seemingly 'on offer'. The relationships between the CCP boundaries and those of the new proposal envisaged in the C-Mods is shown in Fig. 2 p10. The obvious difference in Fig. 2 is the reductions in areas of the proposed open cut and highwall mining. The numerical data (in ha) are not easily extracted from the various versions of the original CCP and the various changes to the CCP, so in Table 1 they are omitted unless of relevance. The C-Mods data are from the current proposal (footnote 18). Compared with the original, preferred and contracted proposals, the C-Mods directly involve destruction of 150 ha of native forest and woodland. This is a reduction of 84% (82%)*, 80% and 77% respectively. This is numerically impressive, but if one assumes that the existing open cut approvals will not go ahead should the current proposal be refused, the effective saving of native forest and woodland is (150 + 514) = 664 ha; this in fact is equivalent to the damage to habitat by the final contracted project. The effective percentage reductions are therefore 30% (20%)*, 13% and 0%. Is this the contracted project by stealth?

<table>
<tr><th>Stakeholder</th><th>ID</th><th>Category</th><th>Issue</th></tr>
<tr><td></td><td></td><td></td><td>It is emphasised that, in terms of impacts on flora and fauna habitat, the analysis based on hectares of destroyed habitat neither takes edge effects, setbacks and stand-offs into account, and nor does it consider any impacts from highwall mining activities. To avoid repetition in relation to edge effects and the like, reference should be made to Appendix A, Sections 4.1(a) and 4.2.

Table 1: Area comparisons in relation to Coalpac proposals
<table><tr><th>Coalpac's Proposals</th><th>ha within the Project boundary</th><th>ha of vegetat -ion within Project boundary</th><th>ha of vegetat -ion cleared for o/c min -ing</th><th>ha affected by HW mining</th><th>ha of o/c min-ing in existing approval**</th><th>ha of HW mining in existing approval</th></tr><tr><td>CCP original</td><td>2484</td><td>1952</td><td>958 (835)*</td><td>-</td><td>-</td><td>-</td></tr><tr><td>CCP preferred</td><td>-</td><td>-</td><td>762</td><td>-</td><td>-</td><td>-</td></tr><tr><td>CCP final contracted project</td><td>-</td><td>-</td><td>665</td><td>-</td><td>-</td><td>-</td></tr><tr><td>C-Mod Invincible</td><td>-</td><td>-</td><td>88</td><td>86</td><td>152</td><td>56</td></tr><tr><td>C-Mod Cullen Valley</td><td>-</td><td>-</td><td>62</td><td>79</td><td>362</td><td>68</td></tr><tr><td colspan="7">*Figure cited on p193 of Vol 1 of the March 2012 Environmental Assessment
** That is carried over from the previous approvals</td></tr></table></td></tr>
<tr><td></td><td></td><td>Ecology, pagodas</td><td>A second and more substantial matter is related to fragmentation of habitat. Consideration of Figure 2 shows that the original contracted open-cut mining area describes a tract of country which, being of similar elevation and broadly following the strike of the coal-bearing stratigraphy, is likely to have similar habitat as may be assessed by examining March 2012 Environmental Assessment, Volume 1 Fig. 41 p18519. Clearly, the three discrete Invincible open-cuts and the Cullen Valley open cut along what was once the continuous contracted open cut must fragment the continuity of the uncleared habitat, and thereby destroy parts of the Tablelands Grassy Woodland Complex Unit of the unique BBPLS.</td></tr>
<tr><td></td><td></td><td>Ecology, pagodas</td><td>The above leads into the third and most substantial concern, that being the integrity of the BBPLS. The Society finds it totally inconceivable that the DP&I, having made a courageous decision by rejecting the CCP, largely based on the uniqueness of the BBPLS, is in any way contemplating destruction of parts of the Tablelands Grassy Woodland Complex Unit, this being the least reserved and most vulnerable unit within the BBPLS.
The case for preserving the integrity of the BBPLS is overwhelmingly based on the PACRR and DAGR findings in Section 2.4.1 (a) and (b), and the evaluation in Section 2.4.1 (c) and (d). As this was very much the main reason for rejecting the CCP, it should accordingly be the main reason for rejecting the C-Mods. In fact, the logic supporting such a rejection is so irrefutable</td></tr>
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Stakeholder	ID	Category	Issue
			that discussing other ecological aspects should be deemed unnecessary. Nevertheless, at the risk of becoming boring, I again cite from the DAGR initial Addendum (p6)20: *"…the Department is satisfied that the vast majority of the project site is properly characterised as a 'pagoda landform complex'. This landform comprises a complex arrangement of habitats characterised by a convoluted line of towering rock faces that give way to rocky steep slopes and these in turn give way to forested slopes and valley floors dominated by various eucalypt vegetation communities. All components contribute to the overall significance of the pagoda landform complex, and any impacts to components of the landform complex have the potential to compromise the significance of the landform complex as a whole."* I rest my case!
		Economics	3.2.2 What does the future hold? Should the modifications be approved despite strongly held beliefs (cited above), the mines will be re-opened, coal will be supplied to the power station (assuming that the power station has not reached a better agreement with Centennial in the interim), and Coalpac will probably be taken over by Energy Australia through a deal with the Administrator (or whatever). This then begs the following questions: • Will Energy Australia (or Coalpac if still in the saddle) be satisfied with completing the rehabilitation and shutting the mines down, or will it in a few years' time be seeking further extensions with ultimate aim of linking the various open cuts and creating 'son of CCP'? Common sense says that having once had a successful outcome, it will not shy away from trying again. After all, each open-cut nibble will create more need for rehabilitation until such time as the Tablelands Grassy Woodland Complex Unit is fully destroyed and the BBPLS is no more. • Will the Department of Planning & Environment (?) under a new minister and with a different Director-General be able to withstand the economic pressure to abandon its strongly held view about the uniqueness of the BBPLS and countenance even more desecration? Difficult to know, but the trend under the previous • Premier and the Planning and Environment Ministers was to weight matters in favour of economic outcomes at the expense of environmental, social and heritage concerns. Even now the Draft Biodiversity Offsets policy weights the assessment processes strongly in favour of a proposal being approved; everything can be offset in one of the many ways outlined in the Draft. The probable conclusion is that bureaucratic courage will be severely challenged, but will hopefully prevail! Obviously there are no simple answers, but the message to be learnt is that once a concession is made regarding a small part of a large proposal, it will be increasingly difficult to reject subsequent extensions.
		Ecology, Ben Bullen State Forest	4. <u>A pictorial approach to environmental values</u> Few who have not been to the field will have much idea of the types of scenery and vegetation affected by the C-Mods, and the distance between the highwall boundaries and pagodas. As the main reasons for refusing the C-Mods are based on the unique character of the BBPLS and the scenic value and biodiversity of its lower and middle units (respectively the Tablelands

Stakeholder	ID	Category	Issue
			Grassy Woodland Complex Unit and the Ben Bullen Range Pagoda Unit) it is important to overcome such deficiencies. This is the purpose of the maps and booklets referred to in Section 4, but they will also be of assistance to Section 5.
		Ecology, Ben Bullen State Forest	4.1 Photo-enhanced maps These photo-enhanced maps are presented in Appendix B for the Cullen Valley and Invincible open cut and highwall mining areas. The Cullen Valley map is Appendix B(a), while the one for Invincible is Appendix B(b). It is again emphasised that all the areas shown are in the publicly-owned Ben Bullen State Forest. Appendix B has been submitted as an e-file separate from the e-file for the main text of this submission. 4.1.1 What does the future hold? This should be considered in conjunction with Fig. 13 in the C-Mods proposal21 and Figs. 3.1 and 3.2 in Appendix C of that proposal. The quality of the legend/map correlation is extremely poor in Fig. 13, to the extent of being indecipherable; it is a little better in Fig. 3.1. It is disturbing that such poor quality has been accepted by the DP&I. The Society is of the opinion that the DP&I should request replacements. The matters of importance are: • ▪ Photos 1, 2, 7-10 are of the Tablelands Grassy Woodland Complex Unit and variously classified by Cumberland Ecology (CuE) in its Fig. 3.1 as MU34 Tableland Slopes Brittle Gum – Broad-leaved Peppermint Grassy Forest (1, 2, 8-10), and MU 32 Tableland Scribbly Gum – Narrow-leaved Stringybark Shrubby Open Forest (7). • Photos 7-10 are in the open-cut area. Approximately 470 E. cannonii (Vulnerable listing) will be destroyed by the open cut according to the C-Mods proposal Appendix C p3.22. [This aspect will be discussed more in Section 4.1.2 below]. • In Appendix D (pp33-34), the existence of small linear developments of the Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland EEC are referred to. It is noted that the developments "…are arguably present in the area proposed to be cleared for the [Cullen Valley] open-cut mine"; also, that "…investigation of the extent of this community in the area of the proposed mine is warranted using ground-truthing." Furthermore, it is suggested that the potential direct loss of Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland should be highlighted and that any indirect effects of the open-cut mining proposal on this community where it occurs offsite should be considered. • Photos 1 and 2 are in the highwall area. On CuE Fig. 3.1 the CEEC MU20 Capertee Rough-barked Apple - Red Gum - Yellow Box Grassy Woodland occurs in the highwall area to the west of photo 2, while • MU20a Capertee Rough-barked Apple – Red Gum – Yellow Box Woodland – non grassy is southwest of photo 1 in the open-cut area. The matter of 'Box-Gum Grassy Woodland' is referred to in Appendix A Section 4.3(a) p22 and receives further consideration in Appendix D pp31-32, where it is suggested that even if the 'Blakely's Red Gum' community "…is most sensibly considered Tableland Grassy Forest, this would not preclude the possibility that the Red Gum-dominated subunit can be treated as 'Box-Gum Grassy Woodland'.

Stakeholder	ID	Category	Issue
			• It is noteworthy that: P. marginata occurs throughout the northern third of this area scheduled for open cut and highwall mining (see Appendix A pp22-23). In Appendix D pp35-36 Dr Douglas states: "…greater regard should now be given to the conservation status of this species, and what measures might be undertaken if this substantial area of known habitat is destroyed by mining…To the best of my knowledge, there is not currently a reliable means of translocating P. marginata or reintroducing it into a reconstructed habitat after mining…this species is genuinely under-conserved and…warrants reservation of as much of its habitat as is feasible…the plant is more abundant than has been previously estimated, but whilst more occurrences have been found, population size remains small, and threat levels, including from mining, remain high and may be escalating." • Photos 3-6 are of the Ben Bullen Range Pagoda Unit within CuE Fig. 3.1 terms MU30 Exposed Blue Mountains Sydney Peppermint - Silvertop Ash Shrubby Woodland. • The principal matter here is that the highwall mining entirely undercuts excellent examples of pagodas. This is to be avoided as it potentially dries out and degrades the moist forests on the slopes located below the escarpments, and impacts cliffs, pagodas and Aboriginal heritage at risk of being damaged through subsidence during and following such coal mining. The latter was extensively addressed in a previous submission by BMCS regarding highwall extraction under the CCP proposal22. The pertinent section is included as Appendix E.
		Ecology, Ben Bullen State Forest	4.1.2 Invincible – Appendix B(b) As with Appendix B(b), this should be considered in conjunction with Figs. 3.1 and 3.2 in Appendix C of the C-Mods proposal (see footnote 21). The matters of importance are: • Photos 1-3 are in the Ben Bullen Range Pagoda Unit. Photo 1 is at the north-western point of the highwall area. The pagodas here form part of a north-trending ridge which is best seen on the C-Mods proposal (footnote 21) Figure 18 p96. The highwall mining here will definitely undercut the pagodas and the associated ridge. • On Figure 18, a north-trending pagoda-bearing ridge bisects the northernmost highwall area; this is photo 2. Pagodas may also be seen in photo 3, despite there being nothing obvious in the equivalent position on Figure 18. This effectively shows that the stand-off distance for the pagodas has not been adequately ground-truthed. Pagodas are also present (based on Fig. 18) at the southeast corner of the southernmost highwall area. Highwall mining was supposed not to impact on any pagodas! • Photos 4-7 and 12-14 are in the proposed open cuts and are part of the Tablelands Grassy Woodland Complex Unit. The open-cut areas are variously classified by CuE in its Fig. 3.1 as MU13 Tableland Gully Ribbon Gum Blackwood Applebox Forest in a 'sea' of MU30 Exposed Blue Mountains Sydney Peppermint – Silvertop Ash Shrubby Woodland, and an area below photo 6 of MU34 Tableland Slopes Brittle Gum – Broad-leaved Peppermint Grassy Forest. Photos 6 and 7 are

Stakeholder	ID	Category	Issue
			hosted by MU13 Tableland Gulley Ribbon Gum Blackwood Applebox Forest. • In the southern open cut, Appendix C Figure 3.1 shows a thin NNE-trending strip of non-listed MU35 DNG Tableland Gully Mountain Gum Broad-leaved Peppermint Grassy Forest Derived Native Grassland. In contrast, the C-Mods proposal document (footnote 21) Figure 13 p59 shows this as MU20 Capertee Rough barked Apple - Red Gum - Yellow Box Grassy Woodland EEC. This change, which results from a reassessment by CuE, was considered in Appendix A Section 4.3(a). The Society's consultant was unable to visit this location due to the limited time available before the submission date. • Photos 8-11 also belong to the Tablelands Grassy Woodland Complex Unit but are in the highwall areas. The vegetation units are mapped by CuE (Fig. 3.1) as minor patches of MU32 Tableland Scribbly Gum –Narrow-leaved Stringybark Shrubby Open Forest on higher spurs, a predominance of MU30 Exposed Blue Mountains Sydney Peppermint – Silvertop Ash Shrubby Woodland, MU37 Cox's Permian Red Stringybark - Brittle Gum Woodland in the northwestern area, and MU34 Tableland Slopes Brittle Gum – Broad-leaved Peppermint Grassy Forest with riparian MU35 Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest towards the southern end. • Appendix D p32 suggests that MU35 is rated by OEH as having most remnants in a 'moderately disturbed' condition, and only a very small percentage as being in the 'low disturbance' condition. OEH's information indicates that MU35, whilst much generally more abundant than MU20, warrants recognition as vulnerable. OEH is clear that this vegetation should be conserved, irrespective of its current lack of any clear TSC/EPBC legal status. • *E. cannonii* is listed as Vulnerable under the TSC Act, and also has a Rare or Threatened Plant (ROTAP)23 listing as 2Vci (C-Mods proposal Appendix C24 pp3.21-3.22). Some 4,500 individuals are predicted (by CuE) to be within the C-Mods combined open-cut and highwall proposals and approximately 2,300 of these would be removed by the C-Mods combined open-cut proposals; approximately 1830 individuals are supposedly in the three Invincible open cuts, so the combined highwall areas must account for 2200 Clearly this is a problem for at least the top and bottom open cuts based on the distribution of E. cannonii in Appendix C Fig. 3.2. • *E. aggregata* (Black Gum) primarily occurs in the Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland community which is noted in Section 4.1.1 dot-point 3. C-Mods proposal Appendix C pp3.28-3.29 indicate that this eucalypt grows in the lowest parts of the landscape on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and that approximately 20 trees were recorded within a cleared valley floor pasture at the location on Appendix C Fig. 3.2. In Appendix D p34 it states: "The species is at or near the northern limit of its distribution in this area, and is threatened by further clearing, fragmentation, weeds, direct and indirect effects of mining, grazing that prevents recruitment, altered hydrology, genetic 'swamping' from proximate species, and by climate change." Dr Douglas concludes in the Appendix D Executive Summary (p27): *"The occurrence of Black Gum in the region (esp. Wallerawang) may merit listing as an Endangered Population and is of sufficient significance to warrant consideration in relation to the Critical Habitat provisions*

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			of the TSC Act." • There would have been a significant possibility of *E. aggregata* being found in and downslope from the open cuts in both the Cullen Valley and Invincible Modification areas; this still applies to the Cullen Valley site, but at Invincible, downslope is represented by the existing Invincible open cut.
		Ecology, Ben Bullen State Forest	4.2 Photo-booklets The two photo-booklets are produced separately as hard copies or sequentially for electronic transmission. They collectively comprise Appendix C. Appendix C(a) is for the Cullen Valley Modifications and Appendix C(b) deals with the Invincible Modifications. Appendix C is submitted as an e-file separate from the e-file of the main text. These are booklets of large photographs. The photo-booklets are an attempt to convey some of the ecological values impacted by the Coalpac Modifications proposed for the Cullen Valley and Invincible coal mines near Cullen Bullen at the foot of the western escarpment of the Blue Mountains. One covers the proposed Cullen Valley Modifications, the other deals with Modifications at Invincible; each has a map of the proposal at the beginning. There is less focus on the MU (mapping unit) vegetation classifications encountered in Section 4.1. But there is a stronger focus on the current appearance of the open-cut, highwall and pagoda areas, and what might be seen after they have been impacted and now rehabilitated. The proposed Modifications involve more open cut and highwall mining in the publicly-owned Ben Bullen State Forest. The Cullen Valley proposal is for one open cut with highwall mining on three sides and bounded to the west by the existing Cullen Valley mine. The Invincible proposal is more fragmented. It comprises three open cuts separated and partly bound by eight sections of highwall mining, and abutted on the western side by the existing Invincible workings. Each of the booklets has four subsections: one covers native forest in the proposed open cut areas, the second shows native forest in the highwall areas, the third features pagoda landscapes potentially impacted by highwall mining, and the fourth focuses on existing rehabilitation. Open cuts totally destroy native forest and all associated habitat. Examples of rehabilitation are given because the company claims to mitigate its actions by rehabilitating the areas of destroyed landform and native forest. But a cosmetic veneer will never replicate what has been trashed! It is intensely disturbing that the Modifications will partly destroy and otherwise impact the area recognized by the Department of Planning & Infrastructure (DP&I) and also a Planning Assessment Commission Review Report (PACRR) as having a unique landscape (termed the Ben Bullen Pagoda Land System - BBPLS) and significant levels of biodiversity. The PACRR recommended that25 *"…the pagodas and the associated escarpments be considered natural features of special significance and that they be fully protected from any mine-induced impacts."* The DP&I noted26: *"…the project site is properly characterised as a 'pagoda landform complex'. This landform comprises a*

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			complex arrangement of habitats characterised by a convoluted line of towering rock faces that give way to rocky steep slopes and these in turn give way to forested slopes and valley floors dominated by various eucalypt vegetation communities. All components contribute to the overall significance of the pagoda landform complex, and any impacts to components of the landform complex have the potential to compromise the significance of the landform complex as a whole." The photos in the open cut and much of the highwall areas are within the slopes and valley part (Tablelands Grassy Woodland Complex Unit) of the BBPLS, whereas those featuring pagodas and cliff-lines are within the Ben Bullen Range Pagoda Unit. The photos aim to show the general nature of the native forest and the scenic value of the pagodas. Although some photos may have a general title or a species may be named, formal identification of every aspect is not intended and would require more detailed fieldwork.
		Ecology	Some noteworthy features in the booklets are: • The character of the Tablelands Grassy Woodland Complex Unit in the open cuts and parts of the highwall areas – the understorey varies from grassy to sparsely shrubby with interspersed leaf, twig and bark litter and exposed soil areas – the understorey is the 'larder' for foraging species which retreat to the pagodas and cliff-lines for overnight protection and breeding purposes. • The relationships of pagodas and cliff-lines to the highwall boundaries – in the Cullen Valley area there is clearly no setback distance (it should be 300 m as recommended by PACRR) – in the Invincible area there is still some encroachment of 'highwalling' in places but it is far less blatant – this undermining of pagodas and cliff-lines is unacceptable. • Take time to compare the natural botanical beauty of the native forest showing divers bark colours and patterns with the scenic beauty and rugged geomorphology of the pagodas and cliff-lines of the Ben Bullen Range Pagoda Unit. • Let your eyes, hearts and minds see the outcomes of rehabilitation after native forest and the geological substrate is trashed by open-cut mining – the cosmetic veneer has little diversity as the plantings follow a linear pattern, an understorey is lacking, and the fauna species have left the neighbourhood – it might look more like forest (but a different forest) in 50 to 100 years' time!
		Ecology	5. <u>A pictorial approach to environmental values</u> These will not necessarily be dealt with extensively because many aspects have been covered in responses to the original CCP, in submissions to the PAC and in responses to the PACRR, and in other submissions made to the DP&I regarding various modifications to the CCP. These documents will not be referenced here because they are all on the DP&I major projects register under Coalpac. The Society notes that the majority of the consultants' reports presented in support of the Modifications proposed for the Cullen Valley and Invincible Mines were those developed for the CCP. In fact very little new work has been done beyond Hansen

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			Bailey putting together the C-Mods proposal. For example, most of the ecological work was done in 2011, with a few extra bits in 2013, and very little of it in terms of the quadrats actually took place in the C-Mods areas. Likewise, the same claims are being made in relation to economic benefits, the needs of Energy Australia and electricity prices; these were assessed by the DP&I in determining that the environmental values outweighed them. Obviously it is not unreasonable to use the CCP data as much as is practicable, but it should be appreciated that much of the data has been questioned in numerous submissions by government departments and NGOs, before it was rejected in the PACRR and then in the DGAR and its Addenda. Nothing has changed other than the size of the proposal. The Environmental Assessment is still failing to protect the pagodas and the BBPSL, is continuing to promote ineffectual approaches to stand-offs, setbacks and edge effects, has failed to have an independent organization evaluate many of the 'claims', and regrettably remains intent on destroying the amenity of local residents.
		Ecology	5.1 Other flora and fauna 5.1.1 Vegetation communities and flora These have been addressed in Appendix A Section 4 pp21-25 (particularly Sections 4.1 and 4.3), and then they have been evaluated in Appendix D pp33-40. Appendix A shows that Coalpac, as advised by Hansen Bailey and Cumberland Ecology (CuE), has minimised the significance of the C-Mods to flora and fauna. The Society expressed extreme concern about such seemingly unjustified claims being made in a formal document to the Department of the Environment. This process of minimisation and disregard of reality continues into the C-Mods proposal document27 and in the Appendix C to that document. Thus, in C-Mods Section 6.6.3 p65, having recognised that "…the Capertee Rough-barked Apple Red Gum Yellow Box Grassy Woodland and Derived Native Grasslands represents a form of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland), which is listed as an Endangered Ecological Community (EEC) under the TSC Act and a Critically Endangered Ecological Community (CEEC) under the EPBC Act" it is emphasised that the community only exists in the highwall areas and will not be subject to any direct or indirect impacts. This is wrong on two accounts: (i) CuE's own mapping places the community in the southernmost Invincible open cut (C-Mods Appendix C Fig. 3.1 – despite this being controversial and re-assessed in Appendix C p4.1) and Appendix D presenting a different opinion about the community's presence in the Cullen Valley open cut; and (ii) there is every possibility that highwall mining will affect the hydrologic regime and therefore induce an indirect impact. Again, C-Mods Appendix C p2.14 states: *"Cumberland Ecology is satisfied that the conservation significance of the flora, condition and viability of vegetation communities and likely impacts of the Modifications on native vegetation has been satisfactorily assessed."* And on p2.15: *"…the fauna surveys of the study area were comprehensive enough to record the majority of the vertebrate species that occur in the study area, and to allow the suitability of the habitat within the study area for*

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			fauna species to be adequately assessed." This all sounds good, but fails to deal with the large numbers of P. marginata missed in the Cullen Valley open cut, the failure to resolve the issue of 'Box Gum Woodland', the failure to address the possible presence of the Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland EEC in the Cullen Valley proposal (See Appendix D), and the effective disregard of impacts on fauna and flora from edge effects around the open cuts. With the above in mind, some of the species merit further comment.
		Ecology	*Persoonia marginata* – Appendix A Fig.1 shows the distribution mapped by LEG (Chris Jonkers). Additional occurrences have been recorded in the Cullen Valley open cut subsequent to producing the map. It is likely that the LEG submission will have an updated map. Regardless, failing to find this number of a species when they are an extension of a population (mapped by CuE) in the highwall area is at best incompetent!
		Ecology	*Thesium australe* – Appendix A and D have covered much about this species. It is a small, cryptic plant listed under both the TSC and EPBC Acts. It has now been recorded in the nearby Neubeck Creek open-cut proposal. This greatly increases the likelihood of it being present within the areas of the C-Mods proposals and requires that this potential habitat be treated as actual habitat.
		Ecology	*Bursaria spinosa ssp*. Lasiophylla (critical habitat for Paralucia spinifera the Bathurst Copper Butterfly) – Appendix A provides some comment as several populations of this species exist in the Invincible and Cullen Valley mine regions. This plant is critical to the Butterfly which has a vulnerable listing. However, an ant species serves the same function as the Butterfly – this has enabled the consultants to downplay the possible existence of the Butterfly in the area.
		Ecology	*Eucalyptus pulverulenta* (Silver-leaved Mountain Gum) – listed as Vulnerable under the EPBC Act and TSC Act, grows in shallow soils as an understorey plant in open forest, and has been recorded a few km away. Habitat comprises the Exposed Blue Mountains Sydney Peppermint, Silvertop Ash Shrubby Woodland and Tableland Scribbly Gum Narrow-leaved Stringybark Shrubby Open Forest vegetation communities. A substantial amount of these exist in the C-Mods areas. Repeated targeted surveys failed to locate the species. This is rather surprising.
			Prasophyllum sp. Wybong – Appendix A p24 provides information on this orchid – as with many orchids, Prasophyllum is difficult to find unless in flower. It is classified as CE and has a moderate likelihood of being present in the areas of habitat to be destroyed by the C-Mods. Habitat clearance linked to mining is a major threat, yet little seems to have been done to check whether it is present.
		Ecology	ROTAP species – CuE seems to be strongly of the view that if something is not listed then it can be disregarded – this may be the case from a Federal viewpoint, but it is wrong to ignore ROTAP species. Appendix D Executive Summary makes the following statement: "Unless competently assessed and found otherwise, ROTAPs that are not currently listed as threatened

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			under the Acts should be treated as environmentally important and, in accordance with the precautionary principle, as potentially threatened. Their Rare and/or Poorly Known status is indicative that they may be at risk: most have simply not been further assessed. They should not be disregarded in the impact assessment of open cut mining". The DP&I must ensure that ROTAPs are properly assessed.
		Ecology	Targeted surveys – these were conducted for a range of threatened plants with potential to occur within the C-Mods boundaries (C-Mods Appendix C p2.4). In most cases the species were not found, but in this context the Society has lingering concerns about the implementation of the surveys.
		Ecology	5.1.2 Fauna Aspects of threatened fauna are considered in Appendix A Section 4. Threatened fauna consist of the endangered Regent Honeyeater, Swift Parrot and Spotted-tailed Quoll, and the vulnerable Broad-headed Snake, Large-eared Pied Bat, Grey-headed Flying-fox and the Bathurst Copper Butterfly; the latter is dealt with in relation to *Bursaria spinosa* above. Numerous other threatened fauna species either likely to occur or with potential to occur are discussed in the C-Mods Appendix C Section 3.5.2 pp3.34-3.48. The assessment relative to the C-Mods is that no threatened fauna species have been recorded within the C-Mod areas, although some are likely to occur or have the potential to occur. The Society is of the view that the level of impact on fauna species has been dismissed too lightly (see Appendix A pp21-22).
		Air quality	5.2 Other flora and fauna The Society is firmly opposed to the levels of noise, air quality reduction, and impacts on health which will be re-imposed on the citizens of Cullen Bullen should the C-Mods proposals be approved. The facts are that mining stopped in late 2013 and residents have had the opportunity to experience the improved amenity. The usual expert consultants have been used to produce assessments of impacts. Unsurprisingly, the work shows that the residents' quality of life will not be impacted because the bureaucratically determined criteria will not be exceeded. The Society has on many occasions pointed out that the various criteria are determined by government in discussion with companies and consultants, and looked at in the context of overseas practice. Unfortunately, the people who are the 'beneficiaries' of the impacts are rarely listened to; perhaps because the difficult ones are bought out, or will lose their jobs, or are poorly organized relative to the companies. And perhaps because people differ in their responses to these impacts as a function of individual health (or lack of it!), perception of noise irritants, and varying responses to particulates as a function of genetic make-up. The Society also notes that, in the case of the CCP, many of these factors were deemed manageable! Yet the questions remain: would you want your grandchildren to go to school in Cullen Bullen? Would you want to live in Cullen Bullen if the mining starts up again and continues for up to 7 years (but longer if additional extensions are granted)? Do you believe that there are totally safe levels of fine dust (PM2.5) and is it cumulative? Finally, who decided that an average PM10 of 10.5 µg/m3

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			is non-injurious and that anything less than an average of 30 µg/m3 is safe? NSW Health was unimpressed and suggested that there are no such things as safe levels of ingestion of fine particulates – presumably 'dust' is unable to determine when it is 'average'!
		Subsidence	5.3 Highwalling Refer to the C-Mods proposal Sections 6.7.3 and 6.7.4. The previous work by the first consultant, the second consultant doing the peer review and the third consultant giving an expert overview has been trotted out to provide assurances that an FoS of 1.3 is satisfactorily conservative; and this will ensure that surface subsidence does not exceed 20 mm. The Society addressed these matters in previous submissions and pointed out that: rock mass has heterogeneous mechanical properties, rocks at surface (e.g., as parts of cliffs and pagodas) have tilting and tumbling instabilities which can be triggered by even small degrees of subsidence, and mining engineers see the types of failure which induce small collapses as being manageable by adjusting their parameters. In other words, there shouldn't be any problems, and if minor ones arise and do not delay production, then everything is 'sweet'! Preservation of pagodas and cliff-lines involves a different set of parameters from those attuned to maintaining production! Approving 'highwalling' under pagodas and cliff-lines will inevitably result in minor rock falls – and when this happens, what remediation will be possible? Out with the epoxy resin and stick it all back together? I think not!
		Rehabilitation	5.4 Mitigation, Rehabililtation and Offsets *Mitigation* of an impact relies on various commitments to monitor things and take actions if needed (typically under various management plans), or to implement progressive trials to see at which stage damage eventuates. Both options (and the various shades of these options) are forms of 'trial and error'/'suck it and see'. The engineer sees this as practical problem solving, others might class it as adaptive management, but BMCS sees it as the environment incurring the risks and suffering various impacts, while the company sees it in terms of maximising production.
		Rehabilitation	5.5 Mitigation, Rehabililtation and Offsets Rehabilitation is put forward on the basis that it mitigates the destruction of natural landforms and the habitat embodied in native forests. BMCS has previously discussed rehabilitation in submissions about the CCP. The brief story is that: • An open cut coal mine is a hole in the ground from which coal seams and much interlayered sandstone, siltstone and shale have been removed – the coal is taken for processing and the 'rubbish' (or mulloch) is stockpiled. • When the time comes to rehabilitate the land, the disordered (jumbled) rock and soil are returned to the hole (make-up fill may be needed to compensate for extracted coal) and machine tamped.

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			• The fill is then contoured to a 'suitable' shape, covered with a clay cap, and then topsoil. • Once the moulded landform has settled, native species are planted and tended over many years (in theory). Four things will never be re-created: (i) the rock layering and structure which was once there; (ii) the gradational relationships from rock, through weathered rock into a soil cover; (iii) the hydrologic regime of groundwater and surface water and their inter-relationships; and (iv) the original native forest and its evolved habitats. The bottom line is that rehabilitation is a fancy term for cosmetically and superficially improving a trashed volume of rock and soil; it is an improvement over doing nothing! But rehabilitation of superficial damage must never be grounds for approving the creation of more damage.
		Biodiversity Offsets	Biodiversity offsets (see Appendix A Section 5.3) are a necessary outcome when approval is given to create adverse environmental outcomes. The Federal Policy is that measures aimed at providing environmental offsets, compensation or off-site benefits CANNOT be taken into account in making the initial decision about whether the proposal is likely to have a significant impact on a matter protected under the EPBC Act. As there is now a bilateral agreement on the assessment of State and Federal developments, the Society hopes that the NSW Government will not allow offsets to enter the treatment of a proposal until a decision has been made to approve a proposal on grounds other than offset criteria. In the current C-Mods proposal and that of the CCP, offsets were used to mitigate anticipated environmental damage (in fact almost to 'buy' a favourable outcome). The Society is totally opposed to such cheque book driven assessments, regardless of any legislated subterfuge.
		Ecology, pagodas, socio-economics	6. <u>Conclusions</u> • The original CCP was an immensely destructive concept which was sensibly rejected from environmental, social and heritage viewpoints. • The C-Mods proposal is a contrived commercial arrangement between Coalpac, creditors and a company driven by self-interest; it should sensibly be rejected. • Approval of the C-Mods proposal (the infant son of CCP) will be the end of the unique Ben Bullen Pagoda Land System (BBPLS) as it encourage more applications for extensions, each of which will be easier to approve because the BBPLS will have progressively lost its integrity.
		Ecology, biodiversity offsets, economics	**Appendix A BMCS's submission to the DoE in relation to the EPBC Referral Reference Number: 2014/7147** **Abridged Version** 2. The proponent's new proposal Coalpac places emphasis on (Referral document Section 2.1 p10) *"…backfilling and rehabilitation of the residual final voids*

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			resulting from existing mining operations and the rehabilitation of areas affected by subsidence from historic underground mining operations in the area" and facilitating (Referral document Section 2.2 p10) *"…the complete rehabilitation of both the proposed and existing mining…at the conclusion of the Modifications' mining activities."* The above sounds good, but the Society is concerned because all previous operations should surely have been subject to rehabilitation requirements and involved a bond to ensure that the work's anticipated cost was covered? Is Coalpac…suggesting that, should the application be refused, none of the work will be done? If so, this is a severe endictment of the whole process and a totally unjustified basis for any government making a determination. The Society is further concerned about the statements that (Referral document Section 2.2 p10) *"No feasible alternatives to the Proposed Action are available" and the "…primary need for the Modifications is to ensure the short term continued supply of competitively priced coal to the domestic power generating facilities at the nearby Mt Piper Power Station whilst other strategies for longer term fuel supplies can be explored."* The first part of the quotation is…only from Coalpac's viewpoint. Alternatives do exist. The Administrator, government and creditors should not be swayed by Coalpac's self-interests. The second section of the quotation may be Coalpac's primary need for the new proposal, but an ongoing coal supply is available from Centennial, which is the current supplier. Energy Australia (EA) is a foreign-owned company which…may increase its profit margin if it can access dirt-cheap poor quality coal, but this is neither in the best interests of the impacted residents of Cullen Bullen, nor of the environment. These aspects were…decided in favour of social and environmental interests by the PAC review and the Director-General's report. Coalpac is asking for the interests of residents and the environment to be put aside so that EA…can benefit from its dealings with Coalpac, whilst concurrently exploring strategies for longer term fuel supplies! EA (through ownership of Enhance Place) is already pursuing other options in the region…Through what might become effective ownership of Coalpac, it will benefit through Coalpac doing the work and receiving approval for its new proposal. EA would then be in a position to push for…a succession of modifications… …why should mining in this environmentally and socially critical region be allowed to progress through successive encroachments when the overall concept was comprehensively rejected?
			4. Assessment of the proponent's claim – flora and fauna 4.1 Cumulative concerns In a submission relating to the CCP EPBC Referral 2010-5776 the Society noted in Section 2.429 that: *"The histories of the Cullen Valley and Invincible Mines are complex….The Cullen Valley Mine evolved through consolidation of mines…extending back to the late 1800's. The Invincible Mine commenced as an underground operation in 1901 and evolved via a second underground operation until the late 90's when open-cut extraction commenced. Both Mines have been*

Stakeholder	ID	Category	Issue
			intermittent as a function of coal-price fluctuations. *The salient points are that the region firstly experienced progressive consolidation of underground mines, and then witnessed movement to open-cut and high-wall mining with larger surface areas adversely affected. The region is now threatened by further consolidation and enlargement of the impacted surface areas. This has protracted and cumulative impacts on groundwater, surface water, and fauna and flora through destruction of habitat..."* Disregard of cumulative impacts and/or seemingly cynical minimisation of their importance characterises various parts of the Referral document (RD)30. Examples are... (a) In relation to the [proposed] 150 ha of totally removed habitat and 165 ha of potentially impacted habitat, the cumulative impact…from previous operations by Invincible and Cullen Valley [mines] are either disregarded or treated as a positive factor…RD p18 notes that the areas encompassed by the disturbance boundaries31 provide potential habitat for a range of species, including some threatened species…[but] the habitat is of minor significance relative to large areas of similar habitat in the nearby region…that due to being adjacent to existing Cullen Valley and Invincible approved workings…[the disturbance] will not induce habitat-fragmentation and [the habitat] is likely to be already impacted… These suggestions are outrageous because they: (i) involve classical minimisation and ignore the fact that the new proposal is extending the destruction of habitat by the existing mines; (ii) disregard the time- and space-cumulative impacts of past, present and future mines on habitat along the tract of the western escarpment; (iii) are wrong about fragmentation (particularly in the Invincible area)32 as may readily be seen on…RD, Attachment A, Part 1, Fig. 4a; and (iv) [while recognising] that the existing open cuts cause impacts beyond their boundaries,…apparently see this as in some twisted way justifying the new open cuts – but each additional cut extends the damage envelope. (b) Four CE and E species are listed in RD Tables 3.2 and 3.3 as having a moderate likelihood of being present in the areas of removed habitat and potentially impacted habitat; they are a critically endangered leek orchid (*Prasophyllum sp. Wybong*), and the endangered Regent Honeyeater, Swift Parrot and Spotted-tailed Quoll. RD pp19-20 [suggest] that…*the removal of this area [138.8 ha] of potential foraging habitat is unlikely to impact the availability of foraging habitat for these species in the locality."* The leek orchid is disregarded. …these species are dismissed too lightly: (i) 138.8 ha versus the amount of habitat in the nearby Parks is again minimisation; (ii) the habitat removal is one small part of a cumulative problem, both locally at the scale of the new proposal and existing mining operations, and also more regionally as emphasised in (a)(ii) above; and (iii) there is negligible consideration of what happens to the species when the particular areas of habitat which they visit are destroyed or in other ways impacted – when dealing with endangered or critically endangered species, what level of disruption and risk is deemed to be acceptable? …the foraging argument has less validity when dealing with mammals such as the rare Quoll, and no validity when dealing with a critically endangered orchid.

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			(c) vulnerable species…with moderate to high likelihood of occurrence comprise…Silver-leaved Gum, Clandulla Geebung, Austral Toadflax…Broad-headed Snake…Large-eared Pied Bat, Grey-headed Flying-fox and the Bathurst Copper Butterfly. In relation to…these, it is stated (RD pp20-21): *"The species have not been recorded and therefore (are) not known to exist within the Disturbance Boundary, however…suitable habitat features occur for them within the Disturbance Boundary..."* *"…no important population of these species occurs within the Modification Boundaries. Accordingly, the proposed action will not reduce the area of occupancy of an important population."* *"…no important population of these species occurs within the Disturbance Boundaries…The Disturbance Boundaries are located directly adjacent to the existing Invincible Colliery and Cullen Valley Mine, and therefore no fragmentation of habitat will occur."* *"The Proposed Action will remove a relatively small area of potential habitat for these vulnerable species when compared with the available areas in nearby conservation areas…The action will not impact habitat to the extent that any vulnerable species known or predicted to occur will decline."* *"It is not considered likely that any vulnerable species would be significantly impacted by the Proposed Action."* …the potential existences of these species within…the disturbance and modification boundaries are dismissed in a too cavalier fashion…the BMCS responses in (a) and (b) above are also applicable here, but to elaborate: (i) cumulative impacts are ignored; (ii) minimisation is rife; (iii) there is negligible consideration of what happens to the species when the particular areas of habitat which they visit or occupy are destroyed or in other ways impacted; (iv) fragmentation is distinctly possible as may readily be seen on…RD, Attachment A, Part 1, Fig. 4a…; (v)…at least one of the species has been recorded within the disturbance and modification areas, is part of an important population, and would certainly decline if this new proposal is approved; and (vi) the last of the above quotes is…absolute nonsense.
			4.2 Edge effects, setbacks and stand-offs The analysis of impacts…treats the disturbance boundary as absolute to the extent that there will be…no impact beyond it…edge effects will be nil. This…seems to follow on from the belief that hardly anything of significance exists in the modification boundary, yet RD, Attachment A, Part 1, Fig. 3 shows that this is incorrect in relation to P. marginata… There is clearly a need to address edge effects, setbacks from potential breeding habitat and clusters of threatened populations, and stand-offs in the context of cliff-lines and pagodas. BMCS is firmly of the view that these matters must be covered in any environmental assessment of the new proposal…
			4.3 Specific concerns – threatened ecological communities and species (a) The CEEC comprising 'Box Gum Woodland'…in RD Section 3.1(d) p18 it is stated that: *"The proposed action will not*

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			remove any Endangered Ecological Community (EEC) or habitat for EEC's"; and that "Box Gum Woodland (listed under the EPBC Act as a CEEC) occurs nearby but does not occur in the Modification Disturbance Boundaries and will not be impacted." This is clarified in RD Section 3.3(e) p27: whereas the CEEC (Capertee Rough-barked Apple – Red Gum – Yellow Box Grassy Woodland, MU20)33 was originally identified by Cumberland Ecology within the Invincible Colliery modification boundary, it has been re-assessed. Cumberland Ecology now believes that the vegetation better conforms with a variant of the dominant surrounding community, Tableland Gully Mountain Gum – Broad Leaved Peppermint Grassy Forest (MU 35)34. …it is clear from this reclassification that identifying these differing vegetation assemblages requires much expertise and leaves room for a degree of subjectivity [e.g., as discussed in The Vegetation of the Western Blue Mountains, Sections 4.1.10, 4.1.14, 4.1.15, 4.2.1 (Tables 4.1 and 4.2), 4.5 and 4.6]35. …identifying vegetation communities was also raised in the Planning Assessment Commission's Report on the CCP and cited by Keith Muir in his current submission36 as follows: *"…given the controversy over this issue, any further survey work to establish the occurrence and distribution of vegetation communities on the site should be fully independent or directly oversighted by OEH at the Proponent's cost"*…Cumberland Ecology has not opted for independent oversight in the preparation of the referral document (RD). (b) *Persoonia marginata* (Clandulla Geebung)…Figure 1 below…should be considered in conjunction with RD, Attachment A, Part 1, Fig. 3 which shows the distribution of P. marginata according to Cumberland Ecology. RD Section 5.2 p31 states: *"Silver-leaved Gum, Austral Toadflax and Clandulla Geebung [BMCS emphasis] have not been recorded from within the Disturbance Boundaries and the habitat present is not considered to be critical for their survival. No important populations of threatened species are likely to be impacted by the Proposed Action."* RD Section 2.5 p12 states: *"…targeted surveys were undertaken at Cullen Valley Mine for Clandulla Geebung (Persoonia marginata)…Before each subpopulation was sampled, the boundary of the subpopulation was walked to find the limit of outlying individuals...All areas within the currently approved disturbance area for Cullen Valley Mine where Persoonia marginata were identified have been conserved."* RD Section 3.1(d) pp20-21 state: *"These vulnerable species have not been recorded from the Modification Boundaries and no important population of these species occurs within the Modification Boundaries. Accordingly, the proposed action will not reduce the area of occupancy of an important population." And: "The habitat to be removed is not considered to comprise critical habitat for any species occurring or with potential to occur on the site."* None of these quoted claims withstand closer examination…and even in terms of RD, Attachment A, Part 1, Fig. 3 by Cumberland Ecology…the Clandulla Geebung (P. marginata) is part of a significant population within the modification boundary. It is reprehensible that Coalpac, presumably as advised by Cumberland Ecology, has made such seemingly unjustified claims in a formal document to the Department of the Environment.

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			The Society is particularly conscious of the broader distribution of P. marginata in relation to the existing Cullen Valley Mine workings (Fig. 1)…the existing mine workings [seem to] have fragmented and perhaps destroyed part of the P. marginata population…any additional mine-related work will seriously impact this vulnerable species. (c) *Prasophyllum sp. Wybong*…37: this critically endangered (CE) orchid has a moderate likelihood of being present in the areas of habitat to be destroyed (RD, Table 3.2). The Department of the Environment website notes that this terrestrial orchid grows to approximately 30 cm high when in flower but that it otherwise (in winter and spring) comprises a single, tubular, fleshy, dull-green leaf. A principal threat to the species stems from the difficulty of identifying it, other than when in flower, and comprises habitat clearance from mining activities…one population apparently occurred in a proposed open-cut coal mine site! …this CE species receives no further attention…the Society would have at least expected a clear statement about whether it was subject to a targeted action or in any other way specifically investigated. (d) *Hoplocephalus bungaroides* (Broad-headed Snake – BHS): RD Section 3.1(d) p21 says *"The habitat to be removed is not considered to comprise critical habitat for any species occurring or with potential to occur on the site."* And also: *"As no important populations of these species are known or predicted to occur on the site, the breeding cycle of an important population will not be impacted."* This vulnerable species received…little consideration…despite [being sighted and photographed] in the broader area38…the species is present in the general area above the proposed open cut and could well forage in the defined open cut and highwall areas during the warmer months… Mr Muir39 has…drawn attention to advice by OEH that the stand-off distance for a BHS should be 500 m…the 50 metre stand-off zone…[had] little ecological basis and provided an inadequate level of protection.
			(e) Other species recorded and/or disregarded by the RD…the Society highlights the following species… • *Thesium australe* (Austral Toadflax) – V (vulnerable) with a moderate likelihood of occurrence; this and other vulnerable species were covered…in Section 4.1(c) items (i)-(vi)…a targeted survey should be conducted for this species as it has been recorded at Pine Dale Mine and the Neubeck Coal Project…a little to the south of the existing Invincible Mine. • *Prostanthera cryptandroides subsp. crytandroides* (Wollemi Mint Bush) – V and with a reasonable chance of being within the areas delineated by the disturbance and modified boundaries; this and other Prostanthera species have essentially been ignored… • *Paralucia spinifera* (Bathurst Copper Butterfly) – V and with a moderate likelihood of occurrence…several populations of Bursaria spinosa ssp. Lasiophylla (critical habitat for the Butterfly) exist on the Invincible and Cullen Valley mine sites and were recorded on the NSW Wildlife Atlas in 201140; the amount of…habitat is understated in RD Table 3.3 p16. • *Chalinolobus dwyeri* (Large-eared Pied Bat) – V and with a high likelihood of occurrence…bat species require stand-off distances of 500 m from breeding sites according to OEH; they are directly impacted by noise, dust and strong lights and

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			will become collateral damage should the new proposal be accepted; they are essentially disregarded…
			5. Assessment of the proponent's claim – avoidance, mitigation and compensation 5.1 Avoidance RD Section 4 p30 emphasises that: "…the mine plan proposed for the Modifications has been modified to avoid environmental impacts. The proposed disturbance area has been reduced to avoid impacts on known occurrences of Box Gum Woodland CEEC, upon a known population of Persoonia marginata (listed as vulnerable under the EPBC Act), upon sandstone outcrops and habitat areas that provide overwintering habitat for the Broad-headed Snake." The above is amusing in its degree of ineptness… • The plan has been modified to avoid impacts on the Box Gum Woodlands CEEC; this would be impressive were we not told elsewhere (RD Table 3.1, RD Section 3.1(d) p18, RD Section 3.3(e) p27) that…has in fact been reinterpreted as Tableland Gully Mountain Gum – Broad Leaved Peppermint Grassy Forest… • The plan was also modified to avoid populations of P. marginata…the areas encompassed by the disturbance and modification boundaries contain several hundred P. marginata plants… • Ensuring the open cuts avoided the BHS's 'overwintering' cliffs and rocky outcrops is sensible…it would have been better to entirely exclude such breeding habitat from highwall mining and to stipulate the stand-off distances.
			5.2 Mitigation …the RD commonly emphasises that destruction of habitat…will be temporary because of the progressive rehabilitation programme. BMCS has, in submissions related to the CCP, intensely criticised the mining industry's approach to rehabilitation and does not resile from it…when something is trashed, one has to clear up the mess, but cosmetic improvements are far different from the habitat and landforms which were destroyed. …rehabilitating damage from the existing operations is put forward as a reason for approving the new proposal…granting extensions to a mining operation on the basis that past damage will be rectified is ridiculous. Actions of this type should not be required if appropriate bonds are taken by government and ongoing rehabilitation is practised and properly policed.
			5.3 Offsets …RD Section 4 p30 in blue font: *"…measures aimed at providing environmental offsets, compensation or off-site benefits CANNOT be taken into account in making the initial decision about whether the proposal is likely to have a significant impact on a matter protected under the EPBC Act."* BMCS fully endorses this position. Offsets should not be on the table until the Federal department has discharged its obligations under the EPBC Act… If the Principles of Ecologically Sustainable Development are properly applied the need for offsets will be infrequent. The conflicts over offsets arise because they are not 'like for like', the discussions about offsets become part of the decision-making process rather than a consequence following on from making the decision, and the divisions of government charged with protecting the environment become embroiled in determining the details of the offset process.

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		Ecology	**Appendix D Ecological Surveys & Planning Report to BMCS** Executive Summary • A form of the threatened 'Box-Gum Grassy Woodland', namely the open, grassy (not Joycea) woodland dominated by Blakely's Red Gum, occurs in the study area but is masked by aggregation at mapping scales that are apparently too coarse to reveal it;
			• Whilst OEH view the broader unit in which the Blakely's Red Gum Woodland occurs as Tablelands Grassy Forest, this does not preclude the Red Gum-dominated subunit being treated as 'Box-Gum Grassy Woodland' at a suitable scale of mapping and analysis;
			• Irrespective of whether the contentious vegetation is MU20, MU35 (of DEC, 2006) and/or a variant of 'Box-Gum Grassy Woodland', it clearly has at least State significance due to it being of a class that is over-cleared, under-conserved, and significantly threatened;
			• It is grossly incorrect to assume that communities, species (including R and K ROTAPs) or populations that are not currently listed as threatened under the TSC and/or EPBC Acts could not be listed were they to be assessed and nominated. The lists of threatened biota under those Acts are far from comprehensive;
			• Unless competently assessed and found otherwise, ROTAPs that are not currently listed as threatened under the Acts should be treated as environmentally important and, in accordance with the precautionary principle, as potentially threatened. Their Rare and/or Poorly Known status is indicative that they may be at risk: most have simply not been further assessed. They should not be disregarded in the impact assessment of open cut mining;
			• A form of Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland EEC is present in the area proposed to be cleared for the Cullen Valley open-cut mine, but is currently obscured by aggregation at the map scales that have been used. The extent of this EEC in the area of the proposed mine should be investigated using ground-truthing;
			• The occurrence of Black Gum in the region (esp. Wallerawang) may merit listing as an Endangered Population and is of sufficient significance to warrant consideration in relation to the Critical Habitat provisions of the TSC Act;
			• Unless surveys for *Thesium australe* within the subject area occur at the same time as the recently confirmed proximate population is in flower, any credible potential habitat should be deemed actual habitat for this very cryptic plant. Plant numbers and densities should be presumed to be the same as at the proximate site unless there are significant differences in site conditions. This species may warrant nomination as Endangered and the local occurrence as an Endangered Population (if the species remains listed as Vulnerable);

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			• The population of *Persoonia marginata* is significantly larger and more extensive in the study area than claimed by Cumberland Ecology. Greater regard must be given to the conservation status of this species, and the consequences for it at the species and population scales if this substantial area of known habitat were destroyed by mining.
			<u>Introduction</u> Ecological Surveys & Planning was originally engaged by BMCS to review documentation and to undertake brief fieldwork to determine the extent, if any, to which Capertee Rough-barked Apple – Red Gum – Yellow Box Grassy Woodland (MU20 as per DEC 2006) is present in areas proposed for open-cut mining within the proposed extension to Cullen Valley Mine. The primary purpose of this investigation was to clarify uncertainty about the presence, local form and extent of MU20 because consultants (Cumberland Ecology, herein, CE) for the mine proponent and officers from NSW Office of Environment & Heritage (OEH) have expressed differing views on this issue. MU20 is seemingly accepted by both of those parties as within the scope of a threatened ecological community informally known as 'Box-Gum Grassy Woodland' listed under both State and Federal laws. In undertaking the review of relevant documentation, it became apparent that there are additional ecological issues relevant to the interest of BMCS, including the need to consider another threatened ecological community and associated species detected nearby; the flawed rationale used by CE in downplaying / dismissing 'R'-coded Rare Or Threatened Australian Plants (ROTAPs) in assessments for the proposed mine extension (and other earlier related assessments); and an apparent lack of mapping of hollow-bearing trees that are potential habitat for threatened fauna, and that if removed, require suitable substitution.
			<u>Methods</u> BMCS and/or Lithgow Environment Group (LEG) provided links to websites or emailed attachments with the intent that the author read relevant sections to become suitably informed about the matters under investigation. To gain an adequate understanding of the ecological issues at the core of this report, numerous documents were read, and some are not specific to the current proposed extensions to Cullen Valley and Invincible Mines. Some of the key information relates to ecological assessment in relation to the now defunct Coalpac Consolidation Project (CCP) that was far larger in scale than what is currently being considered, but that dealt with the same or at least related issues. No statistical analysis of vegetation mapping information or any revision of aerial photo interpretation (API) was undertaken for this report. Fieldwork was brief and targeted, and was directed by LEG delegates, Chris and Julie. The first site visited was east of Cullen Bullen Cemetery, and was used to examine an area of vegetation where there were differing opinions as to how best to classify it, specifically, whether any of it could sensibly be considered to be MU20. The second, third, and fourth sites were all within the proposed open cut mining area east of the railway. The fifth site was in the area that Invincible Colliery will reportedly soon clear as that mine expands upslope parallel to the highway. Most site inspections involved walking only a short distance from the vehicles. Only one substantial transect was undertaken, and this was commenced at the NE corner of an existing open-cut within Cullen Valley Mine, then progressed upslope roughly parallel to a shallow drainage depression until it

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			was determined that there was no longer scope for Box-Gum Grassy Woodland or other communities of note to occur.
			Research findings Box-Gum Grassy Woodland and allied communities Under-sampling and variability MU20 is described in DEC (2006) and is shown to have been subject to only three quadrat samples within that large study area (Western Blue Mountains). DEC (2006) states that communities with very low sampling density are likely to be less well defined relative to those with higher sampling densities. Three quadrats is a very low sampling density, and it is also evident that the type form of the community is from the Capertee Valley, which DEC acknowledges has a relatively unique set of abiotic parameters. It is therefore feasible that MU20 only occurs in the Capertee Valley in the strict form in which it was originally described, and that other variants of it outside that area could, subject to adequate sampling, be recognised as another allied community, or a distinct variant of MU20 that may, for example, contain a different mix of canopy species but have a very similar understorey and structure on the same geology. The situation is strongly evident in the NSW Southern Highlands where the listed Endangered Ecological Community (EEC) Southern Highlands Shale Woodland (a concept originally derived from basic 1:100,000 scale mapping), has several forms, some of which are so distinct that they can sensibly be recognised as different communities, not just sub-communities or variants, depending on the scale of assessment. Thus, the scale of assessment and mapping is critical to consideration of whether MU20 is valid in the study area and how similar any related vegetation would need to be to the described form to be sensibly deemed to comply with it. The Colong Foundation and others have commented on this issue.
			Problems of scale It does not appear that either OEH (formerly DEC) or CE have undertaken mapping within the Cullen Valley and Invincible mine areas at a fine enough scale to be optimal for assessing the ecological effects of the proposed mine extensions, which are considerably smaller than the CCP. It is not OEH's job to provide project-scale mapping, but because of controversy about the alleged deficiencies of CE's mapping, OEH has reviewed and updated information based on DEC (2006), and provided this information in a response to the CCP Planning Assessment Commission (PAC). In the various commentaries on this wider issue, OEH states that CE mapped a Tableland Open Forest, some of which features Blakely's Red Gum, and considered it to be 'Box-Gum Grassy Woodland'. OEH later used 3D high resolution imagery to assist its mapping, and concluded, aided by fieldwork, that CE's Tableland Open Forest is outside the scope of 'Box-Gum Grassy Woodland' because the dominant canopy species is Mountain Gum, +/- Bridge's Apple Box, with Blakely's Red Gum sometimes present, and sometimes locally dominant. OEH considers this vegetation to be Tableland Grassy Forest. The issue here is the decision by OEH to aggregate all local variants of this Tableland Grassy Forest, and through this aggregation, conclude that the vegetation is largely outside the scope of 'Box-Gum Grassy Woodland'. Finer scale mapping could/would have determined that whilst most of the Tableland Grassy Forest in contention isn't 'Box-Gum Grassy Woodland', one subunit of it is: namely the open, grassy (not Joycea) woodland dominated by Blakely's Red Gum. Thus the problem remains one of aggregation, which in this case, has resulted in OEH forming the view that there isn't any

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			'Box-Gum Grassy Woodland' in the area proposed to be cleared for the mine extension. Note that this is OEH's conclusion, not CE's, and that CE earlier took a view similar to mine (but perhaps even broader) and identified part of its Tableland Open Forest as 'Box-Gum Grassy Woodland' EEC. The Colong Foundation has commented on the wider issue of map scale and interpretation in which it sees that CE's mapping (apparently coarser than DEC's 2006 regional work at 1:25,000) has tended to aggregate some of DEC's communities, giving the impression that the vegetation of the subject area is less diverse at the community scale, and perhaps more problematically, that there is a larger area of the well-conserved communities and a smaller area of the poorly reserved units. It seems that CE's mapping is coarser than DEC's 2006 work, and whilst not as coarse as the 1:100,000 map by Benson & Keith (1990), still involves some aggregation of map units initially created at 1:100,000 scale. This seems odd. It suggests that, at least at that time, CE was not using mapping at an appropriate project scale (even allowing for the fact that the project area was relatively large) and/or that there are deficiencies in how the mapping team interpreted earlier maps, aerial photos, and ground-truthing. It may be that in addition to issues of method, the team lacked sufficient familiarity with the techniques and may not have put in sufficient time on-ground or otherwise to produce a suitably competent result. Project-based mapping would normally be expected to split map units derived from coarse scales such as 1:100,000 and 1:25,000. I suggest that CE's mapping should sensibly be at something closer to 1:5000, and were it so, it would very likely deal with subunits mentioned but not mapped by DEC (2006). Presumably, CE now has access to the ADS40 imagery and associated equipment as used by OEH. If so, it seems reasonable that it use that imagery to review its map, that it adopt a suitably fine scale of mapping with a heavy emphasis on fieldwork. Known or potential threatened ecological communities or those of other conservation significance should be mapped on-ground by walking their boundaries with DGPS. This seems sensible given the size of the area that would be cleared or otherwise potentially put at risk by the proposed mine extensions. In summary, OEH ruled out the presence of 'Box-Gum Grassy Woodland', at least in part as a function of aggregation at the particular scale of their mapping and analysis.
			<u>The lack of a clear mapping standard</u> Many consultants are constrained by the budgets (time and money) imposed by their client and/or the competitive tendering process. In CE's work for the CCP EA, it sampled 44 vegetation quadrats for use in mapping. This may have been based on the process of stratification whereby the consultant examines existing vegetation maps and on-ground attributes to conclude how many likely vegetation communities or types are likely to be present, then determines how many quadrat samples would reasonably be needed to obtain statistically adequate data for each of them (this may vary where there are existing datasets that the consultant can access, in which case, far fewer samples may be required). In cases where I have been involved in vegetation mapping, the bare minimum, or less, is funded, and this can produce a suboptimal result which is readily critiqued by external observers or those who don't appreciate the severity of constraint that under-funding can impose on accuracy. Vegetation mapping is a labour-intensive process. Doing it well is very expensive and come clients won't pay to do the job

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			properly.
			MU20, MU35, 'Box-Gum Grassy Woodland' or an unlisted vulnerable community? Whilst this project brief placed much emphasis on the extent of MU20, the important question is whether any vegetation compliant with the 'Box-Gum Grassy Woodland' listings is present. On that basis, it is suggested that any 'hair-splitting' as to whether MU20 is present or not, or whether communities that are similar to MU20 are close enough to be treated as MU20 or not, isn't the core issue. From my limit observations and readings, I suggest that BMCS focuses on making the case that some of the Tableland Open Forest mapped by CE, which is classified as Tableland Grassy Forest by OEH, should be regarded as part of the 'Box-Gum Grassy Woodland' EEC. Fieldwork revealed that a vegetation community that is seemingly compliant with the broad scope of Box-Gum Grassy Woodland occurs in the subject area beyond that currently mapped by CE, and probably beyond that classified by OEH. The dominant canopy species are Blakely's Red Gum and Red Box, with Rough-barked Apple and Yellow Box being absent. The understorey is clearly different from that of the surrounding Scribbly Gum / Stringybark Forest/Woodland, in that it contains little or no Red-anther Wallaby Grass, but instead contains a suite of lower, more palatable grasses and herbs, with little or no shrub layer. This Blakely's Red Gum community was seen in subtle drainage depressions, first order watercourses, and rarely spreading from those wetter sites into a more bench-like form that is likely associated with a particular geological stratum and/or higher groundwater. OEH mention this vegetation type (here called the Blakely's Red Gum community) in a wider context in their response to the PAC for the CCP (Appendices A to E, Enclosure 3, e.g. p13, 3.1 para 2). OEH state that within their study area, four vegetation types are identifiable on undulating Permian sediments. The one containing a subunit that is seemingly within the scope of Box-Gum Grassy Woodland is described in their paragraph 2: *"The gently undulating footslopes at the base of hills, or in smaller drainage lines with less developed alluvial flats, support a grassy forest with Mountain Gum, often with Apple Box and sometimes with Blakely's Red Gum (E. blakelyi). The ground layer is grassy with palatable species such as Snow Grass, Themeda, Echinopogon, Microlaena dominating, and coarser grass such as Red-anther Wallaby Grass (Joycea) are relatively uncommon or absent. This is equivalent to Tableland Mountain Gum / Broad-leaved Peppermint vegetation type mapped by Cumberland Ecology."* OEH has placed the above-described vegetation outside the scope of 'Box-Gum Grassy Woodland', and apparently in response to OEH's review, CE revised its approach, leading to a reduction in its mapped extent of this most contentious vegetation type. The primary basis on which OEH excluded this community from 'Box-Gum Grassy Woodland' is that much of the canopy is non-compliant, and only rarely does Blakely's Red Gum become a significant canopy component. I haven't looked at this issue as widely as OEH, and have only viewed a component of the area proposed for open cut mining, but I believe that even if we accept OEH's view that the subject community is most sensibly considered Tableland Grassy

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			Forest, this would not preclude the possibility that the Red Gum-domainted subunit can be treated as 'Box-Gum Grassy Woodland'. In its reply to the CCP PAC, OEH do not provide sufficient evidence to convince me that this is not a reasonable conclusion. For example, OEH has not said that the understorey is outside the scope of 'Box-Gum Grassy Woodland' or that abiotic factors such as location, geology, and climate would exclude it. OEH's decision seems to be somewhat arbitrarily based on the issue of canopy composition and the relative rarity (in their view) with which Blakely's Red Gum becomes a significant canopy component. I suggest that BMCS pursue this further. If OEH has a good case to exclude the vegetation from 'Box-Gum Grassy Woodland', it is important that this be made known and in adequate detail. OEH equate the subject vegetation that includes the Blakely's Red Gum community with MU35 in DEC (2006). DEC's (2006) figures indicate that MU35 would appear to be 'vulnerable' as long as its status in the Hawkesbury-Nepean catchment is representative or less threatened than across its wider range. MU35 is also rated as having most remnants in a 'moderately disturbed' condition, with a very small percentage rated as being in the 'low disturbance' condition. OEH's information indicates that MU35, whilst much more abundant in the DEC (2006) study area than MU20, warrants recognition as vulnerable. OEH is clear that this vegetation warrants conservation irrespective of its current lack of any clear TSC/EPBC legal status. Just because a community isn't listed on the TSC or EPBC Act is no indication that it isn't of conservation significance and wouldn't warrant listing if appropriately researched and nominated. It appears that MU35 and very likely a wider unit of allied communities would warrant listing as a threatened ecological community, at least under the TSC Act. BMCS could contemplate resourcing a nomination of MU35 and allied communities as threatened under the TSC Act. Humane Society International has been preparing such nominations internally, and has also funded me to prepare several nominations of threatened communities, all of which have been successful or are in the process of being further researched by the Department of Environment. Even though OEH has opted to exclude the Blakely's Red Gum community from the 'Box-Gum Grassy Woodland' EEC, it notes that the community is poorly reserved, especially outside the south of their range, and that because two of the local forms within this broad class occur on "more fertile, undulating sites" (they) are likely to have been subject to clearing (more so than is generally the case for the wider vegetation class). OEH states, "impacts to these vegetation types within the Project Area should be avoided" because of their high level of clearing and low level of reservation. Thus, irrespective of whether the contentious vegetation is MU20, MU35 and/or a variant of 'Box-Gum Grassy Woodland' it is still clearly of at least State significance.
			<u>The conservation status of unlisted communities</u> CE indicates that communities that are not threatened under the TSC or EPBC Acts do not warrant consideration as threatened. OEH effectively makes the contrary point in relation to Tablelands Grassy Forest and other communities that are either not listed in their own right or are not within the scope of wider listings. It is concerning that CE have apparently assumed that the absence of a threatened status means that a community does not warrant formal listing. This assumes that there has been a state-wide, or at least in this context, regional or catchment-based assessment of the status of all mapped communities, and that any which would warrant listing as threatened under the TSC and/or EPBC Acts have been listed. That this is demonstrably not the case would be confirmed by OEH and the NSW Scientific Committee and the Commonwealth

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			Threatened Species Scientific Committee. OEH does not have internal funding or external grant funds to undertake such an assessment and nomination process. In its reply to the CCP PAC, OEH describe various communities as being of conservation significance, and warranting protection because they are over-cleared, in generally poor condition, and under-reserved. This is evidence that they are at least 'vulnerable'.
			<u>Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland EEC</u> OEH's description of the vegetation types on undulating Permian sediments is broadly consistent with what I have seen during my fieldwork for this report. OEH indicates that the more low-lying terrain with larger alluvial flats support(ed) a community which CE terms Tableland Ribbon Gum / Blackwood / Apple Box. Much of this community has been cleared in the region because it is relatively accessible and arable. Part of this community could be within the scope of the Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland EEC, especially in frost hollows and sites where cold air drainage and ponding is a significant factor. Increasing elevation yields CE's Tableland Mountain Gum / Broad-leaved Peppermint community which is apparently equivalent to DEC's MU35. Further increases in elevation generate drier communities with progressively less palatable grassy understorey, i.e. an increasing prevalence of Joycea. In the subject area, it seems that MU35 generally occurs higher in catchments, most likely in more sheltered sites and/or areas that are perhaps wetter due to their receiving more runoff from the pagodas and perhaps more groundwater seeping through strata, including coal measures. MU35 may then grade down-catchment into MU20 or at least a more grassy woodland form where abiotic factors favour a community which is much less a montane grassy forest and instead more of a tablelands / slopes woodland. Fieldwork supported such a transition, but it was less dichotomous and rather more complex. Thus, in one subcatchment, a community which could be considered MU35, transitioned into a narrow drainage line-associated community with affinities to Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland (e.g. E. viminalis, E. dalrympleana, E. rubida, E. pauciflora); in turn this became less montane and more open with Blakely's Red Gum becoming dominant for a section; then as the first order ephemeral stream began to incise and a streambed developed, Bridge's Apple Box phased in and became a significant canopy component, while the moist, grassy/herbaceous ground stratum decreased in significance, presumably because the incision of the stream (or more accurately, erosion, probably due to earlier land uses) meant that there wasn't as much relatively moist soil to support this vegetation. The narrow, riparian Bridge's Apple Box community also supports Blakely's Red Gum and Red Box, with Brittle Gum and Broad-leaved Peppermint on its fringes where it begins to intergrade with the drier, surrounding Scribbly Gum / Stringy Bark Forest/Woodland. In the areas examined, a community arguably within the scope of 'Box-Gum Grassy Woodland' is present in small sections associated with subtle drainage depressions. These areas may be too small to have been mapped by OEH and perhaps by CE but they can be sensibly mapped. The extent to which this community broadens lower in the landscape is unknown (fieldwork was restricted to the upslope side of the railway), but it seems likely that it would extend downslope until it may be replaced by

Stakeholder	ID	Category	Issue
			Ribbon Gum-dominated communities or other allied vegetation associated with lower-lying and colder riparian and floodplain environments. Most of that lower-lying vegetation has been cleared for agriculture / pastoralism, and a subset of it is now listed as the Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland EEC. Small, linear areas of Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland are arguably present in the area proposed to be cleared for the open-cut mine. One such area is described above in the transition from MU35 to the Red Gum grassy woodland. It is unlikely to be evident from aerial photo interpretation, and lacks one or more components typical of the community, but still warrants consideration as an example of the EEC. It is noteworthy that CE does not appear to have dealt with this community in its ecological assessment, perhaps because its extent in the subject area is very small, and it can't be mapped remotely. However, investigation of the extent of this community in the area of the proposed mine is warranted using ground-truthing. I recommend that BMCS highlight the potential direct loss of Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland, and that it consider any indirect effects of the proposal on this community where it occurs offsite (downstream/downslope).
			<u>Species of particular note</u> <u>Black Gum</u> The threatened tree species, Black Gum (Eucalyptus aggregata) primarily occurs in the Tablelands Snow Gum, Black Sallee, Candlebark, Ribbon Gum Grassy Woodland community (and is listed as a component in the Final Determination). Both the community and this species occur nearby. The indirect risk from mining is through alteration of surface and subsurface hydrology. At least some sites supporting this habitat are likely to be groundwater dependent. BMCS could consider nominating the local occurrence of Black Gum as an Endangered Population. It is one of only three large populations across its range in NSW, VIC and ACT. The species is at or near the northern limit of its distribution in this area, and is threatened by further clearing, fragmentation, weeds, direct and indirect effects of mining, grazing that prevents recruitment, altered hydrology, genetic 'swamping' from proximate species, and by climate change. Note that this species is currently under review for potential listing as Endangered, and that if this happens, the listing of an Endangered Population is automatically precluded because that status is restricted to species below the threat level of Endangered. Whilst OEH has become extremely reluctant to use the Critical Habitat provisions of the TSC Act, BMCS could nominate an area or areas of Critical Habitat for Black Gum in the region. The significance of the regional or at least local population, especially around Wallerawang, is already documented, and because it is one of only three large populations, and perhaps the largest (the others are in the Braidwood and Black Springs areas), it has extra weight as potential Critical Habitat.
			<u>Thesium australe</u> This is a small, cryptic plant, listed under both the TSC and EPBC Acts. Until recently, it had not been recorded in the Lithgow LGA, but has been detected not far from the current proposed mine extension as noted in the EPBC Act Referral for the

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			Neubeck mine proposal. This species is very poorly understood, and would readily go undetected unless in flower. It is believed to be at least hemi- parasitic on the roots of grasses, and is most strongly associated with Themeda. It is known to occur in highly disturbed sites that may be so seemingly degraded that most ecologists wouldn't look there or would devote very little survey effort to such areas. CE earlier asserted that the species hadn't been recorded in Lithgow LGA based on BioNet Atlas records, and that it was unlikely to be present in the study area. This is another example of CE's either profound misunderstanding of how datasets like the Atlas and ROTAP codes operate, or of unprofessionally selective misuse of information. Proposing that a species is unlikely to be present simply because there are (were, in this case) no proximate Atlas records fails to consider that the Atlas is not a database of comprehensive, systematic survey results, and that many, indeed most areas, have not been surveyed for threatened biota, especially something as cryptic as Thesium australe. Oddly, in another context, CE uses something of a contrary argument by rightly pointing out some of the limitations of Atlas data when arguing against a view that Atlas data can be used to a) predict the presence of a community and/or b) determine the relative biodiversity of an area. CE clearly understands that the Atlas isn't comprehensive, and that the absence of a species in its records means virtually nothing because of the general paucity of survey data available. The perversity of CE's reasoning in this regard is revealed in the Neubeck EPBC Act referral that shows that the species is now confirmed from the region in two substantive populations. Thesium australe is strongly associated with Themeda grasslands and could occur in native grassland, derived grassland, and grassy woodland/forest. CE apparently hasn't performed targeted surveys for this species. This may be especially warranted given how cryptic the species can be (especially if surveyed outside of flowering time), and because at least one of the proximate records was found in 'highly disturbed areas', which may be so poor that CE and others wouldn't have looked there or given the area much attention. In the absence of thorough survey at a time when the proximate populations are flowering, I suggest treating potential habitat as actual habitat using the same sort of numbers and densities as occur at the proximate site unless there are significant differences in site conditions. This would result in an over-estimate of actual habitat, not least because the species doesn't seem to occur in areas where it would often be predicted based on what is known of its habitat requirements. My preliminary assessment is that this species warrants upgrading to Endangered, at least in one or more States, even if it remained Vulnerable nationally.
			Persoonia marginata Chris Jonkers showed me information that confirms this species occurs well outside the area in which CE has mapped it. I was shown two such occurrences, along with a map of Chris's new records of this plant. In the latest information that I have seen, CE claims that the current form of the proposed open cut extension to the Cullen Valley mine excludes all occurrences of P. marginata. This is now demonstrably incorrect, and not by a small margin, as according to Chris's data, there are numerous plants within the proposed open cut. This species is not cryptic like Thesium or many orchids or other tiny or highly seasonal

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			plants. It is a small to medium sub-shrub to shrub that is readily observed and identified. Even allowing for all of the situations that could cause ecologists to miss significant plants, I'm confounded as to why CE has so severely under-recorded this species. But irrespective of this, CE's information and associated claims are now shown to be defective, and substantially so. This needs to be addressed, and greater regard should now be given to the conservation status of this species, and what measures might be undertaken if this substantial area of known habitat is destroyed by mining. To the best of my knowledge, there is not currently a reliable means of translocating P. marginata or reintroducing it into a reconstructed habitat after mining. I believe this species is one of several threatened Persoonias where, beyond the issue of direct habitat loss, it is not clear what the causes of decline are and/or how these can be readily managed (problems associated with honey bees and the absence of native fauna critical to seed germination are theorised). I suspect that this species is genuinely under-conserved and that it warrants reservation of as much of its habitat as is feasible. Further surveys at the level of intensity undertaken by Chris Jonkers would greatly assist OEH and others to understand the species' distribution, abundance, and threat level. Chris's information reveals that the plant is more abundant than has been previously estimated, but whilst more occurrences have been found, population size remains small, and threat levels, including from mining, remain high and may be escalating.
			<u>*Eucalyptus cannonii*</u> The now accepted name of this taxon is synonymous with the earlier name, *E. macrorhyncha ssp. cannonii*. The taxon is listed as Vulnerable under the TSC Act and until recently, held the same status under the EPBC Act. It appears to have been one of many default listings under both Acts due to its ROTAP status (2VCi), which in the Federal case, saw it listed by default on the earlier Endangered Species Protection Act. The trigger for its removal from the EPBC Act is unknown. However, based on similar removals or attempted removals in recent years, I believe the motivation was a departmental policy to remove default ROTAP listings of Vulnerable species that may not have warranted listing had they been subject to current assessment standards. I don't believe the delisting was driven by an external nomination. My reading of the decision to delist this species from the EPBC Act is that the determination is inadequately informed, out-dated, and that it could readily have been challenged at the time that public submissions could be made. The claim that the species is not actively threatened is demonstrably inaccurate given the situation with mining in the Cullen Bullen area and beyond. The original EPBC Act Listing Advice for the species also lists threats such as too frequent fire, grazing, and logging (esp. for firewood), along with the non-specific threat of land clearing. The determination to delist the species does not provide evidence that these threats have diminished or ceased to operate. Furthermore, there is abundant evidence of landscape-scale decline of stringybarks, most notably E. macrorhyncha s.l., apparently due to moisture stress and potential over-abundance of insect pest species associated with the most recent thirteen-year drought. E. macrorhyncha has been widely reported to have experienced extensive deaths and die-back (loss of foliage, death of limbs etc.) across the tablelands and western slopes of south-eastern Australia. Evidence of this is still abundant. E. cannonii is

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			closely related to E. macrorhyncha and may well have suffered the same stresses and decline. On the basis of current and potentially continuing threats, including from mining and from drought that is officially accepted as having been magnified by climate change, there seems to be a case for nominating E. cannonii to be relisted as Vulnerable on the EPBC Act. Equally, there is sufficient cause to retain its status under the TSC Act. I doubt that OEH or the NSW Scientific Committee would seriously contemplate removing this species from the TSC Act based on the evidence available and on assessments of other Vulnerable species that have been had their status evaluated in detail. The proposed removal of a substantial number of E. cannonii to accommodate the mine extension will clearly only weaken the species' conservation status, which I believe is legitimately Vulnerable. The magnitude of this threat needs to be assessed in the context of an accurate appraisal of the local population and its significance for the conservation of the species across its range. Vulnerable species are often prone to incremental erosion of their conservation status because they are not at imminent risk of extinction, and may be locally common. Assessment of the effects of the proposed mine extension on this species should have full regard to the risk of incremental endangerment through a series of decisions to remove habitat associated with forecast mining, forestry (especially plantation development), road works, etc., as well as considering the best available information about the effect that climate change may have.
			'R' ROTAPs and their conservation status It was brought to my attention that CE has allegedly downplayed the conservation significance of Rare Or Threatened Australian Plants (ROTAPs) that aren't currently listed on the TSC or EPBC Acts. Having read at least some of the relevant material, particularly in the PAC correspondence, I agree that there is a genuine issue here. As noted earlier in this report, CE has demonstrated a tendency to misunderstand and misuse information and concepts in a manner that is scientifically naïve at least, or professionally dubious at worst. If the latter, CE may think that by such endeavours, it is favouring the interest of its client, which superficially it may be, but in the current level of scrutiny, this approach makes CE's assessment look less than credible, and arguably brings the consultancy industry into disrepute. I respectfully suggest that any competent ecologist operating at a level where they are undertaking major surveys and assessments for projects of the scale of the CCP, would understand the limitations of BioNet Atlas data; of OEH and other mapping projects in relation to the legal status of ecological communities; and of the ROTAP lists and codes. Unfortunately, for whatever reasons, CE has tried to make it appear as though any species or community not currently listed under the TSC or EPBC Act is known not to be threatened. This is seriously misleading if it is a deliberate attempt to deceive consent authorities and the public, or at the very least, it is profoundly naïve. I note that OEH, in its reply to the CCP PAC (Report Appendices A to E, Enclosure 2. p9), does not accept CE's argument in this regard: "Although the four ROTAP species are not listed as threatened, considering their restricted distribution and the general lack of information on the reservation status of three of these species, OEH considers that potential impacts to them are of concern. Moreover in the absence of detailed assessment information, OEH cannot gauge the significance of predicted or potential

Stakeholder	ID	Category	Issue
			impacts resulting from the Project." The four ROTAPs mentioned are Acacia asparagoides (2R), Leionema lamprophyllum ssp. orbiculare (2R-P3), Leucochrysum graminifolium (2R), Philotheca obovalis (3RCa). Contrary to CE's perspective, most species and communities, even if there is published material indicating or confirming that they are in some way 'vulnerable', have not been assessed to determine whether they would warrant listing under those Acts. Underfunding of OEH and the NSW Scientific Committee is the main issue, but it may not be politic or in other ways appropriate for OEH to nominate threatened biota. Indeed, some may see a conflict of interest if OEH were known to be nominating threatened biota for listing or upgrading, whilst it is also a concurrence/consent authority. Nominations are now largely a matter for experienced professionals with access to key data sources, some of which require licenses. Given such circumstances, it is not at all surprising that most ROTAPs not already listed under the Acts, have received very little or more often no attention in terms of assessing their potential suitability for adding to the Acts. Instead, at the Federal level, some resources have evidently been directed to researching and supporting internal nominations to remove from the EPBC Act biota previously listed as threatened. Note that it does not follow that biota removed from the EPBC Act are also removed from the TSC Act, as is apparently the case with Eucalyptus cannonii. This may be because the biota has a higher threat level in NSW than nationally. The removal of some biota from both Acts is warranted simply because the original default listing may have been in error and/or because new information has emerged such that the original default listing is redundant and unsupportable. However, it seems odd that there is currently public funding to remove biota from the EPBC Act, when there is so little funding to research and support additions. It is also noteworthy that the original lists of threatened plants under the TSC and EPBC Acts were not generated by a process of research and nomination as CE would seem to believe, or at least want us to believe. They were, and to a degree still are, lists derived from the ROTAP schedules. For example, the Vulnerable plants listed under the TSC Act were originally just V-coded ROTAPs within NSW. They were added by default, and equally, ROTAPs with codes other than V and E e.g. K (poorly known) and R (rare) were left off the original TSC and EPBC Acts. This was not because they were deemed to be less than threatened, but simply because there was insufficient information to automatically list them as threatened under the Acts. Although listing (and delisting) of species under both Acts are wider issues, they provide insight into why ROTAPs not in the Act remain largely unlisted but far from immaterial in terms of their need for protection. CE should assess any relevant ROTAPs currently outside the Acts, to determine their actual status, not just their out-dated status under ROTAP. Conversely, if CE opts not to do this, ROTAPs' environmental significance must certainly not be disregarded. Indeed as a guide, the precautionary approach indicates that Rare or Poorly Known species be treated as threatened (at least Vulnerable) unless there is sufficient information to conclude otherwise. Furthermore, it is essential that the consent authorities in DP&I be aware of this importance and not be misled by consultants who seem to suggest otherwise.
			<u>Recommendations</u>

Stakeholder	ID	Category	Issue
			1. OEH to specify a scale and other parameters that CE can use to generate a vegetation map that all parties can agree is of an appropriate scale and level of reliability suitable for this project. The Director-General's Requirements can and should specify factors such as mapping methods, including scale. OEH has published Threatened Biodiversity Survey and Assessment Guidelines for Development and Activities, and CE has stated that it complies with this publication and with the Department of SEWP&C's (now DoE) guidelines for identifying the EPBC Act-listed 'Box Gum Woodland'. It would be useful if OEH (and probably DoE) were to add guidelines or requirements for vegetation mapping that help consultants to more accurately quote on and provide that information. Setting such standards would provide a benchmark that consultants will need to meet if not exceed.
			2. MU20 was defined by DEC based on 3 quadrats. This could and should be improved by more sampling. To assist this, even if there is now little or no MU20 in the current project area, CE could and should supply their quadrat data to OEH as per OEH's request. CE are arguably obliged to supply their survey data, including quadrat data, to OEH under the terms of their Scientific License to collect flora samples. License holders are reminded annually by OEH of their obligation to upload their flora data to the BioNet Atlas, though it is widely believed that few do this because the time to do the work isn't directly funded, and OEH has little means to know which licensee has generated any data. In this case, because OEH know that CE has undertaken vegetation fieldwork, OEH should insist that CE supply the associated data as a condition of its license.
			3. In the context of matters raised in the original brief for this report, BMCS should focus its attention on the basis on which OEH determined that CE's Tableland Open Forest and OEH/DEC's Tableland Grassy Forest is not 'Box-Gum Grassy Woodland' EEC. . Based on my observations, OEH has not convinced me that their conclusion is sound.
			4. BMCS consider resourcing a nomination of MU35 and appropriately aggregated communities (all or part of Tablelands Grassy Woodland) as threatened under the TSC Act and potentially under the EPBC Act.
			5. BMCS consider resourcing research and if appropriate, nominations for at least the four 'R' ROTAPs already identified as relevant to the proposal, along with the poorly known Epacris purpurascens var. onosmiflora that has been identified near the Invincible Colliery.
Colo Committee	SIG3	General objection	<u>1.0 Introduction</u> The Colo Committee is an environmental organisation that has been active since 1974 in the Wollemi and then the Gardens of Stone areas. We have several environmental scientists as members of the committee and have been active in assessing both the pagoda rock formations (and their biodiversity and geodiversity significance) and the extensive impacts of coalmines in the Western coalfields since 1980. The Colo Committee objects to the proposed modifications to the Invincible Colliery and Cullen Valley mine PA 07_0127 and DA 200-5-2003 and urges that they not be approved. PA 07_0127 is part of the previously proposed Coalpac Consolidation Project for which the Planning Assessment Commission on Dec 12, 2012 noted: *The Commission has found that, when the merits of the project are considered as a whole, the benefits of the project are substantially outweighed by the breadth and potential magnitude of the impacts. The Commission therefore recommends that*

Stakeholder	ID	Category	Issue
			the project should not be approved. The Department of Planning similarly later found against that project. We believe that the current proposed projects suffer from the same failings as the original Coalpac Consolidation Project. We believe also that this is merely the first step in seeking to carry out the refused Coalpac Consolidation Project one step at a time. On balance this project and the ones that inevitably will be proposed to follow it will inevitably cause the same 'breadth and potential magnitude of the impacts' which is why the PAC refused the original proposal. Accordingly these two proposals should similarly be refused.
		Ecology, pagodas, Ben Bullen State Forest	The Colo Committee objects to the proposed modifications for the Invincible and Cullen Valley coal mines because they will adversely impact on the internationally significant pagoda landform complex (Washington and Wray, 2011) located on the western edge of the Great Dividing Range in Ben Bullen State Forest. This public forest, and particularly this part of the forest, should instead be fully protected from open-cut mining and instead reserved in a State Conservation Area as soon as possible.
		Ecology, pagodas, subsidence	The open-cut mining would destroy 150 hectares of the Tablelands Grassy Woodland Complex. This community is integral to the ecological health of the pagoda landform complex community. The talus slopes of this community that stretch up to the cliff-lines act as 'flying buttresses' to support the cliffs and the pagodas found there. Accordingly this area is integral to the physical stability of the pagodas also. Open cut mining can thus have impact on pagoda geodiversity. Removal of the valley bottom woodland will clearly impact negatively on the biodiversity of adjacent areas on the pagodas. The highwall mining of an additional 165 hectares is (given past experience over several decades or researching coal mining in the area) very likely to lead to cracking and localised subsidence (despite repeated assurances). This will impact on the internationally recognised pagoda rock formations. It would also impact negatively on cliffs and on associated Aboriginal heritage, and both are at risk of being damaged through subsidence during and following such coal mining. There is a very good chance that cracking caused by highwall mining will dry out and degrade the moist forests of the pagoda complex. The BMCC 'Save our Swamps' project (Hensen, 2010) identified that the swamps in this area had become desiccated, and that this coincided closely with past mining leases. This desiccation of communities such as the pagoda complex is likely to cause a loss of understorey species, such as orchids and ferns.
		Air quality, acoustics	The Invincible modification proposal is less than two kilometres from Cullen Bullen and dust from this project will lead to increased morbidity and mortality in the community from respiratory and cardiovascular disease. The PAC report noted for the Coalpac Consolidation Project that: *The project cannot meet NSW air quality criteria at all residences and is close to the limit at many others. It is therefore at the limit of acceptability for air quality impacts.* The same is likely to apply to this proposal. Noise, truck movements and blasting from both modification proposals will also adversely impact on residents. These costs have in the past been seen as 'externalities' that are not the responsibility of the mining company. However they are very real impacts that will follow from the proposed project.
		Ecology, rehabilitation,	The proponent maintains on p. 18 of the EA:

Stakeholder	ID	Category	Issue
		social	*The mine plans which are being proposed for these Modification applications for Invincible Colliery and Cullen Valley Mine promote:* • *The principles of Ecologically Sustainable Development (ESD);* • *The minimisation of environmental and social impacts; and* • *The optimisation of a rehabilitation strategy for the existing disturbed areas at each mine site.* Given that the Hon. Secretary of the Colo Committee is an environmental scientist working in the sustainability area, it is clear from this that the proponent misunderstands (or is deliberately mis-construing) the principles of ESD. It is clear also that the proponent (as for the previous Coalpac Consolidation Project) has made no serious attempt to minimise environmental and social impacts. The Colo Committee thus believes this project should be refused on 3 key grounds: 1) Unacceptable environmental impact in terms of both significant biodiversity and internationally significant geodiversity of the pagodas 2) Unacceptable social and health impacts on local communities 3) Dubious economic rationale for the proposal, which produces low quality coal through a proposed activity that has such high environmental and social costs.
		Greenhouse gas	2.0 Specific issues 2(a) Poor discussion of climate impact of the project The previous Coalpac Consolidation Project sought to deliberately confuse the climate science in its submission. It stated that human-caused emissions of CO2 each year were 100 times larger, this was because they used the figure for the CO2 atmospheric pool as that for human annual emissions. When this was pointed out by Dr Washington, they still sought to maintain this inaccuracy at the second stage. Hence Dr Washington had to get Prof. David Karoly of Melbourne university, a distinguished climate scientist, to make the same correction directly to the Commission of Inquiry held at Lithgow. The current proposal does not make that particular error, but does seek to play down the significance of the proposal in terms of its climate impact. Section 6.2.3 of their EA document seeks to emphasise the small 'scope one' emissions involved (due to fugitive emissions and staff travel) but fails to actually discuss in the text the total emissions produced when the coal will be burnt. These are shown in Table 8 as being just over 17 million tonnes of CO2e over 4 years. This averages out at 4.5 million tpa CO2e. Australia's annual CO2 emissions (as noted by the Commonwealth's quarterly update) were 538.4 Mt CO2-e. Thus just this one proposal thus has the same impact for each of the 4 years as 0.84% of Australia's total CO2 emissions for each of those years. This is thus a significant project in terms of overall climate impact. The vast majority of climate scientists support leaving the majority of our fossil fuels in the ground if we are avoid catastrophic runaway climate change. Australia, the driest inhabited country in the world, is one country at high risk from such climate change. Hence this project will help exacerbate negative climate impacts on future Australians.

Stakeholder	ID	Category	Issue
			Keeping carbon in the ground is the best way to prevent climate change disaster. Those determining fossil fuel proposals, including this one, should adopt a policy of permanently sequestering the carbon embodied in coal resources, particularly the poor quality resources or where sensitive environments and communities would be affected. A gradual transition towards ending fossil fuel use by 'resource sterilisation', particularly of inferior coal resources, is a pragmatic means to overcome mining and energy industry inertia in addressing climate change. It will shorten the time taken to transition to a more sustainable such as renewable energy. Prof. Mark Diesendorf (2014) and colleagues of UNSW have demonstrated that a shift to 100% renewable energy for Australia is both feasible and economic. As development consents run for a 21 year period, changes to development control policy regarding sequestering coal need to occur now.
		Ecology	2(b) Flora and fauna Concern about accuracy of flora and fauna surveys The previous Coalpac Consolidation Project missed 100 plants species, including the threatened *Persoonia marginata* (which was found by a local botanist). It also missed the threatened Broad-headed snake. As members of the Colo Committee have been environmental consultants for many years, we find these mistakes quite incredible and unprofessional. They demonstrate an inadequate survey of the area. There is no indication that the surveys for this proposal have actually rectified those omissions, in fact they seem to rely on the same flawed surveys. The 2012 Planning Assessment Commission report on the Coalpac Consolidation Project noted that OEH raised a number of issues with the accuracy of the proponent's vegetation community descriptions in its response to the Commission's questions. The Commission's report recommended that: *given the controversy over this issue, any further survey work to establish the occurrence and distribution of vegetation communities on the site should be fully independent or directly oversighted by OEH at the Proponent's cost* (p. 93 of PAC report and Commission's recommendation 49, 2012). This recommendation for independent oversight of its vegetation survey work has not been adopted by Cumberland Ecology in the preparation of the EA report for the modifications. Instead, Cumberland Ecology has made comments regarding the significance of the vegetation that are contrary to the conclusions of the Commission, the OEH and the Department of Planning and Infrastructure. The comments made by Cumberland Ecology regarding the general merit of the native vegetation found on the proposal site are not substantiated by any new evidence that rebuts the views these agencies and the Commission. Cumberland Ecology relies on existing old data to understate the value of the vegetation on the site. The evidence provided to support Coalpac's position is weak and new evidence regarding the importance of the vegetation to be mined has been produced by Dr Steve Douglas. He confirms that there are several concerns regarding the vegetation survey work by Cumberland Ecology.
		Ecology, pagodas	Failure to provide an adequate buffer from open cut to pagodas The proposal does not provide the 300 metre minimum buffer recommended by the Planning Assessment Commission report

Stakeholder	ID	Category	Issue
			on the Coalpac Consolidation project in 2012 from the base of the pagoda rock formations and the open-cut area. Such a buffer was recommended to protect fauna species. Such a buffer would provide some protection for wildlife, including many lyrebirds and the threatened broad-headed snake. The reason why it was not carried out here is clear, as if such a buffer were applied, no mine would be feasible. In other words a safe buffer zone cannot be reconciled with the proponent's desire to opencut. Their proposal is thus not environmentally sound and should be rejected.
		Ecology, Biodiversity offsets	Concern over adequacy of biodiversity offsets There are very real grounds to believe that the proposed offsets do not meet the criteria of 'like for like'. This was detailed in previous submissions on the Coalpac Consolidation Project. Figure 3 of the EA shows that a large part of the proposed offset is in fact cleared land to the west of the current Invincible open cut. This is not acceptable as a 'like for like' offset. Contrary to Coalpac's claims, viable ecosystems cannot be replanted on farmland or after open-cut mining native forests. No mature woodland has ever been established on a mine rehabilitation area. The PAC on the Coalpac Consolidation Project found that rehabilitated areas cannot be returned to their pre-existing landforms across the project area and the biodiversity characteristics of rehabilitated areas cannot replicate the existing characteristics and will inevitably be less diverse and less species rich (PAC, 2012 p. 155). To suggest the rehabilitated modification areas as offsets lacks scientific credibility. The biodiversity offsets are inadequate, and cannot replace a Gardens of Stone Stage 2 reserve over Ben Bullen State Forest (as proposed by a wide range of community groups). The Gulf Mountain proposed offset is 17 kilometres away from the modification proposals, and is not contiguous with existing NPWS reserves, unlike the Ben Bullen State Forest. This offset is located on undifferentiated Palaeozoic metamorphic rocks, and, contrary to the assertions in the EA are by definition unlike the sedimentary rocks of the Sydney Basin. No threatened flora species have been recorded on this property, suggesting that it is unsuitable as an offset property. The other proposed offsets require substantial rehabilitation. In relation to the Hillview and Billabong properties it is proposed to conserve and rehabilitate similar vegetation to that located within the Modification Disturbance Boundaries. The area proposed to be mined is not in a degraded condition, unlike that of the proposed offsets. The proposed additional offset properties are adjoining offsets for previous mining operations, and also require substantial rehabilitation. The Environmental Assessment for the modification proposals does not deal with cumulative impacts either from Pine Dale and Neubecks Creek open-cut proposals or from future stages by Coalpac after this mine proposal is completed in four years. All these proposals will further degrade this intact remnant pagoda landscape complex. In view of the above, we believe that the PAC's highly critical conclusion of 2012 regarding offsets applies to the offsets to the proposed modifications. The offset package is designed to exchange a number of fragmented areas that in some instances require extensive rehabilitation and are not considered suitable for reservation for a single area of high quality habitat that is already proposed for reservation and which adjoins like areas of high quality habitat (p. 155).

Stakeholder	ID	Category	Issue
		Rehabilitation	Poor and inappropriate rehabilitation practice Coalpac's claim that these two modifications should be granted development consent in order to complete rehabilitation of mine pits is not the first time this miner has sought such consideration. Coalpac made a similar application for extension to Invincible Open-cut mine and rehabilitation activities in 2006. While Coalpac should not be criticised for proposing to rehabilitate another company's abandoned workings, it had eight years to bring its rehabilitation works up to date. This time around the reason for rehabilitation work being incomplete at both mines is because the Coalpac deliberately retained open-cut highwalls to facilitate future mining it now proposes. Page 126 of the EA states that 'there are currently three open cut mining voids at Invincible Colliery and a further three open cut mining voids at Cullen Valley Mine. These voids were left open to facilitate the continuation of future mining activities and will assist the recommencement of mining under this Modification.' This self-serving argument is not grounds to issue development consent. The justification of mining to allow rehabilitation should be rejected. Coalpac's reasoning has the implicit assumption that a mining company determines when a mining project is completed, and not the determining authority when it formulated a consent. Both mines have operated under relatively new development consents require these voids to be rehabilitated, without the need for further development consents. Coalpac should be required to use its rehabilitation deposits and to sell company assets to ensure adequate rehabilitation of the six existing mine voids. The claim that there is not enough existing waste material to fill these six mine voids is nonsense. Open-cut mining create a surplus of mine overburden waste that can reshaped to fill the mining voids.
		Pagodas	2(c) Geodiversity Concern over proper investigation of geodiversity The Colo Committee is similarly concerned over adequate investigation of the geodiversity of.the area, given past history of the proponent in the Coalpac Consolidation Project proposal. The Hon. Sec. of the Colo Committee (author of this submission) is the co-author of a peerreviewed scientific paper on the geomorphology of the pagodas (Washington and Wray, 2011). Dr Washington had visited the Coalpac area and clearly there were both platy and smooth pagodas present. However the previous EA by Coalpac had attempted to claim these were not present, and had even attempted to use Dr Washington's paper in support of their claim, which was clearly completely incorrect. Dr Washington accordingly had to inform the PAC of the proponent's misuse of that paper.
		Economics	Coal resources are very poor compared to nearby alternatives The coal proposed to be mined has high-ash (14 to 30%) content. It is full of shale bands, and has weathered, thin and discontinuous coal seams. Such poor quality coal is neither essential (nor good) for the on-going operation of Mt Piper Power Plant at Lidsdale. Compared to the Ulan, Lithgow and Katoomba coal seams, the Lidsdale and Irondale seams in the Invincible and Cullen Valley Mines are inferior in quality, and the others, the Middle River and Moolarben seams, are hardly worth mining.

Stakeholder	ID	Category	Issue
			The Springvale Colliery was specifically developed by an Electricity Commission subsidiary for the needs of the Mt Piper Power Plant with a coal conveyor belt built directly to the plant. The Angus Place Colliery was also developed by an Elcom subsidiary and it has a purpose built haul road to the power plant. The Springvale and Angus Place coal mines can produce 8.5 million tonnes of coal a year. In 2006-07 the combined resources for these mines were 325.5 million tonnes of coal. These mines alone can provide sufficient coal to the power plant for the foreseeable future.
		Economics	Poor terrain for open cut The proposed approach to mining differs from a typical open cut coal mine, due to the high relief and steep slopes. The terrain is unsuited to open-cut mining operations because it requires intricate and inefficient operations with truck and shovel machines. This sort of operations is not 'Ecologically Sustainable Development', because the proposed intensification of mining methods will damage an internationally significant pagoda landscape complex, and destroy part of the significant Tableland Grassy Woodland complex.
		Subsidence, pagodas	Spurious claims of highwall 'safety' The proposed highwall mining of the Lithgow Seam at the Invincible Colliery apparently ignores the cumulative impact of the old workings and sequential highwall mining. The estimates of factors of safety at both mines do not appear to consider the cumulative effects of the mining of successive coal seams. The net effect of the high wall mining is the sum of all the highwall mining proposed. Given the uncertainties involved with multi-seam mining and in the case of Invincible reworking former mining areas, the proposed highwall mining is inappropriate. P. 77 of the EA states: 'By designing with an adequate FoS the stability of the surface over highwall mining areas over the long term is ensured'. This is statement without proof, as no evidence for this is provided. Similarly p. 78 states 'the potential for surface subsidence to occur as a result of highwall mining is negligible (i.e. less than 20 mm)'. Again, this cannot be said as a statement of fact. The Colo Committee has heard many such statements since 1980. When cliff collapse later occurs, the miner essentially says 'oops!'. Given that there can be joints and stresses in the cliff face and pagoda formations, subsidence due to highwall mining may in fact cause damage and collapse. Given that highwall mining in fact produces comparatively little coal compared to the open cut, one can only wonder why the proponent continues with a practice under what they do acknowledge is an area of international significance?
		Economics	2(d) Concern over economic analysis The economic analysis is based purely on a neoclassical cost benefit analysis. This ignores all such 'externalities' such as the impact of dust on the health of the community (and biodiversity and ecosystems), impact on water tables, impact on potential tourism to the Gardens of Stone area, etc. As such it is a flawed economic analysis that only looks at 'values' associated with selling coal on the market, and not values of keeping this natural area as it is, along with its natural heritage and ecosystem services. By comparison, the Institute of Sustainable Futures at UTS carried out an ecological economics study of the previous Coalpac Consolidation Project that showed the negatives outweighed the positives. The same would apply here. These

Stakeholder	ID	Category	Issue
			modification proposals would not be economic were it not for the diesel fuel subsidy. The claim of increased costs to electricity consumers if the Coalpac proposal does not proceed is a wild exaggeration. Nearby underground mines have provided for local electricity power plants for over 20 years without the price hikes foreseen by Coalpac.
		Aboriginal archaeology and cultural heritage	2(e) Concern over adequacy of Aboriginal archaeology The Aboriginal cultural heritage assessment lacks credibility because it did not find a cave art site in the highwall disturbance area for the Cullen Valley Mine proposed modification. The claim (EA, p. 109) that no Aboriginal archaeological sites or artefacts have been located in the Modification Disturbance Boundary at Cullen Valley Mine is incorrect. Previous studies had missed another important Aboriginal cave art site in the project area of the Invincible Colliery.
		General objection	<u>Conclusion</u> This proposal is an attempt to carry out the Coalpac Consolidation Project in stages, with this being the first step. The Planning Assessment commission found conclusively for the original proposal that Coalpac should not proceed as the negatives far outweighed the positives. Similarly here the negatives outweigh any dubious positives. We accordingly urge you to refuse this application.
Colong Foundation for Wilderness	SIG4	General objection, air quality, acoustics, ecology, pagodas, Ben Bullen State Forest	The Colong Foundation for Wilderness objects to the proposed modifications for the Invincible and Cullen Valley coal mines because they will adversely impact on the internationally significant pagoda landform complex located on the western edge of the Great Dividing Range in Ben Bullen State Forest. This public forest, and particularly this part of the forest, should instead be fully protected from open-cut mining and reserved in a state conservation area as soon as possible. The open-cut mining would destroy 150 hectares of the Tablelands Grassy Woodland Complex that is integral to the pagoda landform complex. The highwall mining of an additional 165 hectares will dry out and degrade the moist forests of this complex located below the escarpments. This desiccation will cause a loss of understorey species, such as orchids and ferns. Highwall mining will also place cliffs, pagodas and Aboriginal heritage at risk of being damaged through subsidence during and following such coal mining. The Invincible modification proposal is less than two kilometres from the Cullen Bullen township and dust from this project will lead to increased morbidity and mortality in the community from respiratory and cardiovascular disease. Noise, truck movements and blasting from both modification proposals will also adversely impact residents.
		Ecology, pagodas	<u>Impact of the Modifications on a distinctive pagoda landform</u> The Colong Foundation, Lithgow Environment Group and Blue Mountains Conservation Society (the groups) described the western portion of the Ben Bullen State Forest in and adjacent to the 2013 ‘contracted’ Coalpac Project as having a distinctive pagoda landform with a specific suite of ecosystems and vegetation types (see Attachment A for details regarding this landform). The groups believe that Coalpac’s consultants have failed to consider what would comprise a comprehensive, adequate and representative sample of this pagoda landform complex.

Stakeholder	ID	Category	Issue
			This landform is affected by both modification proposals, particularly the Tablelands Grassy Woodland Complex Unit of this pagoda landform complex (see below). The pagoda landform complex has a unique sequence of internationally significant platy pagoda landforms which include tableland vegetation types on the valley floor. Although the above conservation groups were unable to map the above landform, Coalpac's consultants did so in an attempt to discredit the groups' claim that the landform was unique to the western side of Ben Bullen State Forest. The Coalpac consultant's land unit mapping confirms that the only place where the three landforms units (shown in pink, yellow and green in the figure below) occur side by side and together is in the western portion of the state forest. In other words, the only place where the Ben Bullen Pagoda Land System exists and thus can be protected is centred on the area where the Coalpac modification proposals are located. If Ben Bullen Pagoda Land System is to be protected, then it needs to be protected where its three components occur together. If only two of the three units were protected then this unique pagoda landform complex is not protected. Ben Bullen Pagoda Land System within the western side of the Ben Bullen State Forest is highly significant because other parts of this land system have been compromised and it cannot be replaced by other pagoda land systems. To the north, most of the Baal Bone coal lease area has been damaged by extensive cliff falls and desiccated due to intensive underground coal mining. Across the Dividing Range in the upper Coxs River valley to the east, the woodlands on Permian strata have been cleared along the Wolgan Road. To the south, Triassic Narrabeen sandstones are absent, and so there are no pagodas. Further north in the Capertee Valley, Tablelands Grassy Woodland Complex is absent; and still further north, the climate becomes drier and the vegetation types change as the Blue Mountains Pagoda Shrublands reach their northern limit. None of the pagoda landscape complex characterised as the unique cluster of three land units comprising the Ben Bullen Pagoda Land System and as mapped below is protected in national parks or state conservation areas. This pagoda landscape complex is then completely irreplaceable and the Tableland Grassy Woodland Complex Unit within it will be badly degraded and compromised by both proposed Coalpac modifications. The Tableland Grassy Woodland Complex Unit is very limited in extent, particularly where it is associated with the other two landscape units. The modifications proposed to Invincible Colliery and Cullen Bullen Mine cut deeply into the Tableland Grassy Woodland Complex Unit, making it difficult to reserve a representative sample of this pagoda landscape complex. The Invincible modification is of particular concern in this regard because it removes the Unit south and just below the Ben Bullen Range where it is particularly well developed.
		Ecology	<u>Unacceptable impacts on important flora and fauna</u> The Colong Foundation believes that at least two vegetation communities listed as EECs will be impacted by these

Stakeholder	ID	Category	Issue
			modifications: a Box Gum Woodland and a Frost Hollow Woodland. Capertee Rough-barked Apple – Red Gum – Yellow Box Grassy Woodland is a Box Gum Woodland variant and a Critically Endangered Ecological Community (CEEC) mapped and shown in Figure 13 on page 69 of the EA for these proposed modifications. Even if this mapped CEEC is a variant of Tableland Gully Mountain Gum – Broad Leaved Peppermint Grassy Forest (MU 35) as Cumberland Ecology claims in its text, then according to a previous submission by the Office of Environment and Heritage MU35 is also of conservation significance because it is poorly reserved. In fact the entire Grassy Woodland Complex Unit is poorly reserved according to regional vegetation mapping by Benson and Keith, 1990. Dr Steve Douglas who is working for the Blue Mountains Conservation Society has identified the presence of Eucalyptus rubida, E. pauciflora and E. bridgesiana in the proposed open-cut for the Cullen Valley Mine modification. These eucalypts suggest that the Frost Hollow Woodland EEC is present comprising a Tablelands Snow Gum – Black Sallee – Candlebark – Ribbon Gum Grassy Woodland. At least 148 hectares of threatened Eucalyptus cannonii habitat will be destroyed by Coalpac's modification proposals, and is estimated by Coalpac to contain 2,300 individual trees. There are a further 2,200 E. cannonii trees within the modification boundaries outside the proposed extensions to the open-cut pits for both mines. These additional trees will suffer edge effect impacts of dust from open-cut mining and loss of groundwater resources due to both the proposed open-cut and highwall mining operations. The long-term survival of these trees is in doubt due to these effects. Mr Chris Jonkers of Lithgow Environment Group has identified the presence of Persoonia marginata within the proposed Cullen Valley open-cut pit modification (at Lat 33°15'37.70"S, Long 150° 1'26.00"E) and elsewhere. This plant is listed as Vulnerable under the EPBC Act. The Colong Foundation is confident that the Lithgow Environment Group will provide more details on this in its submission to these modification proposals. Many more examples of this geebung are found close to the existing and proposed open-cut boundaries, and within the proposed high-wall mining area. This boundary relationship is important ,as appropriate setback distances are not adequately discussed in the EA final report or its Appendix C. The 2013 Planning Assessment Commission (the Commission) report regarding the 2012 environmental assessment was highly critical of the analysis of edge effects for Persoonia marginata undertaken by Coalpac's consultants (PAC, Dec 2012 page 94). Previous environmental assessments lodged by this applicant have been found unreliable through open public inquiry processes in such matters as vegetation mapping and adequate identification of threatened species. The 2012 Commission report noted that OEH raised a number of issues with the accuracy of the Proponent's vegetation community descriptions in its response to the Commission's questions. … The Commission report recommended that given the controversy over this issue, any further survey work to establish the occurrence and distribution of vegetation communities on the site should be fully independent or directly oversighted by OEH at the Proponent's cost (page 93 of PAC report and

Stakeholder	ID	Category	Issue
			Commission's recommendation 49, 2012). This recommendation for independent oversight of its vegetation survey work has not been adopted by Cumberland Ecology in the preparation of the EA report for the modifications. Instead, Cumberland Ecology has made comments regarding the significance of the vegetation that are contrary to the conclusions of the Commission, the OEH and the Department of Planning and Infrastructure. The comments made by Cumberland Ecology regarding the general merit of the native vegetation found on the proposal site are not substantiated by new evidence that rebuts the views of these agencies and the Commission. Cumberland Ecology relies on existing data to understate the value of the vegetation on the site. The evidence provided to support Coalpac's position is weak and new evidence regarding the importance of the vegetation to be removed by mining has been produced by Dr Steve Douglas. Dr Steve Douglas confirms several concerns regarding the vegetation survey work by Cumberland Ecology. Coalpac admits that at least eight threatened fauna species in Ben Bullen State Forest would be further impacted if these modification proposals are approved (EA, page 76). The Broad-headed Snake, Large-eared Pied Bat and Eastern Bent-wing Bat habitat would also be impacted based on OEH advice to the PAC dated Nov 6th, 2012. Coalpac has not provided scientific evidence in this EA that contradicts the OEH recommended 500 metre setback for these species or rebuttal of the PAC 2012 recommendation of 300 metre setback to provide 70-75 per cent of the foraging area for these species.
		Ecology	<u>The modifications are not small and have a significant impact</u> The EA for the modifications rests on the claim that the proposal is small and does not impact on sensitive areas. In relation to the small size of the pagoda landscape complex in question, the Ben Bullen Pagoda Land System, the modifications are relatively large and still have a major impact on this landscape, particularly the poorly reserved Tablelands Grassy Woodlands Complex. Given its size relative to Newnes State Forest and the Gardens of Stone National Park, Ben Bullen State Forest has higher overall plant and animal diversity. Coalpac's modification areas are irreplaceable elements of that diversity. Both modifications contain an EEC plant community and the Cullen Valley mine modification contains many nationally endangered Clandulla geebung shrubs. The modifications should have been deemed to be a controlled action under the Environment Protection and Biodiversity Conservation Act, 1998. The determination that these modifications are not controlled actions was based on incorrect and incomplete vegetation data. The proposal will destroy by open-cut and highwall mining the unique biodiversity, scenery and geological values associated with an irreplaceable pagoda landform complex. It also appears that Coalpac may have misled the Federal Department of the Environment in suggesting that its proposal should not be a controlled action when it will be mining two EECs. The PAC 2012 found that the real value of the area from a biodiversity perspective is that it contains a wide diversity of

Stakeholder	ID	Category	Issue
			vegetation associations and a very high species richness, which is not adequately mitigated by the modification proposals given the critical location of this proposal to the pagoda landscape complex.
			Inconsistency between native vegetation mapping and text In the Environmental Assessment, the legend in Figure 13 on page 69 shows a Capertee – Rough Barked Apple – Red Gum – Yellow Box Grassy Woodland, an Endangered Ecological Community (EEC). This Figure indicates this EEC occurs in the proposed southern open-cut area for the Invincible mine bounded by a bright red line. The text of section 6.6.3 on page 67 regarding Impacts on Communities states that a form of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland) is present. This community is listed as an Endangered Ecological Community (EEC) under the TSC Act and a Critically Endangered Ecological Community (CEEC) under the EPBC Act as it is a form of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (i.e. a Box Gum Woodland). The next paragraph, however, states this vegetation community exists only within the proposed highwall mining areas and will not be impacted. This statement is inconsistent with Figure 13. Further, highwall mining is within the area affected by edge effects. The combined impact of dust and desiccation on this EEC may, over a period of years, kill it or reduce its diversity. Table 14 describing disturbance areas of the Invincible coal mine modification is also inconsistent with Figure 13, as this CEEC is not specified in the table. It is also claimed in section 6.6.4 on page 70 that this CEEC is avoided, which according to Figure 13 it is not. Further, the text on section 6.6.3 regarding Impacts on Flora on page 68 and continued on page 70 makes no mention of Eucalyptus aggregata which is a threatened species (listed as vulnerable under the NSW Threatened Species Act). Figure 13 shows this Eucalypt also being present in the southern open-cut pit of the proposed modification for the Invincible mine.
		Aboriginal archaeology and cultural heritage	Aboriginal Heritage assessment lacks credibility The Aboriginal cultural heritage assessment lacks credibility because it did not find a cave art site in the highwall disturbance area for the Cullen Valley Mine proposed modification. The claim (EA, page 109) that no Aboriginal archaeological sites or artefacts have been located in the Modification Disturbance Boundary at Cullen Valley Mine is incorrect. Previous studies had missed another important Aboriginal cave art site in the project area of the Invincible Colliery.
		Ecology	Ineffective fauna mitigation The proposal does not provide the 300 metre minimum buffer recommended by the Planning Assessment Commission from the base of the pagoda rock formations and the open-cut area. Such a buffer would provide some protection for wildlife, including many Lyre Birds and the threatened broad headed snake. If such a buffer were provided, there would be no mine. The proposal in section 6.6.4 under Mitigation on page 71 to fell hollow-bearing trees after they are marked and catalogued for their species appears to be an ineffective approach. Noting the approximate dimensions of hollows so that nest boxes can be affixed to similar standing trees located in offsets and mine rehabilitation areas is an untried experiment. How will wildlife

Stakeholder	ID	Category	Issue
			survive in rehabilitation areas without suitable foraging habitat? The EA in section 6.17.5 on page 125 does not adequately explain how pre-clearing fauna surveys, capture of all fauna and relocation as aspects of Coalpac's land disturbance protocol will work. It provides little evidence of such practices being successful in mitigating fauna species loss.
		Rehabilitation	<u>Poor and inappropriate rehabilitation practice</u> Coalpac's claim that these two modifications should be granted development consent in order to complete rehabilitation of mine pits is not the first time this miner has sought such consideration. Coalpac made a similar application for extension to Invincible open-cut mine and rehabilitation activities in 2006. While Coalpac should not be criticised for proposing to rehabilitate another company's abandoned workings, it had eight years to bring its rehabilitation works up to date. This time around the reason for rehabilitation work being incomplete at both mines is because Coalpac deliberately retained open-cut highwalls to facilitate future mining it now proposes. Page 126 of the EA states that 'there are currently three open cut mining voids at Invincible Colliery and a further three open cut mining voids at Cullen Valley Mine. These voids were left open to facilitate the continuation of future mining activities and will assist the recommencement of mining under this Modification.' This self-serving argument is not grounds to issue development consent. The justification of mining to allow rehabilitation should be rejected. Coalpac's reasoning has the implicit assumption that a mining company determines when a mining project is completed, and not the determining authority when it formulated consent. Both mines have operated under relatively new development consents which require these voids to be rehabilitated, without the need for further development consents. Coalpac should be required to use its rehabilitation deposits and to sell company assets to ensure adequate rehabilitation of the six existing mine voids. The claim that there is not enough existing waste material to fill these six mine voids is a nonsense. Open-cut mining creates a surplus of mine overburden waste that can be reshaped to fill the mining voids.
		Biodiversity offsets	<u>Habitat offsets lack credibility</u> Contrary to Coalpac's claims, viable ecosystems cannot be replanted on farmland or after open-cut mining native forests. No mature woodland has ever been established by mine rehabilitation. The PAC found that rehabilitated areas cannot be returned to their pre-existing landforms across the project area and the biodiversity characteristics of rehabilitated areas cannot replicate existing characteristics and will inevitably be less diverse and less species rich (page 155, 2012). To suggest the rehabilitated modification areas as offsets lacks scientific credibility. The biodiversity offsets are inadequate, and cannot replace a Gardens of Stone Stage 2 reserve over Ben Bullen State Forest. The Gulf Mountain proposed offset is 17 kilometres away from the modification proposals and is not contiguous with existing NPWS reserves, unlike Ben Bullen State Forest. This offset is located on undifferentiated Palaeozoic metamorphic rocks which

Stakeholder	ID	Category	Issue
			contrary to the assertions in the EA are by definition unlike the sedimentary rocks of the Sydney Basin. No threatened flora species have been recorded on this property, suggesting that it is unsuitable as an offset property. The other proposed offsets require substantial rehabilitation. In relation to the Hillview and Billabong properties it is proposed to conserve and rehabilitate similar vegetation to that located within the Modification Disturbance Boundaries. The area proposed to be mined is not in a degraded condition, unlike that of the proposed offsets. The proposed additional offset properties are adjoining offsets for previous mining operations, and also require substantial rehabilitation. The Environmental Assessment for the modification proposals does not deal with cumulative impacts either from Pine Dale and Neubecks Creek open-cut proposals or from future stages by Coalpac after this mine proposal is completed in four years. All these proposals will further degrade this intact remnant pagoda landscape complex. In view of the above the Colong Foundation believes that the PAC's highly critical 2012 conclusion regarding offsets, applies to the offsets for the proposed modifications. The offset package is designed to exchange a number of fragmented areas that in some instances require extensive rehabilitation for an area of high quality habitat proposed by the NPWS for reservation that connects with an existing national park (page 155).
		Economics	<u>Coal resources are very poor compared to nearby alternatives</u> Coalpac's remnant of high-ash (14-30% ash), high-shale, weathered, thin and discontinuous coal seams are not essential for the on-going operation of Mt Piper Power Plant at Lidsdale. Compared to the Ulan, Lithgow and Katoomba coal seams, the Lidsdale and Irondale seams in the Invincible and Cullen Valley Mines are inferior in quality, and the others, the Middle River and Moolarben seams, are hardly worth mining. The area affected by these modification proposals is by and large being subjected to an environmental 'double jeopardy'. These proposals are not sequential land uses. Heritage values previously retained by less intensive underground mining methods will now be destroyed. The proposed approach to mining differs from a typical open-cut coal mine, due to the high relief and steep slopes. The terrain is unsuited to open-cut mining because it requires intricate and inefficient operations with truck and shovel machines. This sort of operation is not Ecological Sustainable Development, because the proposed intensification of mining methods will destroy an internationally significant pagoda landscape complex, particularly its Tableland Grassy Woodland Complex. These modification proposals would not be economic were it not for the diesel fuel subsidy. Australia's fossil energy resources are expected to last for many decades, if not centuries at projected rates of production. NSW has over 12 billion tonnes of recoverable coal reserves. The proportion of economic demonstrated reserves (EDR) to current production for Australia is estimated at 90 years for black coal, 63 years for conventional gas and 100 years for coal seam methane (Energy in Australia, 2010, pages 4 and 5). The total reserves of coal and gas are at least an order of magnitude greater than the economically proven resources and recoverable reserves already identified by exploration.

Stakeholder	ID	Category	Issue
			Keeping carbon in the ground is the best way to prevent climate change disaster. Those determining fossil fuel proposals, including this one, should adopt a policy of permanently sequestering the carbon embodied in coal resources, particularly poor quality resources or areas where sensitive environments and communities will be affected. Given the very large extent of Australia's coal and gas resources, the arbiters of coal mining proposals should 'sterilise' carbon-based energy resources to provide for the necessary environmental protection and social welfare measures that local communities, like the Cullen Bullen community are demanding. As previously stated, there are more than ample alternative coal deposits of better quality to exploit before society must transition to more sustainable energy resources and survive. A gradual transition towards ending fossil fuel use by resource 'sterilisation' particularly of inferior coal resources, is a pragmatic means to overcome mining and energy industry inertia in addressing climate change. It will shorten the time taken to transition to more sustainable resources and reduce the environmental damage caused before the transition is achieved. Government and decision-makers will be condemning future generations to living with climate disaster, unless decisions are made to permanently sequester coal. As development consents run for a 21 year period, changes to development control policy regarding sequestering coal need to occur now. NSW can well afford to protect a representative example of the Tablelands Grassy Woodland Complex on undulating Permian Illawarra Coal Measures that are part of the internationally significant pagoda complex landscape. In making such a decision no unique coal resources will be sterilised nor the security of the national power grid affected. Such claims have no basis in fact and a casual examination of the coal resources of the Western Coalfield will establish that there a decades of alternative resources available. The Springvale Colliery was specifically developed by an Electricity Commission subsidiary for the needs of the Mt Piper Power Plant with a coal conveyor belt built directly to the plant. The Angus Place Colliery was also developed by an Elcomm subsidiary and it has a purpose built haul road to the power plant. The Springvale and Angus Place coal mines can produce 8.5 million tonnes of coal a year. In 2006-07 the combined resources for these mines were 325.5 million tonnes of coal. These mines alone can provide sufficient coal to the power plant for the foreseeable future. The Airly Colliery and the mines of the Rylstone District, combined with the Clarence Colliery could extend these resources for the foreseeable future. The claim of increased costs to electricity consumers if the Coalpac proposal does not proceed is a wild exaggeration. Nearby underground mines have provided for local electricity power plants for over 20 years without the price hikes foreseen by Coalpac. Coal reserves in the Western Coalfield have increased from 250 million tonnes in 1962 to nearly 1,000 million tonnes of recoverable coal in 1991-92 to 1,793.25 million tonnes of recoverable coal reserves in 2006-07 (Coal Industry Profile data, 2008). Please refuse consent to both proposed modifications and stop open-cut mining in the Gardens of Stone region.
		Surface water	Additional surface water pollution

Stakeholder	ID	Category	Issue
			It would appear that a new water pollution licence will be required for the discharge from the proposed water transfer pipeline as implied by the statement of undertakings (see below). The eco-toxic water in the old workings is heavily polluted and must be treated before discharge, yet this is not proposed. The Colong Foundation believes that the proposal to mine coal pillars from the old workings in the Invincible Colliery is not adequately explained in relation to groundwater disposal and further consideration of the proposed open-cut mining of the Lithgow seam by Invincible Colliery is required. It is understood that the previous Coalpac consolidation proposal did not intend to remove the Lithgow Seam coal pillars, perhaps because of major environmental problems associated with such open-cut mining operations.
		Groundwater	<u>Confusing groundwater information</u> Page 85 of the EA states that open-cut and highwall mining associated with the Invincible Modification will not result in any groundwater inflows because historic underground mining activity has drained the coal seams. This is contradicted by the proposal to vastly increase groundwater extraction from underground workings from 26Ml/year to 750Ml/year that will be transferred from Invincible to Cullen Valley Mine. Perhaps some of this water will be used to suppress the ongoing fires underground and in waste heaps but that does not justify or explain the quantum of pumping requested. Where 2Ml/day of water pumped from old workings is to be released is not explained by the water balance diagram in Figure 16. The statement of undertakings on page 128 of the EA states that EPL 1095 (Invincible) and EPL 10341 (Cullen Valley) will be amended to include the transfer of water between Invincible Colliery and Cullen Valley Mine. This undertaking implies that Coalpac intends to discharge this eco-toxic mine effluent untreated into surface waters. This effluent has salinity ranging from 1600-1750 µS/cm (Jonkers, 2009) and will have high levels of eco-toxic metals, such as zinc and nickel. The request to amend EPL licences to permit further pollution of surface waters is not supported by the surface water consultant who states a contrary position. The consultant believes that “some water may be released via existing licensed discharge points including the Invincible Main Colliery Dam and/or at Dam 1 and Dam 4 at Cullen Valley, provided the quality of these releases complies with the existing EPL discharge conditions” (page 6, NRM, Water and Environment, Jan 2014). In this contingency, no water treatment to remove salt and metals is proposed. On page 86 the EA states that some coarse reject materials associated with the Lithgow Seam are potentially acid forming (PAF). This statement cannot be reconciled with the previous claim on page 84 that the Lithgow Seam in the Northern Mining Area of the Invincible modification area is predicted to be partially saturated with surface water run-off stored in the abandoned underground mine workings. Coalpac claims this water differs from formation groundwater, and is referred to hereafter as “subsurface water”. Coalpac also claims that the Lithgow Seam is a poor aquifer, while acknowledging that Invincible open-cuts are retained in a more or less dry condition contingent upon continued pumping by Baal Bone Colliery at a rate of 4.25Ml/day. Baal Bone has either completed or almost completed rehabilitation work and it is highly likely that the water levels in the Lithgow Seam will

Stakeholder	ID	Category	Issue
			soon rise into the Invincible Colliery open-cuts when the pumping at Baal Bone ceases. The Lithgow Seam, contrary to Coalpac claims is a highly permeable aquifer. The fact that Centennial proposes to pump 43.8Ml/day by 2023 from its Angus Place and Springvale mines contradicts Coalpac's claims that the Lithgow Seam is a tight aquifer. As a broad generalisation, Permian coal measures may well be less productive aquifers with yields less than 5 L/sec but in the Western Coalfield the Lithgow and Katoomba seams are productive aquifers! The Colong Foundation believes that the so-called "subsurface water" is saline eco-toxic water with high levels of dissolved metals. It should not be discharged at a rate of 2Ml/day without reverse osmosis treatment otherwise it will kill downstream aquatic life. The option to discharge eco-toxic effluent from the old mine workings in the Lithgow Seam by the Long Swamp Bore (LDP001), Invincible's Main Colliery Dam or from the Cullen Valley Mine water management system via the proposed pipeline are strongly opposed. The Long Swamp Bore should be decommissioned to prevent any discharge into the headwaters of the Coxs River. Any discharges from either mine modification area should be treated by reverse osmosis to remove metals and salt. An additional problem is the potential draining of the flooded Old Tyldesley underground workings by the proposed mining at both Cullen Valley and Invincible. The proposed mining of the transmissive Lithgow Seam could dramatically increase underground burning as it may drain these old workings. The assumptions made by Coalpac about Lithgow Seam groundwater are incorrect, and may have dramatic implications on the management of underground fires and groundwater. Given the above groundwater problems the proposed open-cut mining to remove coal pillars remaining in the Lithgow Coal Seam should be prohibited.
		Pagodas, subsidence	<u>Highwall mining should not be approved under cliffs and pagodas</u> The proposed highwall mining of the Lithgow Seam at Invincible Colliery apparently ignores the cumulative impact of the old workings and sequential highwall mining. The estimates of safety factors at both mines do not appear to consider the cumulative effects of mining successive coal seams. The net effect of the highwall mining is the sum of all the highwall mining proposed. Given the uncertainties involved with multi-seam mining and Invincible reworking former mining areas, the proposed highwall mining is inappropriate. The pagodas, cliff and cave overhangs are susceptible to subsidence hazards yet Coalpac did not protect these features from highwall mining as recommended by the Planning Assessment Commission, despite the small coal yield obtained by these operations. Cumulative subsidence from highwall operations in each of the seven coal seams mined may cause far greater subsidence damage, such as pagoda cracking and collapse. Such mining will surely have more than 2cm of subsidence movement attributable to the mining of one seam. More conventional underground mining of any sort would be prohibited along cliff lines, particularly in scenically prominent pagoda areas where highwall mining is being proposed.

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			Highwall mining should not be attempted in such a scenic and geomorphologically unstable area.
Cullen Bullen Lifestyle Group	SIG5	Ecology	We strongly object to both modifications for the following reasons EPBC Documents From what we understand from reading Coalpac Pty Ltd (Administrators Appointed) application in relation to EPBC, the modifications being sought are part of a larger project. It appears from having read the document that if these modifications/extensions are approved then more modifications and extension will be sought. It is our fear that if approved the village of Cullen Bullen could see itself surrounded by open cut mine quarries each a smaller part of a larger plan. Local Jobs and over dependence on a single industry economy Media reports, local authorities and Coalpac Pty Ltd (Administrators Appointed) focus on the local jobs these extensions and modifications could create. It is one of the main arguments for approval. However, we understand that Baal Bone Colliery, a mine very close to the proposed modifications, is currently in care and maintenance mode and if that were to change could also provide local jobs. We are not sure if representation has been made to regional or state representatives by local authorities to seek job creation opportunities there. Cullen Bullen and surrounding areas has long been a coal mining community. Coal mining by its very nature can only exist for a given period of time. Estimates are that local reserves will dry out within 40 years. That's one generation of workers. The areas over dependence on a single industry economy will mean that future generations in this area will have to make difficult choices to transition out of this over dependence. We would like to see that the balance between underground mining operations and other industries be reestablished so as to create a sustainable future for everyone.
		Economics	Coal Supply for Power Stations Another argument often given for the need for thee extension to be approved is that the coal will be used to supply the local power stations. Our understanding is that Centennial Coal has already stepped forward to offer to supply the coal. This offer does not seem to have been taken up by Energy Australia. We are left to wonder if the bottom line of big business is a contributing factor. There are numerous public documents regarding the current financial situation available from McGrathNicol - Corporate Recovery.
		Pagodas, socio-economics	"Worthy Of Protection" Coalpac's Pty Ltd (Administrators Appointed) previous application the "Consolidation Project" was rejected. A PAC found the area outlined in the project to be worthy of protection due to the unique nature of local landforms. The pagodas referred to are estimated to be over 250 million years old. The areas around these structures are the home to some rare and endangered flora and fauna species. We are confused as to why the protection recommended by PAC has not been given to these areas. We are also confused as to why this land can be used by one stakeholder at the expense of all others. An open cut mining operation in this area is in conflict with other industries, such as farming and tourism. To approve these modifications would be in conflict with what has been previously recommended by NSW Planning and Infrastructure, particularly if this application is the beginning of a large number of smaller applications. The area of Cullen Valley Mine proposed modifications are at a

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			distance to at least 3 significant pagoda structures. There is no guarantee that these structures won't be harmed or destroyed as a result of blasting and mining operations. Homes There are a number of residents in Cullen Bullen who believe their homes have been damaged by blasting before when Cullen Valley Mine was in care and maintenance mode. Even though independent assessors have declared the damage to be caused by other means, residents insist that this isn't so. However to have these beliefs investigated would leave them out of pocket. When so many people are left dissatisfied, perhaps the system currently in place for assessing such claims needs to be looked at as well. For many residents of Cullen Bullen, their homes are their most valuable asset. There were many homes, approximately 5-6, on the market during the time the Coalpac Consolidation Project was being considered. None of these homes were able to be sold. However within a fortnight of the last Director-General's recommendation to reject the application, 4 homes were sold. This speaks to what we believe is a direct correlation between the real value of homes in the area as liquidable assets and open cut mining operations.
			<u>Health and Safety</u> Our final but perhaps most important reason for asking that both application be rejected is our concern about residents health. We are concerned that the experiences of residents in relation to health issues is not given the true credit it deserves. Instead of referring to the anecdotal evidence of residents, industry standards policies are quoted. It seems that a system of decision making when faced with the issue of community health, would prefer to cite papers and numbers as opposed to looking at the people most impacted by the noise and dust, may be out of touch with what is happening. There is also the issue of increased number of trucks on the road that despite precautions being taken, when dry will increase the dust in the air and when wet will increase the mud on local roads. For these reasons we ask that both modifications be rejected.
Cullen Bullen Tidy Towns	SIG6	Economics, social, general support	Cullen Bullen Tidy Towns committee would like to make a submission regarding Invincible Colliery and Cullen Valley Mine. It is important that these mines begin operations as we require employment in our district. The local area is in a bad way with a lot of local and surrounding businesses almost unable to operate. The operation of these mines would also help local workers that have recently been retrenched in mines and local business houses. Invincible Colliery and Cullen Valley Mine have always contributed to local community prokects and assist the district in many ways. Cullen Bullen has a population of 198 people at the last census, not all of these people are against the mining project but do not wish to put their names forward due to the small community and wish to stay anonymous. There are some people against the mines but do not live in Cullen Bullen or in the district, although Cullen Bullen has always been a mining town for over 100 years. Cullen Bullen mines has in the past rehabilitated a lot of old open cut workings that were lieft in an unsightly state and now they look rejuvenated and continues to improve.
EnergyAustralia	SIG7	Economics, general support	EnergyAustralia welcomes the opportunity to make a submiss¡on to the New South Wales Department of Planning and Infrastructure in support of the Coalpac Modification Project.

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			EnergyAustralia is a major participant in the New South Wales (NSW) energy sector' with over 1.3 million electricity and natural gas customers in the State. To support our customers' demand for energy, we operate a portfolio of electricity generation assets in South Australia, Victoria and New South Wales. In New South Wales this includes the Tallawarra Gas Fired Power Station commissioned in 2009, and the Mt Piper and Wallerawang Power Stations in the Lithgow region. EnergyAustralia acquired Wallerawang and Mt Piper outright in 2013 from the NSW Government, after owning the Delta West Gentrader bundle since 2011. Earlier this year we announced a reduction in generation from the less efficient Wallerawang Power Station following commercial coal supply shortages and a declining trend in energy demand across NSW. Mt Piper remains our key NSW generation asset. As the state's newest and most energy and emissions efficient coal-fired generator, the Mt Piper Power Station will be central to providing our customers with the most cost effective, reliable and efficient electricity supply in the future. Coalpac has been a critical supplier to the Mt Piper Power Station and is forecast to provide up to 70% of the total fuel supply into the future. This assists in ensuring a cost-effective, secure and reliable supply of electricity from Mt Piper Power Station to New South Wales customers and the flow on provision of direct and indirect employment in the local and regional area.
		Economics	<u>Importance of the Coalpac Modification Project to Mt Piper production</u> The Coalpac Modification Project is critical to providing a short term supply of competitively priced coal to Mt Piper Power Station whilst alternative longer term options are secured. Alternative coal supply options currently available for Mt Piper are likely to result in an increase to the coal price given the influence of export markets and lack of suppliers in the local market. Like any industry, increases in fuel input costs directly impact the competitiveness and consequently production profile of the underlying asset which in this case is the Mt Piper Power Station. Depending on market conditions, this could adversely impact on wholesale energy market pricing outcomes, which subsequently flow through to increased costs for retail customers. In addition, reduced generation output from Mt Piper could result in reduced operations and maintenanee expenditure by the statien with furÈher lcneel< en adverse imPaets to the local economy. We also note that all other local coal suppliers require further planning approvals to continue supply in the short to medium term. In order to ensure security of supply for Mount Piper over the next few years, approval of this Coalpac modification project is of high importance.
		Economics	<u>Importance of Coalpac to the Regional Economy</u> The mining sector has and continues to be a significant economic contributor to the Lithgow economy. With a net social benefit of between $219m and $227m the Coalpac Modification Project will sustain 121 mining jobs with flow on employment to other sectors projected to provide a total of 245 jobs. A Voluntary Planning Agreement with Lithgow City Council would ensure the economic benefits from the Project are shared with the immediate township of Cullen Bullen. The economic benefits of the project also extend to the wider Regional and State economy. An annual contribution of $149M in

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			direct & indirect gross regional output is a major increment to regional economic activity at a time when the local economy faces some significant restructuring challenges. In addition royalty payments in the order of $29m (present value) could be contributed towards the provision of services and infrastructure state wide.
		Economics	<u>Maximising economic value from the regional coal resource</u> The Modification Project is an efficient use of the coal resource being an extension to an existing mining operation in close proximity to its primary end user - the Mt Piper Power Station. Utilisation of existing mining infrastructure and transport routes minimises the potential disturbance area and adverse impacts compared to a new development proposal. In addition, the proposed land use is consistent with the historical use of the land and the wider locality as coal mining has been part of the history of Cullen Bullen since the late 1800's. An extension to an existing mining operation demonstrates that the Modification is compatible with land uses in the vicinity of the development. Waste material from the Modification would assist with optimising rehabilitation of formerly mined areas. Some commentators have suggested the coal quality available from Coalpac is of inferior quality compared to other local suppliers, However the Mt Piper Power Station has been designed to deal with coal from these local seams and so it is appropriate for Power Station usage. This is demonstrated by the fact that coal has been supplied from the Invincible Colliery and Cullen Valley Mine for more than 10 years, In addition, we note that coal supplied from Coalpac to Mt Piper Power Station would not be at the expense of coal produced by other suppliers in the local area, given recently approved export infrastructure will allow their production to continue to be sold into export markets. In this way, the economic benefits associated with Coalpac are truly incremental to the regional and state economy as benefits for other mining ventures can continue to deliver their economic contributions via other markets. This diversification and flexibility of NSW's coal supply portfolio is critical to ensure the resource is utilised in the most economically beneficial way for the state.
		General support	<u>EnergyAustralia support for the project</u> EnergyAustralia has entered into arrangements to assume ownership of Coalpac should Project Approval be granted for the Coalpac Modification Project (amongst other conditions) This means that there is a clear path to Coalpac being recapitalised and to emerge from Administration with a strong parent able to meet its obligations under any Project Approval granted. EnergyAustralia is committed to working closely with the communities in which we operate and providing the necessary resources to ensure safe and environmentally responsible operations that contribute to the local region. We maintain a regular program of engagement with community stakeholders across all our sites and development projects as part of our social licence to operate. Community consultation plays a key role in helping us to gain a greater understanding of local opinions, priorities and expectations, which assists us in our planning and operations. Our aim is to ensure stakeholders feel appropriately informed of our plans prior to them occurring and have confidence in our approach. Locally we operate the Western Community Reference Group which provides a platform for the community to voice their

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			opinions and for EnergyAustralia to share information about our Mt Piper and Wallerawang sites. As with all EnergyAustralia's generation and asset sites, we have a commitment to supporting community projects and regularly sponsor local groups and events. Summary As a major employer in the Lithgow region, primary end user of coal from the Coalpac mine and supplier of electricity to more than 1 million NSW customers, we support the Coalpac Modification Project. It provides a required short term solution to the provision of commercial coal to Mt Piper Power Station which is the newest, most efficient and least carbon intensive coal fired power station in NSW. The project is also anticipated to deliver positive direct and indirect economic benefits to the local, regional and state economy.
Environment Liaison Office	SIG8	N/A	The Environment Liaison Office (ELO) provides a parliamentary liaison function for the state's leading environmental advocacy organisations. The members of the Environment Liaison Office are the Nature Conservation Council, Total Environment Centre, National Parks Association, the Wilderness Society, Colong Foundation for Wilderness, Blue Mountains Conservation Society, North Coast Environment Council, Central West Environment Council and the South East Region Conservation Alliance. We are united by a common commitment to environmental protection, nature conservation and ecologically sustainable development in New South Wales. Together, our organisations represent hundreds of thousands of individual members from across New South Wales.
		Ecology, pagodas	Significant impact on an internationally significant landscape The ELO objects to the proposed modifications for the Invincible and Cullen Valley coal mines because they will cause a significant adverse impact on the internationally significant pagoda landform located on the western side of the Great Dividing Range within Ben Bullen State Forest. This public forest, and particularly the part west of the Great Dividing Range, should be protected from open-cut mining and reserved in a state conservation area as soon as possible. Ben Bullen State Forest has higher overall plant and animal diversity than either Newnes Plateau or the Gardens of Stone National Park. The proposed open-cut mining would destroy 150 hectares of the Tablelands Grassy Woodland Complex that are an integral component of this pagoda landform. A further 165 hectares of this woodland's moister elements located below the sandstone escarpments will be permanently dried out and degraded by proposed highwall mining above the proposed open-cut mine pits. The grassy woodland areas on the Permian sediments below the sandstone outcrop areas and within the modification proposals are critical to this pagoda landscape complex. To the north, the pagoda landform complex found in the Baal Bone coal lease area has been damaged by extensive cliff falls and desiccation due to intensive underground coal mining. To the east across the Dividing Range in the upper Coxs River valley, along the Wolgan Road, the woodlands on Permian strata have been cleared. To the south, Triassic Narrabeen sandstones are absent, and so there are no pagodas. Further north in the Capertee Valley, Tablelands Grassy Woodland Complex is absent; and still further north, the climate

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			becomes drier and the vegetation types change as the Blue Mountains Pagoda Shrublands reach their northern limit. None of the unique pagoda landscape located on the western side of the Ben Bullen State Forest is protected in national parks or state conservation areas. This landscape is irreplaceable and the Tableland Grassy Woodlands will become so degraded by the proposed Coalpac modifications that it will no longer provide suitable habitat for many of plants and animals now in it. The woodlands within the proposed modifications area contain examples of two Ecologically Endangered Communities (EECs): a Box Gum Woodland; and a Frost Hollow Woodland. At least 2,300 threatened Eucalyptus cannonii trees will be destroyed by the proposed Coalpac modification and a further 2,200 trees may die due to stress effects of being in the buffer area or through planned highwall mining. Numbers of Persoonia marginata, an EPBC listed plant, are within the proposed Cullen Valley open-cut pit modification area. Many more are found in the buffer area and the proposed high-wall mining area as no setback buffers are proposed. The modification proposals do not provide the 300 metre minimum wildlife buffer from between the base of the pagoda rock formations and the open-cut area as recommendation for Coalpac by the Planning Assessment Commission (PAC, 2012). Such a buffer would provide some protection for wildlife, including many Lyre Birds and the threatened Broad-headed Snake, Large-eared Pied Bat and Eastern Bent-wing Bat. If such a buffer were provided, there would be no mine. Instead of offering an adequate buffer to mitigate damage to plants and animals, these modification proposals rely on biodiversity offsets.
		Biodiversity offsets	<u>The biodiversity offsets are inadequate compensation for mining</u> The 2012 Planning Assessment Commission's (PAC) decision on an earlier Coalpac proposal covering the sites currently proposed for mining, found that no mature woodland has ever been established in mine rehabilitation. The PAC found that the biodiversity characteristics of rehabilitated areas cannot replicate the existing characteristics and will inevitably be less diverse and less species rich (NSW Planning and Assessment Commission Coalpac Review Report (14 December 2012), page 155). Coalpac's claims that its proposed rehabilitation can form a part of its biodiversity offsets are contrary to findings of the 2012 PAC decision, and are not supported by peer reviewed science or common sense. The proposed offset known as 'Gulf Mountain' is remote from the modification proposals, on different geology, and unlike the Ben Bullen State Forest, the property is not contiguous with existing NPWS reserves. No threatened flora species have been recorded on it. The relevant vegetation types that do exist on the other proposed biodiversity offsets areas require substantial rehabilitation, including extensive replanting, and so compare very unfavourably with the intact equivalent vegetation proposed to be mined. Coalpac has offered no mine buffers or adequate offsets to compensate for the loss and fragmentation of an international significant pagoda landscape complex within the modification areas.
		Economics	<u>Coalpac's other arguments for mining are also unfounded</u> Another reason Coalpac offers for mine extension is to enable rehabilitation of open mine pit voids. Coalpac presented rehabilitation as an argument for granting its original consent in 2006. Eight years have elapsed in which rehabilitation works

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			have not been brought up to date. Coalpac admits in its Environmental Assessment that the current mine voids were retained to facilitate future mining. This failure to rehabilitate in the hope of obtaining further approvals is a very poor reason upon which to justify a further development consent. Coalpac also reasons that its coal resource is strategic, essential for power generation and necessary to keep energy prices low in NSW. The remnant coal resource in the modification areas are found in high-ash (14 to 30% ash), high-shale, weathered, thin and discontinuous multi-layered coal seams. This poor-quality resource is not essential for the on-going operation of Mt Piper Power Plant. The quality coal in the Lithgow Seam under the Ben Bullen State Forest was removed by underground mining for over a century. The proposal to mine the remaining coal pillars from these flooded old workings must be seen as a desperate measure proposed by Coalpac so as to enrich an otherwise unsuitable resource. Further, the high relief and steep slopes of the modification areas are unsuited to large-scale open-cut mining technology, and instead mining requires intricate and inefficient operations with truck and shovel machinery. These modification proposals are only possible because of the diesel fuel subsidy for mining operations. The claim of increased costs to electricity consumers if the Coalpac proposal does not proceed is false. Nearby underground mines have provided for local electricity power plants for over 20 years without the price hikes foreseen by Coalpac.
		Aboriginal archaeology and cultural heritage	<u>Aboriginal heritage poorly assessed</u> The recent discovery of an Aboriginal cave art site that was not previously recorded in Coalpac's archeological survey raises serious questions about the thoroughness of the company's environmental assessment. Coalpac incorrectly claimed that there are no Aboriginal art sites in the modification areas. Previous studies had missed another Aboriginal cave art site near to the Invincible modification area.
		Ecology, Ben Bullen State Forest	<u>Conclusion</u> The modification proposals should be refused due to their impact upon a unique pagoda landscape complex that is only found on the western side of the Great Dividing Range in the Ben Bullen State Forest (see attached figure). The only place where the three elements of the pagoda landscape exist is in this public forest. No offsets or suitable mining buffers for this unique landscape are possible. For these reasons the determining authority should refuse consent for both modification proposals.
Hawkesbury Environment Network	SIG9	Greenhouse gas, ecology, pagodas	On behalf of the peak community body working to protect the natural environment of the Hawkesbury and surrounding areas, I strongly object to Coalpac's proposed changes to the Invincible and Cullen Valley coal mines. This area has unique natural resource qualities which will be permanently damaged by the proposed modifications to their operations. If approved, the changes will destroy some of the areas valuable biodiversity and threaten nationally endangered plants and geological features. We oppose the short-sighted expansion of this coal mine at a time when Australia and the planet is experiencing a carbon pollution crisis while alternative, renewable sources of energy are readily available and sustainable in the long-term.
Lithgow Environment Group	SIG10	General objection, ecology, paogdas	The Lithgow Environment Group (LEG) unanimously opposes the proposed Modifications for the Invincible and Cullen Valley coal mines because we believe they will adversely impact upon an internationally significant pagoda landform complex located

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			on the western edge of the Great Dividing Range in Ben Bullen State Forest. Open-cut mining is incompatible with this part of Ben Bullen State Forest, and should instead be fully reserved in a State Conservation Area as soon as possible. LEG members regard this as a stealthy reincarnation of the twice-rejected Coalpac Consolidation Project – and if it is approved a never ending stream of Modifications and Extensions will ramp the mines up to the originally intended scale, just like Invincible Mine's seven (7) Modifications and Extensions between 2006 -2010. We believe that local residents and environmental groups have a right to know what they are lodging a submission on – not unwritten agendas of death by a 1000 cuts.
		Air quality, health	The Invincible modification proposal is less than one kilometre and Cullen Valley only 2.6km dust from from Cullen Bullen township. Dust from coal trucks and blasting on this project will lead to increased morbidity and mortality in the community from respiratory and cardiovascular disease.
		Objection	LEG members totally oppose the Modifications for the following reasons: 1. INADEQUATE ABORIGINAL & CULTURAL HERITAGE ASSESSMENT 2. INADEQUACIES IN THE FLORA ASSESSMENT 3. INACCURATE DESCRIPTIONS OF VEGETATION COMMUNITIES 4. IMPACT ON THREATENED PLANT SPECIES 5. IMPACT ON ROTAP LISTED SPECIES 6. IMPACT ON OVERALL SPECIES RICHNESS 7. IMPACT ON FAUNA 8. INADEQUATE BIODIVERSITY OFFSETS 9. ADVERSE IMPACTS ON THE SIGNIFICANT BEN BULLEN PAGODA LANDSCAPE 10. INADEQUATE REHABILITATION 11. IMPACT ON WORLD HERITAGE VALUES 12. UNACCEPTABLE WATER POLLUTION ISSUES 13. INTENSIFICATION OF MINING AFTER APPROVAL 14. UNACCEPTABLE DUST and NOISE LEVELS and BLASTING IMPACTS
		Aboriginal archaeology and cultural heritage	1. ABORIGINAL ARCHAEOLOGY & CULTURAL HERITAGE 1 (a) Aboriginal Heritage Section 6.15 Aboriginal Heritage, page 109 of the Environmental Assessment 1. states that: "A total of 15 Aboriginal archaeological sites are known to occur in the vicinity of Cullen Valley Mine and Invincible Colliery. Of these sites, four occur within the Modification Disturbance Boundary at Invincible Colliery and will be directly impacted by this Modification; no sites have been found in the Modification Disturbance Boundary at Cullen Valley Mine."

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			Figure 21 and summary in Table 21 claims to represent – "The locations of all Aboriginal sites identified within the Modification Boundaries and in proximity to the existing Invincible Colliery and Cullen Valley Mine." And on page 111: "As noted above, no Aboriginal archaeological sites or artefacts have been located in the Modification Disturbance Boundary at Cullen Valley Mine." And on page 109: "All sites recorded from the detailed filed (sic) surveys undertaken for the above assessments have been registered on the AHIMS database." Yet on 6 April 2014 members of Lithgow Environment Group found an Aboriginal Hand Stencil in a cave within the proposed Disturbance Area of Cullen Valley Mine (Latitude -33.265050°, Longitude 150.028320°). Several other Potential Habitation Sites (ie. caves) occur in this same escarpment. LEG contacted the Heritage Division, NSW Office of Environment & Heritage, and Mr Stewart Watters, Senior Team Leader Heritage Databases advised on 10 April 2014 that no recorded sites occur within the search area, and this site is not registered on the AHIMS Database (see below).

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			From: Stewart Watters [mailto:Stewart.Watters@environment.nsw.gov.au] **Sent:** Thursday, 10 April 2014 2:59 PM **To:** Julie Favell **Subject:** RE: Aboriginal hand Stencil Site - Ben Bullen State Forest **Importance:** High Hi Julie, Please find attached a search conducted on your behalf. The search has found no recorded sites within the search area. Please double check the co-ordinates used to ensure that the correct area has been searched. You can conduct these searches yourself via Aboriginal Web Services. Registration is required. The basic search is of no charge. Other extensive and site card requests do incur a charge Further information can be found at http://www.environment.nsw.gov.au/licences/WhatInformationCanYouObtainFromAHIMS.htm As it does not appear that the site is listed you can complete an AHIMS Site recording form and submit it to OEH. Further information can be found towards the bottom of this page http://www.environment.nsw.gov.au/licences/DECCAHIMSSiteRecordingForm.htm Please let me know if you require further information. Regards Stewart Stewart Watters Senior Team Leader Heritage Databases Heritage Division Office of Environment and Heritage NSW Department of Premier and Cabinet PO Box 1967, Hurstville BC, NSW 1481 T: 9585 6448 W: www.environment.nsw.gov.au This Cave Art site is clearly within the proposed Disturbance Area of Cullen Valley Mine, and LEG has serious concerns that mine subsidence induced by highwall mining beneath this escarpment will destabilise the cliffs and collapse this cave, resulting in the permanent loss of irreplaceable Cave Art and potentially other yet to be reported/recorded habitation sites, cave art sites, and aboriginal artefacts. Further, LEG has been approached by members of the aboriginal community in the Windy Gully Road area of Cullen Bullen. They have raised concerns about a cave art site in that vicinity, as well as a trail of 'white rocks' which apparently mark a traditional walking path. This area is likely to be impacted by highwall mining in the proposed Invincible Open-cut area. Yet LEG can find no mention of either of these aboriginal heritage items in the EA1.? The DoPI will recall that on 28 June 2012 bushwalker Mr Yuri Bolotin and his party discovered a cave shelter with Aboriginal Hand Stencils and Stone Artefacts within the previous Coalpac Consolidation Project Proposal Area north of Invincible Mine. The OEH advised that this site had not previously been recorded or registered on the AHIMS Database either. Appendix K (AECOM 2012) for that EA did not identify any cave art sites within the Project Boundary, nor any rock shelter or PAD sites in

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			that vicinity. LEG also reminds the DoPI that despite eight (8) Aboriginal Heritage assessments over 30 years for the adjacent Baal Bone Colliery, in April 2011 LEG found a previously unreported and unrecorded Cave Shelter with Rock Art near the eastern end of Baal Bone Colliery LW 19. It is an offence under the *National Parks and Wildlife Act 1974* not to notify the Director-General of the OEH of the location of an Aboriginal Heritage object or site.
		Aboriginal archaeology and cultural heritage	LEG questions the veracity of the Aboriginal Heritage Assessment for the Proposal, and formally requests – • An independent Aboriginal Archaeological and Cultural Heritage Impact Assessment of the Aboriginal Cave Art Site within the proposed Disturbance Area and including edge-effects of Cullen Valley Mine at Latitude -33.265050°, Longitude 150.028320°; • A comprehensive re-assessment of other unidentified Potential Habitation sites, rock shelters, and caves within the proposed Disturbance Area of Cullen Valley Mine; • A comprehensive re-assessment of all potential Archaeological & Cultural Heritage Sites, including edge-effects, in the Windy Gully Road area of Cullen Bullen; and • A comprehensive re-assessment of all potential Aboriginal Heritage Sites within the proposed Disturbance Area's, including edge-effects, of Modification 4 – Invincible Mine (07_0127 MOD 4), and Modification 2 – Cullen Valley Mine Extension (DA 200-5-2003 MOD 2).
		Non-Aboriginal heritage	1(b) Non-Aboriginal Heritage Tyldsley Trig (Lat: -33.284361°, Long: 150.026639°) is one of the oldest non-aboriginal heritage items in the Cullen Bullen area, and may well be one of the oldest remaining Trig Points in the Lithgow LGA. It has been a major landmark on every map ever printed of the Cullen Bullen area since mapping first commenced in NSW, and is likely to date back to the mid-1800's. Tyldsley Trig was not identified in the previous Coalpac Consolidation Project EA, nor does it appear to be identified in the current EA, despite the fact it was undermined by prior highwall mining at Cullen Valley, and is less than 1.2 km from the Proposal. LEG has also found several old and potentially historic open mineshafts in the Cullen Valley Mine and Invincible Mine Disturbance areas, and a potentially historic old saddle in a cave in the Invincible area. These are just a few examples to highlight the issue. The EA states in Section 6.6.14, page 114 - "No impacts to known items of non-Aboriginal heritage significance will occur as a result of the Modifications." How is it that highly paid consultants for mining companies cannot find potentially very historic items, some of which have appeared on every map ever printed since mapping first commenced in NSW? Is it ethical to claim a heritage item is not "known" simply by failing to acknowledge it's existence? How many other non-Aboriginal Heritage items have been missed in the current EA? How many non-Aboriginal Heritage items will be lost if these two Modification are approved?

Stakeholder	ID	Category	Issue
			LEG questions the veracity of the non-Aboriginal Heritage Assessment for this Proposal, and requests – • A comprehensive independent re-assessment of non-Aboriginal Heritage Items, including edgeeffects, across the entire proposed Disturbance Area of Modification 4 – Invincible Mine (07_0127 MOD 4), and Modification 2 – Cullen Valley Mine Extension (DA 200-5-2003 MOD 2).
		Ecology, biodiversity offsets	2. INADEQUACIES IN THE FLORA ASSESSMENT The work of Cumberland Ecology, authors of the Ecological Assessment2 for this Proposal, have attracted so much criticism that a Federal Government Senate Inquiry has been set up to investigate.3 LEG, BMCS and the Colong Foundation are not alone in having serious reservations about the flora assessments and vegetation community mapping undertaken by Cumberland Ecology. ABC National: Background Briefing "The Trouble with Offsets" on March 16, 20143 also raised serious concerns about Cumberland Ecology's work. A reported 95% of the biodiversity offset mapping of the CEEC of Box Gum Woodland undertaken by Cumberland Ecology on the 1600Ha Mt Lindesay and Wirradale offsets for Whitehaven Coal were found to be wrong. Concerns were also raised about the quality of Cumberland Ecology's offset mapping for Stage 2 of the Moolarben Coal Mine. The NSW Planning Commission (PAC) Report4 on the Coalpac Consolidation Project on 14 December 2012 made seven (7) recommendations relating to the adequacy or otherwise of Cumberland Ecology's work in relation to threatened species, baseline biodiversity, vegetation communities, calculation of edge effects, cumulative impacts of the Nuebeck Coal Project and Pine Dale Mine Stage 2 Extension, the Biodiversity Offset package, and an over-reliance on rehabilitation as a mitigation strategy - *Recommendation 49: The Commission recommends that concerns about the adequacy of the flora assessment and identification of the vegetation associations present in the project area be resolved to the satisfaction of OEH prior to approval of any extension to open-cut mining in the project area and prior to any assessment of adequacy or otherwise of the biodiversity offset package.* *Recommendation 50: The Commission recommends that, given the acknowledged high quality and species richness of the native vegetation present in the project area, the assessment focus should be on the overall quality of the habitat under threat and its biodiversity value rather than just on the threatened species component which is the focus of the EA.* *Recommendation 51: The Commission recommends that calculation of edge effects be required to the satisfaction of OEH before the project is submitted for determination.* *Recommendation 52: The Commission recommends that the cumulative impacts on the biodiversity values of Ben Bullen State Forest and the region of this project, together with the proposed Pine Dale Stage 2 Extension, be considered before any assessment of this project is finalised.* *Recommendation 53: The Commission recommends that the following three principlesbe accepted as underpinning assessment of biodiversity impacts for this project:*

Stakeholder	ID	Category	Issue
			** Rehabilitation cannot restore the existing vegetation associations or ecological balance of the area;* ** Rehabilitation to mature woodland is unproven for open-cut mines in NSW; and* ** The impacts on biodiversity from this project are incompatible with reservation proposals for Gardens of Stone Stage II.* *Recommendation 54: The Commission recommends that, given the considerable Uncertainties concerning the likelihood of rehabilitation on this project area being capable of delivering a satisfactory biodiversity outcome, rehabilitation not be given credence as a mitigation strategy in the assessment.* *Recommendation 55: The Commission recommends that, until the baseline biodiversity characteristics of the site have been resolved to the satisfaction of OEH, assessment of the adequacy or otherwise of the revised offset package should not proceed.* *The Commission also recommends that particular attention be given in the assessment to the essential nature of the trade-off being proposed, i.e. it is a proposal designed to exchange a number of fragmented areas that generally require extensive rehabilitation work and are currently not considered suitable for reservation, for a single area of high quality habitat that adjoins other areas of high quality habitat and is already proposed for reservation.*
		Ecology	LEG considers that none of the above PAC Recommendations have been adequately addressed in the current EA because – • Almost all of the Flora Quadrat Locations shown in Figure 2.1 Flora Survey Locations2. Are outside the proposed Disturbance Boundary; • Negligible additional Flora Survey work appears to have been done since the Coalpac Consolidation Project EA of 2012 apart from a 'random meander' on 10 - 11 December 2013, and most of the flora survey work was done in 20112; • The location and distribution of Persoonia marginata (Vulnerable) within the proposed Cullen Valley Disturbance Area has still not been adequately mapped nor have the edge effects been calculated;2 • No Targeted Surveys have yet been conducted for the most likely to occur Threatened Flora Species • including Thesium australe (Vulnerable), Derwentia blakelyi (Vulnerable), Eucalyptus aggregata (Vulnerable), Prostanthera cryptandroides ssp. cryptandroides (Vulnerable), or Genoplesium superba (Endangered);2 • Continued failure to acknowledge the presence, significance of, or conduct Targeted Surveys for, the seven (7) Rare Or Threatened Australian Plants (ROTAPs) known to occur in or near the proposal Area including Acacia asparagoides (2R), Chiloglottis palachila (ROTAP 3RC), Eucalyptus apiculata (ROTAP 3RC), Leionema lamprophyllum ssp. orbiculare (2R-P3), Leucochrysum graminifolium (2R), Philotheca obovalis (3RCa), and Pseudanthus divaricatissimus (3RCa);2 • Downplaying the fact that a form of threatened 'Box-Gum Grassy Woodland' dominated by Blakely's Red Gum (Eucalyptus blakelyi) does occur within the study area but may be masked by aggregation at mapping scales that are probably too coarse to reveal its presence; • Failure to acknowledge that a form of Tablelands Snow Gum - Black Sallee – Candlebark - Ribbon Gum Grassy Woodland EEC occurs in the proposed Disturbance Area of Cullen Valley Mine but is currently obscured by aggregation at map

Stakeholder	ID	Category	Issue
			scales that were used, and in cumulative terms will also be impacted by the Nuebeck Coal Project and Pine Dale Stage 2 Extension; • Failure to acknowledge that the Federally listed EEC of Temperate Highland Peat Swamps on Sandstone (TSC Act equivalent - Montane Peatlands & Swamps) will be impacted unless Coalpac permanently decommissions and surrenders all Discharge Licences for two Drainage Boreholes in Long Swamp Ben Bullen State Forest approved in 1983 and 1991 - Invincible Colliery Water Drainage Borehole LDP01: 33°18'33.07"S, 150° 5'37.77"E; and Invincible Colliery Water Drainage Borehole near the old Airvent at 33°19'32.13"S, 150° 5'39.98"E; • Misrepresenting the Biodiversity Offset package as being 'Like for Like'; • Failure to adequately calculate the Edge Effects on Threatened species, EEC's, and ROTAP's; • Failure to assess the Cumulative Impacts on Threatened Species, EEC's, ROTAP's, and the overall biodiversity values of Ben Bullen State Forest and the region of these Modifications, together with the proposed Nuebeck Coal Project and Pine Dale Stage 2 Extension; • Over- reliance on rehabilitation as a mitigation strategy contrary to PAC Recommendation 53 & 54.
		Ecology	3. IMPACTS ON ENDANGERED ECOLOGICAL COMMUNITIES (EEC's) At least two vegetation communities listed as EECs will be impacted by the 2 Modifications: • Box Gum Woodland - listed as a Critically Endangered Ecological Community (CEEC) under Federal and State Legislation; and • Frost Hollow Woodland - listed as an EEC in Part 3 of Schedule 1 of the TSC Act. A third EEC of Temperate Highland Peat Swamps on Sandstone (TSC Act equivalent – Montane Peatlands and Swamps) will be impacted upon unless Coalpac P/L formally agree to permanently decommission, and surrender the Discharge Licences for, two Drainage Boreholes approved in 1983 and 1991 in Long Swamp, Ben Bullen State Forest. These are Invincible Colliery LDP01: -33.309182°, 150.093805°; and Invincible Colliery Drainage Borehole near the old Airvent: -33.325623°, 150.094437°.
		Ecology	3.1 Box Gum Woodland CEEC Section 6.6.3 Impact Assessment: Impacts on Vegetation Communities, Page 67 of the EA1 identifies that White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland) listed as an EEC under the TSC Act and a CEEC under the EPBC Act does occur within the Modification Boundaries. However Cumberland Ecology claim that - *"This vegetation community [Box Gum Woodland] exists only within the proposed highwall mining areas and will not be impacted. Therefore, the Modifications will not result in any direct or indirect impacts on listed ecological communities."* Yet Figure 13 clearly shows three (3) areas of the Box Gum Woodland CEEC have been mapped within the orange or Open-

Stakeholder	ID	Category	Issue
			cut Disturbance Boundary of the Invincible Mine Extension (07_0127 MOD 4). Cumberland Ecology now claim that the areas originally mapped as Box Gum Woodland CEEC (MU20) are a variant of Tableland Gully Mountain Gum – Broad Leaved Peppermint Grassy Forest (MU 35). Dr Steve Douglas in a report5 commissioned by the Blue Mountains Conservation Society to investigate this very issue determined that – • A form of the threatened 'Box-Gum Grassy Woodland', namely the open, grassy (not Joycea) woodland dominated by Blakely's Red Gum, does occur in the study area but is masked by aggregation at mapping scales that are apparently too coarse to reveal it; • Whilst OEH view the broader unit in which the Blakely's Red Gum Woodland occurs as Tablelands Grassy Forest, this does not preclude the Red Gum-dominated subunit being treated as 'Box-Gum Grassy Woodland' at a suitable scale of mapping and analysis; And even if this mapped CEEC is a variant of Tableland Gully Mountain Gum – Broad Leaved Peppermint Grassy Forest (MU 35), a previous submission by the OEH on the Coalpac Consolidation Project identified that MU35 is also of conservation significance because it is poorly reserved. Benson and Keith (1990) identified that the entire 10h Grassy Woodland Complex Unit was poorly reserved in the region. The PAC Review Main Report4 stated on page 94 that: *"OEH also raises the poor conservation status of some significant areas of vegetation communities within the project area including 21.1 ha of Ribbon Gum grassy forest on alluvial flats, 65.5 ha of Mountain Gum Apple Box Blakelys Red Gum grassy forest on small drainage lines and footslopes, and 192.5 ha of Broad-leaved Peppermint Brittle Gum Red Stringybark grassy forest on small rises. OEH suggests that impacts on these vegetation types within the project area should be avoided."* These are the very same poorly-reserved vegetation types that are dominate within the proposed open-cut Disturbance Areas of the Invincible Mine Extension and Cullen Valley Mine Extension. Cumulative losses of these very same poorly-reserved vegetation types will occur if the adjacent Pine Dale Mine Extension Stage 2 and Nuebeck Coal Project are approved. The PAC Review Main Report4 states on Page 93 and reinforces in Recommendation 49 that – *"Given the controversy over this issue, any further survey work to establish the occurrence and distribution of vegetation communities on the site should be fully independent or directly oversighted by OEH at the Proponent's cost."* This recommendation for independent oversight of vegetation survey work has not been adopted by Coalpac in the preparation of the EA report for these two modifications. Instead, Coalpac's consultant Cumberland Ecology has made comments regarding the significance of the vegetation that are contrary to the conclusions of the Commission, the OEH, the Department of Planning & Infrastructure, and Dr. Steven Douglas in a report commissioned by Blue Mountains Conservation Society5. The findings made by Cumberland Ecology regarding the significance of the native vegetation to be removed by mining found on the proposal site are weak, understate the value of the vegetation on the site, are not

Stakeholder	ID	Category	Issue
			substantiated by new evidence provided by professional flora consultant Dr Steven Douglas. LEG reiterates the findings of PAC4 that *further survey work to establish the occurrence and distribution of vegetation communities on the site should be fully independent or directly oversighted by OEH at the Proponent's cost*.
		Ecology	3.2 Tablelands Frost Hollow Grassy Woodlands EEC Dr Steve Douglas5 also identified the presence of Eucalyptus rubida, E. pauciflora and E. bridgesiana in the proposed open-cut for the Cullen Valley Mine modification. These eucalypts suggest that the Tablelands Frost Hollow Grassy Woodlands EEC is present. Cumberland Ecology failed to identify the likely presence of the Tablelands Frost Hollow Grassy Woodlands EEC in the EA1 or in Appendix C2 for the two Modification proposals. In 2011 the NSW Scientific Committee made a Final Determination to list Tablelands Frost Hollow Grassy Woodlands as an ENDANGERED ECOLOGICAL COMMUNITY in Part 3 of Schedule 1 of the Act. Tablelands Frost Hollow Grassy Woodlands consist of the vegetation communities Tableland Gully Snow Gum – Ribbon Gum Grassy Forest (MU11), and Tableland Hollows Black Gum – Black Sally Grassy Open Forest (MU15). Tablelands Frost Hollow Grassy Woodlands are yet another component of the Tablelands Grassy Woodland Complex, which the PAC4 and the OEH considered to be poorly reserved, and recommended that impacts to these communities be avoided. The adjacent Neubeck Coal Project site contains Tablelands Frost Hollow Grassy Woodlands7. The main components are Eucalyptus pauciflora (Snow Gum), E. rubida (Candlebark), E. stellulata (Black Sallee), E. viminalis (Ribbon Gum), and E. bridgesiana (Apple Box). The Vulnerable threatened species Eucalyptus aggregata, Eucalyptus cannoni, and Thesium australe also occur on this site. This EEC is also likely to occur in the Invincible Mine area due to the presence (page S11 Appendix C)2 of 20 individual Eucalyptus aggregata in a previous Invincible 2008 offset (Lot 12 DP877190), and potentially in the gully through which the proposed pipeline will run east of the Carleon Coachouse. Open-cut mining poses the single greatest threat to this EEC. Other Threats to Tablelands Frost Hollow Grassy Woodlands include climate change, fragmentation, fertilizers, tree dieback, trampling and grazing by domestic livestock, weed invasion and altered fire regimes. LEG reiterates the findings of PAC4 that further survey work to establish the occurrence and distribution of vegetation communities on the site should be fully independent or directly oversighted by OEH at the Proponent's cost, in this case targeting Tablelands Frost Hollow Grassy Woodlands EEC.
		Ecology, groundwater, surface water	3.2 Montane Peatlands and Swamps EEC The EEC of Montane Peatlands & Swamps (Federal equivalent is Temperate Highland Peat Swamps on Sandstone) occurs in Long Swamp, Ben Bullen State Forest. Invincible Colliery has two Drainage Boreholes in Long Swamp, Ben Bullen State Forest which were approved in 1983 and 1991. Coalpac currently has approval to discharge up 4ml/day from LDP001 into

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			Long Swamp and the Coxs River. Unless Coalpac are required to permanently decommission and surrender their Licence to discharge from both of these Boreholes, this EEC will continue to suffer significant damage. When Invincible Open Cut Mine was first approved in 2006 (App. No. 05_0065) Coalpac Pty Ltd claimed that the Proposal was entirely within the Macquarie River Catchment, and that it would have no impact on the Coxs River catchment or Sydney Drinking Water Supply. Six months after approval, on 23 March 2007, CoalPac Pty Ltd lodged a Licence Variation with the NSW EPA to recommence pumping up to 4 ML/day from LDP01 into the Cox's River. The EPA approved that licence variation, and pumping commenced in June 2007. Salinity levels in the Cox's River downstream of LDP01 jumped virtually overnight from 30 to 1700 µS/cm. The swamp below the borehole was covered with a dense layer of toxic Iron deposits, virtually all groundcover vegetation died, and the pristine clear waters of the Coxs River became choked with green and rust-coloured Iron algae. Dissolved Oxygen levels in the water plummeted to 0.3 mg/L or less than 10% - lethal for aquatic life. Hydrogen Sulphide (Rotten-egg gas) odours filled the air. Coalpac Pty Ltd claim that regional water quality in Invincible Colliery and Cullen Valley underground workings are consistent with ANZECC (2000) guideline values for upland rivers and streams. They also claim that no data is available on Iron and Manganese levels to suggest it exceedd background levels. Yet Coalpac's own Annual Return 2007/2008 for Invincible Colliery Licence No. 1095 states that – • Salinity at LDP01 ranged from 1627 to 1750 µS/cm in 2007/8 - five times higher than ANZECC (2000) guideline for Fresh & Marine Water Quality for an Upland Stream of 30 – 350 µS/cm; • Iron levels averaged 14 mg/L – 46 times higher than the <0.3mg/L ANZECC (2000) upper limit; • Manganese averaged 0.684 mg/L, exceeding the ADWG limit in drinking water of 0.1 mg/L; • Total Suspended Solids averaged 32 mg/L - just below the 33mg/L Licence limit. Lithgow Environment Group has maintained since the 2006 that any discharges from Invincible Mine into Long Swamp Ben Bullen State Forest Proposal will have an adverse impact on the EEC of Montane Peatlands and Swamps, and yet once again Coalpac have ignored/covered up the presence of this EEC and the likely damage their two registered boreholes could do if pumping was recommenced. We urge the DoPI to require both Invincible Colliery boreholes in Long Swamp to be permanently decommissioned, de-registered, and delicenced.
		Ecology	4. IMPACT ON THREATENED PLANT SPECIES Once again Coalpac P/L have not been entirely honest, and have downplayed the significance of the threatened plant species known to occur in or near the Proposal Area. 4.1 Clandulla Geebung (Persoonia marginata) - Vulnerable Coalpac's claim that all Clandulla Geebung (Persoonia marginata) have been avoided in the proposed Disturbance Area of

Stakeholder	ID	Category	Issue
			Cullen Valley Mine is incorrect. Figure 2.1, Appendix C - map of Clandulla Geebung in the Cullen Valley Mine area is incorrect. Coalpac's claim that all Persoonia marginata habitat has been avoided is incorrect. Two records for 23 individual plants to the south-west of the Proposal demonstrate that the entire area is suitable habitat. An estimated 310 individual Clandulla Geebung plants occur within the Disturbance Boundary of the Cullen Valley Mine. Many 100's more individual plants will suffer edge effects from this Proposal. LEG volunteers have walked the entire northern part of the Disturbance Area and recorded the location of each individual plant or groups of plants using a GPS. The southern section has not been surveyed. In some locations a single plant may occur, at other locations a cluster of 60 or more plants can occur. All locations have been recorded on the NPWS Wildlife Atlas8 since under LEG's Scientific Licence SL100714. The location of Persoonia marginata plants in relation the proposed Disturbance Area of Cullen Valley Mine can easily be verified by logging the GPS coordinates below onto a GPS and walking the area.

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Table 1: GPS Coordinates - *Persoonia marginata* recorded within proposed Disturbance Boundary of Cullen Valley Mine

Latitude	Longitude	No. of Individual Plants
-33.261500°	150.025750°	1
-33.260472°	150.023889°	3
-33.260611°	150.029139°	2
-33.259944°	150.029667°	10
-33.259472°	150.028861°	1
-33.259306°	150.029444°	14
-33.259250°	150.025278°	5
-33.259083°	150.024639°	1
-33.258917°	150.025694°	3
-33.258722°	150.028056°	1
-33.258444°	150.025472°	20
-33.258278°	150.025472°	60
-33.258183°	150.025375°	22
-33.257778°	150.025389°	12
-33.257333°	150.025028°	3
-33.257167°	150.028528°	2
-33.257556°	150.030861°	3
-33.257361°	150.030806°	2
-33.257250°	150.031028°	36
-33.257028°	150.031639°	1
-33.256833°	150.031056°	6
-33.255778°	150.028944°	100+
-33.256667°	150.025389°	1
	TOTAL No. of Plants	310

Please note these GPS Coordinates are only for plants within the Disturbance Boundary. Many 100's more plants occur just outside the boundary and will suffer edge-effects. Coalpac only provided GPS Coordinates for the Highwall and not the open-cut boundary. However by checking the maps in the EA it is patently clear that many individual Clandulla Geebung plants occur within the proposed open-cut.

LEG reminds the DoPI that shoddy work by Flora Consultants has already resulted in the loss of 1000's of plants. Cumberland Ecology is continuing that trend. Persoonia marginata was not identified in the original Flora Assessments for Cullen Valley Mine in 1997 (Lembit, R., Flora Survey for Feldmast Coal Project) or 2003 (Gingra Ecological Surveys. Cullen Valley Lease

Stakeholder	ID	Category	Issue
			Extension Project Flora Survey). And Cumberland Ecology failed to identify P. marginata in the EPBC Referral for the Coalpac Consolidation Project 0n 18 December 2010. Because P. marginata occurs predominately on the westerly slopes and 23 plants occur 2.3km south of the main population, it is inevitable that many 1000's of plants would have been lost to previous opencut mining operations before LEG reported the population to the EPA in April 2011. That resulted in work stopping until Coalpac prepared a Species Management Plan (SMP). Cumberland Ecology prepared that SMP but claimed that P.marginata was restricted to the immediate western slope adjacent the Wallerawang – Gwabegar Railway Line, when in fact it occurred in a band up to 1.3km further east. Cumberland Ecology estimated that there were 17,600 individual plants, when in reality there were less than one tenth of that number. The Planning Assessment Commission (PAC) report of December 2012 was highly critical of the analysis of edge effects for Persoonia marginata undertaken by Coalpac's consultants (PAC, page 94)4. After almost 4 years of obfuscation on this issue it is well beyond time for Coalpac and Cumberland Ecology (CE) to finally do the right thing and map the true extent of Persoonia marginata in the Cullen Valley Mine area. As Dr Steve Douglas says in his report5: *This species is not cryptic like Thesium or many orchids or other tiny or highly seasonal plants.* *It is a small to medium sub-shrub to shrub that is readily observed and identified. Even allowing for all of the situations that could cause ecologists to miss significant plants, I'm confounded as to why CE has so severely under-recorded this species. But irrespective of this, CE's information and associated claims are now shown to be defective, and substantially so. This needs to be addressed, and greater regard should now be given to the conservation status of this species, and what measures might be undertaken if this substantial area of known habitat is destroyed by mining.* *To the best of my knowledge, there is not currently a reliable means of translocating P. marginata or reintroducing it into a reconstructed habitat after mining. I believe this species is one of several threatened Persoonias where, beyond the issue of direct habitat loss, it is not clear what the causes of decline are and/or how these can be readily managed (problems associated with honey bees and the absence of native fauna critical to seed germination are theorised). I suspect that this species is genuinely under-conserved and that it warrants reservation of as much of its habitat as is feasible.* *Further surveys at the level of intensity undertaken by Chris Jonkers would greatly assist OEH and others to understand the species' distribution, abundance, and threat level. Chris's information reveals that the plant is more abundant than has been previously estimated, but whilst more occurrences have been found, population size remains small, and threat levels, including from mining, remain high and may be escalating.*
		Ecology	4.2 *Eucalyptus cannonii* (Vulnerable) At least 148 hectares of threatened Eucalyptus cannonii habitat will be destroyed by Coalpac's modification proposals, estimated by Coalpac to contain 2,300 individual trees. The EA identified a further 2,200 E. cannonii trees outside the proposed extensions to the open-cut pits for both mines, which will no doubt suffer edge-effect impacts of dust and loss of

Stakeholder	ID	Category	Issue
			ground water resources due to both open-cut and highwall mining operations. The long-term survival of these trees must be in doubt. Cumulative losses of Eucalyptus cannonii will occur if the adjacent Pine Dale Mine Extension Stage 2 and Nuebeck Coal Projects are also approved. LEG again refers to the report by Dr. Steven Douglas – The claim that the species is not actively threatened is demonstrably inaccurate given the situation with mining in the Cullen Bullen area and beyond. The original EPBC Act Listing Advice for the species also lists threats such as too frequent fire, grazing, and logging (esp. for firewood), along with the non-specific threat of land clearing. The determination to delist the species does not provide evidence that these threats have diminished or ceased to operate. Furthermore, there is abundant evidence of landscape-scale decline of stringybarks, most notably E. macrorhyncha s.l., apparently due to moisture stress and potential overabundance of insect pest species associated with the most recent thirteen-year drought. E. macrorhyncha has been widely reported to have experienced extensive deaths and die-back (loss of foliage, death of limbs etc.) across the tablelands and western slopes of south-eastern Australia. Evidence of this is still abundant. E. cannonii is closely related to E. macrorhyncha and may well have suffered the same stresses and decline. On the basis of current and potentially continuing threats, including from mining and from drought that is officially accepted as having been magnified by climate change, there seems to be a case for nominating E. cannonii to be relisted as Vulnerable on the EPBC Act. Equally, there is sufficient cause to retain its status under the TSC Act. I doubt that OEH or the NSW Scientific Committee would seriously contemplate removing this species from the TSC Act based on the evidence available and on assessments of other Vulnerable species that have been had their status evaluated in detail. The proposed removal of a substantial number of E. cannonii to accommodate the mine extension will clearly only weaken the species' conservation status, which I believe is legitimately Vulnerable. The magnitude of this threat needs to be assessed in the context of an accurate appraisal of the local population and its significance for the conservation of the species across its range. Vulnerable species are often prone to incremental erosion of their conservation status because they are not at imminent risk of extinction, and may be locally common. Assessment of the effects of the proposed mine extension on this species should have full regard to the risk of incremental endangerment through a series of decisions to remove habitat associated with forecast mining, forestry (especially plantation development), road works, etc., as well as considering
		Ecology, cumulative	4.3 *Eucalyptus aggregata* (Vulnerable) Although Cumberland Ecology claims that Black Gum (Eucalyptus aggregata) does not occur within the disturbance boundary, they also said the same about Clandulla Geebung as well. At least 20 individual Eucalyptus aggregata trees occur on a previous Invincible Mine 2008 offset (Lot 12 DP877190) adjacent the proposed Disturbance Area. More Black Gum occur on the adjacent Nuebeck Coal Project site and probably on the Pine

Stakeholder	ID	Category	Issue
			Dale Mine Stage 2 Extension site as well. As well as direct losses from open-cut mining, highwall mining also poses a threat. Dr Steven Douglas5 states that *"The indirect risk from mining is through alteration of surface and subsurface hydrology. At least some sites supporting this habitat are likely to be groundwater dependent."* Dr Douglas further states that the significance of the local population around Wallerawang is well documented. It is one of only three large populations, and perhaps the largest (the others are in the Braidwood and Black Springs areas). The species is at or near the northern limit of its distribution in this area, and is threatened by further clearing, fragmentation, weeds, direct and indirect effects of mining, grazing that prevents recruitment, altered hydrology, genetic 'swamping' from proximate species, and by climate change. LEG believes that Coalpac should be required to undertake a targeted search for Black Gum in the Proposal area, as well as assess the likely Cumulative Losses at the adjacent Nuebeck Coal Project and Pine Dale Mine Extension Stage 2.
		Ecology	4.4 *Thesium australe* (Vulnerable TSC & EPBC Act) No targeted Survey had been conducted Thesium australe in the Proposal Area, despite the fact that it has been recorded just 2 km south of the Invincible Mine Disturbance Boundary on the Nuebeck Coal Project site, and further south on the Pine Dale Mine site. Those populations represent the only records for Thesium australe in the entire Sydney Bio-region. Dr. Steven Douglas5 states that: It [Thesium australe] is believed to be at least hemi-parasitic on the roots of grasses, and is most strongly associated with Themeda. It is known to occur in highly disturbed sites that may be so seemingly degraded that most ecologists wouldn't look there or would devote very little survey effort to such areas. Cumberland Ecology (CE) earlier asserted that the species had not been recorded in Lithgow LGA based on BioNet Atlas records, and that it was unlikely to be present in the study area. This is another example of CE's either profound misunderstanding of how datasets like the Atlas and ROTAP codes operate, or of unprofessionally selective misuse of information. Proposing that a species is unlikely to be present simply because there are (were, in this case) no proximate Atlas records fails to consider that the Atlas is not a database of comprehensive, systematic survey results, and that many, indeed most areas, have not been surveyed for threatened biota, especially something as cryptic as Thesium australe. Oddly, in another context, CE uses something of a contrary argument by rightly pointing out some of the limitations of Atlas data when arguing against a view that Atlas data can be used to a) predict the presence of a community and/or b) determine the relative biodiversity of an area. CE clearly understands that the Atlas isn't comprehensive, and that the absence of a species in its records means virtually nothing because of the general paucity of survey data available. The perversity of CE's reasoning in this regard is revealed in the Nuebeck Coal Project EPBC referral which shows that the species is now confirmed from the local region in two substantive populations. Thesium australe is strongly associated with Themeda grasslands and could occur in native grassland, derived grassland, and grassy woodland/forest. CE apparently hasn't performed targeted surveys for this species. This may be especially warranted

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			given how cryptic the species can be (especially if surveyed outside of flowering time), and because at least one of the proximate records was found in 'highly disturbed areas', which may be so poor that CE and others wouldn't have looked there or given the area much attention. In the absence of thorough survey at a time when the proximate populations are flowering, I suggest treating potential habitat as actual habitat using the same sort of numbers and densities as occur at the proximate site unless there are significant differences in site conditions. This would result in an over-estimate of actual habitat, not least because the species doesn't seem to occur in areas where it would often be predicted based on what is known of its habitat requirements. My preliminary assessment is that this species warrants upgrading to Endangered, at least in one or more States, even if it remained Vulnerable nationally. LEG believes a targeted survey for Thesium australe must be conducted, including a Cumulative Loss assessment of the Pine Dale and Nuebeck Coal Project populations.
		Ecology	4.5 *Prostanthera cryptandroides subsp. crytandroides* (Vulnerable) Coalpac have not undertaken a targeted search for Prostanthera cryptandroides subsp. crytandroides in the Proposal Area, despite the fact that ample suitable habitat exists in the Proposal Area, and it has been recorded just 6km to the east above Baal Bone Colliery LW19. In fact Cumberland Ecology doesn't list a single Prostanthera species in the Flora Species List, Appendix C - Ecological Assessment2. This is despite the fact three (3) Prostanthera species are recorded on the NPWS Wildlife Atlas immediately adjacent Cullen Valley and Invincible Mines, and seven (7) species are recorded in Ben Bullen State Forest. They are – • Prostanthera howelliae – recorded on pagodas 230m east of Invincible disturbance boundary; • Prostanthera saxicola var. montana – recorded on Tyldsley Hill 900m south of Cullen Valley Mine disturbance boundary; • Prostanthera saxicola var. saxicola – recorded 500m north of Cullen Valley disturbance boundary; • Prostanthera rotundifolia; • Prostanthera granitica; • Prostanthera lasianthos;and • Prostanthera cryptandroides subsp. Crytandroides In fact Cumberland Ecology omitted the entire Lamiaceae Family from Shrubs in the Species List!!! The Approved Conservation Advice for Prostanthera cryptandroides subsp. crytandroides approved by the Minister on 30/7/2008 (s266B of the Environment Protection and Biodiversity Conservation Act 1999) states that – • *"The distribution of this species overlaps with the White Box -Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands. EPBC Act listed threatened community."*

Stakeholder	ID	Category	Issue
			• *This very same Critically Endangered Community occurs within the proposed Disturbance Area of Cullen Valley and Invincible Mines (see Figure 131).* • *"Prostanthera cryptandroides occurs in dry sclerophyll forested slopes and gullies, in rocky areas, especially at the base of scree slopes and sandstone boulders, and in shallow sandy loam, as an understorey species to Eucalyptus spp. and Acacia spp. (Althofer, 1978; Fairley & Moore, 1989; Harden, 1992). Associated vegetation communities include Narrabeen Rocky Heath, Narrabeen Acacia Woodland, Narrabeen Exposed Woodland, Open Heath of Common Fringe - myrtle (Calytrix tetragona), Leptospermum parvifolium, Nepean Conebush (Isopogon=dawsonii), and Open Scrubland of Dwyer's Red Gum (Eucalyptus dwyeri), Harmogia densifolia, Dillwynia floribunda, Aotus ericoides and Hemigenia cuneifolia (DECC NSW, 2005a)." The above fits the description of much of the area of the proposed Disturbance Area.* • *"The main identified threats to P. cryptandroides are habitat loss and fragmentation; changed hydrology from erosion; trampling and grazing by domesticated and feral animals; inappropriate fire regimes; habitat modification from weed invasion; reduced water quality from agricultural runoff; and nitrification of the soil due to animal excrement agricultural chemicals (NSW NPWS, 2000a)". The Proposed Action will exacerbate many of these threats.* • *"The main potential threats to P. cryptandroides include waterborne and soil pathogens, based on the sensitivity of other members of the genus to these threats (NSW NPWS, 2000a), fragmentation, and removal of associated vegetation, which is likely to impact on the life-cycle of the associated pollination vectors (NSW NPWS, 2000b; DECC, 2005b)."* The Proposed Action will exacerbate many of these potential threats. LEG must consider it unlikely that Cumberland Ecology could ever find Prostanthera cryptandroides ssp. crytandroides even if it was abundant within and adjacent the proposed Disturbance Boundary, given they could not find 3 Prostanthera species immediately adjacent both mines, and despite the fact seven (7) Prostanthera species are recorded on the Wildlife Atlas as occurring in Ben Bullen State Forest. The members of Lithgow Environment Group urge the Department to require an independent Flora Assessment, and a targeted search for Prostanthera cryptandroides ssp. crytandroides (Vulnerable).
		Ecology	4.6 *Genoplesium superbum* (Endangered) A search of the Wildlife Atlas reveals two records for the endangered Orchid Genoplesium superbum 3.9km and 8.6 km east of the proposed Invincible Disturbance Boundary. Disturbingly those Wildlife Atlas records appear to be in moist gullies dominated by Ribbon Gum/Mountain Gum, similar to the gullies which are proposed to be cleared as part of this Proposal. Ben Bullen State Forest and the Proposal Area in particular contains an extraordinarily biodiverse range of Orchids – 46 species in total. Australia's foremost expert on Australian Orchid species David L. Jones has identified9 that, overall, native Orchids make up 5 - 6% of the Australian flora. Of the 633 plant species recorded for Ben Bullen State Forest, 46 or 13.7% are

Stakeholder	ID	Category	Issue
			Orchid species. The Proposal area is therefore more than twice as rich in Orchid species than the Australian average, and by comparison with other countries almost equals the entire orchid population of Great Britain (approx. 50 species). LEG considers that the endangered orchid Genoplesium superbum is highly likely to occur within the proposed disturbance areas, and that a Targetted Survey must be conducted.
		Ecology	4.7 *Derwentia blakelyi* (Vulnerable TSC Act) The Wildlife Atlas8 contains records for Derwentia blakelyi just 1 km east of the Invincible Mine Disturbance Boundary in similar vegetation communities to those occurring within the Project Area ie. Tableland Gully Ribbon Gum – Blackwood – Apple Box Forest. OEH descriptions for this community identify Derwentia blakelyi as a Definite threatened species component. Cumulative losses of Derwentia blakelyi if the Pine Dale Mine Extension Stage 2 is approved, as a significant population of over 200 individual plants is under threat. LEG firmly believes that Derwentia blakelyi is likely to occur in the Proposal Area, and contends that a targeted survey must be undertaken for this threatened species so that it can be avoided if possible.
		Ecology	5. IMPACT ON ROTAP LISTED SPECIES Coalpac and Cumberland Ecology have consistently omitted ROTAP listed plant species from the species list and Flora Assessment, claiming that because they are not threatened species there is no requirement to report them. Dr. Steven Douglas5 states that ”Unless competently assessed and found otherwise, ROTAPs that are not currently listed as threatened under the Acts should be treated as environmentally important and, in accordance with the precautionary principle, as potentially threatened. Their Rare and/or Poorly Known status is indicative that they may be at risk: most have simply not been further assessed. They should not be disregarded in the impact assessment of open cut mining.” The PAC Review Main Report4 and the OEH held the same view, hence Recommendations 49, 50 & 55. Seven ROTAP Listed species occur within or adjacent the Proposal area – • *Acacia asparagoides – 2R;* • *Banksia penicillata - ROTAP 3RCa;* • *Eucalyptus apiculata - ROTAP 3RC;* • *Leionema lamprophyllum subsp. orbiculare - RECOMMEND 2R-P3;* • *Leucochrysum graminifolium - 2R;* • *Philotheca obovalis – 3RCa;* • *Prostanthera hindii – ROTAP 2RCa;* and • *Pseudanthus divaricatissimus - ROTAP 3RCa.*

Stakeholder	ID	Category	Issue
			LEG regards this as a matter of State and National environmental significance. These plant species are the among the rarest plants on earth, they should have been identified, and the direct/indirect and cumulative impacts of the Nuebeck Coal Project and Pine Dale Mine Stage 2 Extension must be assessed. Cumberland Ecology is making a mockery of the Flora Assessment Process – which in itself is a matter of State and National environmental significance!!!
		Ecology	6. IMPACT ON OVERALL SPECIES RICHNESS Once again almost 100 plant species known to occur in or near the Proposal area have been omitted from the Flora Species List, Appendix C - Ecological Assessment2, including ROTAP listed species and many rare and unusual species. Despite all that has been said by LEG, other environmental groups, the PAC (December 2012), and OEH - Cumberland Ecology appear to wear errors-of-omission as a badge of honour – arrogantly flaunting their coal-god given right to thumb their nose at all and sundry, and 'cherrypick' which plants (and communities) they choose to list, with the primary aim of omitting any and all things rare.The PAC Recommendation 50 was abundantly clear, but has again been ignored: "The Commission recommends that, given the acknowledged high quality and species richness of the native vegetation present in the project area, the assessment focus should be on the overall quality of the habitat under threat and its biodiversity value rather than just on the threatened species component which is the focus of the EA." LEG could once again list all the species that were missed, as we did in 2010, 2011, 2012 and 2013. But what is the point? The DoPI and OEH simply ignore our concerns and it's business as usual for Flora Consultants. However we will highlight the extraordinary richness of Orchid species in the Proposal Area in Particular. A unique combination of soils, landforms, aspect, rainfall and other extraneous factors had created an ideal environment for 46 terrestrial and epiphytic orchid species unparalleled in the Lithgow region. Australia's foremost expert on Australian Orchid species David L. Jones has identified9 that, overall, native Orchids make up 5 - 6% of the Australian flora. Of the 633 plant species recorded for Ben Bullen State Forest, 46 or 13.7% are Orchid species. The Proposal area is therefore more than twice as rich in Orchid species than the Australian average, and by comparison with other countries almost equals the entire orchid population of Great Britain (approx. 50 species). Above are photos of just 3 Orchid species which LEG has only recorded within in the Proposal area, and nowhere else in the entire Lithgow LGA. Individually they may not be listed as Threatened, but surely any Australian environment containing so many species in a small area must be regarded as Threatened? And surely worthy of reservation within a State Conservation Area?
		Ecology	7. IMPACT ON FAUNA Coalpac admits that at least eight threatened fauna species in Ben Bullen State Forest would be further impacted if these Coalpac modification proposals are approved (EA, page 76). The Broad-headed Snake, Large-eared Pied Bat and Eastern Bent-wing Bat habitat would also be impacted based on OEH advice to the PAC dated Nov 6th, 2012. Coalpac has not

Stakeholder	ID	Category	Issue
			provided any scientific evidence in this EA contrary to the OEH recommended 500 metre setback for these species or rebuttal of the PAC 2012 recommendation of 300 metre setback to provide 70-75 per cent of the foraging area for these species. The EA for the Modifications relies on the claim that the proposal is small and does not impact on sensitive areas. In relation to the small size of the Ben Bullen Pagoda Land System, the modifications are large and will have a large impact on the most fertile foraging area of landscape. This proposal is akin to bulldozing the kitchen and living room of a home but retaining the bedrooms – and assumes that dependent wildlife can travel to buy takeaway for the next 100+ years until the area recovers. Given its size relative to Newnes State Forest and the Gardens of Stone National Park, Ben Bullen State Forest has the highest overall plant and animal diversity, the Ben Bullen Pagoda Land System is the key to that biodiversity, and Coalpac's modifications will remove irreplaceable elements of that diversity.
		Biodiversty offsets	8. INADEQUATE BIODIVERSITY OFFSETS The proposed Biodiversity Offset package is contrary to the PAC Recommendation 55 in that is essentially "a proposal designed to exchange a number of fragmented areas that generally require extensive rehabilitation work and are currently not considered suitable for reservation, for a single area of high quality habitat that adjoins other areas of high quality habitat and is already proposed for reservation." The Gulf Mountain Offset is not on Permian Geology, has different vegetation types and fauna association, and does not contain any of the features unique to the irreplaceable Ben Bullen Pagoda Land System. The Hillview/Billabong Offset represents 83 Ha of largely degraded grazing land; is riddled with feral Radiata Pine, St John's Wort, Thistles, Blackberry, Cape Broom, Cotoneaster and more; has a polluted waterway flowing through it from the Invincible Mine Main Dam (Salinity tested by LEG at 900+ EC); and as coal reserves beneath it and there are no guarantees that it won't be mined at some time in the future. The money being spent on Offsets could be better spent buying intact bushland containing the equivalent threatened plants, communities, and fauna species, or preferably by mining in previously cleared areas and converting Ben Bullen SF to a State Conservation Area.
		Pagodas, subsidence, visual, groundwater	9. ADVERSE IMPACTS ON THE SIGNIFICANT BEN BULLEN PAGODA LANDSCAPE The Lithgow Environment Group, Colong Foundation, and Blue Mountains Conservation Society described the western portion of the Ben Bullen State Forest in and adjacent to the 2013 'contracted' Coalpac Project as having a distinctive pagoda landform with a specific suite of ecosystems and vegetation types (see Attachment A for details regarding this landform). The groups believe that Coalpac's consultants have failed to consider what would comprise a comprehensive, adequate and representative (CAR) sample of this pagoda landform complex. This landform is affected by both modification proposals, particularly the Tablelands Grassy Woodland Complex Unit of this

Stakeholder	ID	Category	Issue
			pagoda landform complex (see below). The pagoda landform complex has a unique sequence of internationally significant platy pagoda landforms which include tableland vegetation types on the valley floor. Although the above conservation groups were unable to map the above landform, Coalpac's consultants did so in an attempt to discredit the groups' claim that the landform was unique to the western side of Ben Bullen State Forest. The Coalpac consultant's land unit mapping confirms that the only place where the three landforms units (shown in pink, yellow and green in the figure below) occur side by side and together is in the western portion of the state forest. In other words, the only place where the Ben Bullen Pagoda Land System exists and thus can be protected is centred on the area where the Coalpac modification proposals are located. If Ben Bullen Pagoda Land System is to be protected, then it needs to be protected where its three components occur together. If only two of the three units were protected then this unique pagoda landform complex is not protected. Ben Bullen Pagoda Land System within the western side of the Ben Bullen State Forest is highly significant because other parts of this land system have been compromised and it cannot be replaced by other pagoda land systems. To the north, most of the Baal Bone coal lease area has been damaged by extensive cliff falls and desiccated due to intensive underground coal mining. Across the Dividing Range in the upper Coxs River valley to the east, the woodlands on Permian strata have been cleared along the Wolgan Road. To the south, Triassic Narrabeen sandstones are absent, and so there are no pagodas. Further north in the Capertee Valley, Tablelands Grassy Woodland Complex is absent; and still further north, the climate becomes drier and the vegetation types change as the Blue Mountains Pagoda Shrublands reach their northern limit. None of the pagoda landscape complex characterised as the unique cluster of three land units comprising the Ben Bullen Pagoda Land System and as mapped below is protected in national parks or state conservation areas. This pagoda landscape complex is then completely irreplaceable and the Tableland Grassy Woodland Complex Unit within it will be badly degraded and compromised by both proposed Coalpac modifications. The Tableland Grassy Woodland Complex Unit is very limited in extent, particularly where it is associated with the other two landscape units. The modifications proposed to Invincible Colliery and Cullen Bullen Mine cut deeply into the Tableland Grassy Woodland Complex Unit, making it difficult to reserve a representative sample of this pagoda landscape complex. The Invincible modification is of concern in this regard because it removes the Unit south and just below the Ben Bullen Range where it is particularly well developed. The Cullen Valley Modification will potentially remove an CEEC of Box Gum Woodland, a Frost Hollow Woodland EEC, and a unique pagoda system containing aboriginal rock art.
		Rehabilitation	10. INADEQUATE REHABILITATION Despite hollow reassurances from Coalpac in the EA, the company's past record of rehabilitation at Cullen Valley Mine is very poor. Mining commenced in 1998, and 14 years later less than 10% of the 4 kilometre scar along the western side of Tyldsley Hill has any greenery on it whatsoever. The open-cuts and highwalls were so steep in places that they exceed the angle-of-draw, a point at which soil cannot be prevented from slipping downslope. Meanwhile there was not enough spoil available to cover the highwalls and voids, so

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			Coalpac P/L now want to clear another 300Ha to obtain enough fill to push up these escarpments and to the voids. No doubt when they've cleared this 300 Ha they'll want to clear more to rehabilitate that area – and the cycle will continue. The Modifications can never be rehabilitated to anything remotely resembling the original hydrology, biodiversity and geodiversity of the existing Ben Bullen Pagoda Land System. LEG supports the PAC (Dec 2012) Recommendations 53 & 54, which are quite clear - *Recommendation 53: The Commission recommends that the following three principles be accepted as underpinning assessment of biodiversity impacts for this project:* ** Rehabilitation cannot restore the existing vegetation associations or ecological balance* *of the area;* ** Rehabilitation to mature woodland is unproven for open-cut mines in NSW; and* ** The impacts on biodiversity from this project are incompatible with reservation proposals for Gardens of Stone Stage II.* *Recommendation 54: The Commission recommends that, given the considerable Uncertainties concerning the likelihood of rehabilitation on this project area being capable of delivering a satisfactory biodiversity outcome, rehabilitation not be given credence as a mitigation strategy in the assessment.*
		Pagodas, ecology	11. IMPACT ON WORLD HERITAGE VALUES The Greater Blue Mountains World Heritage Area (GBMWHA) was inscribed on the World Heritage List in 2000 for its *"outstanding natural values including the biodiversity of its plant and animal communities, and its vegetation dominated by Australia's unique eucalypts."* The GBMWHA Advisory Committee has long recommended that it be renominated to the World Heritage List for the geodiversity, cultural heritage and scenic values for which it was originally nominated, but did not get listed. The Federal Government supports such a proposal and has included the GBMWHA and a number of adjacent reserves, including the Gardens of Stone Stage 2 proposal, on the 'Priority List' for National Heritage List re-assessment. Mr Keith Muir of the Colong Foundation for Wilderness has advised that in 2006 the NSW Department of Environment and Conservation considered Ben Bullen State Forest for addition to the national park estate, and that the NSW Office of Environment has since identified this state forest as its first priority for reservation in the region. Protecting the geodiversity, cultural heritage and scenic values of Ben Bullen SF is therefore an important initial step in the World Heritage re-nomination process. The creation of further huge scars from open-cut mining will detract from the scenic value of this gateway to the GBMWHA. Open-cut mining in Ben Bullen SF, including the Coalpac Project, is therefore contrary to commonwealth, State and GBMWHA Advisory Committee long-term plans for this unique area.

Stakeholder	ID	Category	Issue
		Surface water	12. UNACCEPTABLE WATER POLLUTION ISSUES Below are several extracts from a NSW Soil Services report – Erosion & Sediment Control and Remediation Plan – Wallerawang to Kandos Baal Bone Junction, 191.795km to 195.705km. July 199810 The Report10 identifies that the State Rail Authority of NSW undertook a cutting widening program along the Wallerawang to Kandos line adjacent the Cullen Valley Mine open-cut. Construction activities subsequently impacted on the downstream property "Forest Lodge", owned by Mr Reg Larkin. Vegetation in several drainage lines was killed or adversely affected due to – • Sedimentation • Acidic drainage and/or • Saline drainage. The Report10 states the highly acidic saline nature of the run-off smothered and killed the vegetation, making the areas prone to further degradation. The report states that older cuttings constructed 30+ years ago also exposed "Green Rock" or pyritic lenses, and are still discharging water that is Acid (pH 4.0), Saline (5.5 – 9.0 dS/m), with a distinct Sulphur smell, and traces of a yellow precipitate. The Department is well aware that preventing impacts from metal leaching and acid rock drainage produced by sulphide minerals has historically been the major rehabilitation challenge facing the mining industry. Locally the coal mining industry failed to adequately address acid mine drainage at the Eastern and Western Main Collieries (now Lambert's Gully Mine) and Wallerawang Colliery (now Pine Dale Mine). As a result the Nuebeck's Creek arm of the Coxs River has been identified in the Sydney Catchment Audit 2010 as the most severely polluted and degraded waterway in the entire SCA area. The findings on water quality in Appendix D & E Surface Water Assessment for this proposal are a cover-up, and the mitigation strategies proposed are the same as those which have been tried and proven to be a dismal failure at the old Eastern and Western Main Collieries and Wallerawang Colliery. LEG urges the Department not to repeat the mistakes made by the State Rail Authority of NSW adjacent Cullen Valley Mine in the 1990's10, or the mistakes made at the Eastern & Western Main Mines and Wallerawang Colliery in the 1970 - 80's. Coalpac do not have a good track record on managing water quality issues, rehabilitation, coal combustion, dust, noise or other issues – please do not allow them to create and Acid Mine Draingae problem that will persist for 100+ years.
		Visual, ecology, cumulative	10. INTENSIFICATION OF MINING/WEAKENING CONSENT CONDITIONS AFTER APPROVAL LEG considers it grossly unethical that a mine which has twice been rejected can lodge a smaller version of the same proposal, when it is patently obvious they (as EnergyAustralia) have every intention of ramping the project back up to the scale

Stakeholder	ID	Category	Issue
			originally intended. The PAC (Dec 2012) and the DOPI both rejected the original Coalpac Consolidation Project because open-cut mining was considered to be inconsistent with the high biodiversity values and intern tionally significant pagoda landforms located on the western edge of the Great Dividing Range in Ben Bullen State Forest. Nothing has changed. This Proposal would destroy 150 hectares of the Tablelands Grassy Woodland Complex that is integral to the survival of the entire Ben Bullen Pagoda Land System. Destroy one part and you destroy the entire Land System. The highwall mining of an additional 165 hectares will dry out and degrade the moist forests of this complex located below the escarpments. This desiccation will cause a loss of understorey species, such as orchids and ferns. Highwall mining will place cliffs, pagodas and Aboriginal heritage at risk of damage through subsidence and blasting during and following such coal mining. LEG reminds the Department that the approval of the 10 Ha first stage of Invincible open-cut mine on 7 September 2006 was followed by an endless flow of Modifications and Extensions – 7 Approvals in 4 years from 2006 and 2010. Only 3 of those 7 Projects were actually ever approved by a Minister, the remainder were approved by planning staff on behalf of a Minister – 3 were approved by a Mr Chris Wilson and 1 by David Kitto. • Invincible Open Cut Mine Extension (05_0065): 7 September 2006 – Frank Sartor • Invincible Open Cut Mine - Modification 1 (Part3AMod): 4 June 2007 – Frank Sartor • Invincible Colliery Coal Augering (05_0065 MOD 2): 6 December 2007 – Chris Wilson • Invincible Coal Project (07_0127): 4 December 2008 – Kristina Keneally • Open Cut Expansion Project (07_0127 MOD 1): 12 January 2009 – Chris Wilson • Open Cut Expansion Project (07_0127 MOD 2): 12 August 2009 – Chris Wilson • Open Cut Extension Project (07_0127 MOD 3): 8 October 2010 – David Kitto However, not content to sit back and wait for the gradual ramping up of cumulative impacts on the residents of Cullen Bullen, Coalpac simply defied s125 of the EP&A Act between September 2006 and September 2007 illegally dug and transported 80% more coal than their approval allowed. On 11 September 2008 Judge Biscoe found that there had been damage to the integrity of the planning system, that Coalpac had acted intentionally and committed this offence in order to obtain a financial advantage, and fined them $200,000 plus $55,000 prosecution costs – peanuts. Despite this ‘damage to the integrity’ of the Planning System, less than 3 months later on 4 December 2008 (07_0127); then Planning Minister Kristina Keneally ‘rewarded’ Coalpac for their bad behaviour by approving a more than tripling of production from 350,000 MTPA to 1.2 MTPA. Of those seven (7) Modifications and Extensions, the worst approval from an environmental and visual perspective was MOD 2 approved by Mr Chris Wilson on 6/12 2007. The two Prior approvals by Minister Sartor only involved clearing 10 Hectares of

Stakeholder	ID	Category	Issue
			bushland, and the EA specifically stated that opencut mining operations would not be visible from the Castlereagh Hwy. Arguably the 2nd worst approval in terms of impacts on the Cullen Bullen community was MOD 3 07_0127 approved by David Kitto on 8 October 2010 – Increased Road Haulage to Transport an Additional 300,000 tpa to Mt Piper Power Station, bringing the total amount proposed to be trucked from Invincible Colliery to 1.2 MPTA. Mr Kitto should have known about the ongoing dust problem since 1998 of coal trucks from Cullen Valley, Invincible, and Ivanhoe North Mines (MP05_0103 approved 11/4/2007) tracking dirt and mud onto the Castlereagh Hwy, which dried, turned to dust, and was constantly stirred up and dragged by traffic along the highway thru Cullen Bullen, filling the town and the entire valley with dust. The removal of the proposed Coal Conveyor from these Modifications will see a repeat of the above. Similarly after Planning Minister Craig Knowles approved Cullen Valley Mine on 4 December 1997, they were fined $30,000 plus the EPA's costs of $18,000 in 2003 after pleading guilty to a licence breach allowing fine particle mining dust to be emitted from Cullen Valley Mine. As another reward for bad behaviour Minister Knowles approved Extension (DA-200-5-2003) in 2004, followed within months by an Extension of Coal Haulage (00-5-2003 MOD 1) approved by Diane Beamer on 19 August 2004. Residents and environmental groups deserve to know what they are really lodging a submission on – is it 300 ha over 5 years, or is it the Coalpac Consolidation Project revisited in numerous small bites???
		Air quality, acoustics	11. UNACCEPTABLE DUST and NOISE LEVELS and BLAST IMPACTS The adverse health and amenity impacts of dust emissions from Cullen Valley and Invincible Mines on the residents of Cullen Bullen have been very poorly managed. Cullen Valley Mine was prosecuted $30,000 plus $15,000 in 2003 for causing dust emissions. The removal of the Coal Conveyor from these Modifications will see a return of heavy coal trucks on the Cullen Valley Haul Road only 495 metres from Cullen Bullen Primary School, and a return of coal trucks from invincible Mine onto the Castlereagh Highway. Since 1998 of coal trucks from Cullen Valley, Invincible (and Centennial Ivanhoe North Mine approved 11/4/2007) have tracked dirt and mud onto the Castlereagh Hwy, which when dry turned to dust, was constantly stirred up by traffic and dragged along the highway through Cullen Bullen, choking local residents, and filling the town and entire valley with dust. Dust emissions from blasting have proven similarly impossible to control. The Invincible Mine proposal is only 1km, and the Cullen Valley proposal only 2.6km from Cullen Bullen. Self-regulation does not work. Self-regulation will not protect the health of Cullen Bullen residents. The only safe way to manage dust, noise and blasting impacts is to insist on adequate separation distances as recommended by the WA EPA35, SA EPA36, and National Party of NSW33, which is no opencut mining within a minimum of 3 kilometres, and preferably 5 kilometres of a residential township.

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		N/A	12. POLITICAL DONATIONS Lithgow Environment Group Inc. has not made any political donations that need to be disclosed.
		General objection	CONCLUSION The members of Lithgow Environment Group believe we have provided a compelling body of evidence to demonstrate why these Modifications must be rejected. We trust that our submission meets with your favorable consideration.
Nature Conservation Council	SIG11	N/A	The Nature Conservation Council of NSW (NCC) is a non-profit, non-government organisation representing more than 120 community environment groups across NSW. We have long-standing experience in state environmental assessment and planning and are extremely concerned with the proposed modifications to the Invincible and Cullen Valley coal mines in the Lithgow Local Government Area.
		Ecology, pagodas, Ben Bullen State Forest	The Department of Planning and Infrastructure has previously recommended refusal of the open cut coal mine proposal by Coalpac. The proposed development sites are not an appropriate location for mining development, due to potential impacts on important conservation values and local residents. This proposal will adversely impact 315 hectares of the precious Ben Bullen State Forest in the Gardens of Stone region. This public forest located on the western edge of the Great Dividing Range, contains an internationally significant pagoda landform complex and is proposed as a state conservation area for nature conservation, recreation and tourism. Therefore the Ben Bullen State Forest and Gardens of Stone should be fully protected from open-cut and high-wall mining.
		Economics	The coal in this proposal is of poor quality and there are better quality substitute resources that can provide at least 25 years electricity generation by the two power plants in the Lithgow Region. The claim of increased costs to electricity consumers if the Coalpac proposal does not proceed is a wild exaggeration. Nearby underground mines have provided for local electricity power plants for over 20 years.
		Air quality, groundwater, surface water, social	In this submission NCC wishes to address a number of issues relating to impacts on air quality, biodiversity, scenery and geological values associated with the pagoda landform complex and Aboriginal cultural heritage. NCC objects to the proposal on the following grounds. <u>Air quality and community impacts</u> The proposal is less than two kilometres from Cullen Bullen and dust from this project will put the health of the residents at risk. Coal dust from the proposed project coal will cause the release of particulate matter (PM 10 and PM 2.5). Exposure to particulate matter pollution can lead to diminished lung function, damage and inflammation of lung tissue, increased mortality rates in children and young adults, aggravation of asthma symptoms, heightened risk of cardiac arrhythmias, heart attacks and other cardiovascular issues.

Stakeholder	ID	Category	Issue
			Noise, truck movements and blasting will also adversely impact on residents. The proposal intends to vastly increase water extraction from underground workings from 26Ml/year to 750Ml/year, but fails to address the ongoing fires underground and in waste heaps. Where 2Ml/day of water pumped from old workings is to be released is not explained.
		Ecology	<u>Biodiversity</u> The proposal will destroy a Grassy Box Woodland – a nationally endangered ecological community, many nationally endangered Clandulla geebung (*Persoonia marginata*) shrubs and 2,300 threatened Capertee Stringybark (*Eucalyptus cannonii*) trees which provide habitat for Lyrebirds, Regent Honeyeaters, Powerful Owls, Spotted-tail Quolls, Squirrel Gliders, the critically endangered Leek orchid and the Grey-headed Flying Fox. The key threats to these species include land clearing, change in habitat due to subsidence and alteration of water flow, and contamination of land and water. All of these threats are possible effects of this project. The cumulative loss of threatened species habitat in NSW means that many native flora and fauna species are facing a high risk of extinction in NSW into future. The proposed modifications should be instead reserved as a State Conservation Area to protect threatened wildlife, many threatened plants and at least one endangered ecological community. In this context the Planning Assessment Commission 2012 recommendation for independent vegetation study for any further Coalpac proposal should have been an essential element of the Environmental Assessment for these modification proposals.
		Ecology, pagodas	<u>Pagoda landform complex</u> The natural and scenic values of the Gardens of Stone region and the sensitive and important biodiversity areas are of high conservation value, therefore the impacts of the mine are unacceptable. The proposal fails to provide the 300 metre minimum buffer recommended by the Planning Assessment Commission from the base of the pagoda rock formations and the open-cut area. The buffer provides protection for wildlife including many lyre birds and the threatened broad headed snake. If such a buffer were provided, there would be no mine.
		Aboriginal archaeology and cultural heritage	<u>Aboriginal cultural heritage</u> The Aboriginal cultural heritage assessment lacks credibility because it did not find a cave art site in the proposed disturbance area for the Cullen Valley Mine. Previous studies had missed other important Aboriginal cave art sites in the area.
		Air quality, health, ecology, socio-economics, Aboriginal archaeology and cultural heritage	<u>Conclusion</u> This proposal has the potential to create long-term damage to the pagoda landform, threatened species, and the health of residents in the surrounding region. Further, this proposal does not benefit the Lithgow community, because it will deny the community the benefits of tourism provided by this unique natural environment. The Invincible Mine Extension and Cullen Valley Mine Extension would add to the environmental impacts from the cumulative effects of the rapidly growing coal industry in NSW. The project goes against the principles of Ecologically Sustainable

Stakeholder	ID	Category	Issue
			Development as it would substantially degrade the ecological character of the Ben Bullen State Forest and Gardens of Stone. The NSW government needs to manage and protect our states environmental assets so that they can continue to provide valuable environmental services to the state. The threats to the Gardens of Stone are too great to allow this mine to proceed. NCC is unsatisfied that the impacts of the mine can be managed and mitigated to ensure an acceptable level of environmental performance. Due to threats to the natural and scenic values of the Gardens of Stone, biodiversity, threatened species, the community and the Aboriginal cultural heritage it is irresponsible to approve the Invincible Mine Extension and Cullen Valley Mine Extension mine and we urge the determining body to reject these proposals.
NSW Heritage Network	SIG12	General objection, ecology, economics, pagodas, Ben Bullen State Forest	The conservation of the Blue Mountains is of great importance to all people, at all levels in all areas of New South Wales. Scientific research and public opinion strongly support the strategies by the Commonwealth and State governments to arrest land degradation, and co-operative and concerted efforts with committed community groups have made this a national environmental priority. This letter is to register the NSW Heritage Network's strongest possible objection to these proposed modifications to the Invincible and Cullen Valley coal mines because it will adversely impact on the internationally significant pagoda landform complex located on the western edge of the Great Dividing Range in Ben Bullen State Forest. This public forest should be fully protected from open-cut mining in a state conservation area for nature conservation, recreation and tourism.
		Economics	The coal in this proposal is of poor quality and there are better quality substitute resources that can provide for at least 25 years electricity generation by the two power plants in the Lithgow Region. The claim of increased costs to electricity consumers if the *Coalpac* proposal does not proceed is a wild exaggeration. Nearby underground mines have provided for local electricity power plants for over 20 years.
		Ecology	The proposal of open-cut mining, will destroy the unique biodiversity, scenery and geological values associated with the pagoda landform complex. Its outstanding values include a Grassy Box Woodland – a nationally endangered ecological community, many nationally endangered Clandulla Geebung shrubs and 2,300 threatened Capertee Stringybark trees. Given the importance of the natural environment, the Planning Assessment Commission recommendation for independent vegetation study should not have been ignored by Coalpac in its current environmental assessment.
		Ecology, pagodas	The proposal fails to provide the 300 metre minimum buffer recommended by the Planning Assessment Commission from the base of the pagoda rock formations and the open-cut area. The buffer provides protection for wildlife, including many Lyre Birds and the threatened broad headed snake. If such a buffer were provided, there would be no mine.
		Air quality, groundwater, surface water, health	The proposal is less than two kilometres from Cullen Bullen and dust from this project will lead to increased morbidity and mortality in the community from respiratory and cardiovascular disease. Noise, truck movements and blasting will also adversely impact on residents. The proposal intends to vastly increase water

Stakeholder	ID	Category	Issue
			extraction from underground workings from 26Ml/year to 750Ml/ year, but fails to address the ongoing fires underground and in waste heaps. Where 2Ml/day of water pumped from old workings is to be released in not explained.
		Aboriginal archaeology and cultural heritage	The Aboriginal cultural heritage assessment lacks credibility because it did not find a cave art site in the proposed disturbance area for the Cullen Valley Mine. Previous studies had missed other important Aboriginal cave art sites in the area.
		Rehabiltiation	Despite *Coalpac's* rehabilitation claims, ecosystems cannot be replanted on farmland or after open-cut mining native forests. No mature woodland has ever been established through mine rehabilitation. The biodiversity offsets are inadequate, and cannot replace a Gardens of Stone Stage 2 reserve over Ben Bullen State Forest. Protecting a wide variety of landscapes, ecosystems, plants, animals and birds, plus an outstanding tourism and recreational resource, the logic for refusing open-cut mining in this area is unassailable. Our Network urges the refusal of both proposed modifications, and in accord with The Blue Mountains community and advocate groups across the State, we implore the NSW Government to stop open-cut mining in the Gardens of Stone region.
Parramatta Climate Action Group	SIG13	Ecology	I object to Coalpac's modifications to the Cullen Valley and Invincible coal mines. The proposal will: * destroy unique biodiversity, including a Grassy Box Woodland and nationally endangered plants such as Clandulla geebung shrubs and over 2,000 threatened Capertee Stringybark trees.
		Pagodas	* threaten the pagodas by ignoring the 300 metre minimum buffer recommended by the Planning Assessment Commission.
		Air quality, health	* increase morbidity and mortality in Cullen Bullen from respiratory and cardiovascular disease linked to dust.
		Economics	* provide poor quality coal at a massive impact when other sources are available.
Rivers SOS Alliance	SIG14	Ecology, pagodas	At a regional meeting of Rivers SOS in Lithgow, our committee resolved to support action to prevent mining which might threaten the priceless stone pagodas of the Gardens of Stone. Subsequently we attended and helped to organise a rally there, involving hundreds of conservationists, where many saw, for the first time, the unique beauty of these natural structures. The ongoing damage and despoliation of natural beauty spots and tourist attractions in our country: the stone pagodas, the Barrier Reef, the Thirlmere Lakes and several major river systems, must be halted. The greed and corruption of our generation will result in the handing down of a sadly depleted country for future generations. In this case, even the (inadequate) buffer zone of 300m recommended by the PAC is not adhered to. The wild life and habitat surrounding the wonderful stone pagodas is also under threat, all for the sake of low grade coal and the temporary enrichment of so few. We ask you to refuse this plan outright and give adequate protection to one of the country's most beautiful natural wonders.
Stop Coal Seam Gas Blue Mountains	Sig 15	General objection	On behalf of Stop Coal Seam Gas Blue Mountains I wish to object to the proposed modifications to the Invincible and Cullen Valley coal mines because they will adversely impact on the internationally significant pagoda landform complex located on the western edge of the Great Dividing Range in Ben Bullen State Forest as well as the area's complex eco-systems and the

Stakeholder	ID	Category	Issue
			health and well-being of the residents of nearly Cullen Bullen.
		Ecology	Open-cut mining, as proposed, will destroy the unique biodiversity, as well as the scenic and geological values associated with the pagoda landform complex. Its outstanding values including a Grassy Box Woodland - a nationally endangered ecological community, many nationally endangered Clandulla Geebung shrubs and 2,300 threatened Capertee Stringybark trees. Lyrebirds will be threatened. They use the sides of the pagodas to nest and raise young. Not only are the pagodas likely to collapse but mining will remove their food habitats in the valley below. The Regent Honeyeater and Powerful Owl will also have their habitats completely removed. The Office of Environment and Heritage confirmed the existence of flowering shrub, Persoonia Marginata, a nationally listed threatened species.
		Economics	The coal in this proposal is of poor quality and there are better quality substitute resources that can provide at least 25 years electricity generation by the two power plants in the Lithgow Region. The claim of increased costs to electricity consumers if the Coalpac proposal does not proceed is a wild exaggeration. Nearby underground mines have provided for local electricity power plants for over 20 years.
		Ecology	The Planning Assessment Commission recommendation for an independent vegetation study should not have been ignored.
		Pagodas, ecology	The proposal fails to provide the 300 metre minimum buffer recommended by the Planning Assessment Commission from the base of the pagoda rock formations and the open-cut area. This recommendation should be adopted. The buffer provides protection for wildlife including the threatened broad headed snake and the aforementioned Lyrebirds. If such a buffer were provided, there would be no mine.
		Air quality, health, groundwater, surface water	The proposal is less than two kilometres from Cullen Bullen and dust from this project will lead to increased morbidity and mortality in the community from respiratory and cardiovascular disease. Noise, truck movements and blasting will also adversely impact on residents. The proposal intends to vastly increase water extraction from underground workings from 26Ml/year to 750Ml/year, but fails to address the ongoing fires underground and in waste heaps. Where the 2Ml/day of water pumped from old workings is to be released in not explained.
		Aboriginal archaeology and cultural heritage, groundwater	The Aboriginal cultural heritage assessment lacks credibility because it did not find a cave art site in the proposed disturbance area for the Cullen Valley Mine. Previous studies had missed other important Aboriginal cave art sites in the area. This sort of project is likely to produce acid mine drainage and release heavy metals that will affect local streams and kill aquatic life.
		Rehabilitation	Despite Coalpac's claim, ecosystems cannot be replanted on farmland and especially after open-cut mining. The existing eco-systems will be lost forever. No mature woodland has ever been established in mine rehabilitation. The biodiversity offsets are inadequate, and cannot replace a Gardens of Stone Stage 2 reserve.
		Ben Bullen State Forest	Ben Bullen State Forest is a public forest. Degradation of this forest cannot possibly be considered to be in the public interest.

Stakeholder	ID	Category	Issue
			It should be fully protected from open-cut mining in a state conservation area for nature conservation, recreation and tourism.
Portland Newsagency	SIG16	Economics, social, support	Being one of many small business in the local area we have experienced the down turn of trading with the loss of jobs and the leaving of the local family moving from the area to find other work. We support the proposal of the Cullen Valley Coal Mine and Invincible Min as a way of creating jobs locally and reversing the trend of family leaving the area, as well as boosting geh local economy.
Portland District Motor Sports Club	SIG17	Economics, social, support	On behalf of Portland District Motor Sports Club members we would like to make a submission for the proposed mining application for Invincible Mine & Cullen Valley Mine. Due to the closure of these mines in the past 12 months our club track has been struggling to get people to attend our speedway at Cullen Dullen Raceway, Farley St Cullen Bullen. Wo heve noticed that car numbers and spectators are down on the previous year due to unemployment and workers recent been retrenchment from the mines in our local community and people just have no money to attend. Our club has been operating since 1985 and the raceway has been opened since 1991. If these mines do not get the go ahead we belíeve that our club/track will be forced to close in the near future as these mines support us in sponsorship and support our local community with employment.
Portland Automotive Services	SIG18	Economics, support	We own a mechanical workshop and Service station in Portland, in the past year we have seen a significant down turn in our business and our selves had to retrench our workers due to no work from the local mines anymore. With the unemployment so high in our local area it makes it very hard for people to buy and support our business because they have no money to spread around within the community. Without the support of the local community buying petrol, food ect we will have no option but to close our shop and try to sell up and move away, I don't want to see this happen as I was born and bread here like so many other families I know.
The Greens NSW	SIG19	Ecology, Ben Bullen State Forest, pagodas	Thank you for the opportunity to make a submission to the Part 3A Modification 4- Invincible Mine Extension (07 0127 MOD 4) and Part 3A Modification 2-Cullen Valley Mine Extension (DA 200-5-2003 MOD2). These modifications would allow the Invincible Mine to operate until 2020, and extend the open cut mining area by 88 hectares and highwall mining area by 86 hectares amongst other modifications. The modification to the Cullen Valley Mine would allow an extra 62 hectares for open cut mining and 79 hectares for highwall mining. Given the significant impact the proposal would have on the environment, especially the unique stone pagoda formations four)d in the Ben Bullen State Forest, I wish to strongly object to the proposal for the following reasons:
		Ecology	<u>Environmental Impact</u> The proposal, which will significantly expand the area to be mined, and will destroy areas of unique biodiversity and environmental significance. The area includes Grassy Box Woodlands which are a nationally significant endangered ecological

Stakeholder	ID	Category	Issue
			community, along with other threatened flora such as the Clandulla Geebung Shrub and the Capertee Stringybark tree. The Ben Bullen State Forest is also home to the unique geological formations known as Stone Pagodas, which are believed to have been formed hundreds of millions of years ago. These pagodas are significant not only in NSW, but internationally. The proposal fails to provide the 300 metres minimum buffer recommended by the Planning Assessment Commission between the pagoda rock formations and the open-cut area.
		Air quality, noise, health	<u>Health Impact</u> The proposal is less than two kilometres from the town of Cullen Bullen and coal dust from this project could lead to increased health impacts on the community from respiratory and cardiovascular disease. Noise, truck movements and blasting will also adversely impact on residents. However, there is no proposal to cover coal trucks which places residents at unacceptable additional risk.
		Ecology, pagodas, Ben Bullen State Forest	<u>Area of High Conservation Value</u> The Office of Environment and Heritage has identified the whole of Ben Bullen State Forest as being of high conservation value for future reservation. The presence of internationally significant pagoda formations in the Gardens of Stone as well as the unique flora and fauna found in the area make it an ideal candidate to be further protect such as through the *National Parks and Wildlife Act 1974*. The Gardens of Stone need to be protected for nature conservation and ecologically responsible recreation or tourism purposes. Extending mining operations will have an irreversible impact on this spectacular high conservation area. In conclusion, oppose the proposed modifications to the existing development approvals for the Invincible and Cullen Valley Mines.
The Australia Institute	SIG20	Economics	The Australia Institute welcomes the opportunity to make a submission on the *Proposed Modifications to Invincible Colliery and Cullen Valley Mine*. Our submission relates to the economic assessment of the project, included as Appendix F to the environmental assessment, by Gillespie Economics. The economic assessment does not provide a strong case for the project. It overstates the benefits of the project, while understating its costs. In particular: • The coal price used is either inaccurate or assumes the proponents behave irrationally. • If prices are accurate, many benefits will accrue to international interests and should not be included in the assessment. • Discussion of benefits passing through to electricity consumers is simplistic and ignores the nature of the National Electricity Market. • Royalty, profit and tax estimates appear likely to be overstated. • Environmental costs are assigned a zero value, contrary to the positions of the Department of Planning and Infrastructure

Stakeholder	ID	Category	Issue
			(DPI) and the Planning and Assessment Commission (PAC) on impacts to this area. • Non-market value of employment is based on thoroughly discredited studies. • Input output modelling results overstate the impacts of the project. Based on the information presented in the economic assessment, the benefits of the project are unlikely to outweigh its likely environmental costs. The project should be rejected unless a clear benefit for the NSW community can be demonstrated.
		Economics	<u>Production benefits</u> The largest benefit identified in the CBA is the production benefit of selling the coal produced at the mine to the Mount Piper Power Station (MPPS). The economic assessment states: *"Total product coal production is estimated at up to 2.2 Mtpa ROM. This ROM coal will be delivered to Wallerawang and MPPS, unwashed and has a financial value of approximately $50/tonne. However, its economic value is higher. As identified by NSW Trade and Investment and NSW Treasury (2013), in the absence of coal from Coalpac, Wallerawang and MPPS may need to pay around $1.00/GJ more for their coal, which would increase costs from around $50/tonne to $70/tonne. This replacement value for Coalpac production reflects a shadow price of coal suitable for inclusion in the BCA. (p 11)."* There are several problems with this reasoning: • There are no calculations or data presented to justify the $50 or $70 per tonne price estimates. The reference to NSW Trade and Investment and NSW Treasury (2013), also provides no discussion, working or references on how these estimates are derived. • This paragraph suggests that Coalpac are selling coal for a large discount on its actual value. No private operator would do this. If the market is willing to pay $70 per tonne for this coal, Coalpac will sell for $70 per tonne. As it is selling for $50 per tonne, either Coalpac is behaving irrationally and giving away profits of $155 million (present value), or the prices being claimed by Gillespie Economics are inaccurate. • Even if we accept that Coalpac sell coal for $20 per tonne less than it is worth, this $155 million benefit accrues to: *"The operator of the MPPS in the form of lower cost coal, which ultimately benefits electricity consumers in NSW in the form of lower electricity prices. (p 2) "*; The operator of the MPPS is Energy Australia,1 which, despite its name, is a foreign owned company, a subsidiary of Chinese energy company CLP Group.2 Any profits accruing to these operators would not be included in an analysis of benefits from an Australian or NSW perspective. • Gillespie Economics' claim that all of this benefit would be passed on to electricity consumers through lower prices shows a misunderstanding of how electricity markets operate in Australia. Low wholesale energy prices from generators are not always passed on to consumers. Over the past six years wholesale spot prices have fallen in some states and remained steady in others, while retail prices have increased.3 The claim assumes that the operators make no profit and neither do

<table>
<tr><th>Stakeholder</th><th>ID</th><th>Category</th><th>Issue</th></tr>
<tr><td></td><td></td><td></td><td>owners of distribution and transmission infrastructure or electricity retail businesses. This is unlikely.
• Gillespie Economics claim that all of this $155 million ‘benefit’ is passed on to consumers ignores NSW Trade and Investment and NSW Treasury (2013)’s finding that:
“This increases the short run marginal cost (SRMC) of electricity from these generators by around $10/MWh. “
As electricity generation involves costs other than just the input of coal, not all of this saving is passed on. This is clear in the source document, but ignored by Gillespie Economics.
• Furthermore, the emphasis above is on “these generators”. There are many other generators competing in the National Electricity Market (NEM) which NSW is a part of. Providing a subsidy to particular generators may provide a marginal benefit for some consumers, but will have negative implications for other generators and negatively affect the efficiency of the NEM.
Due to these points, it is better to consider the results of the CBA at the level of $50 per tonne, which can be easily ascertained from the economic assessment and are outlined in Table 1 below:
Table 1: Project financial benefits at $50 per tonne
<table>
<tr><td>NSW Government – royalties</td><td>$29m</td></tr>
<tr><td>Coalpac shareholders – profits</td><td>$25m</td></tr>
<tr><td>Commonwealth government – Company tax</td><td>$11m</td></tr>
<tr><td>Total</td><td>$65m</td></tr>
</table>
Source: Economic assessment results on p19. Note all figures are present values discounted at 7 percent per annum.</td></tr>
<tr><td></td><td></td><td></td><td>All of these benefits are likely to be overestimated.
• No royalty calculations are provided. There are many deductions applied to royalties paid in NSW, which are likely to reduce this further.4
• The costs of the mine seem unrealistically low. The economic assessment suggests that the mine will produce 2.2 million tonnes per year which it will sell for $50 per tonne. The present value estimate of total financial benefits, $65 million, suggests a cost per tonne of $28. This would make the mine one of the cheapest mines in Australia. Recent analysis says average costs per tonne in Australia are around $86 per tonne.5 There are some differences between these two figures in terms of treatment of royalties and transport costs, but not enough to explain such a large difference. There is no evidence to suggest that these mines are at such a low point on the cost curve. This suggests the estimates of profits and of</td></tr>
</table>

Stakeholder	ID	Category	Issue
			company tax will be overstated. • It is unclear whether the company tax estimate has included the many deductions available to mining companies such as accelerated depreciation. These deductions reduce the average tax paid by the mining sector to 13.9 per cent of gross operating surplus.6 It is unclear how many of these deductions have been included in Gillespie Economics' analysis or to what measure of profit they have applied a 30 per cent company tax rate. The estimates of benefits provided in the economic assessment represent a maximum possible value to Australian stakeholders. It is likely that costs are higher than estimated in the economic assessment and that the project will struggle to deliver these claimed benefits. NSW decision makers should focus on royalty estimates and factor in the possibility that the project is delayed, changed or cancelled, which would reduce royalties in present value terms. Decision makers should also consider these royalties in the context of total royalties in NSW. At around $6 million per year they represent less than half of one per cent of NSW coal royalties, which themselves represent just two per cent of state government revenue.7
		Economics	<u>Non-market value of unemployment</u> Gillespie Economics inclusion of a non-market value associated with unemployment is inappropriate. Even in reviews commissioned by coal companies this value is considered "contentious"8. The studies this value is based on have been rejected by the NSW Land and The studies this value is based on have been rejected by the NSW Land and Environment Court9 and the NSW Supreme Court10. A NSW Planning and Assessment Commission described these studies as "relatively crude" and "well short of the standard required to withstand rigorous scrutiny".11 This value should not be considered by decision makers due to the fundamental flaws in the studies it is based on and the application of these studies to a different location which may not share the same characteristics.
		Economics	<u>Environmental costs</u> The economic assessment includes no values for any environmental costs associated with the project. All impacts are considered "insignificant" and assigned a zero value. This is inappropriate, particularly in light of earlier assessment of the related Coalpac Consolidation Project. Both the Planning and Assessment Commission and Department of Planning and Infrastructure were highly critical of the same approach to the environmental impacts of projects in this area:12 *"The Department does not accept that the vegetation of the site is valued at only* *$900,000, and believes this illustrates the difficulties in monetising natural resources and biodiversity values. In particular, the Department believes that quarantining the vegetation on the site in the economic assessment grossly under-estimates its inherent biodiversity values, and its connection to the broader pagoda landform complex.*

Stakeholder	ID	Category	Issue
			Although the economic analysis may have been conducted within the applicable guidelines and bounds of economic theory, the facts of this particular project are sufficiently unusual to test the limits of this approach. *Overall the Department is satisfied that these benefits do not overcome the significant and irreversible impacts on the biodiversity, scenic, and geological values of internationally significant pagoda landform complex."*
		Economics	<u>Input output modelling</u> Decision makers should be wary of the economic impact assessment included as part of the economic assessment. It is based on input-output methodology which is certain to overstate the positive impacts of the project, due to many unrealistic assumptions including:13 *"Lack of supply–side constraints: The most significant limitation of economic impact analysis using multipliers is the implicit assumption that the economy has no supply– side constraints. That is, it is assumed that extra output can be produced in one area without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.* *Fixed prices: Constraints on the availability of inputs, such as skilled labour, require prices to act as a rationing device. In assessments using multipliers, where factors of production are assumed to be limitless, this rationing response is assumed not to occur. Prices are assumed to be unaffected by policy and any crowding out effects are not captured."* For these reasons this type of modelling has been described as "biased" by the Australian Bureau of Statistics and "deficient" by the NSW Land and Environment Court. Many economists consider its usage an "abuse", including the Productivity Commission.14 Recently the Department of Infrastructure and Planning noted:15 *"The Department notes the concerns raised … about the value of the [input-output] methodology in general, and accepts that the methodology has limitations. "* This methodology gives very misleading results as to the impact of the project on the local and wider economy. Decision makers should give this section of the economic assessment little weight.
		Economics	<u>Review</u> We note the economic assessment has not been subject to peer review prior to publication. Had the assessment been independently reviewed many of the shortcomings identified above would have been addressed earlier in the planning process and the assessment would have presented decision makers with more useful information. We urge the Department of Planning and Infrastructure to require all proponents to conduct independent review of such assessments, or to hire in-house economists to conduct such reviews. The independence of peer review is important. Earlier versions of this project, known as the Coalpac Consolidation Project and later the Coalpac Consolidation Contracted Project were also assessed by Gillespie Economics.16 The assessment of the

Stakeholder	ID	Category	Issue
			Contracted Project was conducted not by an economist chosen by the Department of Planning and Infrastructure or the PAC, but by another coal industry consultant and academic, Jeff Bennett, also commissioned by Coalpac through their consultants Hansen and Bailey. The PAC was dissatisfied with both the assessment by Gillespie Economics and the review by Jeff Bennett:17 *"In the Commission's view the unresolved contested nature of the approach to, and results of, the analysis mean that it can be accorded little weight. Consequently, the Commission considers that, contrary to the views expressed by the peer reviewer employed by the Proponent, key results of the analysis, such as the project benefits, may not present a sufficiently reliable platform for decision-making."* Decision makers should be aware that Bennett and Gillespie Economics have close links. Bennett is the PhD supervisor of Gillespie Economics principal, Rob Gillespie. 18 They have jointly consulted to the coal industry19 and have jointly written academic papers.20 Bennett explains his and Gillespie Economics' positions in his recent book: *"Coal mine owners….will engage analysts in support of their claims. Once the analysts have established their cases, they will be inclined to maintain these positions. The continued policy debate is certainly in the analysts best interests as it means return business.21"* Gillespie Economics and Professor Bennett have maintained their positions, despite these being refuted by the PAC, the Land and Environment Court22 and more recently in the NSW Supreme Court23.
		Economics	<u>Conclusion</u> The economic assessment of the Coalpac project heavily overstates the benefits and understates the costs to NSW and Australia. In particular the analysis uses two different coal prices and makes unsupportable assumptions that either the mine or the electricity generator behaves irrationally. In assuming that coal is sold for less than it is worth the mine is effectively giving away money. Alternatively if the coal is worth the lower price there is no reason to consider the saving to the generator. Even if this contradiction is ignored, many benefits included in the assessment will accrue to international interests and should not be included as NSW community benefits. The discussion of benefits passing through to electricity consumers is simplistic and ignores the nature of the National Electricity Market. Royalty, profit and tax estimates are likely to be overstated and there is minimal transparency around their calculation. Environmental costs are assigned a zero value, contrary to the positions of the DPI and the PAC on impacts to this area. Impacts in the economic impact assessment section are overstated due to the methodology adapted and should be given little weight. Overall the project's benefits are minimal and uncertain, while serious environmental costs are highly likely. Based on review

Stakeholder	ID	Category	Issue
			of the economic assessment, the project is likely to deliver a net economic loss to NSW and should be rejected on these grounds.
Big Rim Pty Limited	SIG21	Economics, social, rehabilitation, support	The Invincible and Cullen Valley mine extensions provides a threefold benefit to the regional communities and to the State of NSW. The approval of both extensions will provide a clear line of sight to final rehabilitation at both mine sites. The importance of the mine extension for the final rehabilitation outcome is the manner in which the mining sequence will allow for the best possible designed rehabilitation final landscape. Coalpac, Coalpac's employees, their contractors and their local suppliers have been an integral part of the NSW Energy Sector. An approval to the mine extensions will allow for a suitable transition period for the companies, the workers and contractors who have been part of the NSW energy supply chain to Mt. Piper and Wallerawang through Coalpac, to diversify, or to look toward other business sectors for employment or business growth. The approval of the mine extensions will also give the local power stations the capability to revisit their long term supply chain requirements for fuel in an organized manner. Lastly, until such time that the last coal is removed from the two sites, the local power stations and ultimately the people of NSW, will be able to benefit from the lower cost of operation of one of NSW's power stations as a local supply of coal is still made available for fuel from Cullen Valley and Invincible. Coalpac have a track record in demonstrating their capability to take remnant mining locations, safely extract the available coal and commence the rehabilitation of the landscape as part of their mining sequence all while working to the industry's best practices in environmental management, community interaction and maintaining their social license. As a Contractor who has had a presence at both the Cullen Valley and Invincible mine sites, we support Coalpac's application for the mining extensions for both sites, not only because we believe that it will provide a benefit to the local communities, the local workforce and contractors and to the people of NSW, but because of our knowledge that the integrity of the men and women of Coalpac will ensure that these two mine sites will be brought back to the best rehabilitated status possible.

APPENDIX C

Stakeholder Engagement Material

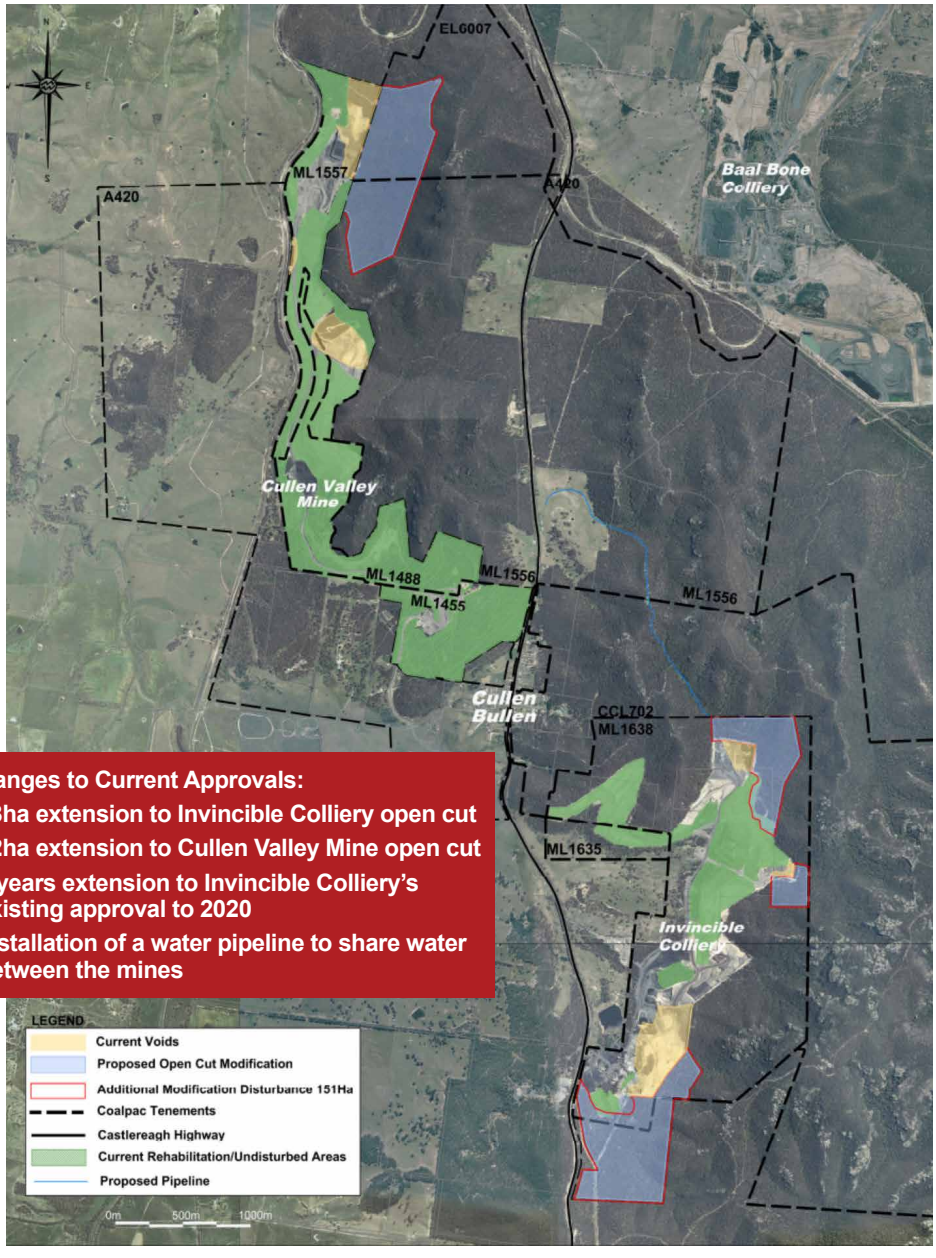
COALPAC

April 2014

Community Newsletter

Welcome to the sixth edition of the Coalpac Community Newsletter. This edition is to outline the proposed Modifications being sought for both our Cullen Valley Mine and Invincible Colliery operations. Your feedback is important to us. If you have questions, please call 02 6359 0600.

Proposed Modifications to Current Approvals



Changes to Current Approvals:

- **88ha extension to Invincible Colliery open cut**
- **62ha extension to Cullen Valley Mine open cut**
- **4 years extension to Invincible Colliery's existing approval to 2020**
- **Installation of a water pipeline to share water between the mines**

Coalpac is seeking approval for two Modifications to allow the continuation and extension of its currently approved open cut and highwall mining operations at Invincible Colliery and Cullen Valley Mine.

The Modifications will not change the operating hours **(i.e - no night time operations)** and **will not change the currently Approved limits for**:

- Production (up to 2.2Mt per annum combined)
- Employee numbers
- Noise levels
- Air quality and dust levels
- Blasting vibration & frequency
- Coal transport

Community feedback will continue to be sought as this proposal moves through the planning approval process.

You can view our Environmental Assessment at:

www.majorprojects.planning.nsw.gov.au

A paper copy will be available for review at Invincible Colliery reception, the Royal Hotel, Cullen Bullen and Lithgow City Council offices.

Next Steps

The Environmental Assessment outlining the details of the proposed Modifications is expected to be placed on public exhibition in early April for 30 days.

Changes at Coalpac

Coalpac's employees and their families have been through a very difficult period and we have had to make further redundancies as a result of entering Voluntary Administration. We continue to work through the Administration process and the future of the company and its employees is reliant upon approval being gained for the proposed Modifications.

If you have any questions regarding the proposed Modifications please contact Ian Follington, our CEO, **on: 02 6359 0600 or ifollington@cetresources.com**

Why the Modifications Should Be Approved

- Provides much needed employment to the local area.
- Ensures the continued supply of competitively priced coal to Mount Piper Power Station to support lower electricity costs for the State.
- Supports Cullen Bullen community directly through a Voluntary Planning Agreement.
- Supports the continued operation of the local power stations; a key part of the local economy.
- Avoids threatened & endangered plant & animal communities in Ben Bullen State Forest.
- Includes a number of measures to minimise the environmental impacts of the proposed mining extensions.
- Allows for better rehabilitation outcomes for both sites and the establishment of a stable rehabilitated landscape at the end of mining operations.
- Same activities as already approved under the same approval conditions.
- Good long term track record on community impacts.
- Large land offset package offered to compensate for disturbance area.

Community Information Session

Members of the community are invited to attend Community Information Sessions hosted by Coalpac to gain a greater understanding of the proposed Modifications.

The Community Information Sessions will be held in the **Cullen Bullen Progress Hall at the following times;**

- **2pm to 8pm Tuesday 15th April**
- **9am to 8pm Wednesday 16th April**

Coalpac staff will be available throughout the Community Information Sessions to answer any questions.

We would encourage anybody wishing to learn more about the Modifications or to raise any concerns they may have to come along and talk to our staff.

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Coalpac
Proprietors of Invincible Colliery and Cullen Valley Mine

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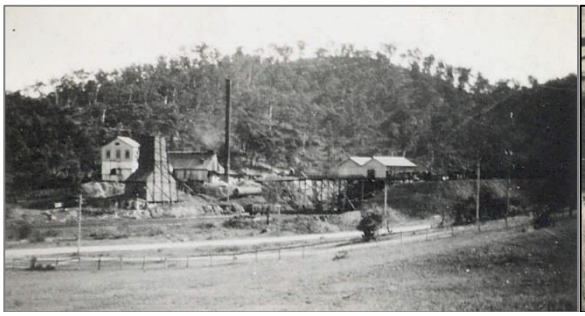
Proposed Changes to the Invincible Colliery and Cullen Valley Mine

Coal mining in Cullen Bullen

Coal mining has been part of the history of Cullen Bullen since 1880 providing local jobs and supporting local businesses for more than 130 years.



Invincible Coal Gantry at Cullen Bullen (Circa 1905)

Workers leaving Invincible Colliery (circa 1950)

Coalpac, an Australian company involved in the mining, processing and marketing of domestic coal, has owned the Invincible Colliery since 1998 and acquired the Cullen Valley Mine in 2007.

Coal has been extracted from the Coalpac tenements through a range of underground and open cut operations over more than 100 years. More than 95% of the coal produced from current operations has been supplied to the nearby Mt Piper Power Station for use in energy generation.

Proposed Plans

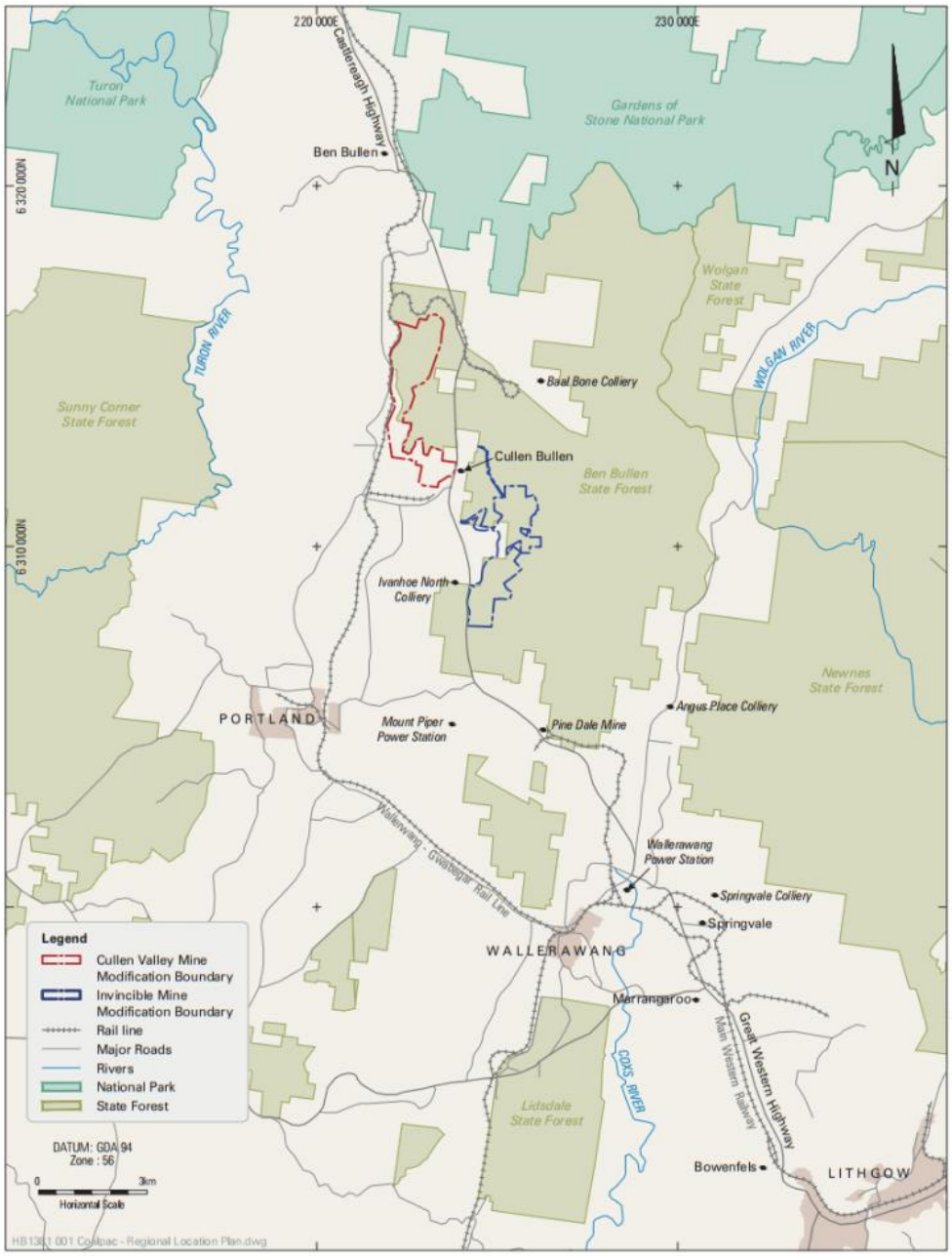
Coalpac has been operating mines in the area since 1998. In order to continue to supply commercial coal to Mt Piper Power Station, we must now seek consent to modify current planning approvals for our two mines to extend operations.

Our 2014 application seeks approval to mine additional land within the current tenement areas and to allow a combination of highwall and open cut methods to continue to be used.

If approved, this proposal would:

- Create 245 direct and indirect jobs in the community
- Provide a short term supply of additional coal for Mt Piper Power Station while other, longer-term commercial coal supply sources are investigated
- Reduce price impacts on local energy consumers by continuing to use local resources
- Enable an orderly cessation of mining within the locality of the existing open cut mining areas and a higher quality rehabilitation outcome for both sites

The extension of the existing approved operations has been designed to minimise community and environmental impacts.



Location of Invincible Colliery and Cullen Valley Mine

What are we proposing?

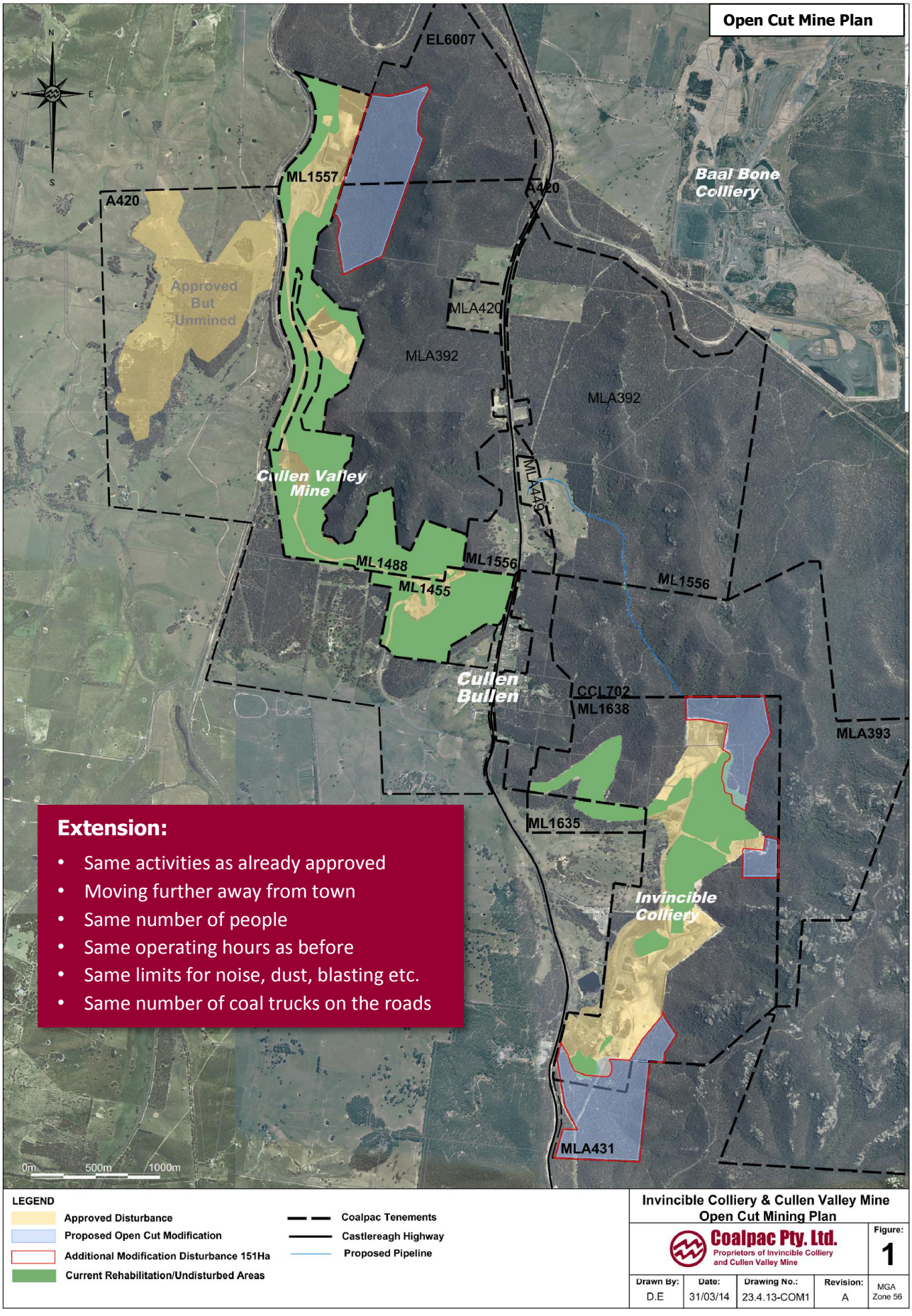
Invincible Colliery

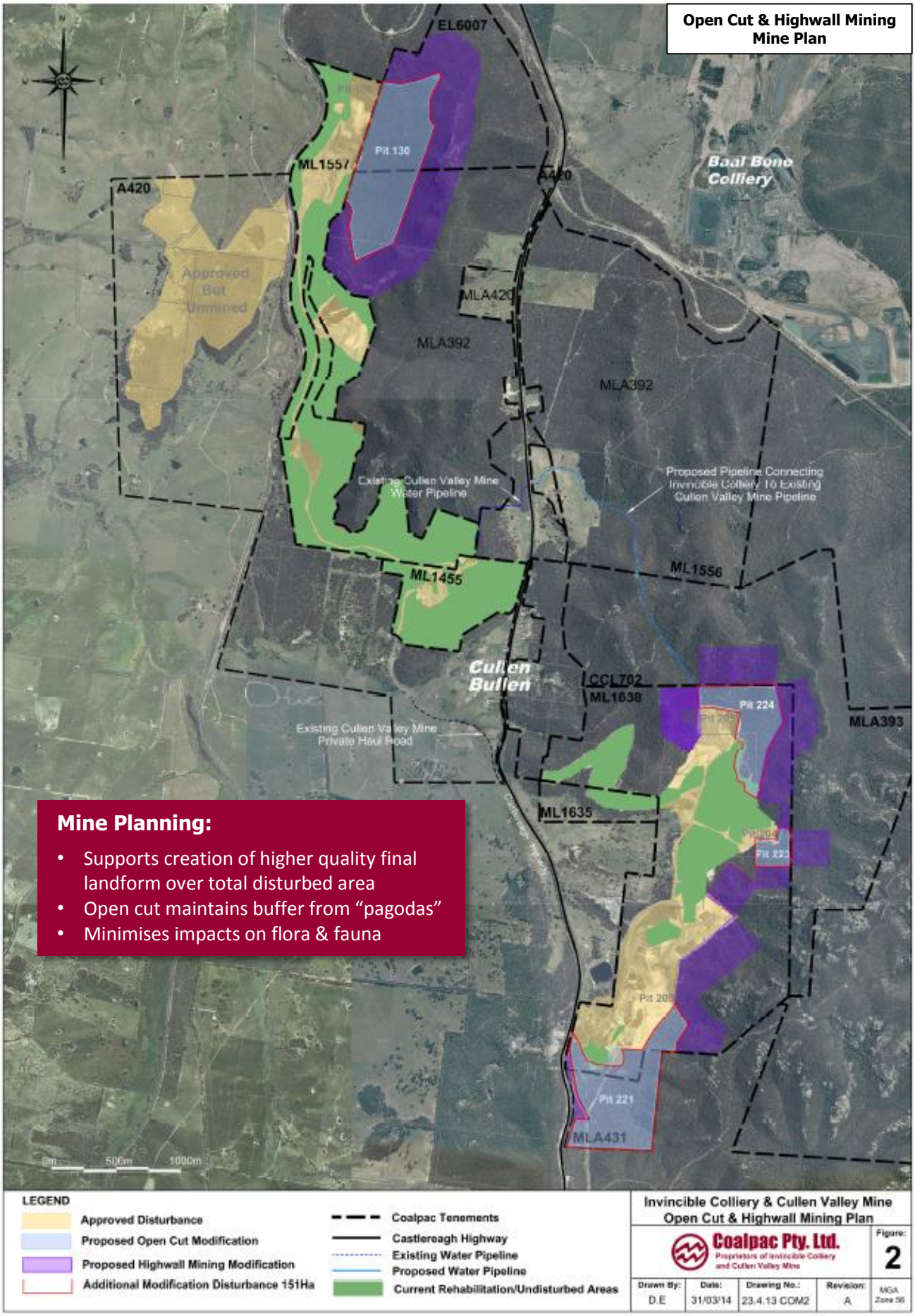
- 4 year extension to mining activities from 2016 to 2020
- 88 hectare extension to open cut mining areas
- 86 hectare extension to highwall mining areas creating no additional surface disturbance
- Installation of a pipeline to transfer water to and from Cullen Valley Mine

Cullen Valley Mine

- 62 hectare extension to open cut mining areas
- 79 hectare extension to highwall mining areas creating no additional surface disturbance

Creation of stable final landforms reinstating surface drainage networks and extending rehabilitation over all disturbed areas.


Open Cut Mine Plan
EL6007
ML1557
A420
A420
Baal Bone Colliery
Approved But Unmined
MLA420
MLA392
MLA392
Cullen Valley Mine
MLA449
ML1488
ML1556
ML1455
ML1556
Cullen Bullen
CCL702
ML1638
MLA393
ML1635
Invincible Colliery
MLA431
0m
500m
1000m
Extension:
Same activities as already approved
Moving further away from town
Same number of people
Same operating hours as before
Same limits for noise, dust, blasting etc.
Same number of coal trucks on the roads
LEGEND
Approved Disturbance
Proposed Open Cut Modification
Additional Modification Disturbance 151Ha
Current Rehabilitation/Undisturbed Areas
Coalpac Tenements
Castlereagh Highway
Proposed Pipeline
Invincible Colliery & Cullen Valley Mine
Open Cut Mining Plan
Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine
Figure: 1
Drawn By: D.E
Date: 31/03/14
Drawing No.: 23.4.13-COM1
Revision: A
MGA Zone 56


Open Cut & Highwall Mining Mine Plan
EL6007
Pit 130
ML1557
A420
Approved But Unmined
Baal Bone Colliery
MLA420
MLA392
MLA392
Existing Cullen Valley Mine Water Pipeline
Proposed Pipeline Connecting Invincible Colliery To Existing Cullen Valley Mine Pipeline
ML1455
ML1556
Cullen Bullen
CCL702
ML1638
Pit 224
MLA393
Existing Cullen Valley Mine Private Haul Road
ML1635
Pit 221
MLA431
0m
500m
1000m
Mine Planning:
• Supports creation of higher quality final landform over total disturbed area
• Open cut maintains buffer from "pagodas"
• Minimises impacts on flora & fauna
LEGEND
Approved Disturbance
Proposed Open Cut Modification
Proposed Highwall Mining Modification
Additional Modification Disturbance 151Ha
Coalpac Tenements
Castlereagh Highway
Existing Water Pipeline
Proposed Water Pipeline
Current Rehabilitation/Undisturbed Areas
Invincible Colliery & Cullen Valley Mine
Open Cut & Highwall Mining Plan
Coalpac Pty. Ltd.
Proprietors of Invincible Colliery and Cullen Valley Mine
Figure: 2
Drawn By: D.E
Date: 31/03/14
Drawing No.: 23.4.13 COM2
Revision: A
MGA Zone 56

Why is further mining needed?

The nearby Mt Piper Power Station is an important source of power for the Region and the State.

The Invincible Colliery and Cullen Valley Mine can provide a critical short term source of commercial coal for Mt Piper Power Station while other longer-term commercial coal supply sources are investigated. The proposed extension to existing approved operations is needed to continue to meet this task.

The advantages of extending the approved operations at the two mines are:

- **Sustainability -** creating over 245 jobs for workers and contractors
- **Reliability -** Securing a reliable supply of competitively priced coal for Mt Piper Power Station for the next six years while alternative fuel sources are examined
- **Affordability** - Reduce price impacts on local energy consumers by continuing to use local resources
- **Suitability** - Providing a mix of coal types well-suited to the station's operations
- **Efficiency -** Making efficient use of existing infrastructure and maximising the use of local resources within the proposed mining area
- **Proximity** - Reducing the need to source and transport coal for Mt Piper Power Station from outside the region
- **Legacy** – Supporting beyond-compliance rehabilitation of existing and future mines including creating landforms consistent with the surrounding landscape, re-forestation of disturbed areas and reinstating free-draining landforms.

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Social and economic contributions

Mining and the regional economy

Coal mining has been part of the history of Cullen Bullen since 1880 providing local jobs and supporting local businesses for more than 130 years.

The mining & energy sector is the largest single provider of jobs in the Lithgow Local Government Area employing more than 1,000 people or over 15% of the working population.

Coalpac remains committed to continuing to provide local jobs.

Should the proposed extensions be approved, they will:

- Provide a reliable supply of competitively priced coal for Mt Piper Power Station for up to six years while alternative fuel sources are examined
- Avoid the need to pass on increased generation costs by continuing to use local resources
- Create over 245 jobs for workers & contractors
- Make efficient use of existing infrastructure & maximise the use of local resources within the current mining area

Keeping power costs for NSW households down

The Mount Piper Power Station is an important source of power for the Region & the State.

The proposed extensions can provide a critical short term source of commercial coal for the Mount Piper Power Station while other, longer-term commercial coal supply sources are investigated.

With NSW energy prices expected to continue to rise, the proposed extensions should enable electricity consumers to access to the benefits of a local & lowest-cost energy supply.

Boosting the local economy

The proposed extensions to both sites are estimated to provide net social benefits of $219M.

This would be the equivalent to each household in Bathurst & Lithgow Local Government Areas receiving a net social benefit of $9,000.

Over the life of the proposed extensions:

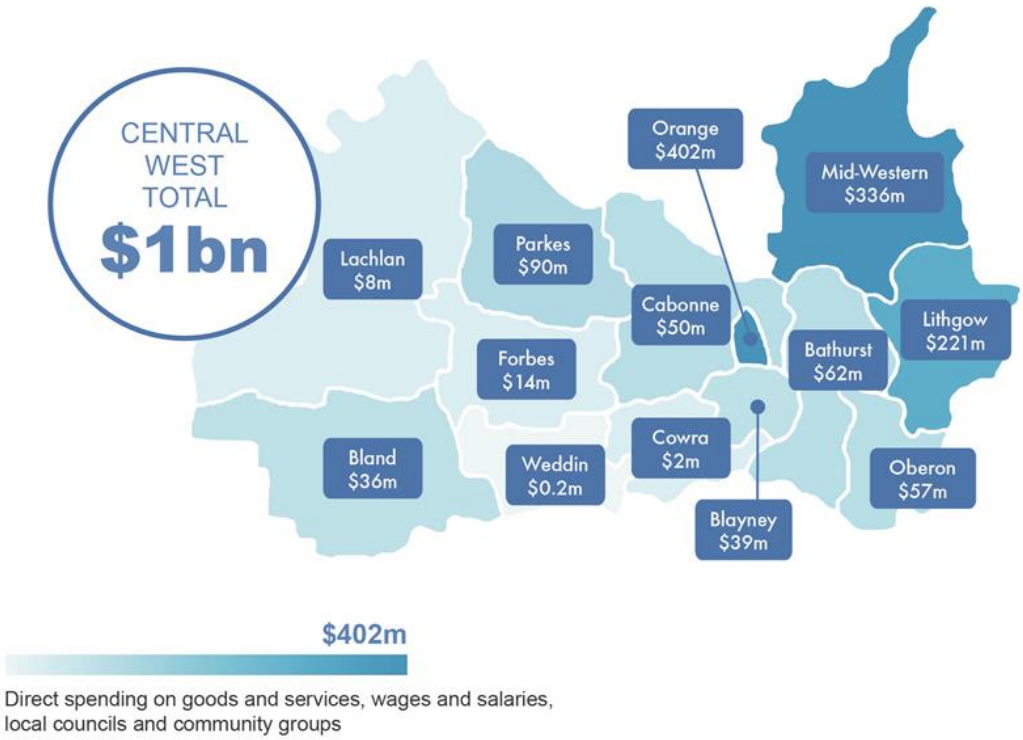
- The Commonwealth Government will receive company tax of $11M present value
- The NSW Government will receive royalties of $29M present value
- Lithgow City Council will receive funding via a signed Voluntary Planning Agreement towards Cullen Bullen infrastructure and services

At full production, the two mines will provide

- $149M in annual direct & indirect gross regional output
- $46M in annual direct & indirect regional value added
- $19M in annual direct & indirect household income

Coalpac is committed to continuing to provide local jobs and prioritises local service providers in awarding contracts, where they offer equivalent cost and quality.

The contribution of the mining industry to the regional economy of the Central West is shown below.



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Minimising Impacts On The Environment

Environmental protection is an important part of our day-to-day business. Consequently, we have included a number of measures to minimise the environmental impacts of our proposed mining extensions.

Importantly, should the extensions be approved, mining activities will allow us to fully rehabilitate voids created by historic mining activity & establish stable landforms which are compatible with the surrounding landscape.

If approved, the extensions will disturb;

- 89 hectares of native vegetation at Invincible Colliery (including construction of a water pipeline between the sites); and
- 62 hectares of native vegetation at Cullen Valley Mine. Over half the area for all proposed mining activities on the site will be mined using highwall mining techniques.

Rehabilitation planted in 2003 at Cullen Valley Mine

What are we doing to reduce environmental impacts?

Avoidance

The mine planning and design undertaken for this proposed extension has considered a number of alternative mine plans to avoid impacts on:

- All individuals, population and habitat for Federally endangered *Persoonia marginata* plants (located to the north and east of Cullen Valley Mine)
- A significant area of habitat for the State endangered *Eucalyptus cannonii* trees, by using highwall mining rather than open cut mining methods. This has avoided impact to a large number of this species, predicted to be in the order of some 2,200 individuals
- Pagoda and rocky escarpment, which provide potential habitat for the following threatened species:
    - Potential Brush-tailed Rock Wallaby habitat
    - Summer and winter habitat for the Broad-headed Snake (located to the east of Invincible Colliery)
    - Roosting habitat for the Large-eared Pied Bat and Eastern Bent-wing Bat
- Critically endangered Box Gum Woodland (as listed under the EPBC Act)

Highwall mining does not disturb the surface which minimises the overall impact of proposed operations.

Over half the area for all proposed mining activities on both sites will be mined using highwall mining techniques.

Mitigation

In addition to avoidance of significant environmental features, Coalpac will implement the following mitigation measures:

- Minimise disturbance of native vegetation during construction and prior to mining operations
- Maintain and extend successful current rehabilitation practices
- Implement a two-stage clearing protocol for all hollow-bearing trees. All hollow-bearing trees to be felled will be marked & catalogued so that hollows & nest boxes can be affixed to similar standing trees located in offsets & rehabilitation areas
- Prepare and implement a nest box management procedure
- Maintain and extend successful current weed management and monitoring practices

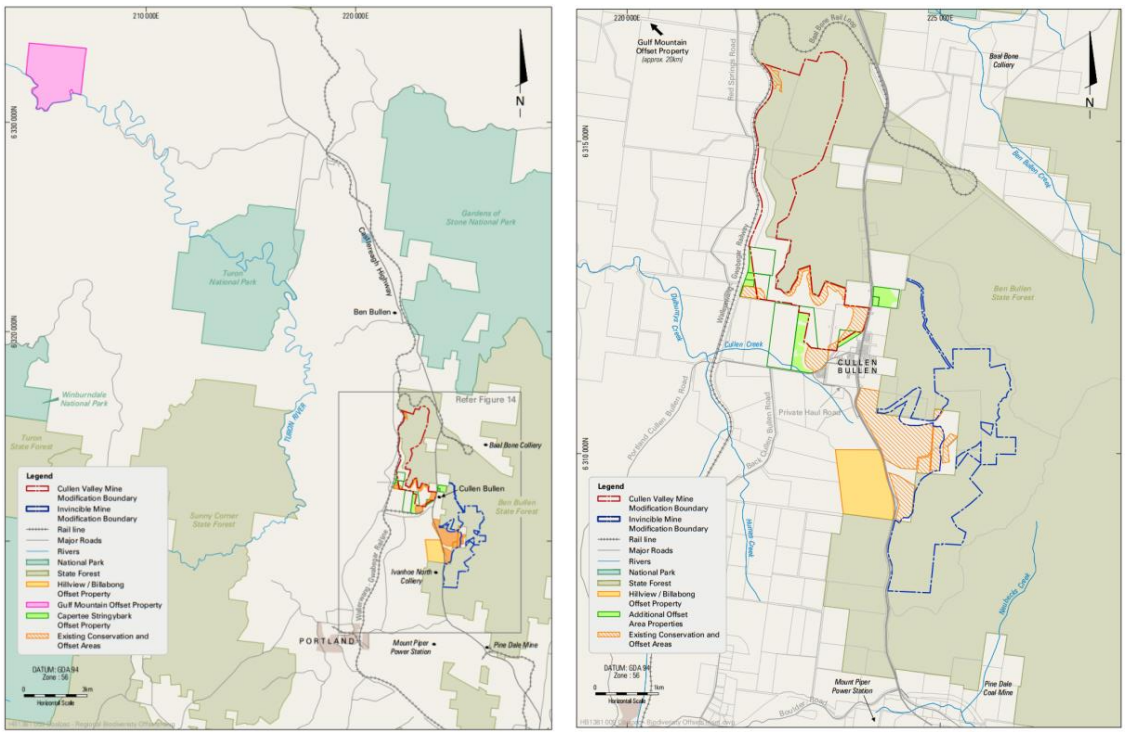
Coalpac's progressive rehabilitation strategy minimises impact by filling the open cut void immediately after mining and avoids the use of out of pit dumping areas which would create additional disturbance.

We will also schedule operations to ensure that a final void does not occur at either site at the completion of mining.

Compensation

Coalpac currently manages 169 hectares of land as biodiversity offsets for the impacts of the existing approved Invincible Colliery (118 hectares) and Cullen Valley Mine (51 hectares) operations.

To compensate for the residual impacts of new mining activities on forest and woodland vegetation communities, Coalpac will establish three new biodiversity offset areas to conserve approximately 645 ha of forest and woodland with similar flora and fauna.



Current and Proposed Biodiversity Offsets

How does a biodiversity offset work?

Coalpac will secure and conserve approximately 645 ha of woodland and forest, located close to the Invincible Colliery and Cullen Valley Mine sites, with similar flora and fauna to that found in the areas that will be disturbed.

This includes about 35 ha of critically endangered Box Gum Woodland which is not disturbed by the proposed extensions.

The overall offset ratio will be 4.3:1. This means 4.3 ha will be conserved for every 1 ha of native vegetation that is disturbed. This is in the upper range of the offset ratio required for similar projects which is between 3:1 and 5:1.

Water impacts

The proposed extension of Invincible Colliery will have no impact upon local catchment areas.

The proposed extension of Cullen Valley Mine would temporarily reduce the catchment area by about 85 ha – about 1.4% of the Jews Creek catchment area upstream from the Turon River.

Open cut mining has been taking place on both sites for more than 14 years without significant impacts to water in the area due to effective water management with only minor discharge of water.

The proposed extensions will continue to have a negligible impact with water drawn from, and pumped into, the flooded underground workings as necessary to support operations.

The proposed water pipeline connecting the sites will allow water drawn from the flooded underground workings to transferred between the sites as needed.

After mining activity has finished the land will be restored to a free draining and stable landform.

Gardens of Stone

The closest point of the proposed Cullen Valley Mine extension is more than 1.5km from the boundary of the Gardens of Stone National Park and the closest point of the proposed Invincible Colliery extension is more than 3 km away.

Independent scientific studies have shown that the proposed extensions will not impose any significant impact on sensitive environmental features or recognised conservation sites.

Both sites will continue to be progressively rehabilitated to ensure an ecological buffer is maintained with the Ben Bullen State Forest. This will help to protect sensitive ecological areas in regional National Parks from the potential impacts of mining activities.

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Managing Impacts On Our Neighbours

Coalpac operates close to the Cullen Bullen township and is committed to working closely with local residents to minimise and manage potential impacts on the community.

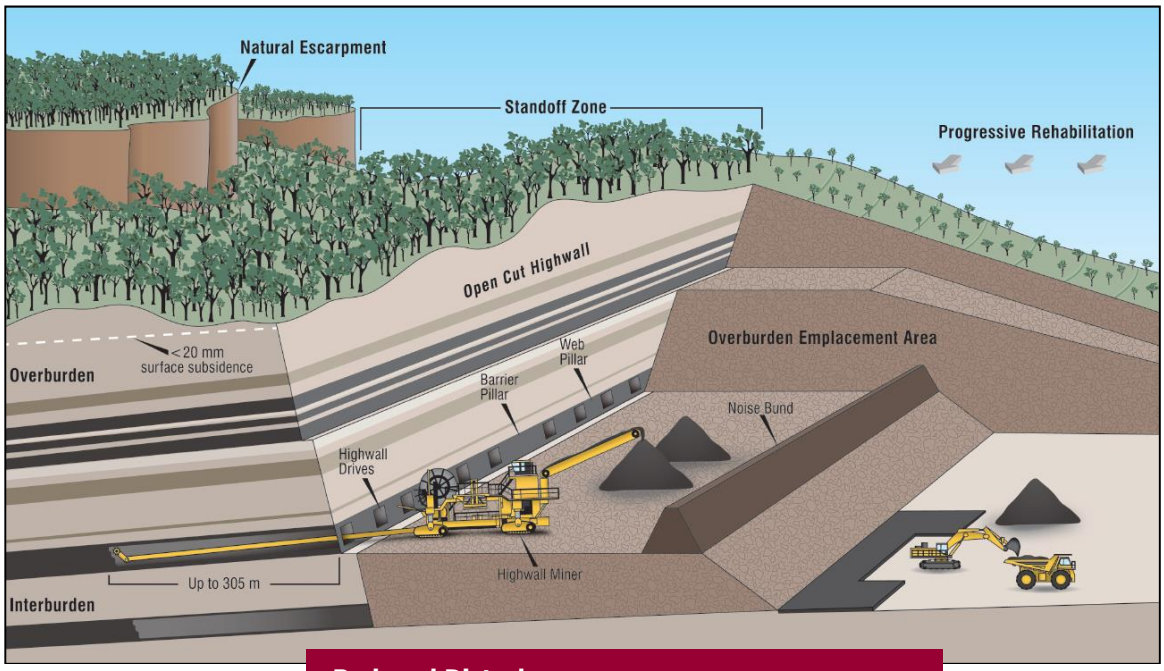
The proposed extension to both sites would move operations further away from the Cullen Bullen township. Residents of Cullen Bullen will be also be shielded from the possible impacts of mining activity by the natural terrain of the region.

Community feedback is important

This proposal reflects community feedback we have received and includes a number of initiatives designed to limit or avoid potential impacts on our neighbours.

These include:

- Highwall mining to significantly reduce surface area disturbed and minimising noise and dust
- Limiting operating hours during evenings and not operating at night improving amenity for residents
- Relocating noise and dust monitoring to allow for more effective management
- Continued progressive rehabilitation to reduce the visual impacts of current and future mine areas
- Creation of stable final landforms reinstating surface drainage networks & extending rehabilitation over all disturbed areas upon completion of mining activities



Reduced Disturbance:

- Highwall mining does not disturb the surface which minimises the overall impact of proposed operations
- Over half the area for all proposed mining activities on the site will be mined using highwall mining techniques

What we will do to manage dust

Current dust control measures will be enhanced with a higher level of watering at both mines.

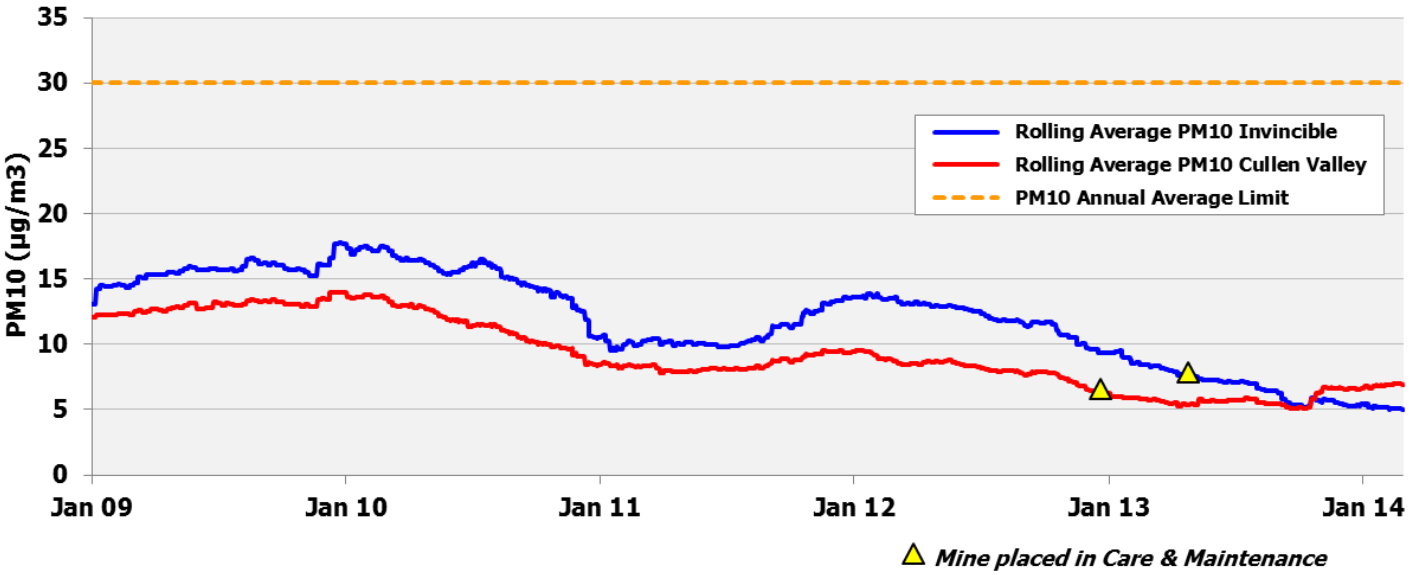
This will be supported by the proposed water pipeline between Cullen Valley Mine and Invincible Colliery to ensure the availability of an adequate and reliable water supply.

Coalpac will continue to implement our current air quality monitoring program to proactively manage operations at both Invincible Colliery and Cullen Valley Mine including two high volume air samplers (HVAS).

Greater application of the highwall mining system, which creates less dust than open cut mining, will also help to minimise any dust impacts.

Coalpac has a good long term track record of managing dust at both sites and remains committed to continuing this performance.

Annual Average PM_{10} Dust Concentrations Measured at Cullen Valley Mine & Invincible Colliery ($\mu g/m^3$)



What is PM_{10}?

- *PM - range of particles that exist in the air we breathe*
- *PM can be increased due vehicle exhausts, power stations, mining, farming, wood heaters or bushfires*
- *PM_{10} includes all particles smaller than 10µm in diameter (smaller than 1/7th of a hair width)*

What we will do to manage noise and blasting vibration

The operating hours of the mines will be limited as follows to minimise noise impacts:

- Invincible Colliery - operations are limited to the day period. Coal processing and coal transportation is restricted to the day and evening periods only
- Cullen Valley Mine - operations are restricted to the day and evening periods. Coal processing and coal transportation is limited to the day period only
- Neither mine will conduct mining related activities during the night period.

We will only operate Invincible Coal Preparation Plant after 6pm if we clad the structure to reduce noise levels.

A Construction Noise Management Plan will be prepared to ensure noise associated with constructing and running the pipeline between the two mines is minimised.

Coalpac will continue to implement the current effective blast management procedures.

The proposed open cut mining extension at Invincible Colliery remains more than 200m from potentially sensitive rock structures.

Additional monitoring & management procedures will be implemented at Cullen Valley Mine where we approach within 200m of potentially sensitive rock structures.

Coalpac will also continue to implement current Noise Management Plans, including noise controls currently used at Invincible Colliery and Cullen Valley Mine.

What we will do to manage light impacts

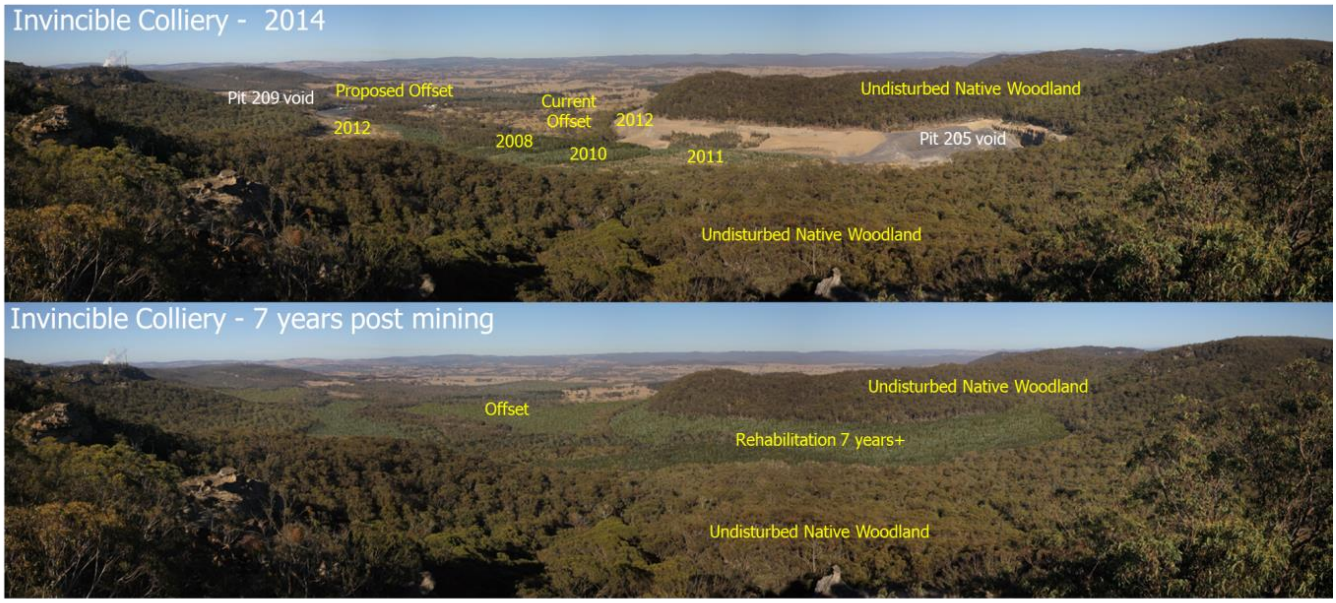
Light spill from the mine sites will be minimal because mining, processing and transporting coal will not take place at night.

Lighting at both sites will be maintained at a minimal level at night and restricted to certain areas for safety and security purposes.

How the mines will look

Specific onsite treatments to reduce visual impacts will include:

- Retention of a strip of existing native vegetation to provide visual screening, of the Southern Mining Area proposed for Invincible Colliery, from the Castlereagh Highway
- This screening will be enhanced by the establishment & maintenance of additional plantings
- Development & rehabilitation of a bund to the immediate north of the Cullen Valley Mine extension to provide screening of active mining operations
- The continued successful progressive rehabilitation of existing disturbance areas as part of the mine extension
- The early establishment & progressive development of rehabilitation within additional areas disturbed by open cut mining at both sites due to the extension works



Dates in yellow indicate date of seeding of rehabilitation area

Road Haulage of Coal

This proposal does not entail any changes to the maximum production, transportation arrangements or operational period for Cullen Valley Mine. Therefore, the traffic volumes generated by the mine are not expected to be altered.

The size, number and frequency of trucks hauling coal to market will remain unaltered from the current approved operations.

Community consultation

Engagement with local residents will continue during ongoing mining activity at the site. This will include continuation of the Community Consultative Committee as well as regular notifications to nearby residents of planned site operations such as blasting.

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Optimising Future Rehabilitation of Land at the Invincible Colliery and Cullen Valley Mine

Future mining

Coalpac, an Australian company involved in the mining, processing and marketing of domestic coal, has owned the Invincible Colliery since 1998 and acquired the Cullen Valley Mine in 2007.

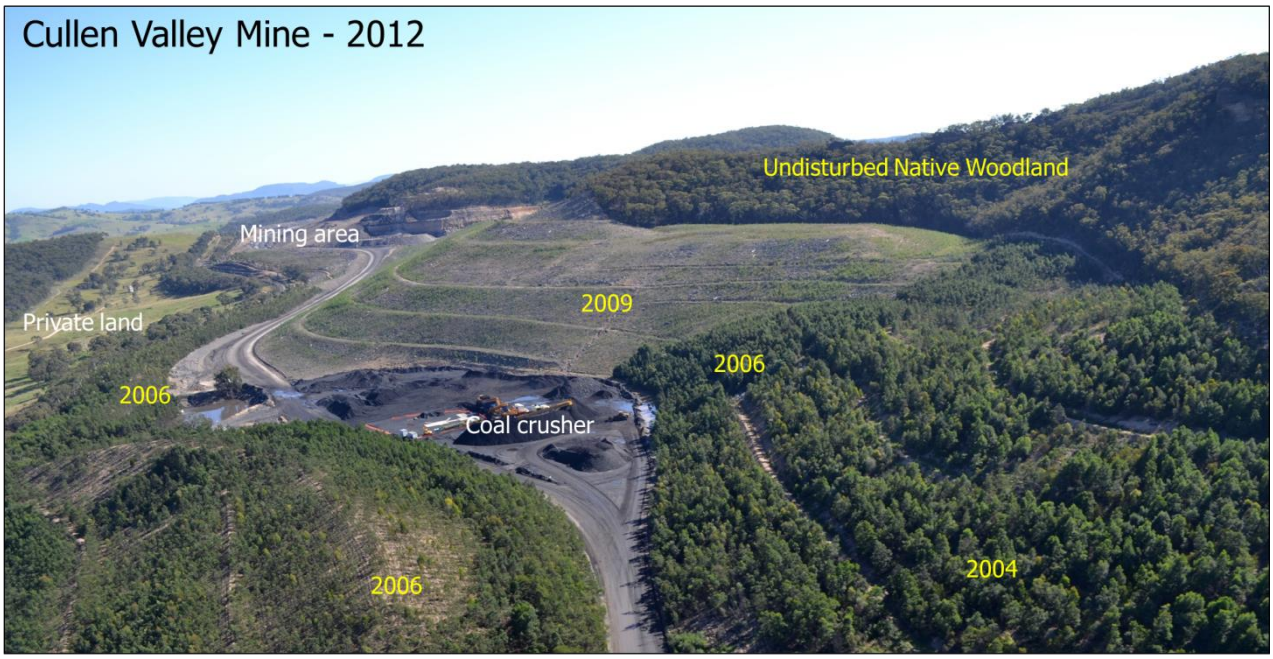
The closest point of the proposed Cullen Valley Mine extension is more than 1.5 km from the boundary of the Gardens of Stone National Park and the closest point of the proposed Invincible Colliery extension is more than 3km away.

Coalpac recognises the scenic and ecological value of these areas and we take our environmental responsibilities seriously both currently and in the future.

As part of proposed changes to extend activity at the mines, we have identified opportunities to improve rehabilitation outcomes for the disturbed land once the mining activity ceases.

Importantly, should extensions to our existing mining activities be approved, mining will allow Coalpac to fully rehabilitate existing mining voids and restore stable free-draining landforms which are compatible with the surrounding landscape.

Whether or not our proposed extension plans are approved, Coalpac has an obligation to rehabilitate all its mining sites once this approved activity has been completed.



Dates in yellow indicate date of seeding of rehabilitation area

What does rehabilitating mining land involve?

Progressive rehabilitation restores the surface after open cut mining & integrates it with the original landscape in parallel with mining activities, rather than waiting until the completion of mining.

Progressive rehabilitation, as practised at both mine sites, offers the following benefits:

- Early re-establishment of native vegetation
- Different age and species composition that improves biodiversity of rehabilitated areas
- Early re-colonisation and use of previously mined areas by native fauna
- Agreed performance criteria can be monitored and measured to identify areas for improvement
- Minimisation of erosion and potential air pollution from dust emissions by earlier rehabilitation of cleared areas
- Early establishment of a stable and free-draining final landform

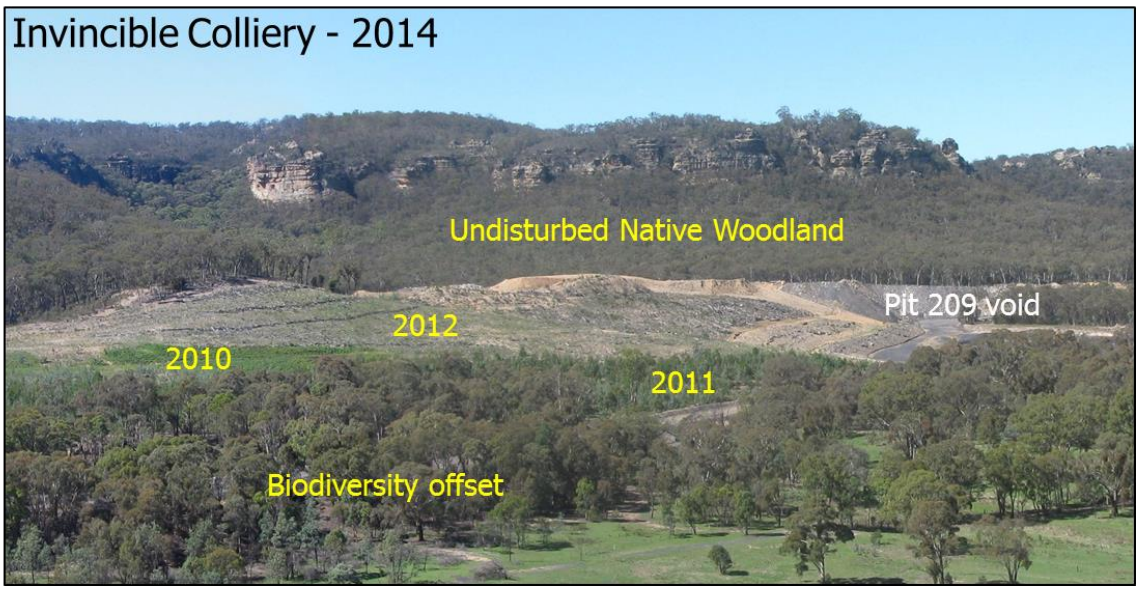
Successful rehabilitation to date

Over the past 12 years, high quality woodland rehabilitation has been successfully established on the Invincible Colliery and Cullen Valley Mine sites.

Key achievements of our rehabilitation program include:

- Rehabilitation of 193 hectares of previous mining areas
- Re-colonisation of rehabilitated areas by a range of native woodland birds, mammals, reptiles and frogs
- Integrating reshaped landforms with surrounding hills, ridges and gullies
- Establishing stable free-draining landforms

Following completion of rehabilitation & re-establishment of natural ecosystems these areas will ultimately be re-incorporated into the Ben Bullen State Forest for conservation, recreation & natural resource purposes.



Rehabilitation of existing voids

Proposed extensions will provide the additional material needed to achieve a higher quality final landform and superior rehabilitation outcomes in new mining areas and for treatment of existing mining voids.

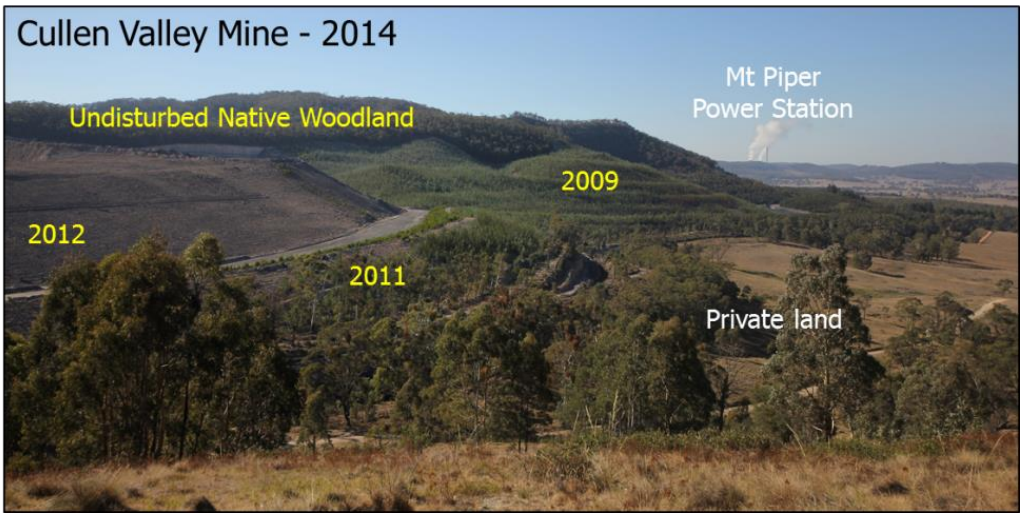
The existing mining voids at Invincible Colliery and Cullen Valley Mine were strategically left open to facilitate the continuation of future mining activities and the efficient extraction of the coal resource.

Material from the existing mining voids has been used in the rehabilitation of adjacent mining areas. Consequently there is insufficient material available (including topsoil and bulk overburden) to completely infill these voids and achieve the desired long-term outcomes of a stable and free-draining landform that is consistent with the surrounding landscape.

If the existing mining voids were to be infilled under existing approvals, additional disturbance of forested areas adjacent to the voids and also existing rehabilitation areas would be required to treat existing open cut highwalls.

Some additional fill material could be sourced from adjacent overburden dumps and existing rehabilitated areas, however, this would fall short of the volume required to achieve the preferred free-draining final landform and meet rehabilitation objectives.
The current shortfall in fill material means that small lakes or dams would need to be left once mining activity ends. Although this meets our obligations and is a common practice at other sites, proposed extensions now offer an opportunity to completely fill and rehabilitate these areas in the future.

The proposed extensions would not leave any final voids & would create a free-draining final landform representative of pre-mining conditions & compatible with the surrounding Ben Bullen State Forest.



CULLEN BULLEN COMMUNITY INFORMATION SESSION DISPLAYS

Coal Mining in Cullen Bullen

History

Coal mining has been part of the history of Cullen Bullen since 1880 providing local jobs & supporting local businesses for more than 130 years.

Invincible Coal Gantry at Cullen Bullen (circa 1905)

Workers Leaving Invincible Colliery (circa 1950)

Coalpac, an Australian company involved in the mining, processing & marketing of domestic coal, has owned the Invincible Colliery since 1998 & acquired the Cullen Valley Mine in 2007.

April 2014

Extension of Current Approvals

Proposed plans

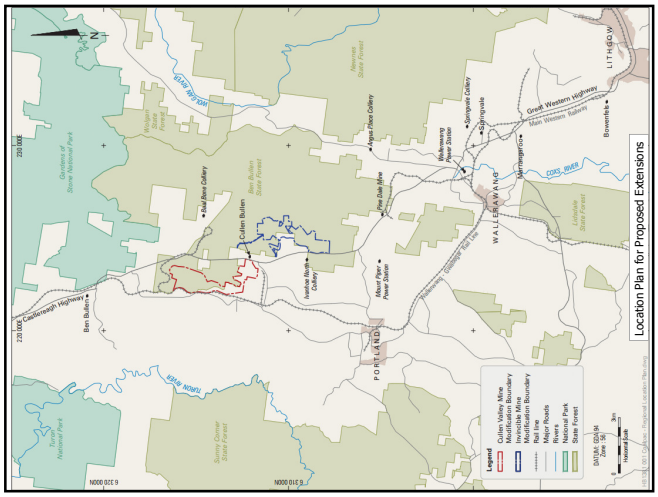
In order to continue the supply of commercial coal to Mt Piper Power Station, we must now seek consent to modify current planning approvals for our two mines to extend operations.

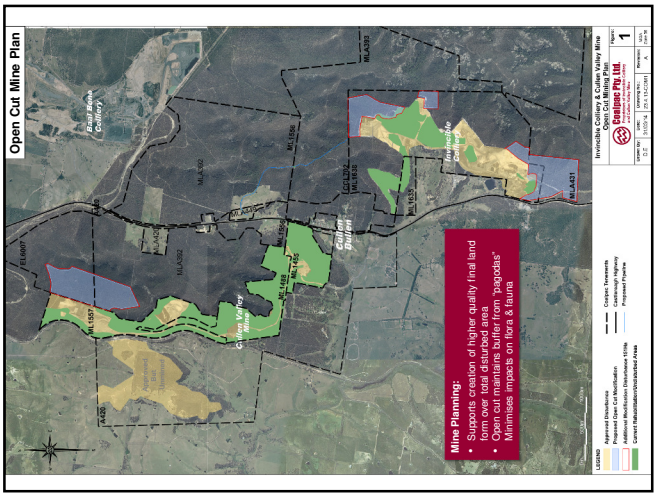
Our 2014 application seeks approval to mine additional land within the current tenement areas & to allow a combination of highwall & open cut methods to continue to be used.

The extension of the existing approved operations has been designed to minimise community & environmental impacts.

Extension:
- Same activities as already approved
- Moving further away from town
- Same number of people
- Same operating hours as before
- Same limits for noise, dust, blasting etc.
- Same number of coal trucks on the roads

April 2014





Planning Approvals

Current Approvals

Extension of the existing development approvals
- Invincible Colliery (PA 07_0127) &
- Cullen Valley Mine (DA 200-5-2003)

Invincible Colliery PA 07_0127	
Date granted	4th December 2008
Term of approval	8 years (December 2016)
Production Limit	1.2 million tonnes product per annum
Hours of Operation	7am to 10pm Mon – Sat. Maintenance activities anytime.

Cullen Valley Mine DA 200_5_2003	
Date granted	19th August 2004
Term of approval	21 years (August 2025)
Production Limit	1 million tonnes product per annum
Hours of Operation	24 hours, 7 days per week.

April 2014

Extension of Current Approvals

What are we proposing?

Invincible Colliery
- **4 year** extension from 2016 to 2020
- **88 ha** extension to open cut mining areas
- **86 ha** extension to highwall mining areas creating no additional surface disturbance
- Installation of a pipeline to transfer water to & from Cullen Valley Mine

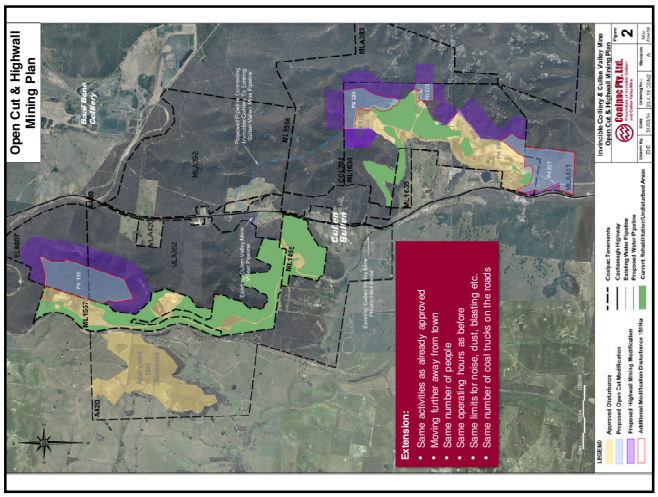
Cullen Valley Mine
- **62 ha** extension to open cut mining areas
- **79 ha** extension to highwall mining areas creating no additional surface disturbance

Upon completion of mining activities we are proposing to create stable final landforms, reinstating surface drainage networks & extending rehabilitation over disturbed areas.

Mine Planning:
- Supports creation of higher quality final landform over total disturbed area
- Open cut maintains buffer from "pagodas"
- Minimises impacts on flora & fauna

April 2014

CULLEN BULLEN COMMUNITY INFORMATION SESSION DISPLAYS



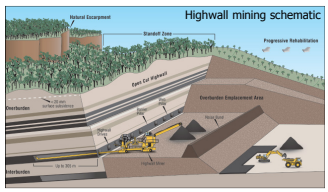
Managing Impacts

Community Feedback

This proposal reflects community feedback we have received & includes a number of initiatives designed to limit or avoid potential impacts on our neighbours.

These include:

- **Highwall mining** to significantly reduce surface areas disturbed – minimising noise & dust
- **Limiting operating hours** during evenings & not operating at night
- **Relocating noise & dust monitoring** to allow for more effective management as needed
- **Progressive rehabilitation** to reduce the visual impacts of current & future mine areas
- **Creation of stable final landforms** reinstating surface drainage networks & extending rehabilitation over all disturbed areas upon completion of mining activities



Reduced Disturbance:

- Highwall mining does not disturb the surface which minimises the overall impact of proposed operations
- Over half the area for all proposed mining activities on the site will be mined using highwall mining techniques

April 2014

Extension of Current Approvals

Why is further mining needed?

The nearby Mount Piper Power Station currently supplies around 15% of NSW's electricity generation capacity. It is an important source of power for the Region & the State.

The Invincible Colliery & Cullen Valley Mine can provide a critical short term source of commercial coal for the Mount Piper Power Station while other, longer-term commercial coal supply sources are investigated.

April 2014

Managing Impacts

What we will do to manage dust

Current dust control measures will be enhanced with a higher level of watering at both sites.

This will be supported by the proposed water pipeline between the sites to ensure the availability of an adequate & reliable water supply.

Coalpac will continue to implement the current monitoring program to proactively manage air quality at both operations including two high volume air samplers (HVAS).

Greater application of the highwall mining system, which creates less dust than open cut mining, to minimise any dust impacts.

Coalpac has a good long term track record of managing dust at both sites and remains committed to maintaining this performance.

April 2014

Managing Impacts

Community Feedback

Coalpac operates close to the Cullen Bullen township & is committed to working closely with local residents to minimise & manage potential impacts on the community.

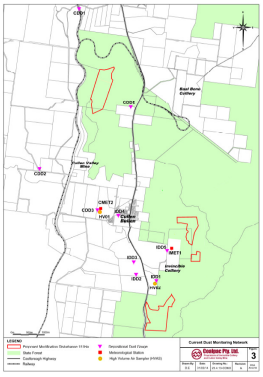
Concerns expressed by local residents have been carefully considered in the planning for the proposed extensions.

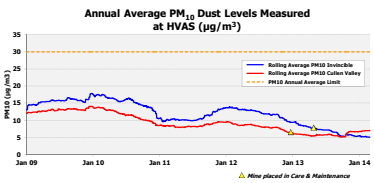
The proposed extension to both sites would move operations further away from the Cullen Bullen township. Residents of Cullen Bullen will also be shielded from possible impacts of mining activity by the natural terrain of the region.

April 2014

Managing Impacts

What we will do to manage dust





What is PM_{10}?

- *PM - range of particles that exist in the air we breathe*
- *PM can be increased due to vehicle exhausts, power stations, mining, farming, wood heaters or bushfires*
- *PM_{10} includes particles of 10µm in diameter (smaller than 1/7th of a hair width)*

April 2014

Managing Impacts

What we will do to manage noise & blasting vibration

The operating hours of the mines will be limited to minimise noise impacts as follows:

- Invincible Colliery - operations are limited to the day period. Coal processing & coal transportation are restricted to the day & evening periods only
- Cullen Valley Mine - operations are restricted to the day & evening periods, coal processing & coal transportation are limited to the day period only
- Neither mine will conduct mining related activities during the night period

We will also continue to implement current Noise Management Plans, including noise controls currently used at Invincible Colliery & Cullen Valley Mine.

We will continue to implement the current effective blast management procedures.

The proposed open cut mining extension at Invincible Colliery remains more than 200m from potentially sensitive rock structures.

Additional monitoring & management procedures will be implemented at Cullen Valley Mine where we approach within 200m of potentially sensitive rock structures.

Definitions:

- ***Day*** *– 7am to 6pm (Mon to Sat) & 8am to 6pm (Sun & Public Hols)*
- ***Evening*** *– 6pm to 10pm*
- ***Night*** *– 10pm to 7am (Mon to Sat) & 10pm to 8am (Sun & Public Hols)*

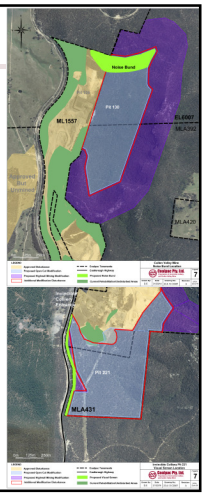
April 2014

Managing Impacts

What you will be able to see

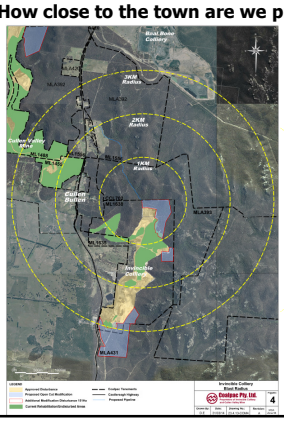
Specific onsite treatments to reduce visual impacts will include:

- Retention of a strip of existing native vegetation to provide visual screening, of the Southern Mining Area proposed for Invincible Colliery, from the Castlereagh Highway
- Development & rehabilitation of a bund to the immediate north of the Cullen Valley Mine extension to provide screening of active mining operations
- This screening will be enhanced by the establishment & maintenance of additional plantings
- The continued successful progressive rehabilitation of existing disturbance areas as part of the mine extension
- The early establishment & progressive development of rehabilitation within additional areas disturbed by open cut mining at both sites due to the extension works.



Managing Impacts

How close to the town are we proposing to blast?



Managing Impacts

Avoidance

The mine planning & design undertaken for the proposed extensions has considered a number of alternative mine plans to avoid impacts on:

- All individuals & populations of Federally endangered *Persoonia marginata* plants (in the vicinity of the proposed Cullen Valley Mine extension)
- A significant area of habitat for the State endangered *Eucalyptus cannonii* trees, by using highwall mining rather open cut mining methods. This has avoided impact to a large number of this species, predicted to be in the order of some 2,200 individuals
- All pagoda & rocky escarpment areas, which provide potential habitat for the following threatened species:
  - Potential Brush-tailed Rock Wallaby habitat
  - Summer & winter habitat for the Broad-headed Snake (located to the east of Invincible Colliery)
  - Roosting habitat for the Large-eared Pied Bat & Eastern Bent-wing Bat
- Critically endangered Box Gum Woodland (as listed under the EPBC Act)

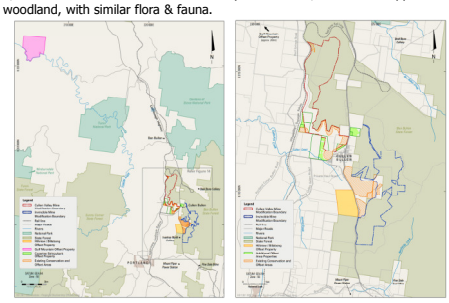
April 2014

Managing Impacts

Compensation

We currently manage **169 ha** of land as biodiversity offsets for the impacts of the existing approved operations at Invincible Colliery (**118 ha**) & Cullen Valley Mine (**51 ha**).

To compensate for the residual impacts of new mining activities on forest & woodland vegetation communities, we will establish three new biodiversity offset areas, to conserve approximately **645 ha** of forest & woodland, with similar flora & fauna.



April 2014

Managing Impacts

Mitigation

In addition to avoidance of significant environmental features, we will implement the following mitigation measures:

- Minimise disturbance of native vegetation during construction & prior to mining operations
- Maintain & extend successful current rehabilitation practices
- Implement a two-stage clearing protocol for all hollow-bearing trees. All hollow-bearing trees to be felled will be marked & catalogued so that hollows & nest boxes can be affixed to similar standing trees located in offsets & rehabilitation areas
- Prepare & implement a nest box management procedure
- Maintain & extend successful current weed management & monitoring practices

Our progressive rehabilitation strategy minimises impact by filling the open cut void immediately after mining & so avoiding the use of out of pit dumping areas which would create additional disturbance.

We will also schedule operations to ensure that a final void does not occur at either site at the completion of mining.

Nesting box trial site in established rehabilitation at Cullen Valley Mine

April 2014

Managing Impacts

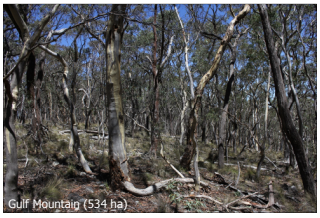
How does a biodiversity offset work?

We will secure & conserve approximately **645 ha** of woodland & forest, located close to the Invincible Colliery & Cullen Valley Mine sites, with similar flora & fauna to that found in the areas that will be disturbed.

This includes about 35 ha of critically endangered Box Gum Woodland which is not disturbed by the proposed extensions.

The overall offset ratio will be **4.3:1**.

This means that **4.3 ha** will be conserved for every **1 ha** of native vegetation disturbed.



Gulf Mountain (534 ha)

Gulf Mountain (534 ha)

Managing Impacts

Progressive rehabilitation strategy

Dates in yellow indicate date of seeding of rehabilitation area

April 2014

Managing Impacts

Water impacts

The proposed extension to the existing Invincible Colliery approval does not result in any further reduction in catchment area.

The proposed extension of Cullen Valley Mine would temporarily reduce the catchment area by about 85 ha – about 1.4% of the Jews Creek catchment area upstream from the Turon River.

Open cut mining has been taking place on both sites for more than 14 years without significant impacts to water in the area due to effective water management with only minor discharge of water.

The proposed extensions will continue to have a negligible impact with water drawn from, & pumped into, the flooded underground workings as necessary to support operations.

The proposed water pipeline connecting the sites will allow water drawn from the flooded underground workings to be transferred between the sites as needed.

After mining activity has finished the land will be restored to a free-draining & stable landform.

Main Dam, Invincible Colliery

April 2014

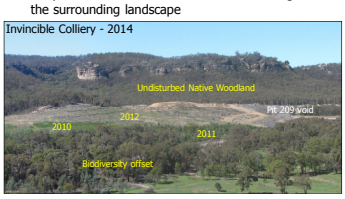
Managing Impacts

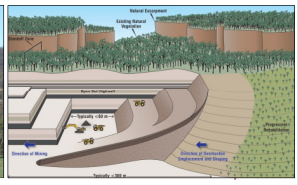
What does rehabilitating mining land involve?

Progressive rehabilitation restores the surface after open cut mining & integrates it with the original landscape in parallel with mining activities, rather than waiting until the completion of mining.

Progressive rehabilitation, as practised at both mine sites, offers the following benefits:

- Early re-establishment of native vegetation
- Different age & species composition that improves biodiversity of rehabilitated areas
- Re-colonisation & use of previously mined areas by native fauna
- Agreed performance criteria can be monitored & measured to identify areas for improvement
- Minimisation of erosion & potential dust emissions by earlier rehabilitation of cleared areas
- Early establishment of a stable & free-draining final landform & improved visual compatibility with the surrounding landscape





Social & Economic Contributions

Mining & the regional economy

Coal mining has been part of the history of Cullen Bullen since 1880 providing local jobs & supporting local businesses for more than 130 years.

The mining & energy sector is the largest single provider of jobs in the Lithgow Local Government Area employing more than **1,000** people or over **15%** of the working population.

Coalpac remains committed to continuing to provide local jobs.

Should the proposed extensions be approved, they will:

- Create over **245 jobs** for workers & contractors & underpin the longer-term employment environment for the energy generation workforce at Mt Piper Power Station
- Provide a reliable supply of competitively priced coal for Mt Piper Power Station for up to six years while alternative fuel sources are examined
- Avoid the need to pass on increased generation costs reducing price impacts on local energy consumers by continuing to use local resources
- Make efficient use of existing infrastructure & maximise the use of local resources within the current mining area

April 2014

Managing Impacts

Successful rehabilitation to date

Over the past 12 years, high quality woodland rehabilitation has been successfully established on the Invincible Colliery & Cullen Valley Mine sites.

Key achievements of our rehabilitation program include:

- Rehabilitation of **193 ha** of previously mined areas
- Re-colonisation of rehabilitated areas by a range of native woodland birds, mammals, reptiles & frogs
- Integrating reshaped landforms with surrounding hills, ridges & gullies
- Establishing stable, free-draining landforms

Following completion of rehabilitation & re-establishment of natural ecosystems these areas will ultimately be re-incorporated into the Ben Bullen State Forest for conservation, recreation & natural resource purposes.

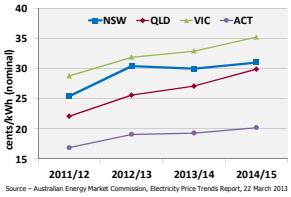
Social & Economic Contributions

Keeping power costs down for NSW households

The Mount Piper Power Station currently supplies around 15% of NSW electricity generation capacity. It is an important source of power for the Region & the State.

The proposed extensions can provide a critical short term source of commercial coal for the Mount Piper Power Station while other, longer-term commercial coal supply sources are investigated.

With NSW energy prices expected to continue to rise, the proposed extensions should enable electricity consumers access to the benefits of a local & lowest-cost energy supply.



Source – Australian Energy Market Commission, Electricity Price Trends Report, 22 March 2013

April 2014

Managing Impacts

Rehabilitation of existing voids

The proposed extensions would provide the additional material needed to achieve a higher quality final landform & superior rehabilitation outcomes in new mining areas & for treatment of the existing voids.

The existing mining voids were strategically left open for future mining activities & the efficient extraction of the coal resource.

Material from the existing mining voids has been used in the rehabilitation of adjacent mining areas & there is now insufficient material available (including topsoil & overburden) to completely infill them.

Under these circumstances the overall quality of rehabilitation would be lower & small lakes or dams would need to be left.

The proposed extensions would not leave any final voids & would create a free-draining final landform representative of pre-mining conditions & compatible with the surrounding Ben Bullen State Forest.

Social & Economic Contributions

Boosting the local economy

The proposed extensions to both sites are estimated to provide net social benefits of **$219M**.

This would be the equivalent to each household in Bathurst & Lithgow Local Government Areas receiving a net social benefit of **$9,000**.

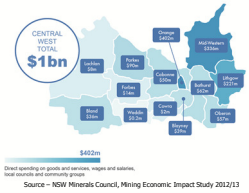
Over the life of the proposed extensions:

- The Commonwealth Government will receive company tax of **$11M** present value
- The NSW Government will receive royalties of **$29M** present value
- Lithgow City Council will receive funding via a signed Voluntary Planning Agreement towards Cullen Bullen infrastructure and services

At full production, the two mines will provide

- **$149M** in annual direct & indirect gross regional output
- **$46M** in annual direct & indirect regional value added
- **$19M** in annual direct & indirect household income

The Contribution of Mining to the Central West Economy



Source – NSW Minerals Council, Mining Economic Impact Study 2012/13

APPENDIX D

Preliminary Biobanking Assessment

Ian Follington
Chief Executive Officer
Coalpac Pty Ltd
Invincible Colliery
Castlereagh Highway
Cullen Bullen NSW 2790

Job No: 14SUTENV-0006

7 May 2014

Dear Ian

RE: Biobanking quantification of Coalpac Modification impact and proposed offset areas

In response to the Office of Environment and Heritage (OEH) submission on Coalpac Pty Ltd's (Coalpac) Expansion Modification for the Invincible and Cullen Valley Mines (the 'project') (Hansen Bailey 2014), Coalpac have commissioned Eco Logical Australia (ELA) to undertake an 'informal' Biobank Assessment, consistent with the Biobanking Assessment Methodology (BBAM) and '*OEHs interim policy on assessing and offsetting biodiversity impacts of Part 3A, State Significant Developments and State Significant Infrastructure projects*' (OEH 2011). The purpose of this assessment is to determine whether the proposed project and offset package meets an 'improve or maintain' (IoM) consistent with the Principles for Offset in NSW, the BBAM and/or Interim Major Projects Offset Policy.

It is noted that the new NSW Major Projects Offset Policy, released as a draft in March is not yet operational and the tools and data sets required to undertake an assessment consistent with this policy not available. However, it is understood that application of this policy to Major Projects will result in lower offset ratios and specifically recognises the offset discounting benefit of commitments to rehabilitate disturbed areas to their pre-existing vegetation types. For this reason, pour assessment has included the rehabilitation of the proposed impact area to reduce the offset requirements consistent with this policy.

Further, the OEH Interim Policy specifically acknowledges that proposals assessed as Major Projects under the EP&A Act do not have to meet the full 'improve or maintain' standard (or Tier 1 outcome) which is required under the Biobanking Scheme. The policy provides a structured approach for assessing proposals that meet one or two alternative standards (Tier 2 "no net loss" and Tier 3 "mitigated loss"), which take into consideration the environmental, social and economic benefits provided by the proposal. Accordingly, the BBAM has been used to inform the quantum of offset required only and the results are presented as to where a Tier 1, 2 or 3 outcome has been achieved.

It is understood that the proposed modification will result in 150.5 ha of impact to five vegetation types with 645 ha of proposed offsets (a ratio of 4.3:1) as outlined in Table 16 the EA report (Hansen Bailey 2014) (**Figure 1**).

Methods

ELA have been provided with the boundaries of the proposed expansion areas (which according to our calculations total 148.47 ha of mapped vegetation), the proposed offset sites ('*Hillview*', '*Additional Mine Site Offsets*' and the whole of '*Gulf Mountain'* –which add up to 1,401.65 ha of mapped vegetation) and the vegetation mapping and biometric plots undertaken by Cumberland Ecology as part of the Environment Assessment Report (Cumberland Ecology 2014).

Only seven of the 42 plots undertaken by Cumberland Ecology are within the new expansion and offset areas and have been used in this assessment. ELA ecologists Bruce Mullins and John Golan collected an additional 43 biometric plots within each of the vegetation zones mapped by Cumberland

Ecology between 7-11 April and 28 April and 1 May 2014 (i.e. a total of 50 biometric plots have been used for this assessment). Whilst not fully meeting the minimum number of plots required for a formal Biobanking Assessment, as an informal assessment to 'inform' the adequacy of the proposed offsets, the number of plots used in the assessment is considered sufficient to provide an assessment of the adequacy of the proposed offsets (**Tables 1, 2** & **3** show the number of plots required and the number of plots used for the impact calculations and offset area calculations). A summary of the plot data is provided in **Table 4** and the original plots sheets are available as **Appendix A**.

It is understood that OEH officers have viewed the impact areas and proposed offset sites and are satisfied with the vegetation mapping undertaken by Cumberland Ecology. Accordingly, ELA were not commissioned to undertake any additional vegetation mapping, however, ELA ecologists noted significant additional areas of one of the vegetation types mapped within the Gulf Mountain property and the vegetation mapping for this property was amended accordingly.

Version 2.1 of the Biobanking tool was used to assess the number of credits 'required' for the proposed impacts and the number of credits 'generated' for the proposed rehabilitation of these same areas to the original vegetation communities (as committed to in the Environment Assessment Report – Hansen Bailey 2014). A separate assessment circle was used to assess the landscape scale impacts of each of the impact components of the project (due to the spatial separation of the three impact areas) however the landscape scores were averaged over multiple assessment circles for the Gulf Mountain property (due to this offset area being one, large consolidate patch) and the combined Hillview/mine site offsets (as these adjoin existing offset areas). It is noted that the credit calculator tool did not include any benchmark data for three of the vegetation types and this was entered manually from the OEH Benchmarks Database.

Results

Table 5 shows that the 148.47 ha impacts to five biometric vegetation types in eight condition zones requires **8,628** ecosystem credits. The proposed rehabilitation of these areas will generate **1,094** credits leaving a deficit of **7,534** credits (A copy of the credit calculator reports for the impacts and rehabilitation is provided as **Appendices B** and **C** respectively). Three of these vegetation types are red flagged (greater than 70% cleared in the Central West CMA) so a Tier 1 offset cannot be achieved, only a Tier 2 or Tier 3.

Consistent with the Interim Major Projects Offset Policy this will require an offset of 'like for like' vegetation types of approximately 810 ha to meet a full Tier 2 offset (based on an average of 9.3 credits generated per ha of offset) or a minimum of 296.94 ha to meet a Tier 3 offset subject to adequate justification that a Tier 1 or 2 outcome is not achievable. A copy of the 'Impact Credit Report', which shows the range of vegetation types that are considered a 'like for like' match in accordance with the BBAM, is provided at **Appendix B**. The mine site rehabilitation report is provided as **Appendix C**.

Table 6 provides a summary of the number of credits generated at each of the offset sites (**Appendix D** and **E** provide the credit reports for these credit calculations). In total there is 1,401.65 ha of offset area that was assessed generating **12,416** ecosystem credits which is well in excess of the **7,534** credits required to meet a full Tier 2 offset for the impacts after mine site rehabilitation, however, not all of the credits generated are of matching 'like for like' vegetation types.

Table 7 provides an analysis of the matching credits consistent with the BBAM and the OEH Interim Major Projects Offset Policy variation criteria. Of the 12,416 credits generated, only **6,388** are considered to be 'like for like' as determined by the impact credit report (**Appendix B**). The proposed offset areas do not generate any credits for impacts to the '*Sydney Peppermint – Silvertop Ash shrubby low open forest*' vegetation type (1,835 credits required), however, as this is part of the Dry Sclerophyll Forest Formation, two other vegetation types within the offset areas that generate surplus credits (i.e. the 'Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest' (with 495 surplus credits) and the '*Red Stringybark – Scribbly Gum – Red Box – Long-leaved Box open forest'* vegetation type (with 4,705 surplus credits) which are also both Dry Sclerophyll Forest Formation vegetation types, can provide the credits that are in deficit in accordance with variation criteria 'a' of the Major Projects Interim Offset Policy.

Based on these calculations, and assuming that all of the additional mine site and Hillview property offsets were utilised first, of the 11,410 ecosystem credits that the Gulf Mountain property could generate, only 6,841 of the credits would be required to meet a Tier 2 outcome, leaving a surplus of 4,569 credits. Subject to the property being registered as a biobank site and a formal assessment being completed, these surplus credits could be used for further projects or sold on the biodiversity credit market. In addition, there would also be a surplus of 313 Apple Box – Yellow Box dry grassy woodland credits on the Hillview property available for future projects.

It is understood that the Gulf Mountain property is a restricted freehold title (converted perpetual lease) that prohibits certain activities on the land such as grazing and firewood collection. As these restrictions protect biodiversity values, it is likely that the OEH will apply a degree of credit discounting should the Gulf Mountain property be used as an offset for the project. The extent of credit discounting is likely to be in the range of 20-30% based on the existing requirement to exclude grazing, retain regrowth and dead timber. It is recommended that Coalpac seek further advice regarding this possibility as tis will reduce the number of surplus credits.

Please note at this stage, we have not undertaken any calculations for any threatened species requiring species credits (e.g. Squirrel Glider, Spot-tailed Quoll) as amendments to the species credit status of these species are yet to be incorporated into the current version of the Biobanking tool. The version of the tool currently available still recognises these species as ecosystem species which are addressed via the protection of habitat.

Impacts and adequacy of offsets for *Eucalyptus cannonii* have also not been completed due to inconsistencies with the quantification of this species in the Ecological Assessment report (which uses a combination of number of individuals, estimates of the number of individuals and area of potential habitat impacted/protected) and the BBAM which uses only number of individuals.

Robert Humphries

Robert Humphries
Manager Biobanking and Offset Programs
Eco Logical Australia

References

Cumberland Ecology 2014. Ecological Assessment – Cullen Valley Modification and Invincible Colliery Modification. Prepared for Hansen Bailey, February 2014.

Hansen Bailey 2014. Environmental Assessment Invincible Colliery PA 07_0127 Modification and Cullen Valley Mine DA 200-5-2003 Modification. Prepared by Hansen Bailey for Coalpac Pty Ltd, February 2014.

Office of Environment and Heritage 2011. NSW OEH Interim Policy on assessing and offsetting biodiversity impacts of Part 3A, State significant development (SSD) and State significant infrastructure (SSI) projects. Approved by Chief Executive Officer 25 June 2011.

Table 1: Number of plots required (full assessment) and undertaken for impact areas

Veg Zone	Biometric Vegetation Type	Condition	Ancillary	Impact Area (ha)	Plots Required (full BBAM)	Plots Completed	
						Cumberland Ecology	ELA
3	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	Moderate to good (Poor)	Non-grassy	0.09	1		BB12
4	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Moderate to good (High)	Good (34)	59.04	5	Q32; Q33	BB13
6	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Moderate to good (Poor)	Good (37)	0.13	1		BB8
7	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Moderate to good (High)	Good (13)	7.04	3		BB7; BB10
9	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Moderate to good (Poor)	Good (35)	7.98	3		BB17; BB18
10	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Moderate to good (Other)	DNG (35)	2.37	2	Q35; Q36; Q37	
11	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290)	Moderate to good	Good	34.95	4		BB14; BB15; BB16
13	Sydney Peppermint - Silvertop Ash shrubby low open forest of the upper Blue Mountains	Moderate to good	Good	36.88	4		BB9; BB11; BB19
				148.47	**23**	**5**	**13**

Table 2: Number of plots required (full assessment) and undertaken for Mine site Offsets and Hillview

								Plots Completed	
Veg Zone	**Biometric Vegetation Type**	**Condition**	**Ancillary**	**Hillview (ha)**	**Additional Mine Site (ha)**	**Total (ha)**	**Plots Required**	**Cumberland**	**ELA**
1	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	Moderate to good (High)	Good	5.53		5.53	3	Q2	BB2
2	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	Moderate to good (Medium)	DNG	29.36		29.36	4	Q1	BB3; BB4
4	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Moderate to good (High)	Good (34)	41.33	4.82	46.15	4		BB1; BB5; BB20
5	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Moderate to good (Medium)	DNG (34)	7.18	2.87	10.04	3		BB21; BB6
8	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Moderate to good (Medium)	DNG (13)		1.98	1.98	1		BB22
9	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Moderate to good (Poor)	Good (35)		20.45	20.45	4		BB24; BB25; BB26
				83.40	**30.12**	**113.52**	**19**	**2**	**12**

Table 3: Number of plots required (full assessment) and undertaken for Gulf Mountain Property

						Plots Completed
Veg Zone	**Biometric Vegetation Type**	**Condition**	**Ancillary**	**Gulf Mountain (ha)**	**Plots Required**	**ELA**
4	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Moderate to good (High)	Good (34)	364.25	7	BB32; BB33; BB34; BB37; BB41
7	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Moderate to good (High)	Good (13)	164.01	6	BB27; BB31; BB36; BB38; BB42; BB43
11	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290)	Moderate to good	Good	753.07	7	BB28; BB29; BB30; BB35; BB39; BB40
12	River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions (Benson 84)	Moderate to good	Good	6.81	3	BB23
				1288.14	**23**	**18**

Table 4: Plot Data summary

Plots shaded 'red' are for impact areas, plots shaded 'green' are for proposed offset areas

Note: Detailed plot sheets are included as **Appendix A**.

PlotName	VegZone	Site	Source	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
BB07	7	Impact	ELA	43	34.5	2	84	0	64	0	4	1	85	225204	6311286	56
BB08	6	Impact	ELA	47	26	1.2	42	0	14	0	2	0.75	75	225192	6311265	56
BB09	13	Impact	ELA	24	23	6.9	4	16	0	0	1	0.83	35	225720	6311266	56
BB10	7	Impact	ELA	42	32.5	0	82	2	66	4	1	1	85	225696	6311088	56
BB11	13	Impact	ELA	30	38.5	8.9	0	12	10	0	1	0.83	45	224900	6308462	56
BB12	3	Impact	ELA	51	13.6	0.8	50	0	22	0	4	1	40	222760	6315988	56
BB13	4	Impact	ELA	21	15.5	0	50	0	12	0	2	1	120	222908	6315930	56
BB14	11	Impact	ELA	20	28	6.4	18	8	0	0	4	0.6	38	222995	6315499	56
BB15	11	Impact	ELA	20	26.5	14.2	4	0	14	0	0	0.6	40	222775	6314932	56
BB16	11	Impact	ELA	37	23.5	0.5	12	0	26	0	1	0.6	105	222700	6315548	56
BB17	9	Impact	ELA	39	26	0.7	62	0	32	5.5	0	0.83	40	224424	6308348	56
BB18	9	Impact	ELA	36	11.5	0	80	0	32	2	0	0.83	24	224588	6308283	56
BB19	13	Impact	ELA	42	24	7.7	4	6	30	0	0	0.83	75	225852	6310074	56
Q32	4	Impact	CE	20	11.5	3	20	4	14	0	3	1	32	224281	6307912	56
Q33	4	Impact	CE	19	19.5	4	30	20	14	0	6	1	38	224550	6307883	56
Q35	10	Impact	CE	30	0	0	18	26	36	0	0	0	1.46	224477	6308320	56
Q36	10	Impact	CE	37	0	0	94	14	24	6	0	0	0	224348	6307830	56
Q37	10	Impact	CE	19	0	0	36	6	36	0	0	0	0	224417	6308210	56
BB23	12	Gulf Mtn	ELA	12	37.5	38	28	66	58	62	0	1	40	765202	6331608	56
BB27	7	Gulf Mtn	ELA	43	31.5	1.1	32	2	52	25.7	4	0.56	98	766446	6332437	55
BB28	11	Gulf Mtn	ELA	22	13.5	0	10	0	2	0	3	0.67	75	765976	6332095	55
BB29	11	Gulf Mtn	ELA	32	19.5	0	2	0	30	0	3	0.67	73	764792	6331917	55
BB30	11	Gulf Mtn	ELA	36	20.5	7	20	2	26	0	1	0.67	124	765841	6333058	55
BB31	7	Gulf Mtn	ELA	36	24.5	2	2	0	40	64	0	0.56	140	765262	6333042	55
BB32	4	Gulf Mtn	ELA	33	22.5	0	24	0	14	2	5	0.83	105	765493	6333245	55

PlotName	VegZone	Site	Source	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
BB33	4	Gulf Mtn	ELA	26	21	0	28	0	22	0	2	0.83	65	766663	6334041	55
BB34	4	Gulf Mtn	ELA	25	16.5	0	42	0	8	0	0	0.83	62	767716	6335442	55
BB35	11	Gulf Mtn	ELA	18	20	0	2	0	4	0	1	0.67	70	766053	6333943	55
BB36	7	Gulf Mtn	ELA	44	8.5	2.7	4	0	70	10	2	0.56	155	765869	6333991	55
BB37	4	Gulf Mtn	ELA	29	23	0	18	0	8	0	2	0.83	75	765796	6334206	55
BB38	7	Gulf Mtn	ELA	18	20	0	36	0	2	0	1	0.56	65	7666681	6334774	55
BB39	11	Gulf Mtn	ELA	39	13.7	0	0	0	60	0	0	0.67	110	767685	6334809	55
BB40	11	Gulf Mtn	ELA	26	21	0	4	0	10	0	2	0.67	85	765464	6336102	55
BB41	4	Gulf Mtn	ELA	29	19	0	20	0	24	0	3	0.83	66	765696	6335819	55
BB42	7	Gulf Mtn	ELA	28	16.5	0	26	0	18	0	4	0.56	70	766407	6335895	55
BB43	7	Gulf Mtn	ELA	25	16.5	0	52	0	4	0	3	0.56	112	767014	6335668	55
BB01	4	Mine Site	ELA	40	25.5	3.1	64	6	16	0	10	0.75	95	223879	6309167	56
BB02	1	Mine Site	ELA	31	9.9	0	86	0	4	8	0	1	1	223511	6309440	56
BB03	2	Mine Site	ELA	20	0	0	54	0	0	94	0	0.33	0	223633	6309633	56
BB04	2	Mine Site	ELA	13	0	0	78	0	0	80	0	0.33	0	223462	6309937	56
BB05	4	Mine Site	ELA	41	21.6	0	62	0	14	2	4	0.75	50	223871	6309670	56
BB06	5	Mine Site	ELA	22	0	0	36	0	8	70	0	1	0	223829	6309488	56
BB20	4	Mine Site	ELA	33	20	5.5	32	2	12	0	0	0.75	27	224057	6312403	56
BB21	5	Mine Site	ELA	46	3	0.5	82	0	30	30	0	1	25	224163	6312485	56
BB22	8	Mine Site	ELA	9	0	0	72	0	0	74	0	0	0	223967	6312554	56
BB24	9	Mine Site	ELA	24	20	0	56	0	8	22	0	0.75	24	222725	6311513	56
BB25	9	Mine Site	ELA	39	18	2	34	0	28	0	1	0.75	32	222742	6311972	56
BB26	9	Mine Site	ELA	25	14	4.5	36	0	16	47.5	0	0.75	15	221905	6312873	56
Q1	2	Mine Site	CE	18	0	0	82	0	2	3	0	0.33	0	223610	6309330	56
Q2	1	Mine Site	CE	14	22.5	0	86	0	18	4	0	1	50	223619	6309377	56

Table 5: Impact and mine site rehabilitation area and number of credit required / generated

			Direct Impacts				Mine Site Rehabilitation			Net Outcome	
Veg Zone	**Biometric Vegetation Type**	**Vegetation Condition (Ancillary Code)**	**Area (ha)**	**Credits required**	**Credits/ ha**	**Offset area required (ha)**	**Area (ha)**	**Credits generated**	**Credits/ ha**	**Final credits required**	**Final offset area required (ha)**
3	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	Non-grassy	0.09	5	55.56	0.54	0.09	1	11.11	4	0
4	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Good (WBM MU34)	59.03	3,516	59.56	378.06	59.16	435	7.35	3,088	332
6	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Good (WBM MU37)	0.13	7	53.85	0.75					
7	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Good (WBM MU13)	7.04	305	43.32	32.80	17.39	128	7.36	579	62
9	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Good (WBM MU35)	7.98	317	39.72	34.09					
10	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	DNG (WBM MU35)	2.37	85	35.86	9.14					
11	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290)	Good	34.95	2,287	65.44	245.91	34.95	259	7.41	2,028	218
13	Sydney Peppermint - Silvertop Ash shrubby low open forest of the upper Blue Mountains	Good	36.88	2,106	57.10	226.45	36.88	271	7.35	1,835	197
	Total		**148.47**	**8,628**	**58.11**	**927.74**	**148.47**	**1,094**	**7.37**	**7,534**	**810**

Table 6: Proposed offset sites and number of credits generated

			Gulf Mountain			"Additional' Mine Site Offsets			Total		
Veg Zone	**Biometric Vegetation Type**	**Ancillary**	**Area (ha)**	**Credits generated**	**Credits/ ha**	**Area (ha)**	**Credits generated**	**Credits/ ha**	**Area (ha)**	**Credits generated**	**Credits/ ha**
1	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	Good				5.53	52	9.40	5.53	52	9.40
2	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	DNG				29.36	265	9.03	29.36	265	9.03
4	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Good (WBM MU34)	364.25	3,129	8.59	46.15	378	8.19	410.40	3,507	8.55
5	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	DNG (WBM MU34)				10.04	76	7.57	10.04	76	7.57
7	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Good (WBM MU13)	164.01	1,493	9.10				164.01	1,493	9.10
8	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	DNG (WBM MU13)				1.98	15	7.58	1.98	15	7.58
9	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Good (WBM MU35)				20.45	220	10.76	20.45	220	10.76
11	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290)	Good	753.07	6,733	8.94				753.07	6,733	8.94
12	River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions (Benson 84)	Good	6.81	55	8.08				6.81	55	8.08
	Total		**1288.14**	**11,410**	**8.86**	**113.51**	**1006**	**8.86**	**1401.65**	**12,416**	**8.86**

Table 7: Matching impact vegetation types with proposed offset area vegetation types

		Impacts				Hillview and "Additional' Mine Site Offsets		Gulf Mountain Offset		Total Offset Area/Credits Available	
Biometric Vegetation Type	**Vegetation Formation**	**Area (ha)**	**No. Credits required**	**No. Credits generated (Rehabilitation)**	**Final credits required**	**Area (ha)**	**No. Credits generated**	**Area (ha)**	**No. Credits generated**	**Area (ha)**	**No. Credits generated**
Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	Grassy Woodlands	0.09	5	1	4	34.89	317			34.89	317
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Dry Sclerophyll Forests (Shrubby sub-formation)	59.16	3523	435	3,088	56.19	454	364.25	3,129	420.44	3,583
Sydney Peppermint - Silvertop Ash shrubby low open forest of the upper Blue Mountains	Dry Sclerophyll Forests (Shrubby sub-formation)	36.88	2,106	271	1,835	0.00	0	0.00	0	0.00	0
Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290)	Dry Sclerophyll Forests (Shrub/grass sub-formation)	34.95	2,287	259	2,028	0.00	0	753.07	6,733	753.07	6,733
Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Wet Sclerophyll Forests (Grassy sub-formation)	17.39	707	128	579	22.43	235	164.01	1,493	186.44	1,728
River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions (Benson 84)	Forested Wetlands	0	0	0	0	0.00	0	6.81	55	0.00	55
Total Credits Required/Generated		**148.47**	**8,628**	**1,094**	**7,534**	**113.51**	**1,006**	**1,288.14**	**11,410**	**1,394.84**	**12,416**
Total Matching Credits (BBAM)							**693**		**5,695**		**6,388**
Total Matching Credits (Interim Offset Policy)							**693**		**6,841**		**7,534**

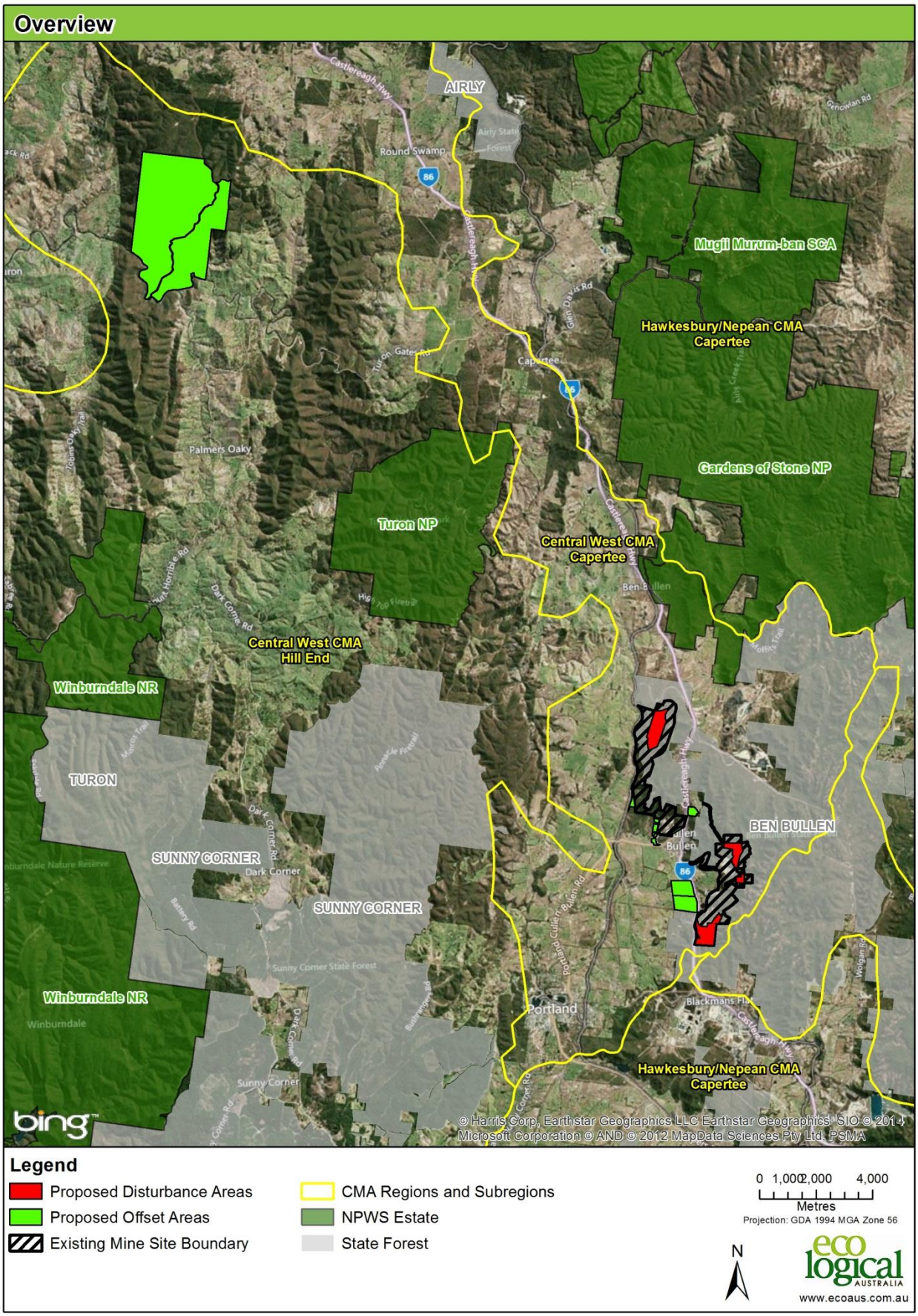


Figure 1: Regional location of Expansion project, existing mine site and proposed offset sites

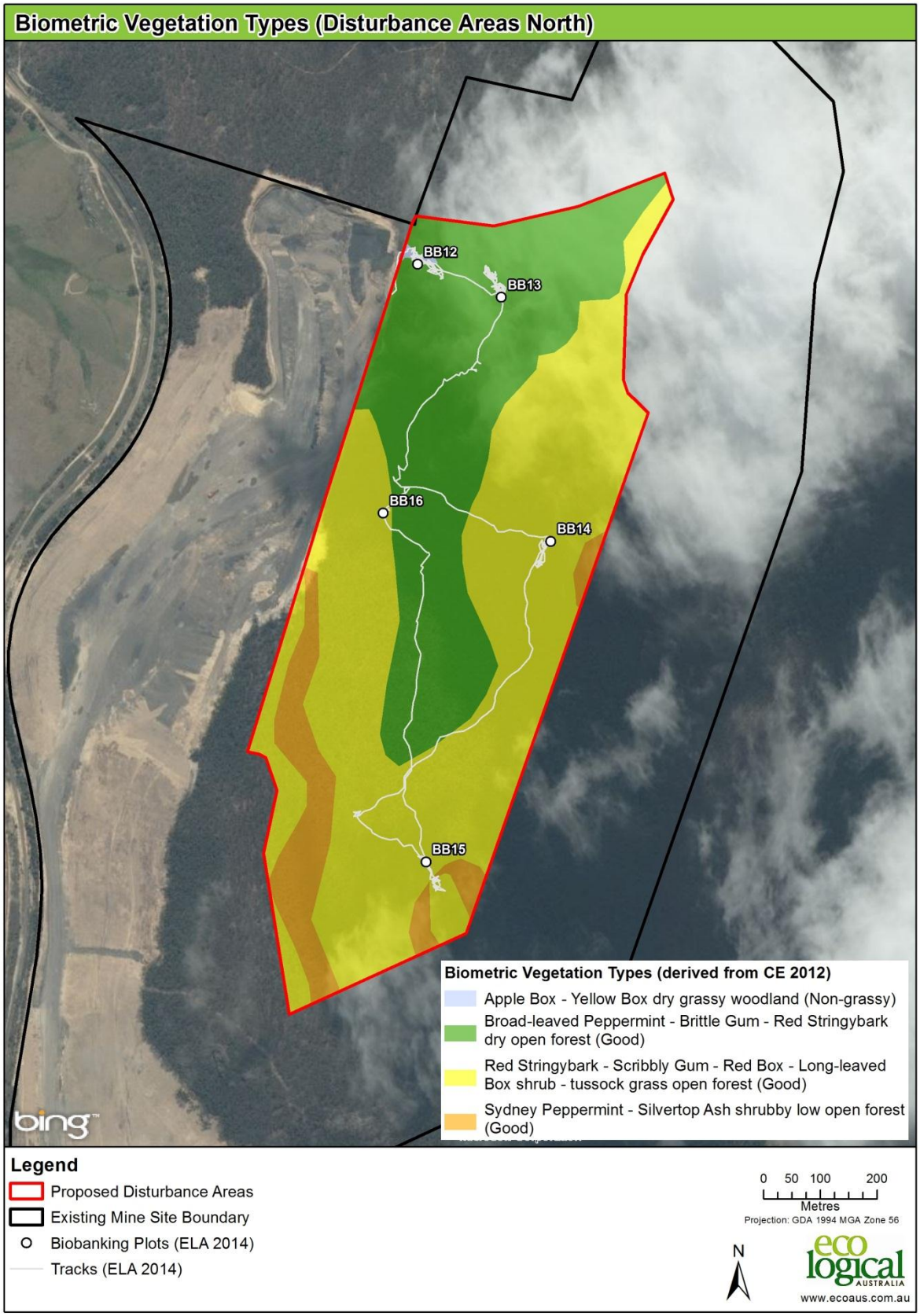


Figure 2: Mapped vegetation and location of biometric plots for impact site north (Cullen Valley Mine)

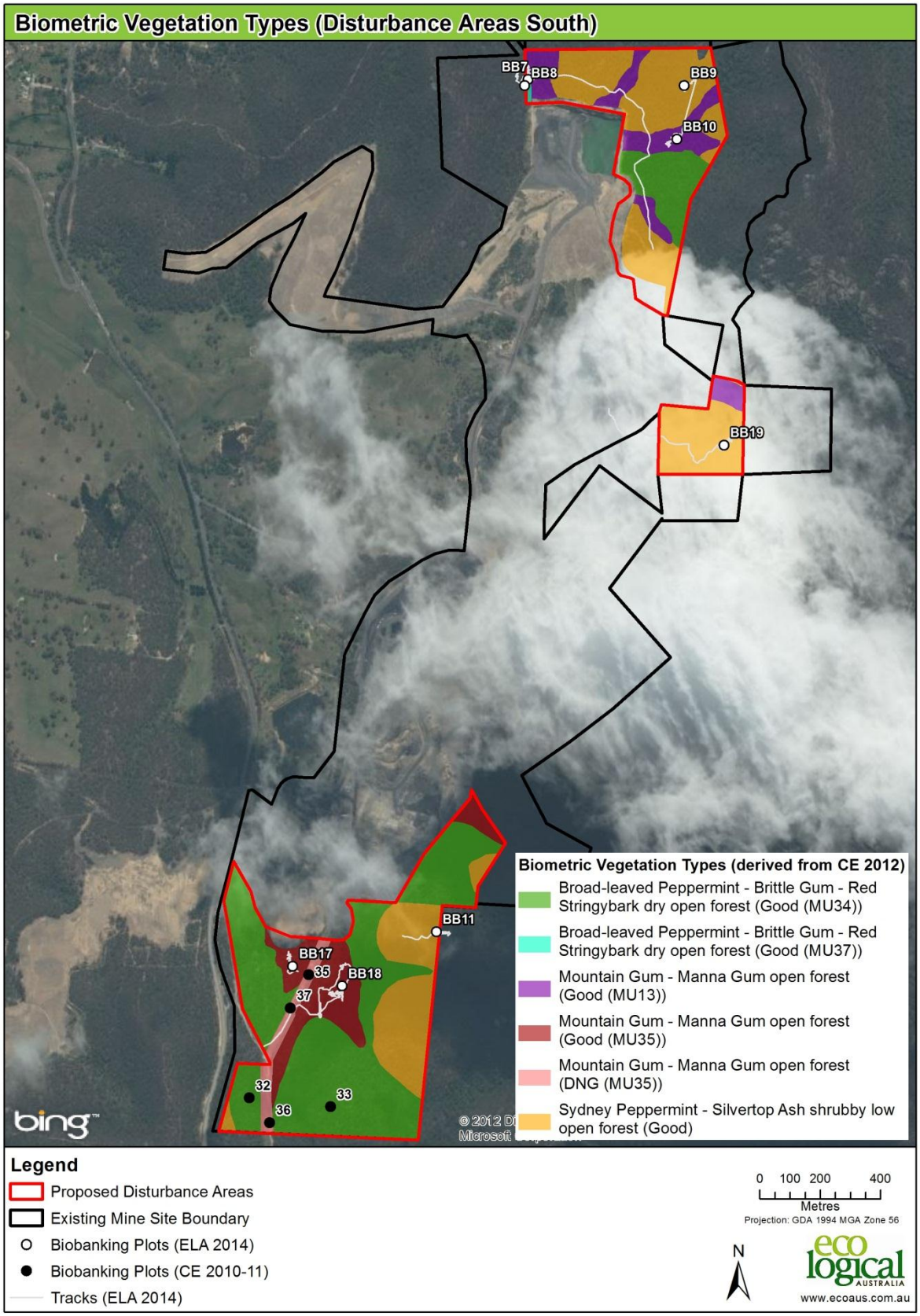


Figure 3: Mapped vegetation and location of biometric plots for impact site north (Invincible Colliery)

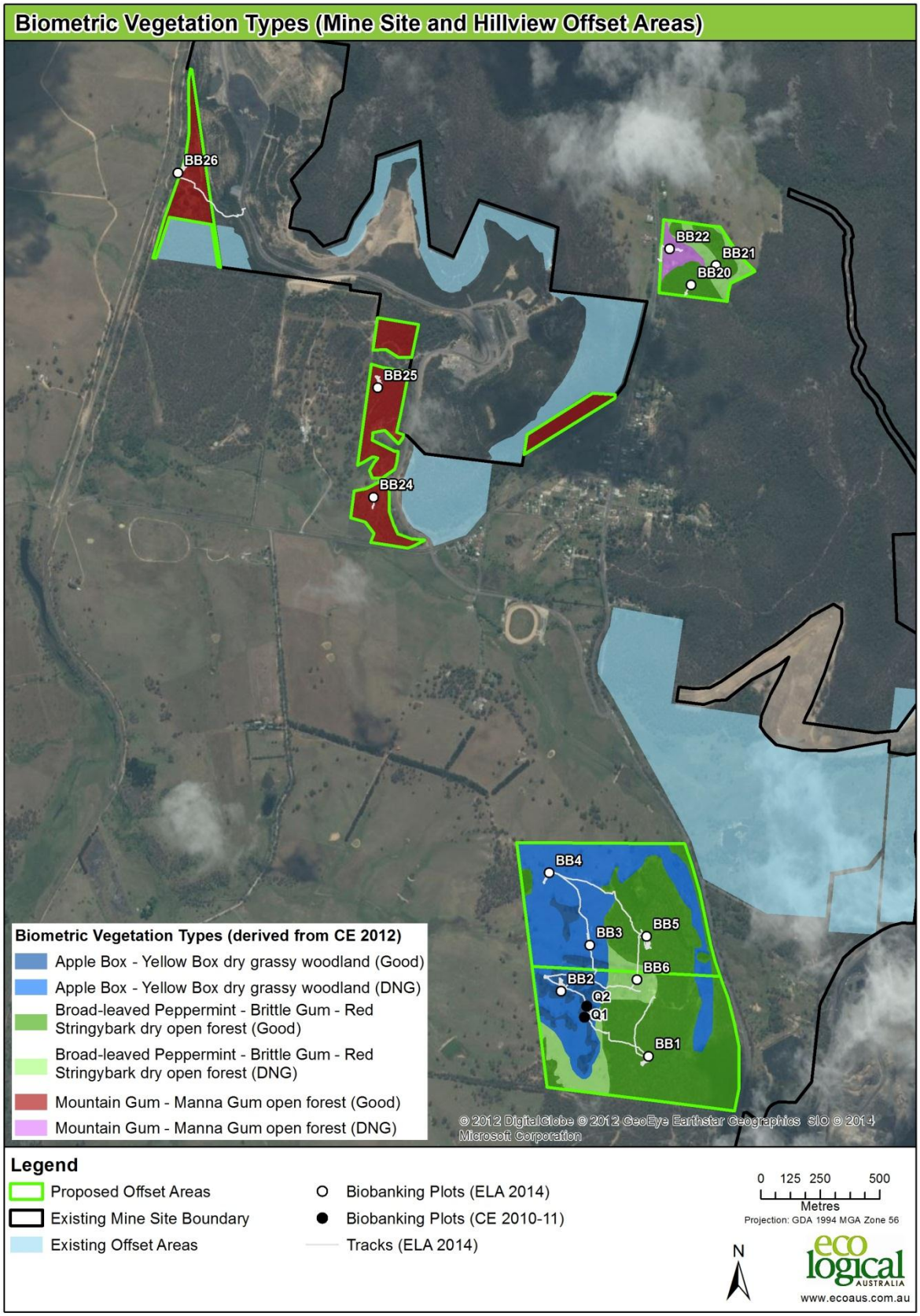


Figure 4: Biometric Vegetation mapping, condition zones and location of plots in 'Hillview' and 'additional' mine site offsets

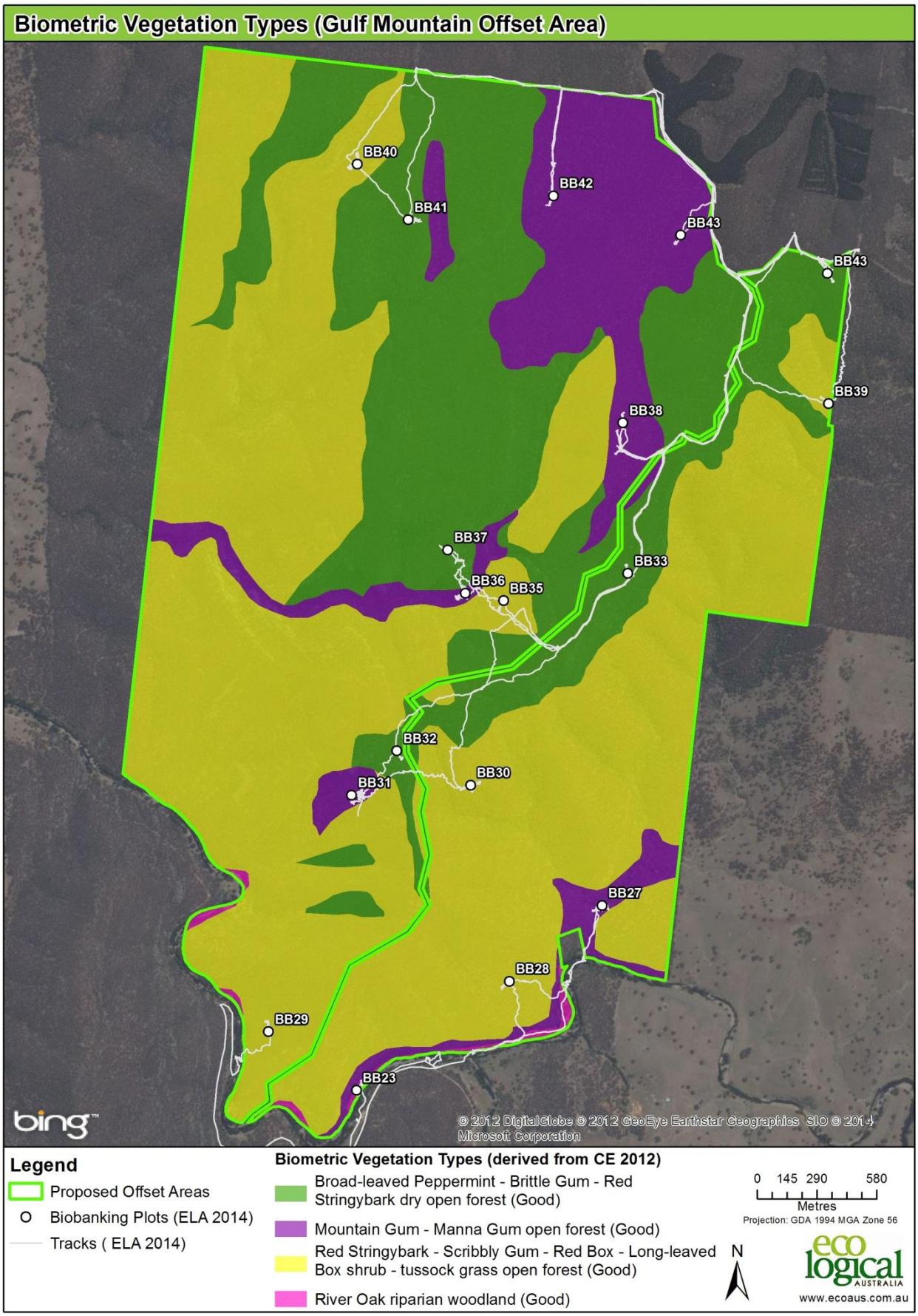


Figure 5: Amended Biometric Vegetation mapping, condition zones and location of plots for Gulf Mountain Offset Property

APPENDIX E

Ecological Impact Assessment

13 June 2014

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INVINCIBLE COLLIERY AND CULLEN VALLEY MINE MODIFICATIONS EA - RESPONSE TO SUBMISSIONS

Dear Dorian,

Cumberland Ecology has been requested by Hansen Bailey to respond to submissions made to the New South Wales Department of Planning (DoP) regarding the proposed Modifications of the Invincible Colliery (PA 07_0127) and Cullen Valley Mine (DA 200-5-2003) in the Lithgow Local Government Area, NSW (the Modifications).

Submissions have been made by the New South Wales Office of Environment and Heritage (OEH) and various conservation groups that relate specifically to ecological impacts of the Modifications and criticise elements of the Environmental Assessment prepared by Hansen Bailey. **Appendix A** of this letter provides our response to the ecological issues raised in these submissions.

Yours sincerely

David Robertson

David Robertson
Director
david.robertson@cumberlandecology.com.au

Appendix A

Response to Submissions: Ecology

A.1 Introduction

The NSW Office of Environment and Heritage (OEH) have made a submission expressing concerns relating to the adequacy of offsets, survey effort, impacts to ecological communities on Permian sediments, and the cumulative impact of the Invincible Colliery and Cullen Valley Mine Modifications (the Modifications). Further submissions have been made by a number of Special Interest Groups, including the Lithgow Environment Group Inc. (LEG), the Blue Mountains Conservation Society Inc. (BMCS) and the Colong Foundation for Wilderness which criticise aspects of the Ecological Assessment prepared by Cumberland Ecology in support of the Modifications EA (Hansen Bailey, 2014) and the impacts of the broader project.

The issues raised include:

- Adequacy of flora surveys and impacts to flora species of conservation significance;
- Impacts to endangered ecological communities (EECs);
- Adequacy of the Biodiversity Offset Strategy;
- Impacts of mining on proposals for future reservation of Gardens of Stone Stage 2;
- Impacts of mining on poorly reserved vegetation on the Permian sediments; and
- Indirect impacts, edge effects and cumulative impacts.

These issues are addressed in the following sections.

Note that within this document key terms and acronyms are as follows:

- **BBSF** – Ben Bullen State Forest;
- **BHS** – Broad-headed Snake;
- **CCP** – Abbreviation for the withdrawn Coalpac Consolidation Project;
- **CCP PAC** – abbreviation of the PAC review of the CCP EA (2012);
- **EPL**- Environment Protection Licences;
- **Escarpment** - a rapid change in relief or topography, exhibited in the general area in the Triassic Narrabeen Sandstone Formation;
- **Invincible Colliery and Cullen Valley Mine Modifications** – full term for 'project' name. To be abbreviated to "the Modifications"
- **The Modifications** - collective term for when referring to both proposals or total impacts predicted from both proposals

- **Modifications EA** - when referring to the EA 2014 document or sections from the EA document
- **Modification Boundary** – collective term for the proposed Modification application areas
- **Modification Disturbance Boundaries** – collective term for the proposed are to be disturbed by mining related activities for the Modifications
- **Response to CCP PAC** –document responding to the CCP PAC Review
- **RTS** – Response to Submissions
- **SIG** - Special Interest Group. Term for non-government agencies, companies, lobby and interest groups

A.2 Flora Surveys

This section addresses the submissions from OEH and conservation groups with regard to flora survey effort and threatened species searches.

A.2.1 Survey Effort

> ***Issue:*** *A number of submissions from OEH and Special Interest Groups (SIGs) make mention of the majority of the flora survey effort being employed in areas which are now not part of the proposed modification plan and of inadequate flora surveys of threatened species and ROTAP species within the Modification Disturbance Boundary. Concerns were raised that not enough effort was applied to impact areas and more surety is needed that threatened species, and others potentially in the proposal area, have been adequately searched for.*

Response: A large survey effort has been undertaken to census the plant diversity present in the Modification Boundary. In our view, the survey effort employed to assess the impacts to flora within the Modification Disturbance Boundaries is sufficient and comprehensive in the context of other flora assessments for similar comparable mining projects.

The survey process was aimed at increasing detection rates during known flowering periods and other active life stages of flora species that were predicted to occur on the basis of habitat assessment of the Modification Boundary and desktop assessments. Desktop searches for the Modifications included database searches of NSW Atlas of Wildlife and Department of Environment (DoE) Protected Matters Search Tool, as well as reviews of scientific literature describing threatened species habitat.

The survey period now spans over three years and were conducted throughout different seasons to increase detection, see **Table 1**.

Dedicated threatened species searches were undertaken by two ecologists for a minimum of 16 days, on top of searches undertaken whilst completing vegetation mapping, quadrat sampling and walking between sample sites throughout the entire survey period.

In addition to this, Coalpac engaged EcoLogical Australia (ELA) to conduct an independent informal biobanking assessment and ELA completed another thirteen quadrats within the Modification Disturbance Boundary. A total of 57 quadrats were completed within the Study Area, including 22 within the Modification Disturbance Boundaries. The ELA informal biobanking assessment is discussed further in **Section A4**.

Table 1 shows the updated survey effort in the Study Area conducted by Cumberland Ecology and ELA, with the locations of Cumberland Ecology and ELA quadrats shown on **Figure 1**.

Table 1 Updated Flora Survey Effort in the Study Area

Survey Technique	Dates	Effort
Vegetation Mapping	21-25 September 2009 19-23 October 2009 28 January 2010 2-3 February 2010 14-19 October 2010 12-16 September 2011 11-12 October 2011 10-11 December 2013	Minimum 24 days two people plus throughout entire survey period.
Quadrat sampling	21-25 September 2009 19-23 October 2009 28 January 2010 2-3 February 2010 14-19 October 2010 12-16 September 2011 7-11 April 2014 28 April 2014 1 May 2014	44 quadrats (Cumberland Ecology) 13 quadrats (EcoLogical)
Random meanders	Throughout flora survey period during vegetation mapping, quadrat sampling and threatened species searches. 10-11 December 2013	Throughout survey period

Table 1 Updated Flora Survey Effort in the Study Area

Survey Technique	Dates	Effort
Threatened flora searches and population estimates	Surveys undertaken concurrently with vegetation community mapping, random meanders and quadrat sampling with counts and additional searches undertaken on the dates below: 20 April 2011 6 and 12 May 2011 16 and 22 June 2011 12-16 September 2011 11-12 October 2011 3 – 6 November 2011	Minimum 16 days for 2 people targeted and throughout survey period

Coordinate System: MGA Zone 56 (GDA 94)

Grid North

CULLEN BULLEN

CULLEN BULLEN ROAD

CASTLEREAGH HIGHWAY

Legend

- Cullen Valley Modification Boundary
- Invincible Colliery Modification Boundary
- Existing Cullen Valley Mine
- Existing Invincible Colliery
- Open Cut Mining
- Highwall Mining
- Pipeline Corridor
- Road
- Waterway
- Town

Flora Survey Locations

Cumberland Ecology
- Flora Quadrat Location

EcoLogical Australia
- Flora Quadrat Location
- Flora Survey Tracks

Image Source:
Image © 2013 DigitalGlobe
© 2013 Google

Data Source:
© Copyright Commonwealth of Australia
(Geoscience Australia) 2006

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I:\...\13007\Figures\Report Figures\Letter 13_RTS\20140606\Figure 1. Flora Survey

Figure 1. Flora Quadrat Survey Locations

500 0 500 1000 1500 2000m

A.2.2 Threatened Flora Species

Issue: *Submissions have been made by OEH and conservation groups on the presence of the threatened flora species Persoonia marginata and Eucalyptus cannonii as well as possible presence of a number of other threatened flora species within the Modification Disturbance Boundaries. These species include:*

- *Persoonia marginata;*
- *Eucalyptus cannonii;*
- *Eucalyptus aggregata;*
- *Thesium australe;*
- *Prostanthera cryptandroides subspecies cryptandroides;*
- *Genoplesium superbum; and*
- *Derwentia blakelyi.*

Response: Each species raised in submissions is discussed separately below. Species known to occur in the Modification Disturbance Boundary are addressed first.

i. Persoonia marginata (Clandulla Geebung)

The shrub *Persoonia marginata* is listed as a Vulnerable species under both the NSW *Threatened Species Conservation Act 1995* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Lithgow Environment Group (LEG) found and mapped some additional plants, including 11 individual plants at Cullen Valley Mine that are within the proposed Modification Disturbance Boundary. LEG claims that this finding invalidates the impact assessments by Cumberland Ecology that asserted no significant impact to the known local population of *Persoonia marginata* would occur. Cumberland Ecology refutes this mistaken assertion.

A referral under the EPBC Act was submitted to the Commonwealth Department of Environment (DoE) on the basis that the Modification would clear an area of forest and woodland habitat of approximately 150 ha and that Commonwealth species and endangered ecological communities would not be significantly impacted. Mapping data was provided to DoE to substantiate that the referral was not a controlled action. Within the referral and in the Modification EA it was asserted that, based upon survey data at the time, no significant impact on *Persoonia marginata* would occur within the Disturbance Boundary as a result of the proposed Modification for Cullen Valley Mine and Invincible Colliery.

Cumberland Ecology understands that the DoE have considered the additional information about *Persoonia marginata* that was submitted by BMCS during the assessment period when the DoE (and the Minister for the Environment) made the determination that the Modifications

were not a controlled action. As such, the determination that the Modifications will not have a significant impact upon matters of national environmental significance remains valid.

The significance of the 11 plants to be disturbed by the proposed Cullen Valley Mine Modification is shown in a regional context of the populations of *Persoonia marginata* in the surrounding area in **Figure 2**.

Moreover, in addition to the aforementioned plants adjacent to the proposed Cullen Valley Mine Modification, targeted searches have identified thousands of individuals occurring in dense populations in forest several kilometres to the west (see Figure 2). The species is also found within the Gardens of Stone National Park, Wollemi National Park and Goulburn River National Park.

The small number of plants that will be disturbed if the Modifications are approved will not make a significant impact upon the known local population.

The majority of the known local population of *Persoonia marginata* occurs outside the Modification Disturbance Boundary at Cullen Valley Mine and will be avoided. All individuals occurring in the immediate proximity of the proposed open cut disturbance areas will be protected from mining related edge effects by a site based Species Management Plan (SMP).

Coordinate System: MGA Zone 56 (GDA 94)

Grid North

Note: OEH records not shown at this scale due to licencing restrictions.

200 0 200 400m

AIRLY
TURON RIVER
Mugii Murum-ban State Conservation Area
Turon National Park
Gardens of Stone National Park
WOLGAN RIVER
Wollemi National Park
TURON
CULLEN BULLEN
BEN BULLEN
Winburndale Nature Reserve
SUNNY CORNER
NEWNES
BEN BULLEN
WALLERAWANG
LIDSDALE
Marrangaroo National Park
LITHGOW
Eusdale Nature Reserve
FISH RIVER
COXS RIVER
MOUNT VICTORIA

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Legend

- Cullen Valley Modification Boundary
- Invincible Colliery Modification Boundary
- National Parks and Reserves
- State Forest
- Road
- Waterway
- Town

Persoonia marginata

Habitat

- Cumberland Ecology

Records

- Cumberland Ecology
- OEH Atlas
- LEG Submission

Scale: 1:250,000

Image Source:
Image © 2010 Sinclair Knight Merz
Image © 2010 DigitalGlobe
© 2010 Cnes/Spot Image

Data Source:
OEH Atlas: accessed 29/05/2014
NPWS Estate 2012
Forests NSW, 2010
© Copyright Commonwealth of Australia (Geoscience Australia) 2006

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I:\...\13007\Figures\Report Figures\Letter 13_RTS\20140603\Figure 2. Persoonia marginata locations

Figure 2. Persoonia marginata Locations

2.5 0 2.5 5 7.5 10km

ii. Eucalyptus cannonii (Capertee Stringybark)

LEG have claimed that the proposed removal of a substantial number of *E. cannonii* will clearly "only weaken the species' conservation status." LEG also claim that "*The magnitude of the threat needs to be assessed in the context of an accurate appraisal of the local population and its significance for the conservation of the species across its range. Vulnerable species are often prone to incremental erosion of their conservation status because they are not at imminent risk of extinction, and may be locally common.*"

The claim by LEG is not supported by the recent decision by the Commonwealth Government to de-list *Eucalyptus cannonii* as a Vulnerable species under the EPBC Act. The tree species is now regarded by the Commonwealth DoE as being secure and not under significant threat. Advice to the Federal Minister of the Environment in December 2013 noted that the species occurs in 67 locations with at least 30 populations and that there are no major current threats. The Commonwealth Government Scientific Committee concluded that based on available information on this species' population size and geographic distribution (including no evidence of decline), the species does not meet any of the required criteria for listing as a threatened species under the EPBC Act. It further noted that the species is well represented in the existing National Park estate including the Gardens of Stone and Wollemi National Parks which provides a high level of protection.

Eucalyptus cannonii is not under significant threat from the Modifications because:

- The numbers of trees to be cleared relative to the numbers of plants that will remain in the locality is not significant;
- The species can be regenerated within current biodiversity offset areas. It is proposed to be included in future rehabilitation; and
- The loss of plants from the Modifications can be offset within the lands of the Biodiversity Offset Strategy and within rehabilitation.

A vegetation survey of the existing Lot 112 and Lot 113 biodiversity offset areas at Invincible Colliery by Global Soil Systems in 2013 noted natural regeneration of *Eucalyptus cannonii* individuals which were spreading within these areas. Younger trees were predominantly located in close proximity to existing mature *Eucalyptus cannonii* individuals. This demonstrates the resilience of the species and its potential to recolonise a previously cleared landscape.

Due to the connectivity of rehabilitated areas with mature native woodland and biodiversity offset areas which contain self-seeding adult *Eucalyptus cannonii* individuals, it is likely that the species will infiltrate rehabilitated areas given time and suitable environmental conditions. The NSW National Parks and Wildlife Service note that *Eucalyptus cannonii* can be easily propagated from seed (NSW NPWS 2000). As such, the species could be propagated and readily introduced to rehabilitated areas as seedlings.

The Biodiversity offset package proposed for the Modifications contains at least 101 ha of known and potential habitat for this species which can be conserved and rehabilitated respectively.

When considering the above information, the Modifications are unlikely to result in a significant impact to *Eucalyptus cannonii* populations and it has been demonstrated that it can be successfully regenerated in biodiversity offset areas.

The species is not at significant risk of extinction as a result of the Modifications.

iii. Eucalyptus aggregata (Black Gum)

LEG stated that there is a possibility that this Vulnerable tree species could be within the Modifications Boundary and could be impacted by the project.

As indicated above a comprehensive survey effort has been undertaken to census the plant diversity present in the Modification Boundaries. Dedicated threatened species searches were undertaken by two people for a minimum of 16 days, on top of searches undertaken whilst vegetation mapping, quadrat sampling and walking between sample sites.

Locally, *Eucalyptus aggregata* is found in two vegetation communities MU 53 Mountain Hollow Grassy Fen, MU 15 Tableland Hollows Black Gum – Black Sally Grassy Open Forest and possibly MU 11 Tableland Gully Snow Gum – Ribbon Gum Grassy Forest where it occurs on alluvium. It is likely that MU 15 would have once occurred in areas previously cleared for agricultural pursuits and now occupied by the Invincible Colliery Biodiversity Offsets (where *Eucalyptus aggregata* has been found). These vegetation communities were not recorded in the Modification Boundaries or wider Study Area.

The Modifications will not add to potential cumulative impacts to *Eucalyptus aggregata* from the proposed Neubeck Creek Project and proposed Pine Dale Mine Extension a few kilometres to the southeast of the Invincible Colliery, on the eastern side of the Great Dividing Range. The Modifications will protect, conserve and replant the species within the Existing Invincible Colliery Biodiversity Offsets during the re-establishment of native vegetation in these areas.

iv. Thesium australe (Austral Toadflax)

Thesium australe is a small, straggling plant that occurs as a root parasite and is typically associated with grasslands or grassy understorey dominated by the native grass called Kangaroo Grass (Department of Environment and Heritage 2013).

The Kangaroo Grass dominated habitats that this species is typically found within do not occur within the Modification Boundaries. It has not been found within any previous surveys of the larger Study Area and is not expected to occur.

It is acknowledged that the species is known to occur several kilometres further south at proposed Neubeck Project and neighbouring proposed Pine Dale Mine Extension. Cumberland Ecology has visited the site where the species occurs at Pine Dale Mine and has been engaged to review the management plan for the species at the site. We note that Kangaroo Grass is abundant in the habitats at Pine Dale Mine and that this is quite different to habitat located within the Modification Boundaries.

v. Prostanthera cryptandroides subsp. crytandroides

Section 2.3.4 of the EIA explicitly states that *Prostanthera cryptandroides subsp. Crytandroides* was specifically targeted during threatened flora searches. This species was not recorded during targeted searches and will not be impacted by the proposed Modifications.

vi. Genoplesium superbum

Genoplesium superbum occurs predominantly in wet heathland on shallow soils above a sandstone cap, but has also been found in open woodland interspersed with heath and dry open shrubby woodland. This species has not been found within the Modification Disturbance Boundaries and therefore will not be impacted.

vii. Derwentia blakelyi

Section 2.3.4 of the EIA explicitly states that *Derwentia blakelyi* was specifically targeted during threatened flora searches. This species was not recorded during targeted searches and therefore will not be impacted by the proposed Modifications.

A.2.3 ROTAPs

> **Issue:** *Issues were raised about the adequacy of information about the* impact assessment for *ROTAP species. These are plants listed as rare or threatened within the following publication:*
>
> > *Briggs JD, Leigh JH (1995).* ***Rare or Threatened Australian Plants****. CSIRO Publishing: Collingwood, Vic.*
>
> *A number of species are known or considered to have a possibility to occur in proposed mining area.*

Response: Although not listed under State or Commonwealth conservation legislation, several ROTAP species have been recorded within the Modification Boundaries by Cumberland Ecology or subsequently by others.

Cumberland Ecology has carefully analysed the distribution of ROTAP species listed by the conservation groups (in particular LEG) in the locality and considered the likelihood of occurrence within the Modifications Disturbance Boundary.

The results of these analyses (as outlined below and illustrated on **Figure 3**) show that while there is potential for some of these ROTAP species to occur within the Modification Disturbance Boundaries, only one of the ROTAP plant species, *Acacia asparagoides*, occurs in the area proposed to be disturbed. The results outlined below also show clearly that the distributions of such species are not restricted to pagoda landforms but also occur in many other areas with differing geology and geomorphology. These species, apart from *Acacia asparagoides*, are also not present in significant numbers close to the areas proposed to be disturbed and therefore are unlikely to be significantly impacted by the Modifications.

Coordinate System: MGA Zone 56 (GDA 94)

Grid North

Gardens of Stone National Park

Turon National Park

SUNNY CORNER

CASTLEREAGH HIGHWAY

CULLEN BULLEN

PORTLAND CULLEN BULLEN ROAD

BEN BULLEN

BOULDER ROAD

NEWNES

BEN BULLEN

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Legend

- Cullen Valley Modification Boundary
- Invincible Colliery Modification Boundary
- National Parks and Reserves
- State Forest
- Road
- Waterway
- Town

ROTAP Species

- *Acacia asparagoides*
- *Banksia penicillata*
- *Eucalyptus apiculata*
- *Leionema lamprophyllum subsp. orbiculare*
- *Leucochrysum graminifolium*
- *Philotheca obovalis*
- *Prostanthera hindii*
- *Pseudanthus divaricatissimus*

Image Source:
Image © 2010 Sinclair Knight Merz
Image © 2010 DigitalGlobe
© 2010 Cnes/Spot Image

Data Source:
OEH Atlas accessed 26/05/2014
NPWS Estate 2012
Forests NSW, 2010
© Copyright Commonwealth of Australia
(Geoscience Australia) 2006

CUMBERLAND ECOLOGY

I:\...\13007\Figures\Report Figures\Letter 13_RTS\20140603\Figure 3. ROTAP Species

Figure 3. ROTAP Species Records

1000 0 1000 2000 3000 4000m

i. Leionema lamprophyllum subsp. orbiculare

This species grows within habitats that are not found within the Modification Boundaries. It is not likely to be impacted by the Modifications.

Leionema lamprophyllum subsp. orbiculare is classified as ROTAP: Recommend 2R-P3, with a geographic range of less than 100km and is considered to be data deficient according to the IUCN (Bell 2008). This species grows in heath on exposed ridges at higher altitudes (Botanic Gardens Trust 2013a).This species is associated with pagoda rock formations on heath and within 'pagoda country', as mapped by Washington and Wray (2011) and the local Escarpment areas as mapped by Cumberland Ecology.

The species has restricted distribution from Kandos Weir (east of Rylstone) to Lithgow where it is known from isolated patches of individuals (Botanic Gardens Trust 2013a). Records for the species occur within and near Wollemi National Park in the vicinity of Dunns Swamp (Kandos Weir) and Newnes and Coricudgy State Forests (Bell 2008, CHAH 2013).

In the Wollemi National Park the species is restricted to pagoda habitats (Bell 2008). The species has been recorded in habitat of open heath to open shrubland of *Acacia* and *Calytrix*species to low open Eucalypt dominated woodland and is associated with *Banksia ericifolia, B. spinulosa, Calytrix tetragona* and *Brachyloma daphnoides* (Benson and McDougall 2001). Bell (2008) notes that such habitat is fairly common in restricted areas along the western escarpment of Wollemi, and that as a consequence, there is considerable potential habitat for this taxa.

No records for this species occur within the Modification Boundaries. However a few records for this species occur to the east of the Invincible Colliery Modification Boundary. **Figure 3** shows the records for this species in the vicinity of the Modification Boundaries and in the wider area.

Based on the distribution of this species within vegetation communities in the locality, any potential occurrences of this species within the Modification Boundaries are considered to be unlikely.

There will be no direct impacts from the proposed development on any potential occurrences within the areas proposed to be highwall mined under the Modifications as these areas will not be cleared and the potential for indirect impacts (e.g. surface subsidence) are considered to be negligible.

Therefore the Modifications will not have any significant impacts, direct or indirect, on this species.

ii. Leucochrysum graminifolium

This species typically grows within habitats that are not found within the Modification Disturbance Boundaries. It is not likely to be impacted by the Modifications.

Leucochrysum graminifolium (Pagoda Rock Daisy) is classified as ROTAP: 2R, a rare species with a distribution of less than 100km. It is considered to be a species of least concern according to the IUCN (Bell 2008).

Leucochrysum graminifolium grows on exposed sites on sandy soils and in sand deposits in cracks and depressions in sandstone pagoda and rock shelf formations and rocky heath (Bell 2008, Botanic GardensTrust 2013a). Although *L. graminifolium* is generally associated with pagoda habitat, it is not entirely restricted to pagodas and also occurs on rock shelf formations and rocky heaths.

This species is endemic to the Greater Blue Mountains World Heritage Area (The Blue Mountains Botanic Garden- Mount Tomah 2013) within the Wollemi and Gardens of Stone National Parks and distributed from the Lithgow district to Rocky Creek and Mt Dawson in the south-west of Wollemi National Park, to the Newnes Plateau (Bell 2008, Botanic Gardens Trust 2013a). It has been recorded in Wolgan State Forest, Ben Bullen State Forest, Birds Rock Nature Reserve and Newnes State Forest (CHAH 2013).

No records for this species occur within the Modification Boundary. However a few records for this species occur to the east of Invincible Colliery Modification Boundary. **Figure 3** shows the records for this species in the vicinity of the Modification Boundaries and the wider area.

Based on the distribution of this species within vegetation communities in the locality, any potential occurrences of this species within the Modification Boundaries are considered to be unlikely.

There will be no direct impacts from the proposed development on any potential occurrences within the areas proposed to be highwall mined under the Modifications as these areas will not be cleared and indirect impacts (e.g. subsidence) are considered to be negligible.

Direct and indirect impacts to this species within the proposed open cut areas are considered to be minimal as potential occurrences, if any, are likely to be limited to a few individuals. This species is found within Wolgan State Forest, Birds Rock Nature Reserve and Newnes State Forest and the potential removal of individuals and a small area of potential habitat is unlikely to place this species at risk of extinction.

Therefore the Modifications will not have any significant impacts, direct or indirect, on this species.

iii. Philotheca obovalis

Philotheca obovalis is classified as ROTAP 3RC (Briggs and Leigh 1995) which indicates that its geographical range in Australia is thought to be greater than 100km, that it is rare (although not currently under any identifiable threat) and has at least one population within a National Park or conservation reserve (Briggs and Leigh 1995).

This species grows in heath and dry sclerophyll forest on sandstone in the Blue Mountains (ANPS 2013a). This species is associated with rocky heath and dry sclerophyll forest on sandstone across the Blue Mountains. Whilst numerous records occur within 'pagoda country',

as mapped by Washington and Wray (2011) and the local Escarpment area as mapped by Cumberland Ecology (2013), the species has a much wider distribution across the Blue Mountains region and is not considered to be dependent on pagoda landforms.

In areas north of Newnes plateau, it occurs on montane rocky heath and is associated with species such as *Banksia ericifolia, Leptospermum parvifolium, Eucalyptus laophila, Dillwynia floribunda var. teretifolia, Kunzea ambigua, Baeckea densifolia, Allocasuarina nana and Grevillea sericea* (Bell 2008). It is also known to occur in open forest along the Mt Cameron Fire Trail, with overstorey species including *Eucalyptus sclerophylla, E. piperita and E. sieberi* and an understorey of sclerophyllous species including *Dillwynia phylicoides, Hakea spp., Hibbertia serpyllifolia, Leptospermum sphaerocarpum, , Banksia serrata, Lomandra obliqua and Patersonia glabrata* (Bell 2008).

As well as being recorded in the Blue Mountains on the northern Newnes Plateau and east along Mt Cameron Fire Trail (Bell 2008), this species has also been recorded at Kydra Mountain, NSW (Botanic Gardens Trust 2013a). Briggs and Leigh (1995) considered this species to be adequately conserved in the Blue Mountains National Park, with insufficient information available on population sizes within Wollemi National Park. It has also been recorded near Mt Jamison and Point Cameron in the Gardens of Stone National Park (Washington 2001).

No records for this species occur within the Cullen Valley Mine Modification Boundary. However a few records for this species occur to the east of the Invincible Colliery Modification boundary. **Figure 3** shows the records for this species in the Modification Boundaries and in the wider area.

There will be no direct impacts from the proposed development on any potential occurrences within the highwall mining areas of the Modifications as these areas will not be cleared and indirect impacts (e.g. surface subsidence) are considered to be negligible.

Direct and indirect impacts to this species within the open cut areas proposed to be cleared are considered to be minimal as potential occurrences are likely to be limited to a few individuals. As shown on Figure 3, this species is also well conserved in the region within the Blue Mountains National Park and Gardens of Stone National Park. The predicted impact to isolated individuals previously recorded in the Invincible Colliery Modification Disturbance Boundary and the small area of potential habitat in the Modification Disturbance Boundaries proposed to be is unlikely to pose a significant threat to this species.

Therefore the Modifications will not have any significant impacts, direct or indirect, on this species.

iv. Acacia asparagoides

Acacia asparagoides is classified as ROTAP 2R, with a geographical range of less than 100km and rare (although not currently under any identifiable threat). This species occurs in dry sclerophyll forest, and occasionally on heathland, on sandstone rock formations (Botanic Gardens Trust 2013a) and is not restricted solely to Escarpment habitats.

This species mainly occurs in the Central Coast (Botanic Gardens Trust 2013a) and Central Tablelands botanical subdivision in NSW, particularly between Katoomba/Lawson and the Gardens of Stone National Park (CHAH 2013). Records occur across this area in the vicinity of Blackheath, Lithgow, Victoria Pass, Newnes State Forest and Ben Bullen State Forest (CHAH 2013). There are two outlying records that occur, one from 40km north of Toowoomba in Queensland and one from 15km southwest of Omeo in Victoria (CHAH 2013). It has also been recorded in disturbed areas (described as cleared or non-native vegetation (CHAH 2013)). It is conserved in Wollemi National Park and the Blue Mountains National Park (CHAH 2013). Only one record for this species occurs within the Modification Boundaries. However, known records of this species show that it is mainly distributed across the Escarpment area to the east of the proposed Invincible Colliery Modification Boundary. **Figure 3** shows the records for this species in the area.

No records for this species occur within the Cullen Valley Mine Modification Boundary. However a few records for this species occur to the east of, and one within, the Invincible Colliery Modification boundary. Figure 3 shows the records for this species in the Modification Boundaries and in the wider area.

There will be no direct impacts from the proposed development on any potential occurrences within the highwall mining areas of the Modifications as these areas will not be cleared and indirect impacts (e.g. surface subsidence) are considered to be negligible.

Direct and indirect impacts to this species within the open cut areas proposed to be cleared are considered to be minimal as potential occurrences are likely to be limited to a few individuals. As shown on **Figure 3**, this species is also well conserved in the region within the Blue Mountains National Park and Gardens of Stone National Park. The predicted impact to isolated individuals previously recorded in the Invincible Colliery Modification Disturbance Boundary and the small area of potential habitat in the Modification Disturbance Boundaries proposed to be is unlikely to pose a significant threat to this species.

Therefore the Modifications will not have any significant impacts, direct or indirect, on this species.

v. Banksia penicillata

Banksia penicillata is classified as ROTAP 3RC (Briggs and Leigh 1995) which indicates that its geographical range in Australia is thought to be greater than 100km, that it is rare (although not currently under any identifiable threat) and has at least one population within a National Park or conservation reserve (Bell 2008). *Banksia penicillata* is listed by the IUCN as least concern (Bell 2008).

It occurs in dry sclerophyll open forest or woodland, heathlands, sandstone cliffs or steep slopes and around rocky outcrops (Botanic Gardens Trust 2013a) and has been recorded in disturbed areas (described as cleared or non-native vegetation) (CHAH 2013).This species is known to occur on pagoda landforms but is not restricted to pagoda habitats as it also occurs on slopes and ridges within Eucalypt open forest on the deeper sands around Hefrons Gap (Bell 2008).

Banksia penicillata occurs in the Central Coast, Central Tablelands and Central Western Slopes botanical subdivisions (Botanic Gardens Trust 2013a) particularly in the northern and north-western parts of the Blue Mountains National Park (CHAH 2013). It occurs in Wollemi National Park, Newnes State Forest and Coricudgy State Forest. There is also an outlying record northeast of Kandos and east of Mudgee (CHAH 2013). This species is conserved in Wollemi National Park and Blue Mountains National Park (CHAH 2013).

No records for this species occur within or in the vicinity of the Modification Boundaries. Known records of this species show that it is mainly distributed across the Escarpment area to the east and north-east of the Invincible Colliery Modification Boundary. **Figure 3** shows the records for this species in the area.

Based on the distribution of this species in the locality, any potential occurrences of this species within the Modification Boundaries are considered to be unlikely. There will be no direct impacts from the proposed development on any potential occurrences within the areas proposed to be highwall mined under the Modifications as these areas will not be cleared and indirect impacts (e.g. surface subsidence) are considered to be negligible.

Direct and indirect impacts to this species within the open cut areas to be cleared are considered to be minimal as potential occurrences, if any, are likely to be limited to a few individuals. This species is conserved within Wollemi National Park and the Gardens of Stone National Park. The potential removal of a few individuals and a small area of potential habitat is unlikely to pose a significant threat to this species.

Therefore the Modifications are not expected to have any significant impacts, direct or indirect, on this species.

vi. Eucalyptus apiculata

Eucalyptus apiculata is classified as ROTAP 3RC (Briggs and Leigh 1995) which indicates that its geographical range in Australia is thought to be greater than 100km, that it is rare (although not currently under any identifiable threat) and has at least one population within a National Park or conservation reserve (Bell 2008). This species occurs in mallee shrubland on skeletal sandy soil on sandstone (Botanic Gardens Trust 2014).

This species mainly occurs in the Central Coast (Botanic Gardens Trust 2013a) and Central Tablelands botanical subdivision in NSW, particularly between Linden and Berrima (Botanic Gardens Trust 2014). Records in the locality mainly occur within Gardens of Stone National Park, Wolgan State Forest, Newnes State Forest and Ben Bullen State Forest (CHAH 2013). Further records occur south of Blue Mountains National Park, Nattai National Park and Belanglo State Forest. (CHAH 2014). It is conserved in Wollemi National Park and the Gardens of Stone National Park (CHAH 2014).

No records for this species occur within or in the vicinity of the Modification Boundaries. The limited known records of this species show that it is mainly distributed across to the south-east and north of the Modification Boundaries. **Figure 3** shows the records for this species in the area.

Based on the distribution of this species in the locality, any potential occurrences of this species within the Modification Boundaries are considered to be unlikely. There will be no direct impacts from the proposed development on any potential occurrences within the areas proposed to be highwall mined under the Modifications as these areas will not be cleared and indirect impacts (e.g. surface subsidence) are considered to be negligible.

Direct and indirect impacts to this species within the open cut areas to be cleared are considered to be minimal as potential occurrences, if any, are likely to be limited to a few individuals. This species is also conserved within the Gardens of Stone National Park. The potential removal of a few individuals and a small area of potential habitat is unlikely to pose a significant threat to this species.

Therefore the Modifications will not have any significant impacts, direct or indirect, on this species.

vii. Prostanthera hindii

Prostanthera hindii is classified as ROTAP: 2KC (geographic range of less than 100km, distribution poorly known, at least one population occurs in a national park (i.e. Wollemi National Park, size unknown).It is also considered to be a species of least concern according to the IUCN (Bell 2008). Conn (1997) estimates this population to be less than 1,000 plants whilst Bell (2008) estimates it to be over 1,000.

The species grows in shrubland and woodland and is confined to shallow quartz-rich sandy soils of rocky sandstone or conglomerate platforms and outcrops, amongst steep rocky turret faces and deep rubble-filled fissures (Conn 1997) in Wollemi National Park and the Rylstone district (Botanic Gardens Trust 2013a).

P. hindii is associated with rocky platforms and Escarpment habitats but is not entirely restricted to these areas. A number of records occur outside of the core Pagoda Country mapping as mapped by Washington and Wray (2011) and outside local Escarpment areas as mapped by Cumberland Ecology (2013).

In the Wollemi National Park, known records of *P. hindii* are found in Escarpment heath environments with considerable variation in associated species, reflecting the variation in elevation and rainfall along the western regions of Wollemi (Conn 1997, Bell 2008). The species has also been recorded in Escarpment heath vegetation at three locations along the western edge of the park; Lee Creek, Dunns Swamp and Rocky Creek near the Newnes Plateau (Bell 2008). Dr Haydn Washington (2001) has recorded this species near Mt Jamison and at Point Cameron within the Gardens of Stone National Park.

The species has very localised and disjunct distribution, restricted to the Wollemi National Park and Rylstone district of NSW (Conn 1997, Botanic Gardens Trust 2013a). No records for this species occur within or in the vicinity of the Modification Boundaries. Known records of this species show that it is mainly distributed across to the north-east of the Modification Boundaries. **Figure 3** shows the records for this species in the area.

Based on the distribution of this species in the locality, any potential occurrences of this species within the Modification Boundaries are considered to be unlikely. There will be no direct impacts from the proposed development on any potential occurrences within the areas proposed to be highwall mined under the Modifications as these areas will not be cleared and indirect impacts (e.g. surface subsidence) are considered to be negligible.

Direct and indirect impacts to this species within the open cut areas to be cleared are considered to be minimal as potential occurrences, if any, are likely to be limited to a few individuals. This species is conserved within Wollemi National Park and the Gardens of Stone National Park. The potential removal of a few individuals and a small area of potential habitat is unlikely to pose a significant threat to this species.

Therefore the Modifications will not have any significant impacts, direct or indirect, on this species.

viii. Pseudanthus divaricatissimus

Pseudanthus divaricatissimus is classified as ROTAP 3RC (Briggs and Leigh 1995) which indicates that its geographical range in Australia is thought to be greater than 100km, that it is rare (although not currently under any identifiable threat) and has at least one population within a National Park or conservation reserve (Briggs and Leigh 1995).

This species occurs in sandy soils on sandstone rock formations (Botanic Gardens Trust 2013a). It occurs within Eucalypt open forest and heathlands but has been recorded in disturbed areas (described as cleared or non-native vegetation) (CHAH 2013).*P. divaricatissimus* has a fairly wide distribution and is known to occur on sandstone rock formations in Eucalypt open forest and heath. It has also been recorded from disturbed areas and is not considered to be dependent on Escarpment landforms.

Pseudanthus divaricatissimus is found in North Coast, Central Coast, Central Tablelands, Southern Tablelands and Central Western Slopes botanical sub-divisions in NSW between Muswellbrook and Bega, although there are records from other states and outlying populations near Dubbo and Urbenville (Botanic Gardens Trust 2013a). The majority of recordings of this species are from between Katoomba and Victoria Pass in NSW. Its distribution includes parts of Morton National Park between Ulladulla and Bundanoon, Blue Mountains National Park, Kanangra-Boyd National Park and Dangelong Nature Reserve. There are records of this species near Cowra, NSW and also in Victoria. The records in Victoria occur in Lerderderg State Park, Snowy River National Park, Alpine National Park and one in a state forest southeast of Coopracambra National Park approximately 40km northwest of Mallacoota (CHAH 2013).

Pseudanthus divaricatissimus is conserved in the Blue Mountains National Park, Wollemi National Park, Kanangra-Boyd National Park, Morton National Park, Snowy River National Park and Dangelong Nature Reserve (CHAH 2013).

No records for this species occur within or in the vicinity of the Modification Boundaries. Known records of this species show that it is mainly distributed across to the north-east of the Modification Boundaries. **Figure 3** shows the records for this species in the area.

Based on the distribution of this species in the locality, any potential occurrences of this species within the modification boundary are considered to be unlikely. There will be no direct impacts from the proposed development on any potential occurrences within the areas proposed to be highwall mined under the Modifications as these areas will not be cleared and indirect impacts (e.g. surface subsidence) are considered to be negligible.

Direct and indirect impacts to this species within the open cut areas to be cleared are considered to be minimal as potential occurrences, if any, are likely to be limited to a few individuals. This species is conserved within Blue Mountains National Park and Wollemi National Park. The potential removal of a few individuals and a small area of potential habitat is unlikely to pose a significant threat to this species.

Therefore the Modifications will not have any significant impacts, direct or indirect, on this species.

A.3 Endangered Ecological Communities

> **Issue:** *This section addresses the submissions from OEH and conservation groups with regard to vegetation mapping and the presence of Endangered Ecological Communities (EECs) within the modification boundaries.*
>
> *Several submissions have been made by conservation groups identifying the possible presence of EECs occurring within the Modification Disturbance Boundary, including Box Gum Woodland, Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland and Montane Peatlands and Swamps.*

Response: The issue of the mapping and presence of Box Gum Woodland and Frost Hollow Grassy Woodland are dealt with below:

A.3.1 Box Gum Woodland

Using ESD principles, the open cut mine design has avoided populations of Box Gum Woodland within the Modification Boundaries. This is shown in the vegetation map provided in Figure 4.2 of the Ecological Impact Assessment.

A vegetation unit referred to as "MU 20 Capertee Rough-barked Apple - Red Gum - Yellow Box Grassy Woodland" is the local variant of Box Gum Woodland. MU 20 is not considered to occur within the Invincible Colliery Modification Boundary. The community within this area was previously mapped by Cumberland Ecology as the EEC, however further analysis has determined that the vegetation better conforms to a variant of the dominant surrounding community, MU 35 Tableland Gully Mountain Gum - Broad Leaved Peppermint Grassy Forest. The re-mapping of this community is supported by the NSW Office of Environment and Heritage in their submission to the NSW Planning Assessment Commission Coalpac Consolidation Review (OEH, 2012). Within their submission, they state that:

> *"...Cumberland Ecology has identified areas with Blakely's Red Gum as the White Box Blakely's Red Gum Yellow Box Endangered Ecological Community.....However OEH reached a different conclusion after sampling a number of sites....The consistent presence of Mountain Gum, and more occasional presence of Blakely's Red Gum suggests that this is a tableland grassy forest."* (OEH, 2012).

A small area (approximately 0.6 ha) of MU 20 Capertee Rough-barked Apple - Red Gum - Yellow Box Grassy Woodland occurs in the Cullen Valley Modification Boundary. The community occurs on the surface in areas proposed for (underground) highwall mining. The use of the highwall mining method will ensure that no surface subsidence of greater than 20 mm occurs within areas mined. As a result, no impacts to surface topography, landform or hydrology will occur. Moreover, the negligible surface subsidence predicted as a result of highwall mining is not considered likely to adversely impact any species occurring within the Modification Boundaries.

A.3.2 Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland (Frost Hollow)

The LEG submission states that the Frost Hollow EEC is likely to occur within part of the Modification Disturbance Boundaries.

This EEC was neither found by Cumberland Ecology nor OEH when they remapped the vegetation of the earlier withdrawn Coalpac Consolidation Project (CCP). It has also not been found or referred to within the EcoLogical Australia informal BioBanking assessment of the impact area (Humphries 2014).

Firstly, it is acknowledged in the EIA that some of the characteristic tree species of this community occur within parts of the Modification Disturbance Boundaries. These include *Eucalyptus viminalis* (Ribbon Gum), *Eucalyptus pauciflora* (Snow Gum), *Eucalyptus rubida* (Candlebark) and *E. bridgesiana* trees referred to by Dr Steve Douglas (REF) occur within parts of the Study Area. However, the presence of tree species alone does not indicate the existence of an EEC. Dr Steven Douglas in his report to BMCS notes:-

> *"It [Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland] is unlikely to be evident from aerial photo interpretation, and lacks one or more components typical of the community, but still warrants consideration as an example of the EEC [emphasis added]".*

This community was not identified during extensive vegetation mapping within the Modification Boundaries, especially within the Modification Disturbance Boundaries. It is also noteworthy that OEH's mapping of Permian sediments of the Study Area for the CCP PAC Review in 2013 did not identify this EEC.

The Final Determination (OEH, 2011) describes the EEC as occurring mainly on valley floors, margins of frost hollows, footslopes and undulating hills between approximately 600 and 1,400 m in altitude. The Final Determination is a broad legal description that describes the ecological

community across its known extent and covers all variation of the ecological community, such as soil type and characteristic species. It also includes a number of previously identified vegetation maps and vegetation types, one of which has covers vegetation types mapped within the Study Area i.e. Vegetation of the Western Blue Mountains (covering lands nearby to the Modifications Disturbance Boundaries).

The valley floor and footslopes within the Modifications Boundaries are mainly covered in Tableland Gully Ribbon Gum Blackwood Apple Box Forest (MU 13), Tableland Gully Mountain Gum – Broadleaved Peppermint Grassy Forest (MU 35) and Capertee Rough-barked Apple Red Gum Yellow Box Grassy Woodland (MU 20). These vegetation communities are not identified in the Final Determination.

The local variant of this EEC corresponds to Tableland Hollows Black Gum – Black Sally Grassy Open Forest (MU 15) and Tableland Gully Snow Gum – Ribbon Gum Grassy Forest (MU 11). MU 11 and MU 15 are more likely to occur in wider valleys and along rivers associated with cold air drainage "frost hollows". Such conditions occur at Blackmans Flat (location of the proposed Neubecks Creek Project and proposed Pine Dale Mine Extension), the Cox's River and within parts of Existing Invincible Offset 2008, west of current operations.

Frost hollows do occur within Existing Invincible Offsets (2008), which are lower down on the valley floor than the Modification Disturbance Boundaries proposed for both sites.

It is likely that MU 11 and/ or MU 15 would have once occurred within the Existing Invincible Offsets prior to their past clearing for agriculture purposes. The EEC will not be impacted by the Modifications, but will be protected and restored in existing offsets for the approved Invincible Colliery operation, therefore adding to the conservation of this EEC in the local area.

A.4 Biodiversity Offset Strategy

Issues: *This section addresses the submissions from OEH and conservation groups with regard to the proposed Biodiversity Offset Package.*

Concerns have been raised by OEH that a recognised metric system has not been used to calculate biodiversity losses and gains from the proposal and that no allowance has been made for the condition of vegetation at the impact or offset sites.

A.4.1 Lack of a Recognised Metric to Calculate Biodiversity Losses

The letter prepared by OEH states the following:

Interpretation of Offset to Impact Ratios

The Proponent has not used a recognised metric to calculate biodiversity losses and gains from the proposal, but simply presents an offset strategy which is based on hectares cleared and hectares offset. The ratio of offset to clearing for each vegetation type identified by the Proponent is presented in Table 16 of the

EA (p 83). Overall the ratio given is 4.3:1. There are a number of problems with this approach:

- *no evidence is presented as to the adequacy of this ratio,*
- *no allowance is made for the condition of vegetation at the impact sites or at the offset sites,*
- *failure to use a recognised metric such as the Biobanking Assessment Methodology (BBAM) means that aspects of offsetting such as effects on threatened species, effects of landscape type or viability of sites are not considered,*
- *the majority (62.5%) of the offset vegetation is contained in one vegetation type at one location, namely Tableland Scribbly Gum – Narrow-leaved Stringybark Shrubby Open Forest at the "Gulf Mountain" offset,*
- *derived native grassland within the offset sites is treated as equivalent to the mature vegetation type even though it will need management to restore it. On the plus side much of this derived native grassland has been described in the EA as part of the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland), which is listed as an Endangered Ecological Community (EEC) (p 77).*

Response: In response to the OEH submission, Coalpac commissioned EcoLogical Australia to undertake an independent, informal BioBanking Assessment (Humphries 2014) consistent with the BioBanking Assessment Methodology (BBAM) and '*OEHs interim policy on assessing and offsetting biodiversity impacts of Part 3A, State Significant Developments and State Significant Infrastructure projects*'. This assessment has been provided to OEH for review.

The independent informal BioBanking Assessment clearly demonstrates that if the entire Gulf Mountain property were to be incorporated into the Biodiversity Offset Strategy, then the offset package would exceed the offsetting requirements for ecosystem credits for the Modifications. This is demonstrated by **Table 3** below, which is reproduced from ELA's independent informal BioBanking Assessment (Humphries 2014).

The Biodiversity Offset Strategy has now been adjusted in response to the results of the independent informal BioBanking Assessment. The Biodiversity Offset Strategy now includes all of Gulf Mountain, Hillview/Billabong and other properties adjacent to the Invincible Colliery and Cullen Valley Mine, and recognition of the rehabilitation of the proposed disturbance area.

The independent informal BioBanking Assessment found that the impact area would generate a BioBanking "liability" of 8,628 ecosystem credits. Assuming that the Modifications Disturbance Boundaries would be rehabilitated and revegetated, rehabilitation can account for 1,094 ecosystem credits, leaving 7,534 ecosystem credits to be sourced within the offset lands.

It is estimated that a total of 12,416 ecosystem credits can be generated by Gulf Mountain, Hillview and the other offset lands. Therefore an excess of ecosystem credits can be generated.

According to current Biobanking guidelines (Environment and Heritage 2012), the ecosystem credits from an offset site must be matched to those of the impact area. The independent informal BioBanking Assessment has found that all of the vegetation communities in the Modifications Disturbance Boundary can be matched to the formation level by vegetation within the lands within the revised Biodiversity Offset Strategy.

Table 2 Preliminary BioBanking Credit Analysis

	Impacts				Hillview/Billabong and "Additional' Mine Site Offsets		Gulf Mountain Offset		Total Offset Area Credits Available	
Vegetation Formation	Area (ha)	No. Credits required	No. Credits generated (Rehabilitation)	Final credits required	Area (ha)	No. Credits generated	Area (ha)	No. Credits generated	Area (ha)	No. Credits generated
Grassy Woodlands	0.09	5	1	4	34.89	317			34.89	317
Dry Sclerophyll Forests (Shrubby sub-formation)	59.16	3523	435	3,088	56.19	454	364.25	3,129	420.44	3,583
Dry Sclerophyll Forests (Shrubby sub-formation)	36.88	2,106	271	1,835	0	0	0	0	0	0
Dry Sclerophyll Forests (Shrub/grass sub- formation)	34.95	2,287	259	2,028	0	0	753.07	6,733	753.07	6,733
Wet Sclerophyll Forests (Grassy sub-formation)	17.39	707	128	579	22.43	235	164.01	1,493	186.44	1,728
Forested Wetlands	0	0	0	0	0	0	6.81	55	0	55
	148.47	8,628	1,094	7,534	113.51	1,006	1,288.14	11,410	1,394.84	12,416

This table of data was taken from the independent informal BioBanking Assessment report by Ecological Australia (Humphries 2014).

One of the concerns raised by various stakeholders, including OEH, about some of the vegetation communities on the Permian sediments, was that they represent forests on fertile soils and that such grassy forests are of conservation significance. In particular, they hypothesise that the forest type called Tableland Gully Ribbon Gum Blackwood Apple Box Forest is a grassy forest that has been over cleared and is not well represented in conservation reserves.

The independent informal BioBanking Assessment found that such forest comes under the category of "Wet Sclerophyll Forests" in what is known as the grassy sub-formation. As such, ELA found that Gulf Mountain can legitimately offset impacts to these communities and that there would be an excess of credits generated for it.

With regard to the Wet Sclerophyll Forests (Grassy sub-formation), the project would impact 17 ha and generate a liability, after consideration of rehabilitation, of 579 credits. The revised Biodiversity Offset Strategy would provide 186 ha of such forest types and generate 1,728 ecosystem credits. As such the impacts to the Tableland Gully Ribbon Gum Blackwood Apple Box Forest can be addressed via the revised Biodiversity Offset Strategy.

The main concerns of OEH are shown again below in italics, with an explanation of how the new metric information addresses the concerns:

- *no evidence is presented as to the adequacy of this ratio*

The independent informal BioBanking Assessment clearly assesses the adequacy of the revised Biodiversity Offset Strategy and demonstrates that the offsets are appropriate to address the impacts of the project.

- *no allowance is made for the condition of vegetation at the impact sites or at the offset sites*

The impact sites and offset sites have been independently assessed using the OEH BioBanking Assessment Methodology that has formal consideration of vegetation condition factored into the offset assessment.

- *failure to use a recognised metric such as the Biobanking Assessment Methodology (BBAM) means that aspects of offsetting such as effects on threatened species, effects of landscape type or viability of sites are not considered*

The BioBanking Assessment Methodology has been independently applied and the effects on threatened species, effects of landscape type and viability of sites have been considered.

- *the majority (62.5%) of the offset vegetation is contained in one vegetation type at one location, namely Tableland Scribbly Gum – Narrow-leaved Stringybark Shrubby Open Forest at the "Gulf Mountain" offset*

Gulf Mountain was independently mapped by ELA for the purposes of the informal BioBanking Assessment. As the entirety of this property is now part of the proposed Biodiversity Offset

Strategy, Gulf Mountain provides substantial offset for a suite of different vegetation types including dry sclerophyll forests, wet sclerophyll forests and forested wetlands.

A.5 Suitability of Proposed Offset Sites for Incorporation in the National Parks and Reserves System

> **Issue:** *OEH notes that the Proponent on this occasion does not propose to 'gift' the offsets for inclusion into the NSW reserve system. However, OEH has sought internal advice from its Parks and Wildlife Group (PWG) regarding the suitability of the current proposed offset properties in the BOP for future reservation in the National Parks and Wildlife Estate. PWG advise that at this point in time, none of the properties would be suitable for this purpose. Consequently, OEH recommends that another form of in perpetuity conservation mechanism would be required over all potential offsets.*

Response: The whole of the Gulf Mountain property will now be included in the Biodiversity Offset Strategy, making future conservation management easier than the previously-proposed "portion" of the property.

It is proposed that the offsets will be set aside for conservation in perpetuity using an appropriate mechanism, such as a Voluntary Conservation Agreement, BioBanking or a Planning Agreement.

A.6 Reservation Considerations

> ***Issue****: OEH is concerned about the loss of land within Ben Bullen State Forest which they consider has high potential for incorporation in the National Parks and reserves system.*

Response: The proposed Modifications have a footprint of approximately 150 ha and will have a net positive outcome for the environment. If the mines were to be closed in their current form, there would be six residual voids (three at each site) in the BBSF resulting in a final landform that is inconsistent with the surrounding landscape in the BBSF.

The Modifications will allow for full mitigation of the six residual voids, and will therefore also provide for improved rehabilitation outcomes in the long term. Such net environmental benefits need to be considered when evaluating their environmental impacts and any impacts to future potential for conservation.

A response to the potential incorporation of the Ben Bullen State Forest in the National Parks or NSW Conservation Reserve system is discussed in the main body of the RTS.

A.7 Pagodas, Escarpments and Associated Features

> ***Issue**: OEH considers that there is potential for damage to occur to scenic features associated with pagodas, cliff lines and sandstone outcrops as a result of subsidence caused by highwall mining, and therefore recommends that highwall mining not be undertaken beneath these areas.*
>
> *Sandstone landscapes in the study area are also considered to provide habitat for the Broad-headed Snake and therefore OEH recommend a 300 m setback from these features. OEH note that in most cases the proposed Modifications achieve this, however some small areas in the northern part of the Invincible Modification and much of the open cut area proposed for the Cullen Valley modification is within 100m of sandstone escarpments.*

Response: This section addresses potential ecological impacts that form a basis for the proposed buffer zone against Escarpment areas. The potential impact of the proposed open cut and highwall mining activities on the stability of Escarpment areas has been responded to in the RTS document as a separate issue and is outside of Cumberland Ecology's expertise.

With regard to Escarpment areas providing habitat for the Broad-Headed Snake (BHS), we note OEH's recommended setback distance of 300m in their submission. This is based on the assumed foraging habitat and range for this species, and presumably is therefore only required where suitable habitat for the BHS is found to exist. We also note that the OEH website states a smaller foraging distance of 200 m, as detailed below, taken from the threatened species profile for the BHS:
(http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10413):-

- *Nocturnal;*
- *Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring; and*
- *Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer.*

As noted by OEH (on their website and in their submission), potential habitat for the BHS includes rock crevices and exfoliating sheets of weathered sandstone that they utilise during the cooler months. Sandstone escarpments and outcrops are quite numerous and extensive in the areas around the Modification Boundaries. An independent herpetology expert consulted on the subject of the BHS, Dr Arthur White (2013), found that despite the extent of the sandstone exposures in the study area, the amount of potential habitat for the BHS was minimal in comparison. He considered many of the sandstone areas not to be snake habitat as they are devoid of exfoliating rocks and lack suitable crevices or cracks (White, 2013). In these areas the sandstone is fine-grained and as this sandstone weathers, it does not crack or peel, but sheds sandstone grains as loose dust. Consequently, there were no associated surface rocks to be found, nor any talus scree suitable for BHS habitat.

The lack of exfoliation and the absence of surface rocks is considered to be a major habitat deficiency. Furthermore, the relative lack of prey species along most of the sandstone areas also implies that the snakes are likely to be very scarce in this area (White 2013). For this reason, a blanket 300 m buffer to allow for potential foraging habitat from all sandstone areas is not considered to be warranted, particularly in areas that provide poor quality habitat for the Broad-headed Snake.

To further validate this position, Cumberland Ecology spoke with a recognised expert on the BHS, Dr Jonathon Webb, who has surveyed the Ben Bullen State Forest for the snake in the past. He has co-authored most of the recent literature on the species and has surveyed for the snake in the western Blue Mountains and elsewhere (Webb and Shine 1997a, Webb J. K. & Shine R. 1997c, a, b, Webb and Shine 1997b, Webb and Shine 1998, Webb J. K. & Shine R. 1999, Webb et al. 2005). He notes from past experience that the BHS habitats of this area are in poor condition and he believes that this is largely as a result of past collections of the species made by illegal reptile collectors. As such we believe there is no verified local population of the species in the Modification Boundaries.

This position also concurs with the results of White (2013) who stated that:

> *"…due to the poor quality of winter habitat, the apparent paucity of available prey habitat and accessibility to the area by snake poachers, these habitat areas would support few (if any) Broad-headed Snakes, and the impacts are not likely to be detrimental to the species in the local area".*

Despite a lack of suitable habitat and no verified local population of the species in or near the Modification Boundaries, Coalpac has committed to the precautionary principle and to maintaining a substantial potential foraging habitat zone adjacent to the Escarpment at Invincible Colliery. This Escarpment area at Invincible Colliery has the highest potential to provide suitable habitat for the BHS, and has connectivity to likely habitat further to the east on the sandstone plateaux, and as such the Modifications have maintained a buffer zone between open cut mining and the Escarpment at Invincible Colliery which is overall significantly larger than the OEH recommended 300 m setback would provide. This is shown in **Figure 4** below.

The proposed buffer zone will provide 200 ha of potential foraging habitat which is substantially more than the 142 ha area that would be preserved if a 300m setback was used. Also, it would be approximately double the area required if a 200m setback was used, as per OEH's threated species profile for the BHS on its website (see link earlier in this Section).

The increased commitment to this buffer zone (as compared with the previous mining proposal) will also substantially increase the amount and connectivity of habitats provided by the Escarpment area to the east of Invincible Colliery that will remain available for the Broad-headed Snake, Brush-tailed Rock Wallaby, Large-eared Pied Bat and Eastern Bentwing-bat.

In areas of the mine plan that are adjacent to Escarpment areas that are unlikely to provide suitable BHS winter habitat, such as those adjacent to the Cullen Valley Mine Modifications, a smaller buffer area for foraging habitat has been provided.

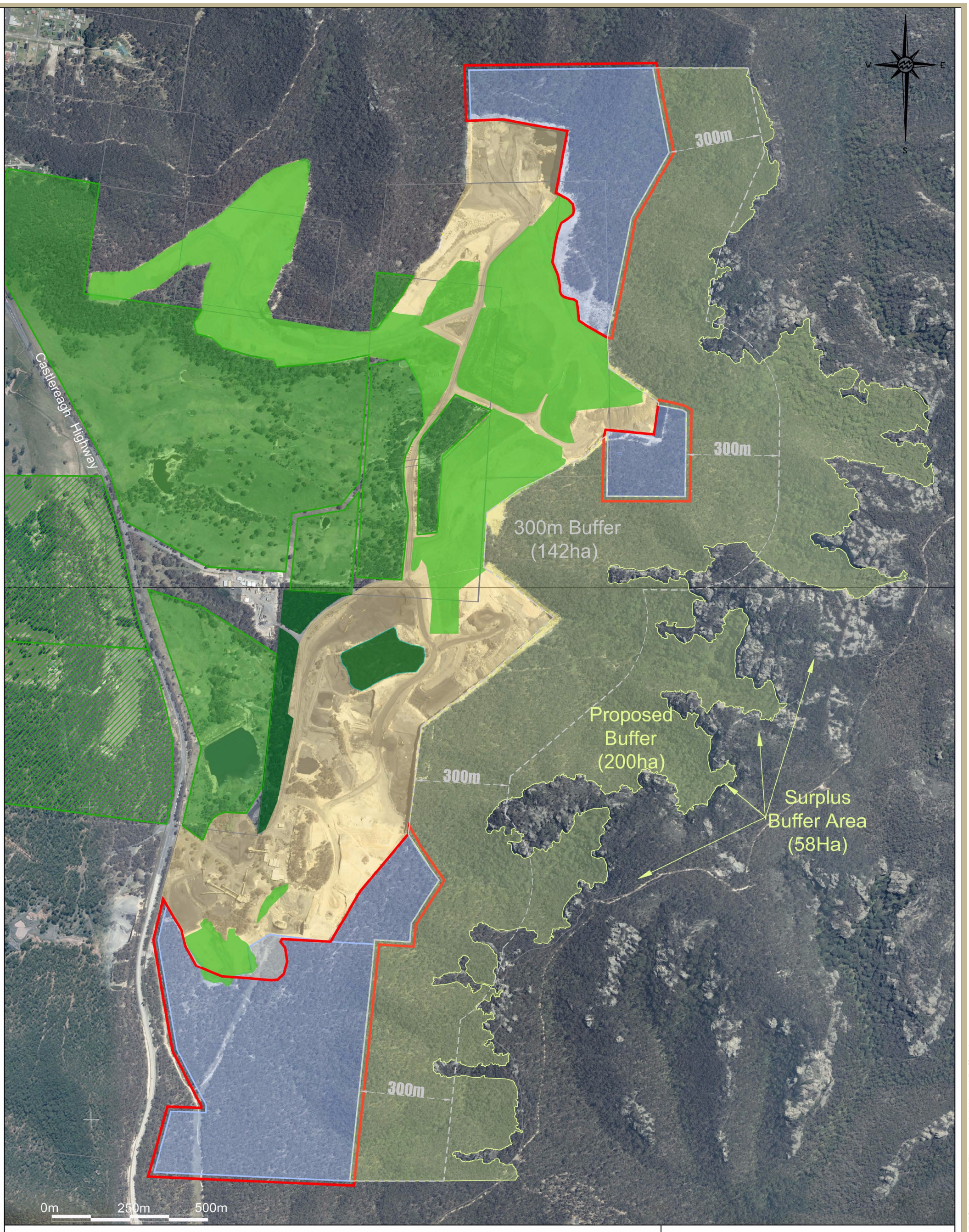

Figure 4. Invincible Colliery Additional Buffer Area from Escarpments

Image Source: Coalpac Drawing No.: 23.4.6ARO, 21/05/14.

A.8 The Significance of the Vegetation on Permian Sediments

Issue: *Whilst the current proposal is much smaller than the previous proposal it remains the case that most of the vegetation impacted has been mapped by OEH as occurring on Permian sediments (100 ha out of 150.5) and that 45 ha of this is comprised of the three higher conservation value vegetation types outlined above. Permian geology is represented in the "Hillview – Billabong" and "Additional Offset Areas" but not represented in the larger "Gulf Mountain" offset area.*

In their submission, OEH also noted that the following vegetation types on Permian sediments were determined to be of higher conservation significance due a high level of clearing and low levels of reservation:

- *Ribbon Gum grassy forest on alluvial flats (equivalent to the Tableland Ribbon Gum Blackwood Apple Box Forest community mapped by Cumberland);*
- *Mountain Gum Apple Box Blakely's Red Gum grassy forest on small drainage lines and footslopes (equivalent to the Tableland Mountain Gum Broad-leaved Peppermint vegetation type mapped by Cumberland Ecology); and*
- *Broad-leaved Peppermint Brittle Gum Red Stringybark grassy forest on small rises (equivalent to the Tableland Slopes Brittle Gum Broad-leaved Peppermint vegetation type mapped by Cumberland Ecology).*

Response: Cumberland Ecology has reviewed this assertion and some of the forest and woodland communities on the lower slopes occur on soils derived from Permian sediments that contain higher levels of nutrients than soils derived from Narrabeen Sandstone in the Escarpment areas adjacent to the Modifications. Increased soil fertility does mean that vegetation can produce more food resources, and so support more insect prey for bats and other fauna, than areas of lower soil fertility.

None of the three "Permian" vegetation communities listed by OEH and mapped on **Figure 5** are endangered ecological communities, and as such are afforded no additional significance over any other vegetation. Like all other vegetation communities to be disturbed by the Modifications, they can be validly offset and the areas to be cleared will be rehabilitated. Comparison of the Modification Disturbance Boundaries to the Ben Bullen Pagoda Land System units (as presented to the CCP PAC from a number of Special Interest Groups) also confirms the relatively small scale of proposed open cut mining on a regional level. On a local scale, the interaction between the three pagoda land system units will also be retained. Further discussion on this is provided in **Section A9** of this response.

There are also extensive areas of Permian geology in the region and the proposed Modifications would only impact a very small proportion of the available Permian landscape with similar vegetation. **Figure 6** demonstrates the occurrence of Permian sediments within a specific area known as the Western Coalfields (Southern Part) Plan (Yoo, E.K., 1998, Western Coalfield Regional Geology (northern part) 1:100,000, 1st edition. Geological Survey of New South Wales, Sydney).

Figure 6 covers an area of approximately 355,315 ha, and approximately 43,903 ha of Permian landscape has been mapped throughout the region. Approximately 835 ha occurs in the immediate locality of the Modifications, and of this total area, approximately 45 ha of the Permian landscape vegetation types referred to by OEH will be disturbed by the proposed Modifications. Such areas will be rehabilitated and revegetated with the local plant species post mining. This equates to the disturbance of 0.1% of Permian landscape occurring across the Western Coalfield (Southern Part) Plan and a small percentage of the vegetation communities of concern to OEH. Notwithstanding that some of the Permian landscape would occur on cleared land, a large proportion occurs as bands along the western side of the Great Dividing Range in conservation reserves, including large National Parks such as Wollemi National Park and Gardens of Stone National Park. As such, a high proportion (29%) of such Permian landscapes and associated vegetation communities are already preserved within National Parks.

As shown by the independent informal BioBanking Assessment (Humphries 2014) (see **Section A4**) all of the impacted Permian vegetation can be validly offset by the suite of offsets proposed for the Modifications. These proposed offsets include the Hillview-Billabong property, the "Additional" offset lands near Cullen Valley Mine and Invincible Colliery and the Gulf Mountain property.

As outlined in **Section A4** above, a revised Biodiversity Offset Strategy is proposed to compensate for residual ecological impacts of the proposed Modifications. Amongst the current offsets, several contain the same vegetation communities on more fertile habitats, particularly the Hillview-Billabong property and the "Additional" offset lands. The Gulf Mountain property also contains some Permian geology and associated comparable vegetation communities, as well as some other productive forest which, although not on Permian geology, are comparable in structure and biodiversity values.

Additionally, Coalpac will continue to progressively rehabilitate the disturbed land using local native species. In the long term, many of the plant species that dominate the areas with Permian soils will be regenerated.

Coordinate System:MGA Zone 56 (GDA 94)

N
Grid North

MUDGEE
Avisford
Nature Reserve
KANDOS
HILL END
Capertee National Park
Mugii Murum-ban
State Conservation Area
Wollemi National Park
Gardens of Stone
National Park
Winburndale
Nature Reserve
PORTLAND
BATHURST
WALLERAWANG
Blue Mountains
National Park
LITHGOW
KURRAJONG
BOWEN MOUNTAIN
BLUE MOUNTAINS
BLACKHEATH
OBERON
LAWSON-HAZELBROOK
WARRAGAMBA-SILVERDALE
bing
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Legend

- Cullen Valley Modification Boundary
- Invincible Colliery Modification Boundary
- National Parks and Reserves
- Town

Vegetation Communities
Western Blue Mountains LGA 2006

- Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest
- Tableland Slopes Brittle Gum - Broad-leaved Peppermint Grassy Forest
- Tableland Gully Ribbon Gum - Blackwood - Apple Box Forest

Wallerawang 1990

- Tablelands Grassy Woodland Complex
- Talus-slope Woodland

Central West CMA

- Red Stringybark (+/- Brittle Gum) open-forest
- Mountain Gum - Peppermint forest at high altitudes

Data Source:
The Vegetation of the Western Blue Mountains, DEC, 2006
The Natural Vegetation of the Wallerawang 1:100,00
Mapsheet VIS_ID 982, Benson, D.H. and Keith, D.A., DECCW 1990
Reconstructed and Extant Distribution of Native Vegetation in the Central West Catchment, DEC 2006.

CUMBERLAND ECOLOGY

I:\...\13007\Figures\Letter 15_RTS\20140603\Figure 5. Vegetation_Permian Sediments

Figure 5. Permian Sediment Vegetation in the Region

5 0 5 10 15 20km

Coordinate System: MGA Zone 56 (GDA 94)

WESTERN COALFIELD (SOUTHERN PART)

GEOLOGICAL SERIES SHEET 8931
and part of 8830, 8831, 8832, 8930 and 8932
(EDITION 1) 1992

Legend

- Disturbance Boundary
- Permian Landscape

Grid North

Era Period | Palynological zone | Stratigraphy | Symbol | Lithology | Depositional environment

CAINOZOIC — QUATERNARY / TERTIARY

Stratigraphy	Symbol	Lithology	Depositional environment
Alluvium	Qa	Silt, clay, sand, gravel	Valley plain
	Tb	Basalt, dolerite	Flow, sill, dyke, plug
	J-Tc	Volcanic breccia, sandstone, minor basalt	Vent, crater
Wianamatta Group	Rw	Shale, sandstone	Coastal plain — Shallow marine shelf
Hawkesbury Sandstone	Rh	Quartzose sandstone	Upper alluvial plain
Burralow Formation		Shale/sandstone laminite	Lower alluvial plain
Banks Wall Sandstone		Quartzose sandstone	
Mt York Claystone		Red-brown claystone	
Burra-Moko Head Sandstone		Quartzose to quartz-lithic sandstone	Upper delta plain
Caley Formation		Claystone, shale, quartz-lithic sandstone	Lower delta plain
Farmers Creek Formation		Claystone, coal, carbonaceous shale, siliceous shale	
Gap Sandstone		Lithic sandstone	Fluvial
State Mine Creek Formation		Claystone, siltstone, tuff, coal	Lower to middle delta plain
Angus Place Sandstone		Quartz-lithic sandstone	
Beal Bone Formation		Mudstone, siltstone, claystone	Marine incursion
Glen Davis Fm./ Nawnes Formation		Sandstone, claystone, coal, oil shale	
Irondale Coal			
Long Swamp Formation		Sandstone, mudstone, coal	Lower delta plain
Lidsdale Coal			
Blackmans Flat Conglomerate		Coal, claystone, siltstone, mudstone, conglomerate	Fluvial
Lithgow Coal			
Narrangaroo Conglomerate			
Gundangaroo Fm Coorongooba Creek Ss. Mt Marsden Cs		Mudstone, coal, sandstone, limestone nodules	Shoreline complex (delta front)
Berry Siltstone		Siltstone, lithic sandstone conglomerate	Marine shelf
Snapper Point Formation			Storm/tide
Rylstone Tuff	Cr	Rhyolitic tuff	
Granite	Cg	Granite, easterlite	
Diorite	Cd	Gabbro	
Undifferentiated Palaeozoic metamorphic rocks	Pz	Quartzite, shale, sandstone, limestone, tuff	

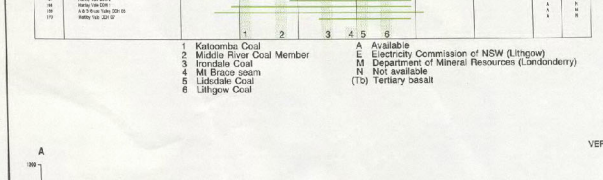
MESOZOIC — TRIASSIC — Early — Narrabeen Group — Middle
- *Aratrisporites parvispinosus*
- *Aratrisporites tenuispinosus*
- *Protohaploxypinus samoilovichii*
- *Lunatisporites pellucidus*
- *Protohaploxypinus reticulatus*

PALAEOZOIC — PERMIAN — Late — Illawarra Coal Measures
- Upper Stage 5b,c — *Microreticulatisporites birtangularis*
- Upper Stage 5a — *Dulhuntyispora parvithola*
- Lower Stage 5
- Lower Stage 4

CARBONIFEROUS — Early

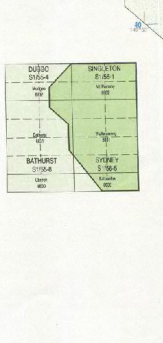
Groups: Wallerawang Subgroup; Charbon Subgroup; Cullen Bullen Subgroup; Nile Subgroup; Shoalhaven Group

- Marine megafossil (mainly brachiopods and bivalves)
- Foraminifera
- Actinarians
- Fish
- Fining-upwards unit
- Coarsening-upwards unit
- Plant fossil
- Bioturbation, burrow



1 Katoomba Coal
2 Middle River Coal Member
3 Irondale Coal
4 Mt Brace seam
5 Lidsdale Coal
6 Lithgow Coal

A Available
E Electricity Commission of NSW (Lithgow)
M Department of Mineral Resources (Londonderry)
N Not available
(To) Tertiary basalt



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MAPPED by E.K. Yoo, I. MacDonald, A.R. Norman, B.M. Bradley and P. West.

GEOLOGICAL FEATURES

GEOLOGICAL BOUNDARY
- Position accurate
- Position approximate

FAULT
- Position accurate
- Position approximate
- showing relative displacement (D, down)

FOLDING
- Anticline
- Monocline - position accurate
- position approximate

LINEAMENT
FRACTURE ZONE
POTENTIAL MINEABLE COAL SEAM (>5 m thick, <300 m deep)
Katoomba seam - approximate extent
- structure contour
Lithgow seam - approximate extent
- structure contour

TOPOGRAPHIC FEATURES
Major road
Secondary road
Railway
River
Creek
Elevation and number
Caution, holding or authorisation boundary (at April 1992)
National park boundary

LIST OF AUTHORISATIONS

A 48 Noyter and Butts Ltd
A104 Electricity Commission of NSW
A179 Glendore Mining Pty Ltd
A179 Coalex Pty Ltd
A206 Glendore Mining Pty Ltd
A230 Department of Mineral Resources
A232 Western Main Collieries Pty Ltd
A397 Hartley Valley Coal Co. Pty Ltd
A331 Swallow Mining Pty Ltd
* CL977 Coal Lease (Act 73) transferred from Lithgow Valley Colliery to Electricity Commission of N.S.W.

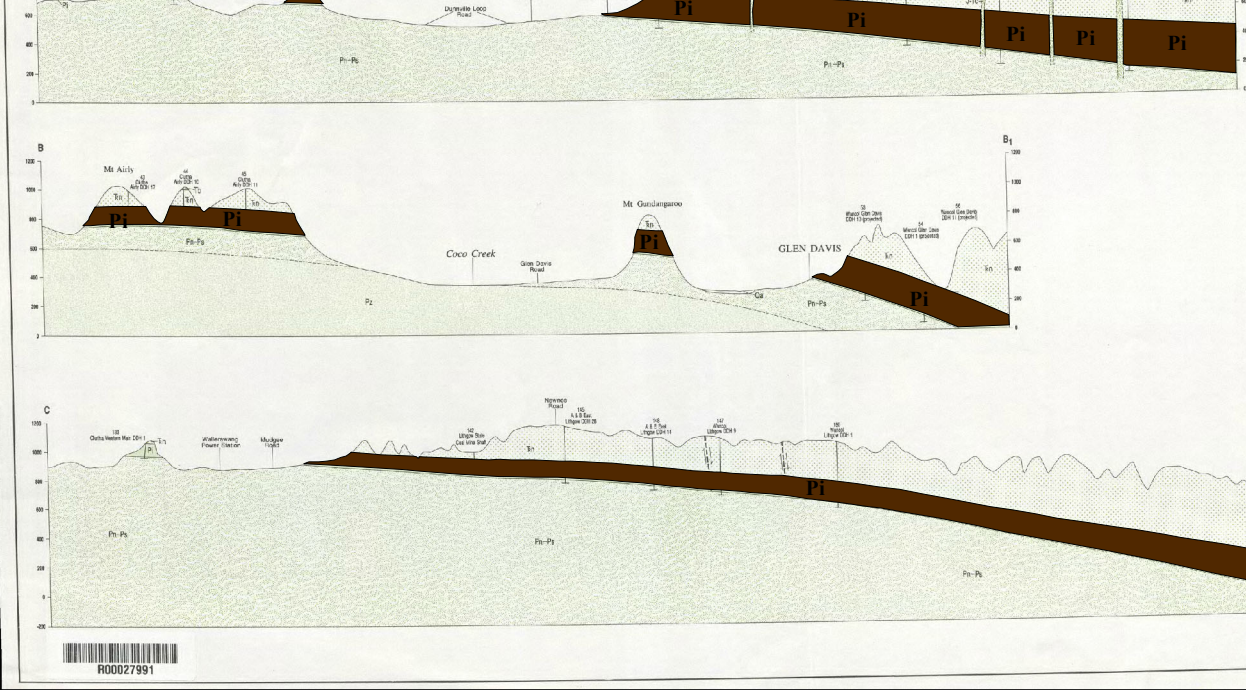
A364 Clarke Coal Pty Ltd
A382 Kandos Cowarbin Mining Co. Pty Ltd
A388 Department of Mineral Resources
A489 Clarke Coal Pty Ltd
A412 Glendore Mining Pty Ltd
A414 Kandos Cowarbin Mining Co. Pty Ltd
A426 Clarke Coal Pty Ltd
A451 Coalex Pty Ltd

SCALE 1:100 000
2 0 2 4 6 8 10 12
Kilometres

TRANSVERSE MERCATOR GRID
GRID LINES INDICATE 10 000 METRE INTERVALS OF THE AUSTRALIAN MAP GRID ZONE 56
GRID TICKS INDICATE 100 000 METRE INTERVALS OF THE INTEGRATED SURVEY GRID ZONE 56.1
Base map compiled from the Division of National Mapping 1:100 000 Topographic Series Sheets OBERON 8630, BATHURST 8931, MUDGEE 8832, KATOOMBA 8930, WALLERAWANG 8931, MOUNT POMANY 8932
Published by the Department of Mineral Resources under the authority of the Minister for Natural Resources 1992

CROSS SECTIONS

VERTICAL EXAGGERATION 1:5



Grid Convergence 1°3'
Grid/Magnetic Angle 10° 25' 08"
TRUE NORTH, GRID NORTH AND MAGNETIC NORTH WAS SHOWN DIAGRAMMATICALLY FOR THE CENTRE OF THE MAP. MAGNETIC NORTH IS CORRECT FOR 1991 AND MOVES EASTERLY BY 2'00" ANNUALLY.

Compiled by E.K. Yoo (Geologist)
G. Majchrzak Hamilton (Cartographer)
Cartography by G. Majchrzak Hamilton
Drawn by Mercury–Walch, Pty Ltd, Hobart, Australia
Printed by Mercury–Walch, Pty Ltd, Hobart, Australia

Copies of this map may be obtained from the Department of Mineral Resources, G. Leonards © New South Wales Government 1992

R00027991

I:\...\13007\Figures\Letter 13_RTS\20140610\Figure 6. Permian Landscape

Figure 6. Regional Extent of Permian Landscapes

Base Map Source: Department of Mineral Resources, 1992

A.9 Impacts to Pagoda Landforms

Issue: *The Colong Foundation (Colong) and Blue Mountains Conservation Society (BMCS) makes reference to the Ben Bullen Pagoda Land System (BBPLS)(as described by Colong and BMCS) composed of three vegetation units that are present in the local area.*

Colong and BMCS contends that the most significant example of the Tableland Grassy Woodland Complex Unit (within the BBPLS) will be disturbed by the Modifications.

Response: The BBPLS was proposed by several SIGs during submissions for the CCP EA, and is a combination of the broad scale vegetation types mapped by Benson and Keith (1990). It presents a simplistic view of the 'uniqueness' of the local area around Cullen Bullen, where the Colong Foundation and the BMCS claim that the three formation units, as mapped by Benson and Keith in their regional 1:100,000 scale vegetation map, are to be found nowhere else in close proximity. Colong and BMCS have incorrectly attributed this mapping data to CE, when in fact CE simply reproduced the Benson and Keith vegetation map in their Response to the CCP PAC Review Report for the CCP (Cumberland Ecology, 2013) commenting on its limitations and dated nature. An excerpt from the CE report is below:

"The Benson and Keith (1990) mapping referred to by the Colong Foundation is a broad scale vegetation map of the Wallerawang map sheet…published 23 years ago in Cunninghamia Volume 2, Number 2, in 1990. It has been superseded by more accurate mapping prepared by OEH in 2006, …(who) mention the Benson and Keith regional scale mapping (scale 1:100,000) was not appropriate for use in the development of Western Blue Mountains Mapping (scale of 1:25,000) (DEC (NSW) 2006)…The Cumberland Ecology mapping shows 10 different forest and woodland "vegetation communities" across the slopes and valleys, whereas the outdated 1990 mapping only shows one forest type (in the slopes and valleys)."

The Benson and Keith (1990) vegetation map cannot be relied upon as an accurate representation of the vegetation communities and formations in the area. As such, to describe all vegetation types in the slopes and valleys below the Escarpment, Colong and other SIGs are incorrectly using the name Tablelands Grassy Woodland Complex.

Colong and BMCS in their submissions on the Modifications have published a map of their BBPLS with the CCP mine plan overlaid on it, which incorrectly implies removal of the majority of the Tablelands Grassy Woodland Complex by open cut mining.

The Modifications have a substantially smaller disturbance area (approx. 15% of the area of the Exhibited CCP), and have been designed to have a minor impact on their Tablelands Grassy Woodland Complex through avoidance and mitigation. The Modifications also provide linkage at Invincible Colliery between buffer zones, preserving this land unit in existing and proposed adjacent biodiversity offsets.

In addition, the Modifications will have no direct impact at all on the other two components of their BBPLS, and as a result, the interaction between the three pagoda land system units of their BBPLS will not be significantly impacted.

A.10 Indirect Impacts and Edge Effects

Issue: A number of respondents raised concerns about indirect impacts and edge effects as a result of the Modifications. Such concerns were most detailed within the OEH response, page 8 of which contained the following statements:

> *In addition to the direct impacts resulting from the removal of native vegetation and habitats, the following indirect impacts on biodiversity are discussed in the EA; subsidence, edge effects, habitat degradation, competition for resources, noise, light, dust, erosion, vehicle strike, weeds, feral animals and overabundant native species. These are discussed in Appendix C, section 4.3, p 4.24. The effect of blasting and vibration are not discussed in this section.*
>
> *Subsidence is dismissed as the Proponent expects no surface subsidence greater than 20mm. However the PAC stated that this was uncertain and could not be relied upon, particularly where operations are in close proximity to pagodas and other sandstone features...*
>
> *Regarding edge effects the Proponent alludes to abiotic edge effects (noise, light, nutrient run-off), and the low likelihood that such edge effects would have a significant impact on retained vegetation upslope of mined areas. However, OEH reiterate that edge effects also include the promotion of edge-tolerant species, including feral predators and native competitors.*
>
> *In general indirect and edge effects are acknowledged to be present by the Proponent but few, if any measures are proposed to minimise the effect the effect of these on neighbouring biodiversity. In most cases it is simply stated that the effect is real but that it will diminish as areas are progressively rehabilitated and will return to normal following cessation of mining activities.*
>
> *The proponent states that edge effects will be mitigated by the implementation of "appropriate surface water management practices (p4.29) and a "weed and feral animals control program (p.4.30).*

Response:

The EA Flora and Fauna assessment provides a detailed discussion of a considerable range of indirect impacts. The topics are covered in Section 4 of the Cumberland Ecology assessment and include:

- 4.1 Subsidence;
- 4.2 Edge effects;
- 4.3 Habitat degradation;
- 4.4 Competition for resources;

- 4.5 Noise
- 4.6 Light;
- 4.7 Dust;
- 4.8 Erosion;
- 4.9 Vehicle strike; and
- 4.10 Weeds, feral animals and overabundant native species.

There is also discussion about the duration and timing of impacts (Section 4.4) and reversibility of impacts (Section 4.5).

The potential for indirect impacts from the Modifications should be considered together with the environmental benefits of the Modifications which will ensure rehabilitation is completed to produce an improved final environmental outcome. Without the Modifications, there would be six partially remediated final voids (three at each site) and they would have significant and potentially permanent edge effects.

Under the proposal, the remediation will cover the full extent of both current and proposed mining operations, will fill the voids and will enable rehabilitation of mined areas to ultimately address the edge effects that currently exist, as discussed in the EA. It is expected that the edge effects will diminish as vegetation on the rehabilitation areas matures.

It is also very important to consider the context of the proposed open cut mining areas relative to the adjacent areas of vegetation that will be retained. This is because the vegetation to be retained and not mined is upslope of the open cut mining areas. This means that a whole range of indirect impacts will be reduced. For example runoff, erosion and weed invasion will not readily occur upslope.

Similarly, as the retained vegetation is upslope of the proposed open cut mine footprints, it is expected that seeds and other propagules from the retained forest will move downslope onto rehabilitation areas, aiding and improving rehabilitation results.

The shape and lateral extent of the proposed Modification open cut footprint is compact and minimises the relative edge effects compared to more elongate and complex geometries.

There are a number of ways in which the indirect impacts of the Modifications will be managed and mitigated. Most of these are discussed in in Chapter 5 of the Flora and Fauna Assessment.

They include:

- The size and shape of the proposed mining areas: only 150 ha is proposed and these areas have been designed to avoid clearance to areas such as the major habitat areas for *Persoonia marginata* and Box Gum Woodland. The smaller footprint and more regular shape means that the edge areas will also be minimised;
- Six final voids will be filled in and fully remediated, reducing what could otherwise have the potential for long term ecological impacts, including edge effects, on remaining habitats;
- The buffer zone between the proposed Invincible Colliery disturbance footprint and the Escarpment is now in excess of that recommended by OEH by at least 40%. With such a significant buffer zone allowed for, it is highly unlikely that the Escarpment area could be impacted by noise and blasting and the flora and fauna associated with them are likely to be substantially protected from the indirect impacts of noise and blasting. In other areas, an optimised mine plan has buffers which have been increased from that presented in the CCP as an additional mitigation measure.

Other mitigation measures mentioned in Chapter 5 of the Flora and Fauna assessment include:

- Mine rehabilitation with local native flora;
- Dust controls,
- Noise management;
- Surface water, erosion and sedimentation controls; and
- Monitoring.

A.11 Cumulative Impacts

Issue: *There has been no attempt in the EA to address the cumulative impacts on biodiversity of other mining applications in the local area, particularly the Pine Dale Stage 2 Extension Project and the Neubeck Coal Project. Any analysis of cumulative impact also needs to include not just areas currently being impacted, but those areas that have already been impacted from past activity in terms of impacts on fragmentation in the landscape and the loss of habitat for threatened and non-threatened species.*

Aspects of particular concern noted by OEH include; fragmentation, loss of habitat on the local area, effect on Ben Bullen State Forest and the loss of potential for reservation in the area.

Response: The locality surrounding the Modifications contains a variety of mining and other industrial development that includes:

- Baal Bone Colliery (closed);
- Mount Piper Power Station Extension (project is on hold);
- Ivanhoe North Colliery (closed);
- Neubeck Coal Project Proposal (DGRs issued); and
- Pine Dale Coal Mine;
    - Yarraboldy Extension (recently completed);
    - Stage 1 and Stage 2 Extensions (DGRs issued).

All were considered in the EA with the exception of the proposed Pine Dale Stage 2 Extension and the proposed Neubeck Coal Project. The aforementioned proposals have yet to be formally assessed and as such quantification of any potential impacts is not possible at this stage.

Baal Bone Colliery proposes to continue underground mining in the northern parts of Ben Bullen State Forest, although no overlying vegetation will be cleared if this proceeds.

The Mount Piper Power Station Extension proposes to avoid direct impacts to remnant native vegetation by restricting construction to pre-cleared areas containing regrowth and planted gardens.

Ivanhoe North Colliery is now closed and 12.3 ha has been rehabilitated.

The Neubeck Coal Project is a proposal for an open cut coal mine at Blackmans Flat, approximately 5 km east of the Modifications. The only publically available information to date is a preliminary briefing paper, which does not contain details on areas of vegetation to be removed. Until more information is available to the public, it can only be noted at this stage. The majority of the land is privately owned and has already been cleared for grazing.

The Yarraboldy Extension of Pine Dale Coal Mine has concluded with the removal of 27 ha of vegetation, 14 ha being native vegetation. Pine Dale Coal Mine Stage 1 Extension as proposed will remove approximately 60 ha and Stage 2 Extension as proposed will remove approximately 170 ha, the majority of which occurs in Ben Bullen State Forest.

Collectively, the Modifications make up the majority of the cumulative impacts. That notwithstanding, both the Modifications and other mining development projects will be required to provide offsets to compensate for the impacts of these projects. The only projects likely to have any significant cumulative impacts are yet to be formally assessed and consideration of these will form an appropriate part of their assessment process following determination of the proposed Modifications.

A.12 Cumberland Ecology Vegetation Mapping

> **Issue:** *Some submissions have noted media stories and papers written about vegetation mapping done by Cumberland Ecology on the Maules Creek Coal Project Biodiversity Offsets. The stories released sensationalist quotes from opponents of the mine who stated that Cumberland Ecology mapping of endangered ecological communities was "95% wrong". This has been cited by LEG as a reason to doubt the vegetation mapping provided by Cumberland Ecology for the Modifications.*

Response: The mapping of vegetation in the offsets for the Maules Creek Coal Project by Cumberland Ecology has been subject to two peer reviews. One by Greenloaning Biostudies, on behalf of Whitehaven Coal, the other by Umwelt, on behalf of the Commonwealth Department of Environment in Canberra. Both peer reviews vindicated the mapping undertaken by Cumberland Ecology and the majority of endangered ecological communities mapped by Cumberland for the Maules Creek Coal Project were found to be correctly mapped. The Commonwealth Government has now endorsed both peer review reports (Greenloaning Biostudies 2014; Peake 2014). The biodiversity offsets surveyed by Cumberland Ecology remain as an integral part of the Maules Creek Coal Project Biodiversity Offset Strategy. They contain extensive areas of the critically endangered ecological community referred to as "Box Gum Woodland".

There is no basis for the exaggerated claims by some respondents that the vegetation mapping completed by Cumberland Ecology is 95% wrong - either at Maules Creek or for the proposed Modifications.

In the case of the proposed Modifications, the vegetation of the impact areas has been mapped by Cumberland Ecology and by OEH officers in their submission to the CCP PAC (Shepherd et al 2012b). Moreover, the vegetation of both the Modifications and the proposed biodiversity offsets has also been independently examined and surveyed by EcoLogical Australia for the purposes of the informal BioBanking Assessment (Humphries 2014). Although there are some differences in the mapping of the various vegetation groups, there is good agreement about the vegetation within the proposed impact areas and biodiversity offsets.

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APPENDIX F

Supplementary Groundwater Impact Assessment

Australasian Groundwater
and Environmental Consultants Pty Ltd
Level 2 / 15 Mallon Street
Bowen Hills, QLD 4006 Australia

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T. +61 7 3257 2055
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brisbane@ageconsultants.com.au
www.ageconsultants.com.au

TJA/JST:tl
Project No. G1515/A.Coalpac Modification
30 April 2014

Coalpac Pty Ltd (Administrators Appointed)
SENT VIA EMAIL

Attention: Bret Leisemann

Dear Bret,

RE: INVINCIBLE COLLIERY AND CULLEN VALLEY MINE MODIFICATIONS SUPPLEMENTARY GROUNDWATER REPORT

1 INTRODUCTION

Coalpac Pty Ltd, Administrators Appointed (Coalpac) owns and operates the Invincible Colliery and Cullen Valley Mine. Each mine operates as a separate entity with separate planning approvals under the *Environmental Planning and Assessment Act 1979* (EP&A Act). Coalpac is seeking to modify both planning approvals under Section 75W of the former Part 3A of the EP&A Act.

Australian Groundwater Environment Consultants Pty Ltd (AGE) undertook a *Groundwater Impact Study, Invincible Colliery and Cullen Valley Mine Modification* dated February 2014[1] (AGE 2014) that supports the *Environmental Assessment Modifications to PA 07_127 and DA 200-5-2003 dated March 2014* which is currently being assessed by the NSW Department of Planning and Infrastructure. This assessment provides further clarification of groundwater related matters for the Modification of existing approvals at Invincible Colliery and Cullen Valley Mine following further consultation with NSW Office of Water and should be considered as a supplementary report to the above mentioned Groundwater Impact Study. Specifically this report provides further information relating to:

1. the predicted 125 ML water take from the Old Invincible underground workings in the northern mining area of the Invincible Colliery Modification;
2. the potential impact to Box-Gum Woodland communities from groundwater drawdown;
3. groundwater seepage analysis and calculations;
4. results of groundwater quality monitoring program, future sampling events, and sampling protocols;
5. development of water management plans, groundwater quality triggers, and trigger action response plans (TARPs);
6. details of groundwater licences held by Coalpac; and
7. the status of neighbouring registered bores.

[1] Australasian Groundwater and Environmental Consultants Pty Ltd, (2014), *"Groundwater Impact Study – Invincible Colliery and Cullen Valley Mine Modification"*, prepared for Hansen Bailey Pty Ltd, Project No. G1515/A, February 2014.

2 DISCUSSION

Each of the above groundwater related matters are discussed in more detail below.

2.1 Predicted Take of Water from Invincible Colliery Modification Area

The majority of the abandoned underground coal mine workings in the Old Invincible Colliery and Invincible Colliery are flooded with water. Water enters the underground workings from rainfall runoff through surface cracking (from subsidence of abandoned underground coal mine workings) in undisturbed catchment areas, seepage through rehabilitated areas, channelled by contour drains or pumped in as part of the mine water management system.

The transition between flooded and non-flooded underground workings is commonly referred to as the “tide mark”. Figure 10-3 from the Groundwater Impact Study AGE 2014 shows the current tide mark. The tide mark of the Old invincible Colliery and Invincible Colliery is, for the most part, currently located to the east (i.e. down-dip) and beyond the limit of the proposed open cut pits of the Invincible Colliery Modification. Therefore, the Eastern and Southern mining areas are not anticipated to intersect flooded workings, and are also not anticipated to intersect saturated aquifers[1].

A small area in the proposed Northern open cut pit area at Invincible Colliery may encounter partial saturation of the Old Invincible Colliery underground workings. Figure 2-1 shows this area in more detail.

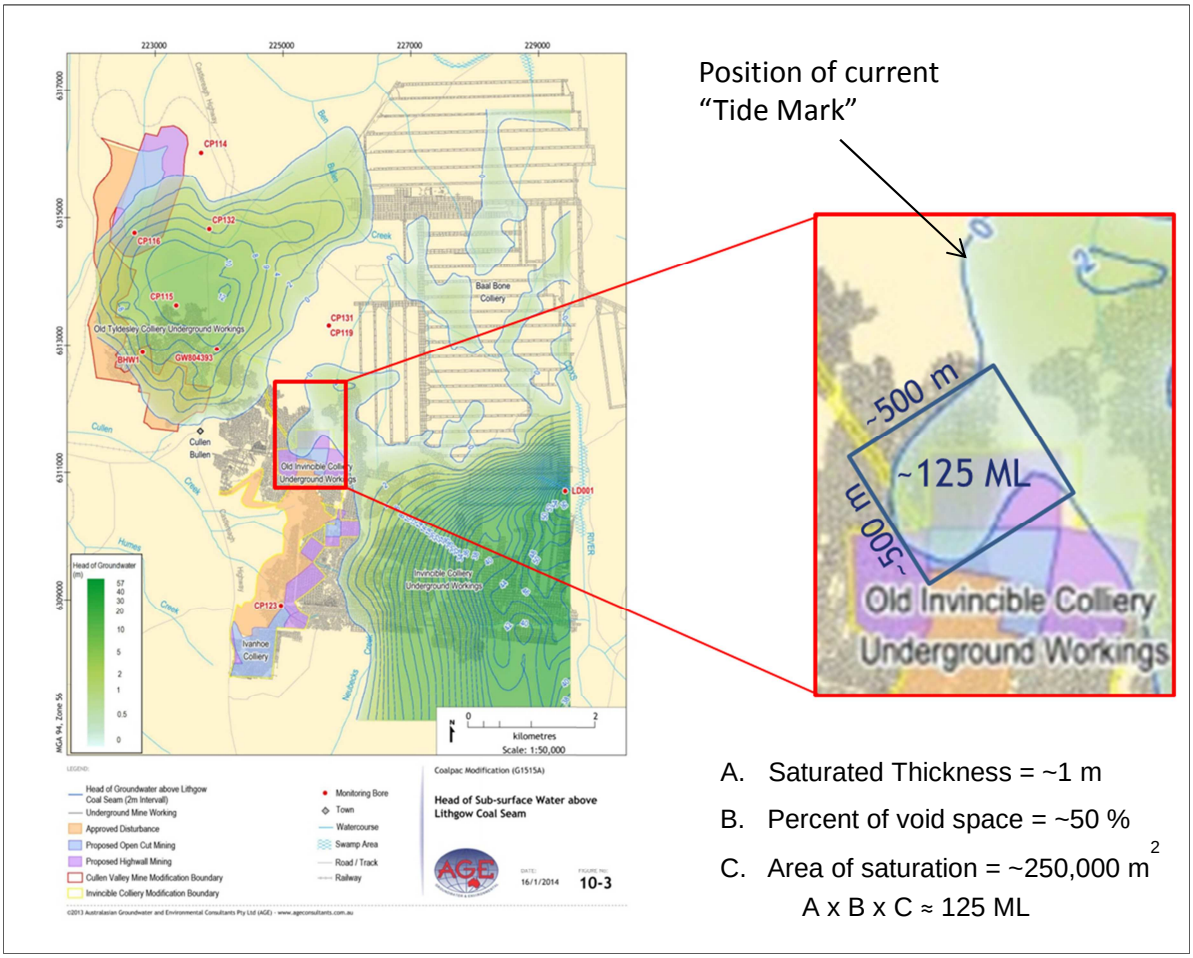

Figure 2-1: Area of Potential intersection of Flooded Workings

The coal seams throughout the Modification Boundary at Invincible Colliery have been folded, creating a network of broad and shallow depressions. These features are somewhat akin to a flattened egg carton, where the shallow depressions are defined from each other by low-profile structural highs.

One of these coal seam depressions is located in the northern portion of the Modification Boundary at Invincible Colliery. The blue polygon shown in Figure 2-1 defines the proposed open cut pit which is planned to mine down into the Lithgow Seam. The purple polygon shows the proposed highwall mining areas which are planned to extract all seams located above (the nearest seam is 15 metres above) the Lithgow Seam. The seams located above the Lithgow Seam are unsaturated.

The depression in the coal seam promotes the accumulation of a small, semi-isolated body of water in the underground workings. This water is considered to have limited connection with the main body of the flooded workings because of the structural highs that separate these areas.

The maximum depth of water within the depression is <1 m, found towards the middle of the depression. The underground workings have an average height of about 1.6 m in this area. Therefore, the underground workings within the depression will not be fully saturated.

A very shallow depth of water (<0.15 m) separates the depression from the main body of the flooded workings, located towards the east. The proposed northern portion of the Modification Boundary at Invincible Colliery is located near the outer limits of the depression, and is predicted to intersect a saturated depth of about 0.5 m within the flooded workings.

The total volume of water stored within the coal seam depression located near the proposed northern portion of the Modification Boundary at Invincible Colliery can be estimated by first calculating the open area of the depression and multiplying this area by the height of the water body within the workings. The depression is roughly square, having lengths equal to about 500 m. The underground workings were mined with bord and pillar methods, which left about 50% of the coal seam in-place to support the roof. Therefore, the total area of the open void within the depression is estimated to be 125,000 m^2. If a conservatively high saturated thickness of 1 m is used, the total volume of water stored within the underground workings in the depression located near the proposed northern portion of the Modification Boundary at Invincible Colliery is about 125 ML.

When open cut mining through this area, Coalpac will direct seepage water from the flooded underground workings (as well as rainfall runoff) towards sumps, where it will be pumped to holding dams which form part of the mine water management system that provides for recycling and transferring water for operational purposes. Groundwater assessments to date indicate that approximately 125 ML of water will need to be pumped to manage the seepage from the underground workings.

The 125 ML is predicted to be taken from the underground workings of the Old Invincible Colliery in the northern portion of the Project Boundary at Invincible Colliery for a period of approximately two years. The anticipated average water take from the underground workings will be about 62.5 ML/year. However, in years with high rainfall, the amount of water that is required to be taken may be higher than 62.5 ML/year. Coalpac hold licences to take 106 ML/year from the NSW Murray-Darling Porous Rock Groundwater Sources. The licence allocation is sufficient to cover the take of any additional water from the underground workings of the Old Invincible Colliery for years of higher rainfall.

A surface water study undertaken by WRM Water and Environment (2014)[2] identified that there will be a surplus inflow of dirty water from existing mining and infrastructure areas into the Old Invincible and Invincible underground workings of approximately 235 ML/yr.

The proposed pipeline connecting Cullen Valley Mine and Invincible Colliery will assist Coalpac in managing any non-licensable surplus inflow of dirty water in its water management system. As noted above this surplus has been estimated to be 235 ML/yr.

In the event that neighbouring underground mining operations cease extraction of sub surface water from the underground workings, water could potentially back-up and flow into the northern portion of the Invincible Colliery Modification Boundary. This has been discussed in the WRM report (Jan 2014)[2] and was estimated to be 1,382 ML over the period of the proposed Modification. In the unlikely event that this worst case scenario develops, there would be a number of potential management and mitigation measures available to Coalpac to account for this water take, these may include:

- Seeking a temporary transfer or acquire a suitable water licence from adjacent mining operations, assuming they do not need their allocation for this water at the time.
- Coordinating the continued release of this water by adjacent mining operations to ensure sub-surface water in the underground workings does not back-up and impact on Invincible Colliery.
- Treating and releasing this water to the downstream catchment, therefore not holding the water in the mine water management system.
- Not mining down to the Lithgow Seam in the northern portion of the Modification Boundary due to the flooding in the underground workings. As such, Coalpac would not intercept or take this water source.

The above management options demonstrate the flexibility and options available to Coalpac in the unlikely event that this worst case scenario develops.

Based on the above review and flexibilities available to control water in the mine water management system it would be unlikely that Coalpac would require any further water access licences to account for the take of any additional water resources.

2.2 Potential Impacts to Box-Gum Communities by Groundwater Depletion

Box-Gum Woodland has been identified outside the Modification Boundary at Cullen Valley Mine at four locations[3]. Figure 2-2 shows the four locations where this community has been found.

The depth to the groundwater table ranges between 20 m and 50 m beneath the topographic surface at each of the locations where the Box-Gum Woodland occurs. The depth of the water table at each location is summarised in Table 1.

[2] WRM Water and Environment Pty Ltd, (2014), "*Invincible Colliery and Cullen Valley Mine Modifications Supplementary Surface Water Assessment*", prepared for Coalpac Pty Ltd, Project No. 0718-01-G, April 2014.

[3] Cumberland Ecology Pty Ltd, (2014), "*Ecological Assessment – Cullen Valley Modification and Invincible Colliery Modification*", prepared for Hansen Bailey Pty Ltd, Project No. 13007RP3, February 2014.

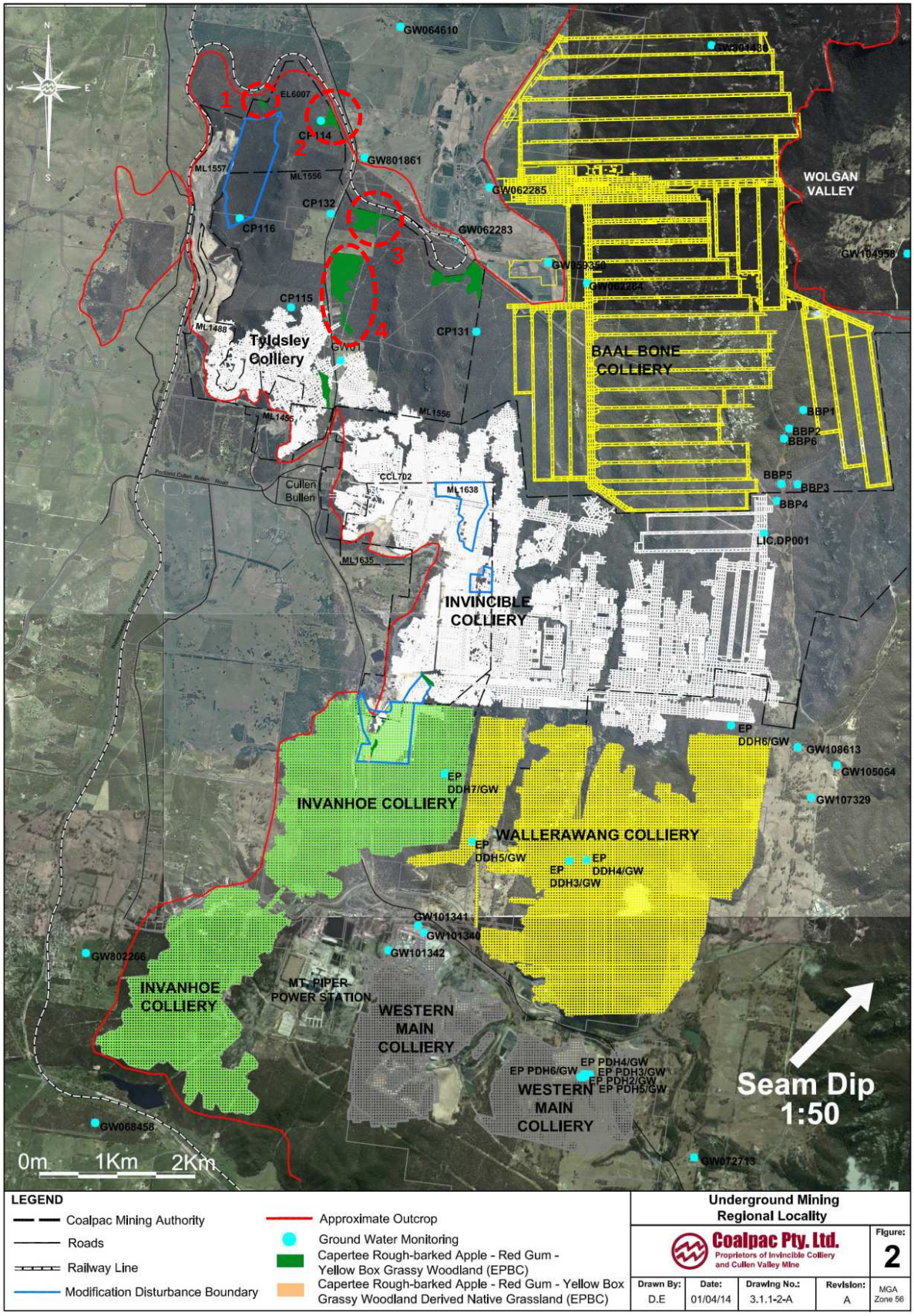

Figure 2-2: Modification Areas and Box-Gum Woodland Communities

Table 1: SUMMARY OF DEPTH TO GROUNDWATER					
Ref.	**Direction of Box Gum Woodland from Modification Boundary**	**Distance of Box Gum Woodland from Modification Boundary (m)**	**Topographic elevation (mAHD)**	**Phreatic surface elevation (mAHD)**	**Vertical distance between topography and phreatic surface (m)**
1	North	120	900	872	~30
2	North-east	590	920 - 900	869 - 862	~50 - 40
3	East	1,200	895 - 885	874 - 868	~20
4	South-east	1,050	935 - 900	892 - 876	~40 - 25

The vertical distances separating the topography and the groundwater table are therefore sufficient to prohibit the root system of the woodland community from directly tapping the regional groundwater table. Any perched groundwater that may be locally present will not be impacted by the proposed Modifications.

2.3 Clarification of Groundwater Seepage Analysis

The available data and previous groundwater assessments[1,4] indicate the Invincible Colliery will not intersect saturated aquifers. However, Cullen Valley Mine Modification Boundary is likely to intersect saturated aquifers of non-disturbed (i.e. not previously mined) coal. The coal seams located above the combined Lidsdale / Lithgow Seam are not saturated, as these upper coal seams typically crop out to the east, north, and west at short distances from the proposed mining area. Therefore, groundwater seepage from these coal seams into the open cut mining and highwall mining will not occur.

Figure 2-1 shows an area where the combined Lidsdale / Lithgow Seam horizon is predicted to be saturated in the southern half of the proposed open cut mine Modification Disturbance Boundary. This is based on the relationship between the elevation of the coal seams (interpolated between exploration drillholes) and the phreatic surface (interpolated between water level measurements taken from groundwater monitoring bores).

The maximum head of water above the base of the combined Lidsdale / Lithgow Seam horizon is estimated to be about 6 m in the far south of the proposed open cut area. The maximum head of water above the base of the coal seams is estimated to be about 9 m in the highwall mining area.

The rate of groundwater flow is proportional to the hydraulic gradient and permeability of the rock unit. In both cases these were low and therefore it was clear from an early stage the rates of seepage would be limited. Determining the seepage rate into the proposed open pit and highwall mine areas using analytical equations in a spreadsheet was considered appropriate given the relatively small pressure head above the mine areas (i.e. <10 m) and the limited intersection of saturated rock. Therefore more complex three-dimensional (3D) numerical modelling was not warranted.

[4] Australasian Groundwater and Environmental Consultants Pty Ltd, (2012), "*Coalpac Consolidation Project – Groundwater Impact Assessment*", prepared for Hansen Bailey Pty Ltd, Project No. G1515, March 2012.

Darcy's Law of fluid flow through porous media was used to estimate the rate of groundwater seepage into the Cullen Valley Mine Modification Boundary for the proposed open pit and highwall mining areas. Darcy's Law is based on first principles of fluid mechanics and states that:

> *'discharge rate (Q) of groundwater is proportional to the hydraulic conductivity of the material (K), the gradient in hydraulic head (i), and the cross-sectional area of discharge (A).'*

Darcy's Law is commonly expressed as:

$$Q = Ki\,A$$

Where:	Q	=	seepage from the coal seam face (m^3/day)
	K	=	hydraulic conductivity of the coal seam (m/day)
	i	=	steady state hydraulic gradient (dimensionless)
	A	=	cross-section area of coal seam aquifer (m^2)

Darcy's Law underlies all assessments of water flow in porous media. It is the basic principle of all predictive groundwater modelling, whether it is spreadsheet calculations, simplified 2D slice modelling, or complex 3D multi-layer modelling.

Other groundwater modelling methods such as 2D slice models (e.g. Seep-W) or 3D models (e.g. MODFLOW) would be unlikely to provide a significantly more accurate estimate of potential seepage rates for the Cullen Valley Mine Modification Boundary because:

- The geometry of the aquifer system is simple, it is a single confined to semi-confined aquifer which is well suited to being analysed by Darcy's Law.
- Groundwater seepage into the mine areas will be sourced solely from the combined Lithgow/Lidsdale Coal Seam, which is not subject to leakage from any other adjacent units.
- Values for hydraulic conductivity (permeability) of the Lithgow/Lidsdale Coal Seam are limited, but are available from tests undertaken at:
    - Cullen Valley Mine[5] ≈ 0.03 m/day to 0.07 m/day, derived by falling head tests;
    - Pine Dale Mine[6] ≈ 0.09 m/day, derived by falling head tests;
    - Springvale Colliery[7] ≈ 0.001 m/day to 0.01 m/day, test method unknown; and
    - Angus Place Mine[7] ≈ 0.01 m/day, test method unknown.
- Values for the storage coefficient of the Lithgow/Lidsdale Coal Seam are not available, which means a representative estimate would be assumed within all types of predictive modelling; and
- The rate of groundwater flow into the existing Cullen Valley Mine open cut mining areas must be low in order for evaporation to maintain the currently observed dry mining conditions.

[5] Australasian Groundwater and Environmental Consultants Pty Ltd, (2012), "*Coalpac Consolidation Project – Groundwater Impact Assessment",* Prepared for Hansen Bailey Pty Ltd, Project No. G1515, March 2012.

[6] Aquaterra Consulting Pty Ltd, (2010), *"Pine Dale Coal Mine Extension Groundwater Assessment",* prepared for Enhance Place Pty Limited.

[7] Aurecon Australia Pty Ltd, (2010), *"Assessment of Hydrogeological Impacts – Angus Place Project Modification",* prepared for Centennial Angus Place.

2.3.1 Range of Hydraulic Conductivity Values

The variability of the hydraulic conductivity of the Lithgow / Lidsdale Coal Seam is confirmed by the range of values obtained (mostly via slug testing) from surrounding mine sites. Similarly, packer test data for coal seams in the Upper Hunter region supports values over five orders of magnitude ranging from an upper limit of 5 m/day down to a lower limit of 0.00001 m/day, with a mean value of about 0.09 m/day[8]. Hydraulic conductivities for seam depths less than 50 m are noted to be generally higher than 0.01 m/day, while lower conductivities are indicated at increasing depths[8].

Therefore, a range of hydraulic conductivity values were used with Darcy's Law to assess the sensitivity of the predicted rate of groundwater seepage to varying permeability. The hydraulic conductivity values ranged between an upper limit of 0.2 m/day and a lower limit of 0.07 m/day, which are conservatively high compared to some of the test results obtained from surrounding mines. This means the predicted rate of seepage is likely to be over predicted using these values.

2.3.2 Prediction of Hydraulic Gradient & Drawdown Extent

If it is assumed that we are dealing with an aquifer in porous media and that the assumptions for the modified non-steady state equations apply, then the drawdown at any point within the area of influence at a given time (t) is given by:

$$s = \frac{2.3Q}{4\pi T} \log \frac{2.25Tt}{r^2 S}$$

The extent of drawdown (also referred to as the radius of influence) at any time (t) is the radius at which the drawdown is zero. For this to apply the log term must be zero (i.e. the value within the log term must equal 1). Thus, at the radius of influence[9]:

$$R(t) = 1.5\left(\frac{Tt}{S}\right)^{\frac{1}{2}}$$

Where:

	R_0	=	radius of influence for a given time (m)
	T	=	transmissivity of the coal seam (m^2/day)
	t	=	time (days)
	S	=	storage coefficient or specific yield, depending on the aquifer type (dimensionless)

From the above it can be seen that the radius depends only on time, transmissivity, and storage coefficient and is completely independent of discharge rate. The discharge rate determines the magnitude of the drawdown within the cone of depression but not the areal extent.

This is a simple means of determining the radius of influence and, if used with care and common sense, can be used to provide a reasonable approximation even for those aquifers which are not in porous media.

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[8] Mackie C, D., (2009), "*Hydrogeological Characterisation of Coal Measures and Overview of Impacts of Coal Mining on Groundwater Systems in the Upper Hunter Valley of NSW*", PhD Thesis, University of Technology, Sydney, N.S.W. Australia, January 2009.

[9] Bear, J., (1979), "*Hydraulics of Groundwater*", McGraw-Hill, New York, 569p.

The extent of drawdown was calculated for five time steps, these being after year 1, 2, 3, 50, and 100. A single representative value of hydraulic conductivity 0.09 m/day was multiplied by a coal seam thickness of 2.5 m to derive a transmissivity of 0.225 m^2/day. A storage coefficient value of 0.0025 was used to represent the confined to semi-confined nature of the shallow coal seam. Figure 2-3 presents the predicted distance-drawdown curves.

The results predict the extent of drawdown resulting from the proposed Cullen Valley Modification Disturbance Boundary will expand to about 500 m after about three years of mine operation. The hydraulic gradient produced by the drawdown will be about 0.012.

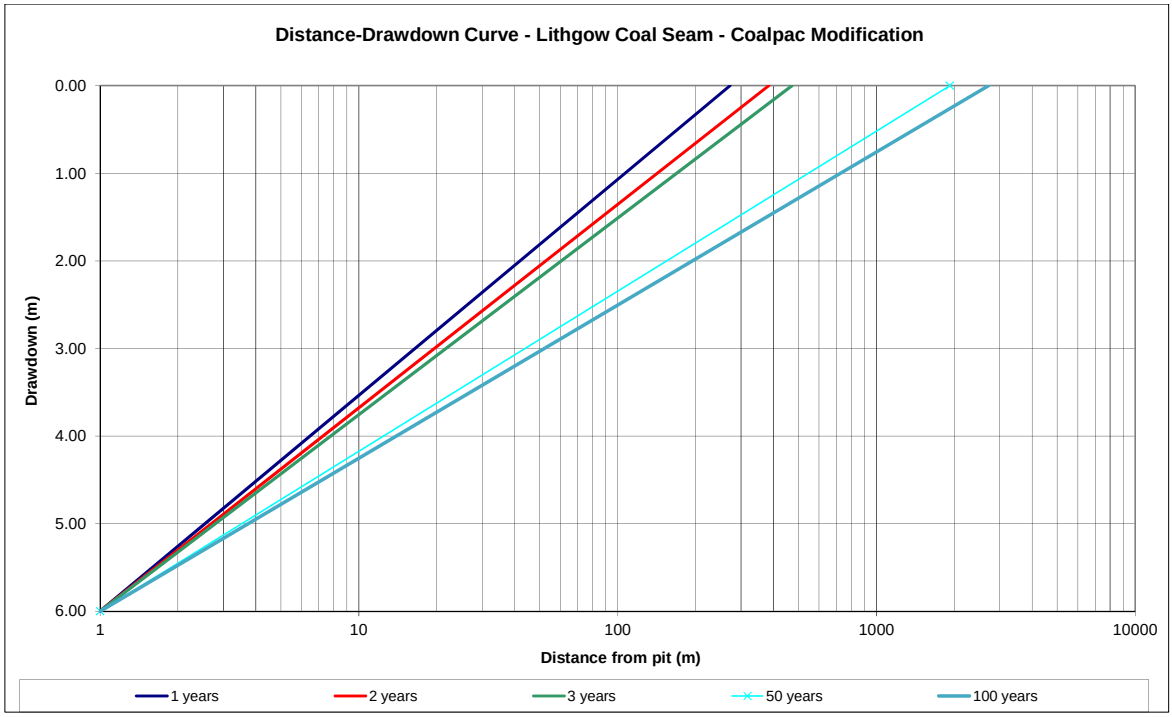

Figure 2-3: Distance Drawdown Relationship

2.3.3 Area of Seepage Face of Proposed Open Pit

The maximum length of the proposed open cut pit within the Modification Disturbance Boundary at Cullen Valley Mine is about 1.5 km. However, only the southern half of this area is anticipated to intersect saturated coal. Therefore, the maximum exposed length of saturated coal will be restricted to about 750 m. The Lithgow/Lidsdale Seam, at this location, has an average thickness of about 2.5 m. The seepage face on the exposed coal seam was assumed to be about 75% of the coal seam thickness, this being about 1.87 m high. Therefore, the cross-sectional area of the seepage face used within the Darcy equation was about 1,406 m^2.

2.3.4 Open Cut Seepage Calculations

The predicted groundwater seepage rate across the length of the open cut in the Modification Boundary at Cullen Valley Mine ranged from 0.4 ML/year up to 1.2 ML/year, as shown in Table 2. The range of predicted groundwater seepage rates into the open cut area were corrected for the effect of evaporation from the seepage face. A rate of 70% pan evaporation was applied to the seepage face to account for partial shadow effects created by the predominantly north-south orientation of the void wall. Evaporation from the seepage face is predicted to account for 100% of groundwater seepage as shown in Table 2. Therefore, evaporation from the seepage face is likely to produce a dry open cut mining area.

The highest seepage rate of 1.2 ML/day was selected as the predicted take of groundwater from a water licencing perspective. This predicted take is considered to be conservative and is likely to overestimate the actual seepage rate likely to be realised.

2.3.1 Highwall Seepage Calculations

The predicted groundwater seepage rate into the highwall drives ranged from 0.36 ML/year up to 1 ML/year, as shown on Table 3.

The Lithgow Seam is too thin to highwall mine in the Modification Boundary at Cullen Valley Mine. However, the Lidsdale Seam immediately above the Lithgow Seam is likely suitable for highwall mining method and the cutting height of the drive in this seam will be about 1.2 m. Each drive will be a maximum of 300 m long and about 3 m wide. Approximately 125 highwall drives will be mined along the 750 m saturated face of the Lidsdale Seam. Each drive will have a storage volume of about 1.08 ML.

The rate of groundwater seepage to the highwall mining drives was predicted using the Darcy Equation described in Section 2.3. The analytical assessment assumed that all highwall mining drives were installed simultaneously, as this assumption simplifies the predictive modelling effort and has the benefit of promoting conservative results.

In this case, groundwater seepage will occur through the end-face of each highwall drive and through the long-wall of the two outer-most drives. The surface area of each end-face is 3.6 m^2 and the length of each long-wall is 360 m^2.

The highwall seepage assessment used the same range of hydraulic conductivity values and the same hydraulic gradient used for the open cut seepage assessment.

The highest seepage rate of 1 ML/day was selected as the predicted take of groundwater from a water licencing perspective. This predicted take is considered to be conservative and is likely to overestimate the actual seepage rate likely to be realised from the highwall mining drives.

Table 2: SUMMARY OF OPEN CUT SEEPAGE RATE CALCULATIONS AND RESULTS						
Parameter	**Unit**	**Range of Input Parameters and Results**				
Hydraulic conductivity (K)	m/day	0.2	0.1	0.09	0.08	0.07
Maximum drawdown	m	6				
Radius of influence	m	500				
Steady state hydraulic gradient (i)	-	0.012				
Average thickness of coal seam	m	2.5				
Length of saturated coal seam	m	750				
Seepage face height	m	1.87				
Cross-section area of seepage (A)	m^2	1,406				
Predicted Seepage Rate to Proposed Open Pit (Q) – <u>not</u> corrected for evaporation	m^3/day	3.37	1.69	1.52	1.35	1.18
	L/s	0.039	0.019	0.018	0.016	0.014
	m^3/year	1232	616	554	493	431
	ML/year	**1.2**	**0.6**	**0.6**	**0.5**	**0.4**
Pan evaporation	mm/day	3.7				
70% pan evaporation	mm/day	2.6				
Evaporation from coal seam (750 m x 2.5 m)	m^3/day	3.64				
	ML/year	1.3				
Predicted Seepage Rate to Proposed Open Pit (Q) – corrected for evaporation	**ML/year**	**-0.10**	**-0.71**	**-0.78**	**-0.84**	**-0.90**
Comment	Evaporation from the seepage face is likely to remove all seepage water from the coal seam face before it can accumulate on the open pit floor as a pumpable volume					

Table 3: SUMMARY OF HIGHWALL MINE SEEPAGE RATE CALCULATIONS AND RESULTS						
Parameter	**Unit**	**Range of Input Parameters and Results**				
Hydraulic conductivity (K)	m/day	0.2	0.1	0.09	0.08	0.07
Radius of influence	m	500				
Steady state hydraulic gradient (i)	-	0.012				
Average thickness of coal seam	m	1.2				
Length of saturated coal seam	m	750				
Seepage face height	m	1.87				
Number of saturated highwall drives	No.	125				
Cross-section area of seepage face – drive end-face (A)	m^2	3.6				
Cross-section area of seepage face – drive end-face (A)	m^2	360				
Predicted seepage rate to all end-faces (Q)	m^3/day	1.08	0.54	0.49	0.43	0.38
Predicted seepage rate to outer wall of drive no. 1 (Q)	m^3/day	0.864	0.432	0.3888	0.3456	0.3024
Predicted seepage rate to outer wall of drive no. 125 (Q)	m^3/day	0.864	0.432	0.3888	0.3456	0.3024
Predicted Seepage Rate to Total Highwall Drives (Q)	m^3/day	2.81	1.40	1.26	1.12	0.98
	L/s	0.033	0.016	0.015	0.013	0.011
	m^3/year	1025	512	461	410	359
	ML/year	**1.02**	**0.51**	**0.46**	**0.41**	**0.36**
Comment	The highwall drives will be sealed after mining and allowed to flood with groundwater seepage					

2.4 Groundwater Quality Monitoring

Four groundwater sampling events to assess water quality in saturated aquifers have occurred to-date. Groundwater quality samples were collected at six-monthly intervals for the first year in February and August 2011. The frequency of sampling events was then reduced to annual sampling from 2012. The sampling frequency and the number of samples collected during each event are shown in Table 4.

Table 4: COALPAC GROUNDWATER SAMPLING EVENTS

Month / Year	Date	No. of Bores Sampled	Samples Collected From
February 2011	16/2/11	5	CP114, CP115, CP116, CP123, LD001
August 2011	17/8/11	5	CP114, CP115, CP116, CP123, LD001
February 2012	02/2/12	6	CP114, CP115, CP116, LD001, CP131, CP132
February 2013	06/2/13	5	CP114, CP115, CP116, CP131, CP132
	27/2/13	1	LD001

The next sampling event is scheduled for May 2014. NSW Office of Water suggested that a baseline groundwater chemistry dataset should ideally contain at least eight sampling events, prior to the commencement of project activities. It is recommended that Coalpac expand the baseline groundwater chemistry dataset.

The groundwater sampling to-date has been undertaken by Hydroilex Pty Ltd (Hydroilex) which specialise in groundwater sampling, analysis, and monitoring. The sampling methods, the quality assurance and quality control (QA / QC) procedures, and results are provided to Coalpac following each sampling event in groundwater sampling/analysis reports.

The general scope of work undertaken by the Hydroilex for each sampling event includes:

- inspection of borehole integrity;
- manual recording of the standing water level;
- downloading and analysis of automatic groundwater level logger data;
- purging of monitoring bores and collection of groundwater samples;
- recording water quality parameters in the field (i.e. pH, EC, Temp, Eh);
- submission of water samples to a NATA accredited laboratory for analysis; and
- review of water quality results and comparison against relevant standards, namely the ANZECC 2000 Freshwater Trigger Values.

The sampling methodology, QA / QC procedures, storage, transport and submission to the laboratory, and the analytical laboratory analyses comply with industry best practice and the following guidelines and standards:

- The Australian / New Zealand Standard Water Quality – “Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples” (AS/NZS 5667.1:1998);
- The Australian / New Zealand Standard Water quality – “Sampling, Part 11: Guidance on sampling of groundwaters” (AS/NZS 5667.11:1998);

- Geoscience Australia, (2009), "Groundwater Sampling and Analysis – A Field Guide"; and
- Murray-Darling Basin Commission, (1997), "Murray Darling Basin Groundwater Quality Sampling Guidelines", Technical Report No. 3, Groundwater Working Group.

In summary, the sampling protocol included:

- purging three bore volumes prior to sampling;
- collecting samples with either a Grundfos MP1 submersible sampling pump (where flow rates were sufficient), or a stainless steel bailer (where flow rates were low);
- calibrating field probes prior to the sampling event;
- storage of samples in laboratory supplied bottles;
- acidifying samples to preserve the dissolved metal concentrations; and
- storing samples on ice until delivered to the laboratory.

The samples collected for each event are analysed for the following:

- Physical Parameters – pH, Electrical Conductivity, and Hardness.
- Major Ions – Sodium, Potassium, Calcium, Magnesium, Chloride, Sulphate, Bicarbonate, Carbonate, Nitrate, and Nitrite.
- Dissolved Metaloids – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, and Zinc.

The QA / QC protocols used during the sampling are listed in Table 5.

Table 5: Field QA / QC

Sampling Team	The fieldwork was managed by Hydroilex. Project personnel comprised professionals and technicians trained in conducting groundwater investigations.
QA/QC System	All fieldwork was conducted in accordance with the Hydroilex Standard Sampling Procedure by professionals and trained technicians.
Chain of Custody Forms	All samples were logged and transferred under appropriately completed Chain of Custody (COC) Forms.
Preservation	All samples were delivered to the laboratory in appropriately preserved containers, with preservation consisting of packing samples in eskies with ice.

The laboratory (Envirolab Services Pty Ltd) used for the chemical analysis of samples is NATA accredited for the selected analyses. Laboratory QA/QC standards and results are documented in the laboratory reports.

The laboratory QA/QC indicators either, all complied with the required standards, or showed variations that would have no significant effect on the quality of the data or the conclusions of the water quality assessment. It is therefore concluded that, for the purposes of this study, the QA / QC results are adequate and the quality of the data is acceptable for use.

2.5 Water Management Plans and Trigger Action Response Plan

Coalpac has an approved Water Management Plan (WMP) in place for Invincible Colliery and the Cullen Valley Mine. Coalpac has committed to updating the currently approved WMP to ensure appropriate management and mitigation measures are implemented to minimise potential groundwater impacts. It is recommended that the WMP plan is prepared in accordance with relevant guidelines to the satisfaction of NOW. The WMP should detail programs to monitor the site water balance, surface water, and groundwater.

The draft WMP should also describe the methodology of establishing groundwater quality triggers and present a preliminary trigger action response plan (TARP). The water quality triggers and the TARP should be finalised after establishing a suitable and robust water quality baseline dataset.

2.6 Groundwater Licence Details

An updated summary of the Water Access Licenses (WAL's) for groundwater issued under the WM Act for Cullen Valley Mine and Invincible Colliery are summarised in Table 6.

Table 6: GROUNDWATER LICENCES

WM Act Licence Number	Bore Name	Share Component (ML)	Water Source	Water Sharing Plan
WAL27898	Tillies Bore	80	Sydney Basin MDB Groundwater Source	NSW Murray-Darling Porous Rock Groundwater Sources
WAL35978	Washery Bore	26		
WAL36458	Long Swamp	120	Sydney Basin Coxs River Groundwater Source	Greater Metropolitan Region Groundwater Sources

2.7 Status of Neighbouring Registered Bores

There are no privately registered bores located within the predicted zone of aquifer depressurisation surrounding the Cullen Valley Mine Modification Boundary. Figure 2-4 shows the location of neighbouring registered bores in more detail.

GW801861 was drilled as a test bore and it's licence has been cancelled. GW064530 and GW064531 are active and are used for stock and domestic purposes. Table 7 summarises details for each of these neighbouring bores.

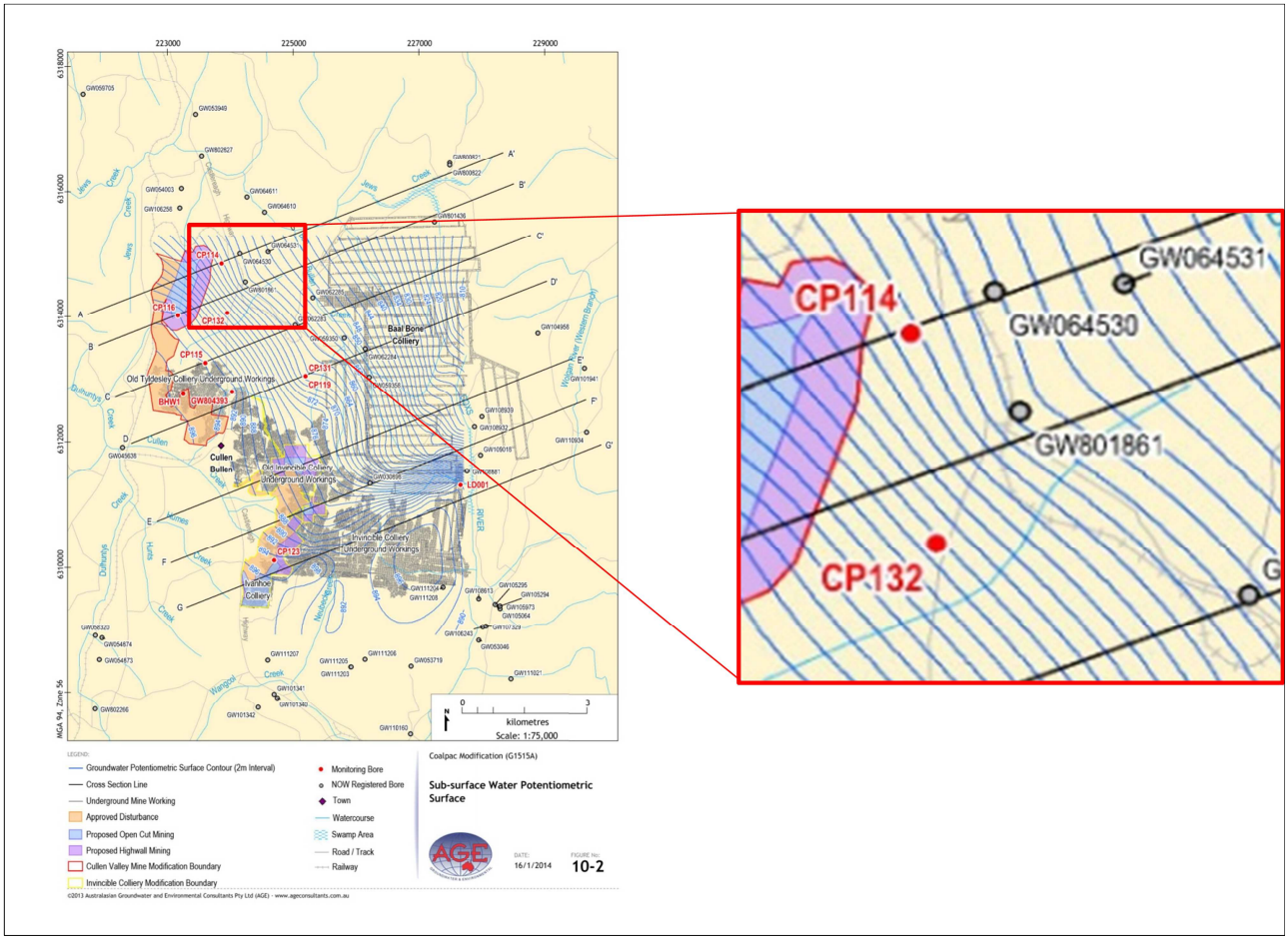

Figure 2-4: Neighbouring Registered Bores

Table 7: NEIGHBOURING REGISTERED BORES					
Work No.	**Year**	**Licence Status**	**Completed Depth (mbgl)**	**Water Bearing Zone (mbgl)**	**Water Bearing Formation**
GW801861	2002	Test Bore – Cancelled	72	62 – 64	Shale
GW064530	1987	Domestic/Stock – Active	85.4	66 – 68	Sandstone
GW064531	1987	Domestic/Stock – Active	48.8	40 - 42	Shale

The water bearing zone for these bores ranges between 40 mbgl and 68 mbgl, and the water is sourced from shale and sandstone units. These water bearing zones are located significantly deeper than the Lithgow Coal Seam, as illustrated in Figure 2-5 and Figure 2-6. Therefore, water levels within the registered bores are not predicted to be impacted by the open cut or highwall mining areas proposed for the Cullen Valley Mine Modification.

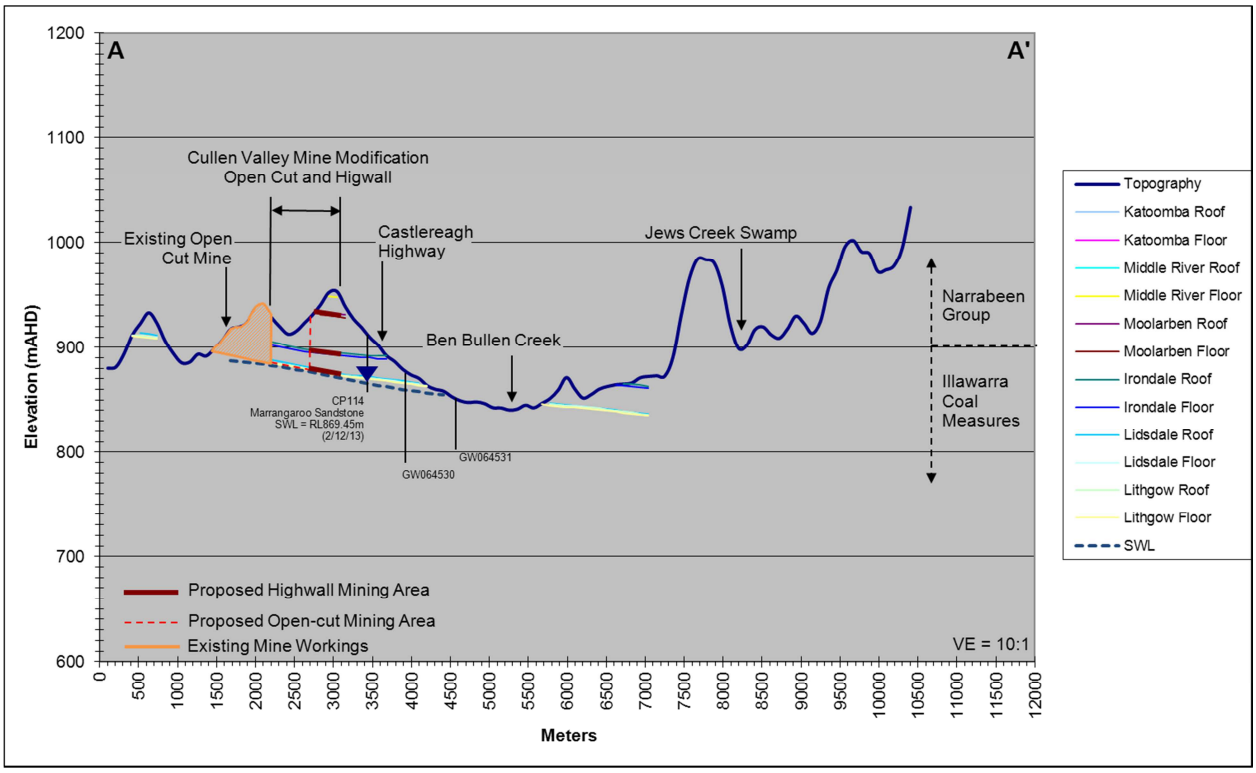

Figure 2-5: Cross-Section A-A`

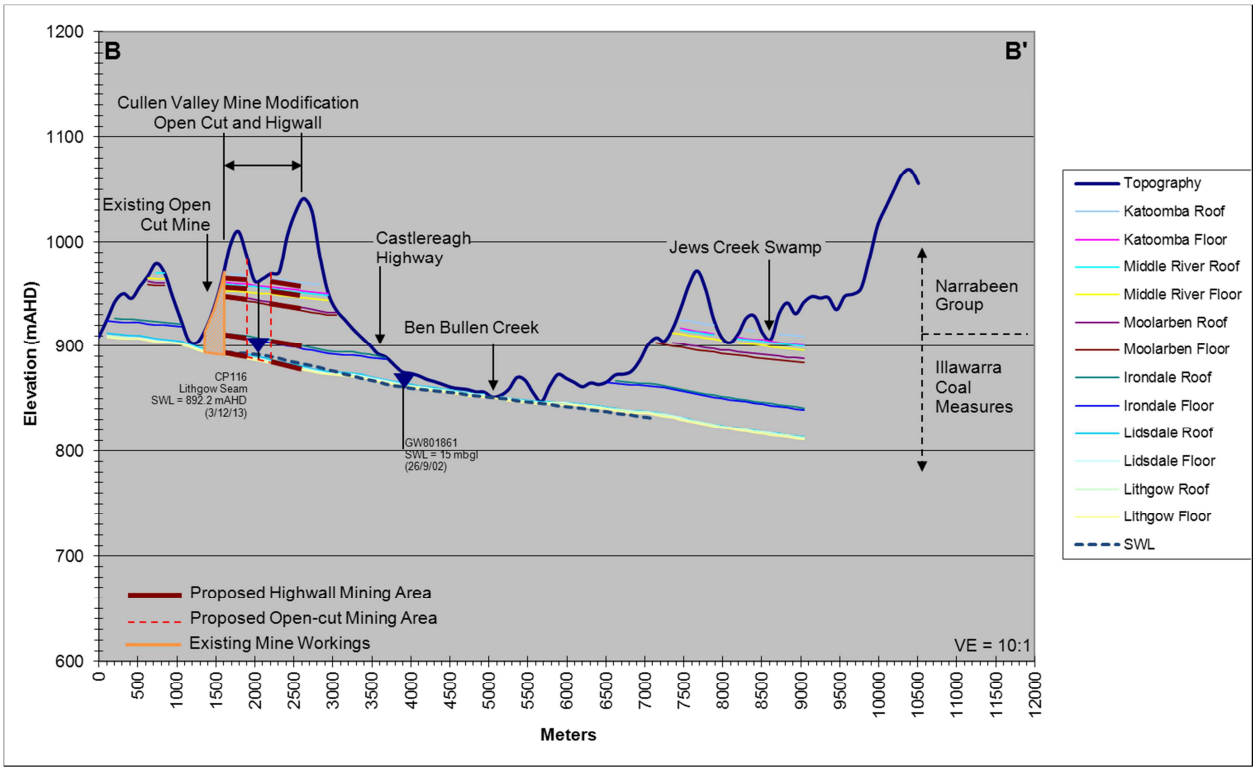

Figure 2-6: Cross-Section B-B`

3 SUMMARY AND CONCLUSIONS OF IMPACT STUDY

The proposed Modifications pose a low risk to the groundwater regime because:

- Only half of the proposed Cullen Valley Mine Modification Disturbance Boundary is likely to intercept a saturated coal seam, this being the Lidsdale / Lithgow Seam. All other coal seams are unsaturated;
- The Cullen Valley Mine Modification is predicted to generate a localised zone of depressurisation in the coal seams, but this is not expected to impact on adjacent neighbouring registered bores or other aquifers adjacent to the Modification Boundary;
- Predicted take of groundwater for the Cullen Valley Mine Modification Boundary is 2.2 ML/year at peak;
- The current predictions suggest that dry mining conditions will still prevail for the Cullen Valley Mine Modification due to evaporative losses;
- The Northern mining area proposed for the Invincible Colliery Modification will intercept sub-surface water in the Old Invincible Colliery underground workings. Mine dewatering of up to 125 ML is predicted in this area over a two year period for the Modification. The Eastern and Southern mining areas proposed for the Invincible Colliery Modification are unlikely to intercept saturated aquifers and flooded underground workings;
- The removal of up to 125 ML sub-surface water from the flooded workings of the Old Invincible Colliery will have a negligible impact on the remainder of the flooded underground workings;
- The backfilling of existing mining void areas across both mine sites and the creation of a free draining final landform at both Cullen Valley Mine and Invincible Colliery as proposed by these modifications will reduce the risk of poor quality water build up on either mine site and the potential for any surface water or groundwater contamination;

The current hydrogeological regime supports these conclusions because:

- Many of the coal seams are topographically elevated and located within the unsaturated zone (i.e. above the potentiometric surface), where much of the mining will be undertaken;
- The upper coal seams crop out at the ground surface in a number of locations, meaning they do not form continuous aquifers;
- The hydraulic gradients and hydraulic conductivities of the coal seam and sandstone aquifers are both low;
- The coal seam aquifers crop out to the east and west of the Modification Boundaries; and
- Groundwater levels have already been significantly drawn down to the east (down-gradient) of the Modification Boundaries by the Baal Bone Colliery.

Groundwater management has not been a major operational issue at Cullen Valley Mine and Invincible Colliery during their long history for the reasons outlined above. Hence, limited monitoring of groundwater levels and quality has been undertaken until recently. In the absence of abundant long-term groundwater data, a dedicated groundwater monitoring network was installed adjacent to Invincible Colliery and Cullen Valley Mine to enhance the collection of groundwater data, specifically to provide baseline groundwater data and for long-term data collection, assessment, and reporting.

Please do not hesitate to contact the undersigned if you have any queries, or if any clarification is required.

Yours faithfully,

TIM ARMSTRONG
Senior Hydrogeologist
Australasian Groundwater and Environmental Consultants Pty Ltd

APPENDIX G

Supplementary Surface Water Impact Assessment

0718-01-G3
1 May 2014

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Ben Eastwood
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Invincible Colliery
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Dear Ben,

SUBJECT: INVINCIBLE COLLIERY & CULLEN VALLEY MINE MODIFICATIONS SUPPLEMENTARY SURFACE WATER ASSESSMENT

1 INTRODUCTION

Coalpac Pty Ltd, Administrators Appointed (Coalpac) owns and operates the Invincible Colliery and Cullen Valley Mine. Each mine operates as a separate entity with separate planning approvals under the *Environmental Planning and Assessment Act 1979* (EP&A Act). Coalpac is seeking to modify both planning approvals under Section 75W of the former Part 3A of the EP&A Act.

WRM Water & Environment Pty Ltd (WRM) undertook a *Surface Water Impact Assessment, Cullen Valley Mine and Invincible Colliery Modifications* dated 28 January 2014 that supports the *Environmental Assessment Modifications to PA 07_127 and DA 200-5-2003* dated March 2014 which is currently being assessed by the NSW Department of Planning and Infrastructure. This assessment provides further clarification of water related matters for the Modification of existing approvals at Invincible Colliery and Cullen Valley Mine and should be considered as a supplementary report to the above mentioned WRM (2014) Surface Water Impact Assessment.

2 ASSUMPTIONS

The following key assumptions have been made for the purposes of this assessment:

- Coalpac landholdings and relevant surface mining authorities held by the company in the vicinity of Cullen Valley Mine and Invincible Colliery have been included for the purpose of calculating the harvestable right for Coalpac operations;
- There are few minor existing harvestable right dams located on Coalpac landholdings or mining authorities. That is, the majority of dams located on Coalpac landholdings and mine leases are those that form part of the mine water management system;
- Large areas of land to the south of Invincible Colliery are affected by pre-existing subsidence and surface cracking from underground Bord and Pillar mining in the abandoned Invincible Colliery and Ivanhoe Colliery underground workings. All runoff from undisturbed catchment areas affected by pre-existing subsidence is assumed to report directly to the flooded underground workings beneath the site, and does not drain into the Invincible Colliery water management system. As this undisturbed runoff is not captured by the mine water management system, and the subsidence cracking pre-dates Coalpac's operation of the Invincible Colliery, it is not considered to be a licensable take of surface water under this assessment. The catchment areas

impacted by subsidence surface cracking that direct water directly to the old historic underground mine workings are shown in Figure 1.

- Runoff from upstream undisturbed catchment areas in the southern portion of Cullen Valley Mine drains to soaks in the established rehabilitation areas at the site. It is assumed for the purpose of this report that runoff from these areas collects in the soaks and rehabilitation areas and infiltrates into the abandoned Old Tyldesley underground workings beneath Cullen Valley Mine, and is not captured by the mine water management system. As this undisturbed runoff is not captured by the mine water management system, it is not considered to be a licensable take of surface water under this assessment. Undisturbed catchment areas that drain to soaks in the established rehabilitation areas are shown in Figure 1.
- A volumetric runoff coefficient of 11.2% has been adopted for undisturbed catchment areas. This runoff coefficient has been calculated from the NSW Office of Water (NSWOW) Maximum Harvestable Rights Calculator as follows:
    - Maximum Harvestable Right Dam Capacity (MHRDC) is based on a dam or dams that capture up to 10% of average regional rainfall runoff of the property (NSWOW, 2010a)
    - MHRDC multiplier for Coalpac sites = 0.08ML/ha (obtained from NSWOW MHRDC Calculator);
    - MHRDC multiplier is equivalent to 10% average regional rainfall runoff, hence 100% average regional rainfall runoff for Coalpac sites is 0.8ML/ha or 80mm of runoff.
    - Average annual rainfall at the Coalpac sites is estimated to be 716mm based on long term dataset provided by SILO Datadrill;
    - Therefore the runoff coefficient for undisturbed catchments in the vicinity of the Coalpac sites is 80mm ÷ 716mm average annual rainfall = 11.2%;
- A volumetric runoff coefficient of 30% has been assumed for disturbed catchment areas;

3 HARVESTABLE RIGHTS ENTITLEMENT FOR EXISTING OPERATIONS AND PROPOSED MODIFICATIONS

Under the *Water Management Act 2000*, landholders in most rural areas are permitted to collect a proportion of the rainfall runoff on their property and store it in one or more dams up to a certain size. This is known as a 'harvestable right'. A dam can capture up to 10 percent of the average regional rainfall runoff for their landholding without requiring a licence.

For this assessment the land area required for the purposes of calculating the harvestable right is Coalpac landholdings and relevant surface mining authorities held by the company in the vicinity of Cullen Valley Mine and Invincible Colliery. For comparison purposes a second case was investigated with the following areas excluded from the harvestable right calculation:

- Existing disturbance areas under currently approved operations; and
- Undisturbed catchment areas that drain to pre-existing subsidence cracking at Invincible, or infiltration soaks at Cullen Valley.

Table 1 shows the total harvestable right for Cullen Valley Mine and Invincible Colliery for both cases, based on a MHRDC multiplier value of 0.08 ML/ha for the relevant area (refer Section 2).
The MHRDC calculation is summarised as follows:

- Case 1 – No excluded areas:
    - **MHRDC** = 0.08ML/ha x Coalpac Landholdings & Mining Authorities (ha) *[Calc. Ref. A]*;
- Case 2 – Removal of excluded areas:
    - **MHRDC** = 0.08ML/ha x Land Area for Harvestable Right Calculation less Exclusions (ha) *[Calc. Ref. D]*;
    - **D** = Total Landholding Area *[Calc. Ref. A]*– (Existing and Proposed Disturbance Area *[Calc. Ref. B]* + Undisturbed Area draining to subsidence / infiltration soaks *[Calc. Ref. C]*);

Table 1 Harvestable Rights Entitlement

Calc. Ref.	Description	Invincible Colliery	Cullen Valley Mine	Coalpac Total
A	Coalpac Landholdings & Mining Authorities (ha)	635	552	1187
B	Existing & Proposed Disturbance Area (Excluded Works) (ha)	229	218	447
C	Undisturbed Area draining to subsidence /infiltration soaks (ha)	80	32	112
D	Coalpac Landholdings & Mining Authorities less exclusions (ha)	326	302	628
Case 1 MHRDC	**Maximum Harvestable Right Dam Capacity (ML)**	**50.8**	**44.2**	**95.0**
Case 2 MHRDC	**Maximum Harvestable Right Dam Capacity (ML)**	**26.1**	**24.1**	**50.2**

4 WATER LICENSING

The *Water Management Act 2000* applies to surface waters within the Cullen Valley Mine and Invincible Colliery through the *Macquarie Bogan Unregulated and Alluvial Water Sources Water Sharing Plan*. Surface water at the Cullen Valley Mine and Invincible Colliery is regulated under this plan as part of the Turon Crudine River Water Source. Water volumes extracted from these catchments require a water entitlement (an unregulated river access licence).

Dams solely for the capture, containment and recirculation of mine affected water consistent with best management practice to prevent the contamination of a water source are "excluded works" and are exempt from the requirement for water supply works approvals and Water Access Licences (WALs) under the *Water Management Act 2000*. On this basis, water captured in the site water management structures, with the exception of rainfall runoff from undisturbed natural catchments, is not subject to licensing under the *Water Management Act 2000*. It should be noted that runoff intercepted by the mine water management system from undisturbed catchment areas which do not form part of the excluded works area is licensable under the *Water Management Act 2000*.

Portions of land at Invincible Colliery are affected by pre-existing surface cracking from underground Bord and Pillar mining in the abandoned Invincible Colliery and Ivanhoe Colliery underground workings. Anecdotal evidence indicates that much of the surface water runoff which drains through these previously mined areas does not report to downstream surface water management structures, and instead enters the sinkholes and fractures and reports directly to the abandoned underground workings. As such this report, consistent with previous studies (WRM, 2011 & 2014), has assumed that all runoff from subcatchments affected by subsidence cracking does not report to the mine water management system, and instead drains into the old underground workings.

Runoff from upstream undisturbed catchment areas in the southern portion of Cullen Valley Mine drains to soaks in the established rehabilitation areas. It is assumed that runoff from these areas collects in the soaks and infiltrates into the abandoned Old Tyldesley underground workings beneath Cullen Valley Mine, and is not captured by the mine water management system.

For the purposes of water licensing assessment, it is assumed that any capture of runoff from catchments draining to areas of pre-existing subsidence cracking near the Invincible Colliery, or to the soaks in the established rehab at Cullen Valley Mine are not subject to licensing requirements, as this water is not captured by the mine water management system, and the subsidence cracking and abandoned underground workings pre-date Coalpacs operation of these mines.

Runoff from undisturbed natural catchment areas intercepted by the Invincible Colliery or Cullen Valley Mine water management system would require licencing under the *Water Management Act 2000*. Figure 1

and Table 2 shows the undisturbed catchment areas that would be subject to licencing if captured, as well as the disturbed areas and the catchment area that drains to pre-existing subsidence cracking which are to be excluded from licensing requirements. Table 3 shows the estimated licensable and non-licensable volume of water captured within the water management systems at Cullen Valley Mine and Invincible Colliery.

The intercepted average, 90th percentile and maximum annual runoff volume has been estimated using average, 90th percentile and maximum annual rainfalls (from SILO Datadrill) of 716 mm, 939 mm and 1,260 mm respectively. A volumetric runoff coefficient of 0.112 has been used based on the runoff coefficient utilised for harvestable rights calculations at Cullen Valley Mine and Invincible Colliery, as described in Section 2.

Table 2 Catchment Areas

Description	Invincible Colliery	Cullen Valley Mine	Coalpac Total
Undisturbed Catchment Area captured by Mine Water Management System (ha)	224	80	304
Undisturbed Catchment contributing to flooded underground workings (ha)	192	83	275
Existing & Proposed Disturbance Area (Excluded Works) (ha)	229	218	447

Table 3 Surface Water Take

Annual Take (ML)			Invincible Colliery	Cullen Valley Mine	Coalpac Total
Licensable	Undisturbed catchment – captured by mine water management system	Peak	315	113	428
		90th percentile	235	84	319
		Average	179	64	243
Non-licensable	Undisturbed catchment - contributing to flooded underground workings	Peak	270	117	387
		90th percentile	201	87	288
		Average	154	66	220
	Existing and proposed disturbed area	Peak	865	824	1689
		90th percentile	645	614	1259
		Average	468	492	960

After taking into account the harvestable right entitlement at Cullen Valley Mine and Invincible Colliery for Case 1 in Table 1 (i.e. no area excluded), the remaining annual take of water requiring licensing for the peak, 90th percentile and average annual rainfalls, are provided in Table 4.

Table 4 Required Licensing (Accounting for Harvestable Rights Entitlement)

Annual Take (ML)		Invincible Colliery	Cullen Valley Mine	Coalpac Total
Undisturbed catchment	Peak	264	68	332
	90th percentile	184	40	224
	Average	128	20	148

5 IMPACT OF PROPOSED MODIFICATIONS ON LICENSABLE SURFACE WATER TAKE

The proposed Modification at Invincible Colliery will not increase the amount of undisturbed catchment runoff captured by the mine water management system, as the undisturbed catchment upstream of the proposed Modification mining areas already drains into the Invincible Colliery mine water management system. The undisturbed catchment area draining to the mine water management system at Invincible Colliery for both existing and proposed modification conditions is 224.4ha.

The proposed Modification at Cullen Valley Mine will increase the undisturbed catchment runoff captured by the mine water management system. Under existing conditions, the undisturbed catchment area draining to the mine water management system at Cullen Valley is 28.5ha, equating to a licensable surface water take of 23ML for an average rainfall year. The proposed Modification disturbance will increase the captured undisturbed catchment area to 77.9ha, resulting in an increase in the take of licensable surface water to 62ML.

6 LICENSING OF EXTRACTION OF WATER FROM FLOODED UNDERGROUND WORKINGS FOR MINE SITE DEMAND

It is understood that water extracted from the flooded underground workings to supply mine site water demands may be licensable under certain circumstances. The amount of water required to be extracted from the underground workings would be dependent on site rainfall and expected demands. Coalpac have previously provided the following information regarding water demands under normal operating conditions at Invincible Colliery and Cullen Valley Mine:

- Total Annual Water Demand at Cullen Valley Mine: 395ML/yr;
    - Dust Suppression: 386ML/yr;
    - Process Water: 9ML/yr;
- Total Annual Water Demand at Invincible Colliery: 330ML/yr;
    - Dust Suppression: 291ML/yr;
    - Process Water: 9ML/yr;
    - CPP Makeup Water: 30ML/yr;

Table 3 indicates that in an average year the mine water management systems at Cullen Valley Mine and Invincible Colliery would capture approximately 960ML of runoff per annum from disturbed catchments alone. Therefore, on average there will be a water surplus of approximately 235ML/yr captured by the mine water management systems. This additional surplus water is currently directed to the flooded underground workings via channelling or pumping for storage. This will continue to result in a net inflow of water to the flooded underground workings over the Modification period based on long term average climate conditions. Therefore no annual license would be required for extractions of water from the flooded underground workings, as inflows will, on average, exceed any extractions required to meet mine operational demands.

7 STRAHLER STREAM ORDER

Streams draining through the Project site have been classified under the Strahler stream order classification system, as shown in Figure 2. The stream order was determined based on 1:25 000 km topography maps. The Modification at Cullen Valley Mine intercepts 1st and 2nd order streams as defined by the Strahler stream order classification system. The Modification intercepts 3rd order streams in two locations at Invincible Colliery. It should be noted that that these 3rd order streams have already been disturbed by existing approved mining operations immediately downstream of the proposed Modification area.

8 MITIGATION AND MANAGEMENT OPTIONS

A number of strategies are available to offset the volume of undisturbed catchment runoff captured by the mine water management systems at Cullen Valley Mine and Invincible Colliery:

- Extraction, treatment and release of water stored in the flooded underground workings. Releases of water could be made following rainfall events, with release volumes equivalent to estimated flows from undisturbed catchment areas discharged from the site. Any releases of water from the flooded underground workings would need to be treated to ensure compliance with relevant water quality criteria under existing licenses and approvals.
- Construction of drainage channels to convey runoff from upstream undisturbed catchment areas around or through areas disturbed by mining activities, bypassing the mine water management system and releasing water into downstream watercourses.
- Construction of clean water capture ponds upslope of any mine disturbance areas and the installation of gravity fed pipes to transfer clean water directly to downstream watercourses. This strategy is recommended for catchment areas where the construction of clean water diversion channels may not be suitable.
- Note that the construction of clean water diversion works (channels or ponds) would possibly be considered as 'excluded works' under the *Water Management (General) Regulation 2011.* Any clean water diversion works would only be undertaken on 1st and a2nd order streams.

9 CONCLUSION

The assessment of required water licensing and harvestable rights entitlement at Cullen Valley Mine and Invincible Colliery shows that harvestable rights entitlement are not sufficient to cover the required licensing of water take due to capture of undisturbed catchment runoff in the mine water management system. For an average rainfall year, the operations would require water access licenses of 148ML under the *Macquarie Bogan Unregulated and Alluvial Water Sources Water Sharing Plan* if appropriate management and mitigation measures are not implemented. If the management and mitigation measures identified in this report are implemented, were appropriate, and clean water is diverted around 'excluded works' areas and is not captured by the water management system, then it is unlikely that any licence would be required under the above mentioned Water Sharing Plan.

No licenses would be required for extractions of water from the flooded underground workings, as pumped inflows into the flooded underground workings will, on average, exceed any extractions.

Please do not hesitate to contact me if you have any queries.

For and on behalf of
WRM Water & Environment Pty Ltd

Rhys Cullen
Senior Engineer

References:

WRM (2011) *Surface Water Impact Assessment for Coalpac Consolidation Project*, Report prepared by WRM Water & Environment on behalf of Coalpac Pty Ltd, November 2011.

WRM (2014) *Surface Water Impact Assessment, Cullen Valley and Invincible Colliery Modifications*, Report prepared by WRM Water & Environment on behalf of Coalpac Pty Ltd, January 2014.

Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012, Accessed from http://www.legislation.nsw.gov.au/

NSW Office of Water Maximum Harvestable Right Dam Capacity Calculator, Accessed from http://www.water.nsw.gov.au/Water-Licensing/Basic-water-rights/Harvesting-runoff/Calculator/default.aspx

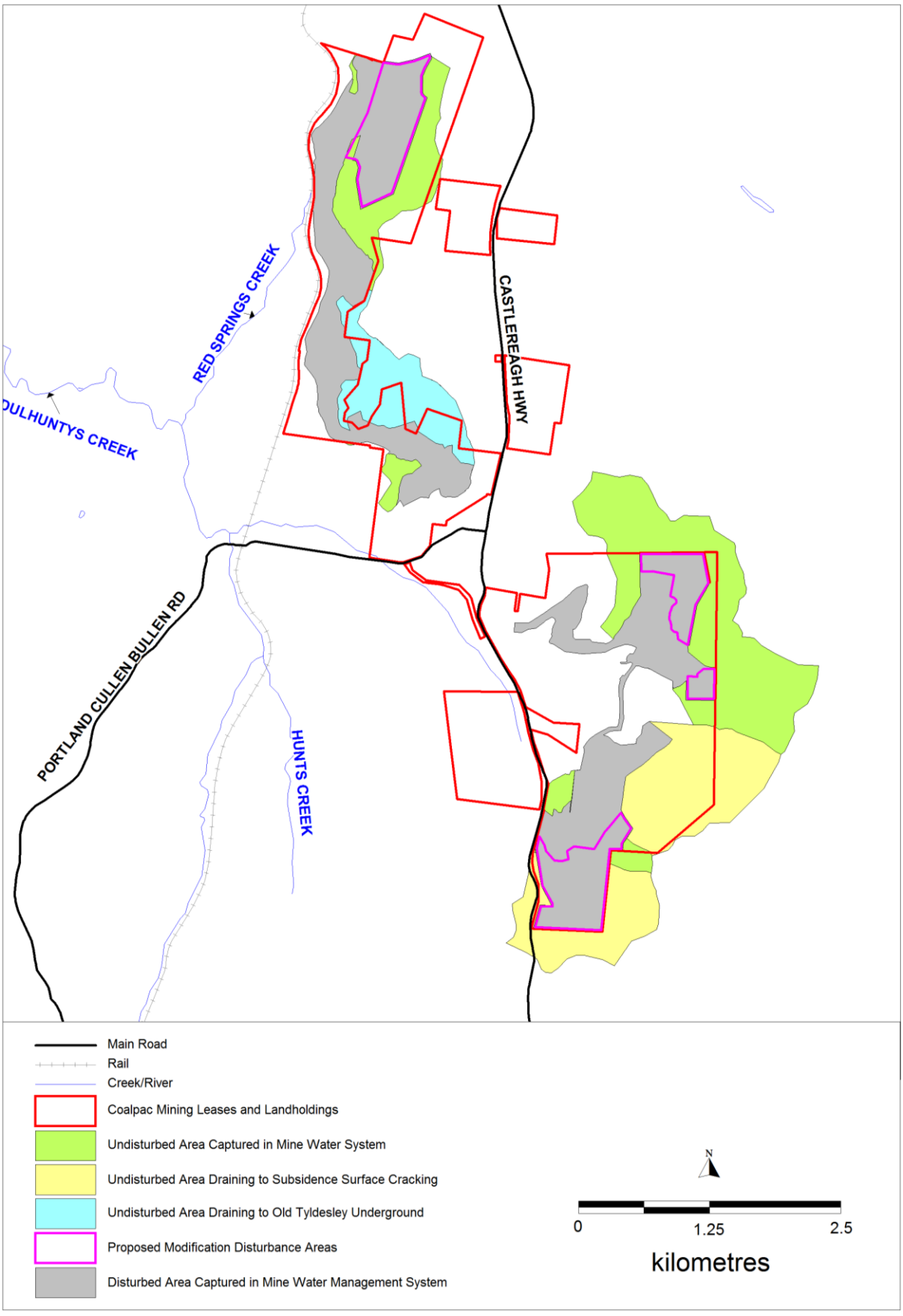

Figure 1 Harvestable Rights Land Area and Catchments for Invincible Colliery and Cullen Valley Mine

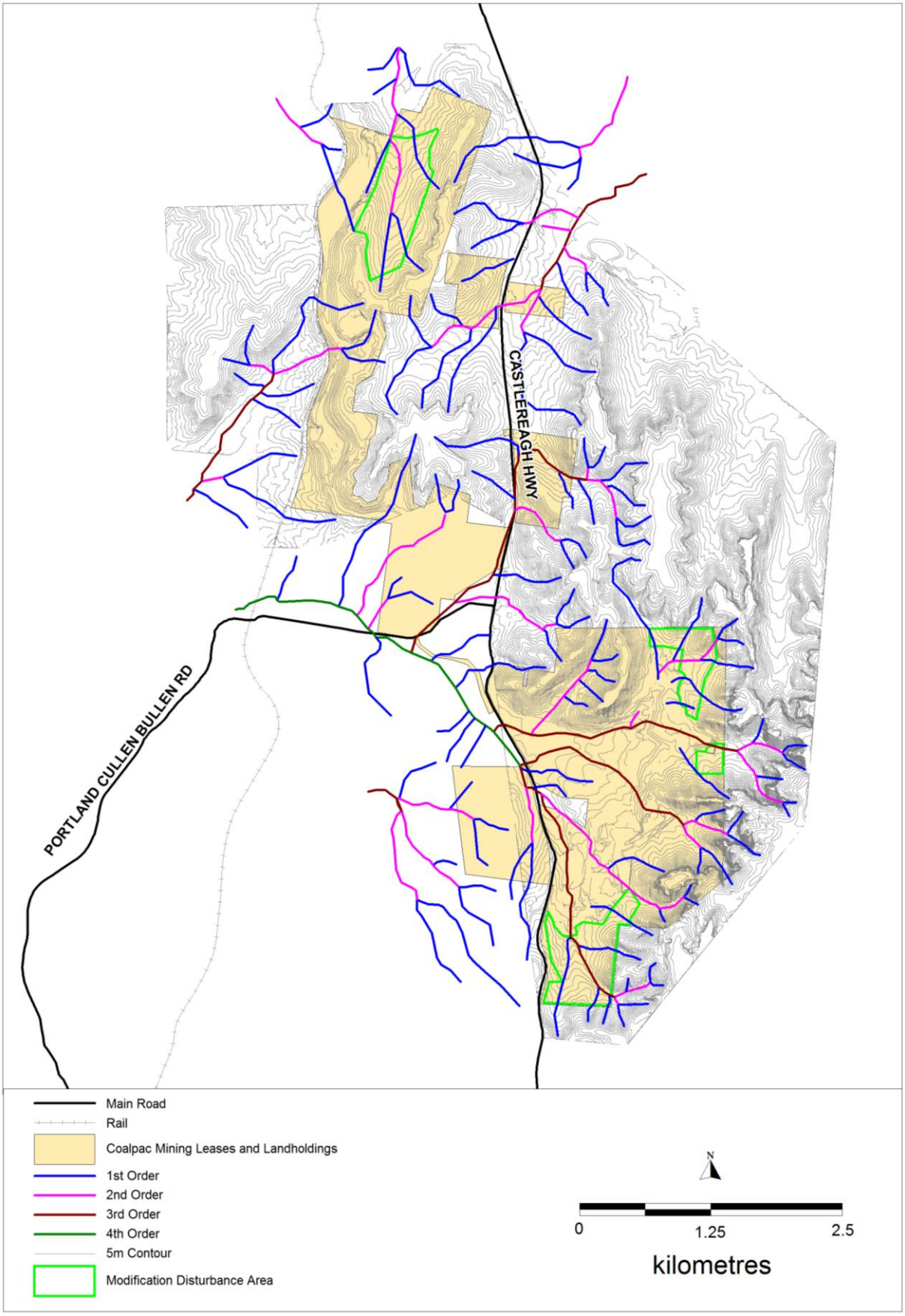

Figure 2 Strahler Stream Ordering at Invincible Colliery and Cullen Valley Mine

APPENDIX H

Cullen Valley Mine Interim Review
Heating Area Plan of Works

COALPAC PTY LIMITED

Cullen Valley Mine

Area of Heating Zone with Completed Capping. January 2014

Cullen Valley Interim Review Heating Area Plan of Works

Prepared by

Olsen Environmental Consulting Pty Limited

February 2014

Interim Review of Heating Area Plan of Works for the Cullen Valley Mine

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1 INTRODUCTION

This review report has been prepared by Olsen Environmental Consulting Pty Limited (OEC) on behalf of Coalpac Pty Limited (Administrators Appointed) (Coalpac) to assess the progress and implementation of the Approved Plan of Works contained within the current Care and Maintenance Mining Operation Plan for Cullen Valley Mine. The Approved Plan of Works is based on the recommendations made by OEC in their report dated January 2013.

This Interim Review was supported by a site visit by OEC on Monday 20th January 2014, inspection of works completed to-date, a review of relevant monitoring data, plans and correspondence and the Approved Plan of Works relating to subsurface heating at Cullen Valley Mine.

This review report also records our observations and includes an updated series of recommendations as required to reflect developments in the interim period since January 2013.

It is the experience of OEC and supported by International literature that successful and efficient management of coal fires has been achieved by the application of facts-based information in an iterative and logical manner. Fire management strategies developed from factual data maximise the likelihood of eventual success. This approach forms the basis of the Approved Plan of Works at Cullen Valley Mine as recommended by OEC.

Coalpac is correctly pursuing a strategy to collect accurate relevant data and to implement appropriate actions based on the data and observations.

2 PROCEDURE

2.1 Site Inspection

OEC (David Olsen) undertook a site inspection on 20th January 2014. An overview presentation was given by Coalpac to summarise the current status of the heating activities at Cullen Valley, including earthworks completed, monitoring and reporting information.

David Olsen and Ben Eastwood (Coalpac) then walked over the area affected by heating and inspected all known affected areas.

Coalpac provided OEC with a number of reports, files and data bases which have been read to assist with this interim review.

2.2 Objectives

The Approved Plan of Works uses a number of primary factors to measure the success or progress in managing and possibly extinguishing the fire at Cullen Valley Mine. These primary factors are:

- **Control and minimise impact on the community.** This relates to controlling odour, minimising smoke and visibility issues and also eliminating any potential; health and safety risks from direct exposure.

- **Control and minimise environmental impact.** This relates to controlling or minimising air quality impacts and to enabling vegetation to be re-established and maintained on any heat affected areas.

- **Avoiding wastage of coal resource.** This concern would be addressed by minimising or avoiding potentially mineable coal being burnt in situ by the fire.

These primary concerns have not changed since our January 2013 Report and should continue to underpin all actions in the Approved Plan of Works as all parties proceed through the iterative process of developing and implementing strategies to manage and extinguish the fire.

3 OBSERVATIONS

This section provides a detailed discussion on the key observations made during the site visit and review of the Approved Plan of Works.

3.1 New Sub-surface Water Monitoring Bore

During 2013 Coalpac installed a sub-surface water monitoring bore in the flooded underground mine workings of the Lithgow Seam in the main valley area affected by heating. This borehole is identified as BHW11 and has enabled the determination of a more accurate sub-surface water level in the area most affected by heating. **Figure 1** shows the location of all monitoring boreholes.

Until the establishment of this bore, sub-surface water levels in the heating area were extrapolated from measurements taken in Tilley's Bore. Tilley's Bore is located approximately 1.4km to the east of BHW11 and down dip from the Cullen Valley Mine heating area. It is potentially subject to regional factors affecting recorded water level and does not provide a direct measurement of the sub-surface water level in the heating area. Notwithstanding, Tilley's Bore water level data is valid and valuable and should continue to be recorded.

Comparison of recorded sub-surface water levels show the level to be approximately 1.5m higher at BHW11 compared to the level in Tilley's Bore. This water level increase of 1.5m significantly improves the ability of the sub-surface water in the mine workings to act as a barrier for the migration of the fire to other areas.

The lowest recorded sub-surface water level in the 12 years of records available for Tilley's Bore is 889.4m. Given the 1.5m increase in level at BHW11 the lowest sub-surface water level in the heated area is estimated to be 890.9m. This means the sub-surface water held in the abandoned underground workings provides a significant barrier to the migration of any underground fire, even in dry times.

OEC consider this finding significant in the ongoing management and mitigation of sub-surface heating at Cullen Valley Mine.

OEC recommends that:

- All plans showing sub-surface water levels should reflect the more relevant levels as determined from BHW11.
- Water levels in Tilley's Bore together with those in BHW11 should continue to be recorded.

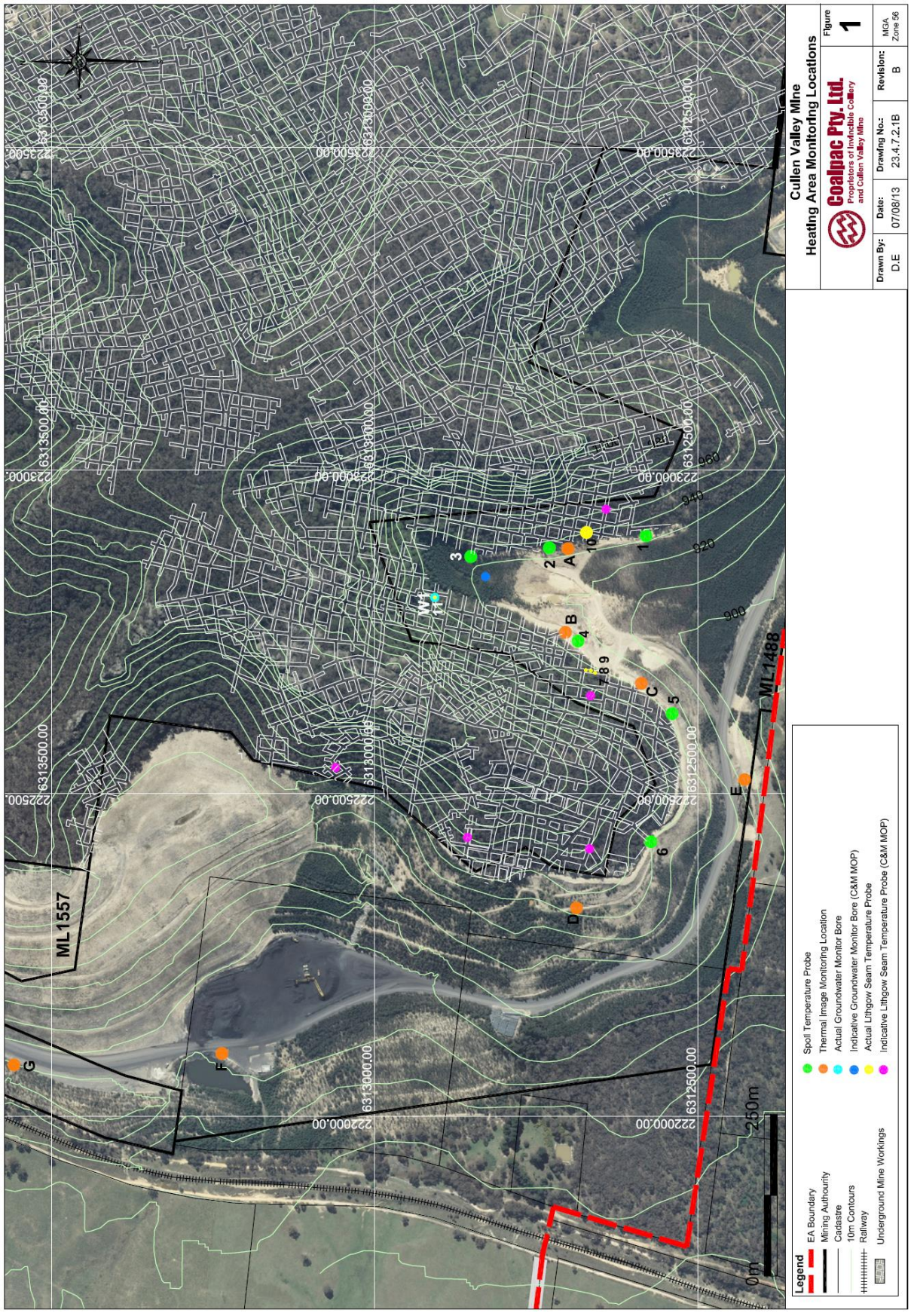

Figure 1. Monitoring Borehole Locations Cullen Valley Mine

3.2 Sub-surface Water Study

One of the key recommendations of the OEC January 2013 Report was to undertake a study of the sub-surface water flooding the abandoned underground mine workings in the Tyldesley Colliery. There is enough information now available to undertake the study and this section outlines our findings and describes a sound model for understanding sub-surface water level behaviour.

Coalpac has previously commissioned Australian Groundwater and Environmental Consultants Pty Ltd (AGEC) to prepare a Groundwater Impact Assessment in relation to the Coalpac Consolidated Project. The following paragraphs are extracted from the AGEC report dated March 2012 and provide a concise overview of the behaviour of sub-surface water in the old mine workings.

- *The Lithgow Seam acts like an aquifer in the region.*
- *The Seam has low hydraulic conductivity of the order of 0.001m/day. However, one or two layers may have slightly higher hydraulic conductivity up to 0.01m/day.*
- *The interburden sandstones, siltstones and mudstones are typically of significantly lower permeability than the coal seams (by one or more orders of magnitude) and they generally act as aquitards.*
- *Sub-surface water levels are not anticipated to have large fluctuations over time.*
- *There is a calculated water storage volume of 707ML in the underground workings at Cullen Valley.*
- *The hydraulic gradient is towards the north east following the coal seams down-dip towards the Wolgan Valley escarpment (via Baal Bone Colliery).*
- *Recharge occurs by diffuse rainfall infiltrations and local runoff into the outcrop in low lying areas and into the weathered and fractured surface units in more elevated areas.*
- *The primary recharge to the coal seams is via direct rainfall recharge through the coal seam outcrop, where the aquifer is unconfined.*
- *Predicted seepage from the Old Tyldesley Colliery underground workings is within the range of 3 to 8ML per year.*

In summary, the water levels in the Old Tyldesley Colliery workings are in an approximate static state with outflows and inflows approximately in balance. The only identified outflows are down dip drainage to the north east which has been estimated at between 3 and 8ML per year. Inflow is derived from surface water and essentially reflects rainfall with wet years resulting in increased levels and dry years resulting in decreased water levels. Over time the balance between inflow and outflow has resulted in a system that is basically static.

Based on sub-surface water levels recorded at Tilley's Bore there has been an approximate 4m range in the water levels over the wet/dry year cycle.

This information provides an adequate working model to assist with the assessment and design of sub-surface water management practices to achieve appropriate water retention in the underground workings in order to provide a secure barrier to the migration of underground fire through the old workings.

The model indicates that water levels can be readily controlled by management of extractions and inputs. It is understood that Coalpac is seeking approval for a pipeline which will allow for the transfer of water from the Invincible underground workings to the Old Tyldesly Colliery underground workings at Cullen Valley Mine. This would provide access to a permanent and reliable water source to ensure the water level in the underground workings at Cullen Valley

Mine can be maintained even during dry times. It may even allow for water levels to be increased if required for fire control and extinguishment.

3.3 Temperature Monitoring

Coalpac has continued to record data from Boreholes 1 to 6 which are located in the open cut backfill adjacent to the old highwall (Refer **Figure 1** for borehole locations).

These boreholes have provided useful data over time and have helped to collect information that has enabled fact-based management actions to be planned and implemented.

The temperature probes in Boreholes 1 to 3 recorded increased temperatures at depth in the backfill. Although elevated, the temperatures were generally below 200^{o}C with most below 100^{o}C. During 2013 Coalpac installed BHW11 into the sub-surface water stored in the Old Tyldesley Colliery workings in the Lithgow Seam. As discussed in Section 3.1, BHW11 has recorded water levels in the immediate vicinity of the heating-affected area approximately 1.5m higher than levels previously predicted by extrapolating levels from the Tilley's Bore. Water levels in the underground workings are up to 1.5m higher than was predicted prior to the installation of BHW11. In support of these findings, Borehole 10 which was installed about the same time originally intercepted a coal pillar and was re-drilled to intercept a roadway which was found to be flooded establish. A temperature monitoring probe has been installed in the flooded roadway.

The presence of water in these areas would indicate that emissions previously observed around Boreholes 1, 2 and 3 most likely originated from heating within adjacent backfill material and not from fire within the abandoned underground workings. This is supported by the recorded temperatures.

In early 2013 the temperatures at depth in Boreholes 1, 2 and 3 increased significantly and by September 2013 the data record indicates that the probes no longer function reliably.

The temperatures recorded in Borehole 4, 5 and 6 are much higher than those recorded in Boreholes 1, 2 and 3. Boreholes 4, 5 and 6 also record increased temperatures with depth.

It is possible (most likely) that the higher temperatures recorded in Boreholes 4, 5 and 6 are related to the proximity of these Boreholes to the active heating area in the backfill material between them and the remediated noise bund. Areas affected by heating appear to be much larger and closer to Boreholes 4, 5 and 6 than to Boreholes 1, 2 and 3.

In December 2012 and early 2013, the temperatures recorded in Boreholes 4, 5 and 6 increased significantly and then it appears that the temperature probes failed after experiencing temperatures outside their operating range.

All the probes in Boreholes 1 to 6 have reached their use-by date and the data being recording is no longer reliable. It is OEC's recommendation that Coalpac cease recording from the current boreholes and replace selected ones (Current Boreholes 2, 5 and 6) with more robust alternatives. These could be positioned within the current boreholes or close nearby in freshly drilled boreholes.

Boreholes 5 and 6 are located adjacent to old workings that do not contain sub-surface water and are up-hill from the most active heating zone in the open cut backfill area. Borehole 2 will provide ongoing monitoring data for the eastern-most section of the heating affected zone.

In mid 2013, Coalpac installed a new series of monitoring bores identified as Boreholes 7, 8, 9, 10 and 11. Boreholes 7 to 10 are located within the Lithgow Seam in the old underground workings and are fitted with temperature probes that are more robust than those used in Boreholes 1 to 6. Borehole 11 (BHW11) was installed to provide site specific water level data and augments the sub-surface water level information provided from the Tilley's Bore. It also records water temperature which has been a constant 20^{o}C ever since installation.

Boreholes 7, 8, 9 and 10 have recorded very consistent temperatures since installation in July 2013 with Borehole 7 recording approximately 28^{o}C, Borehole 8 recording approximately 57^{o}C, Borehole 9 recording approximately 37^{o}C and Borehole 10 recording approximately 53^{o}C. Coalpac now has a significant reliable data set from these four temperature probes over a 7 month period.

Interpreting sub-surface temperature data can be problematic and should be undertaken with "reserved caution". However, the temperatures above give a level of encouragement when compared to the following, which is an extract from the OEC report dated January 2013.

"The Geological Society of America publication, "Geology of Coal Fires; Case Studies from Around the World edited by Glenn B. Stracher includes an article by Cao, Fan, Guan, Wua, Shi and Jia titled, "Geological Models of Spontaneous Combustion of Coal". This article develops a model of the progressive stages of coal fires. The model specifically addresses fires generated as a result of spontaneous combustion however they could be applicable to non-spontaneous combustion fires. It is possible that the model could provide a basis for defining target strata temperatures in the heating areas that determine the stage of the Cullen Valley Mine fire.

The model divides a coalfield fire into 12 successive stages involving increasing and subsequent decreasing fire temperatures. The last two stages as the temperature decreases are identified as Dormancy and Extinguishment. The Dormancy Stage covers that period when the fire temperature passes through the 100 to 61^{o}C range. The extinguishment stage covers the period when the fire temperature is within the range below 61^{o}C. Depending on the oxygen supply a fire in the dormancy stage may experience increasing temperatures and the re-establishment of the coal fire."

Consequently, there is some evidence to support the presence of a Dormancy Stage in the fire (today) in the underground workings around boreholes 7, 8, 9 and 10. In addition, the presence of sub-surface water in this area also reduces the likelihood of fire in the underground workings in this location.

OEC recommends that Coalpac install a similarly robust temperature probe within the old workings that are not flooded by sub-surface water. This probe would provide gas samples from the old workings and then provide ongoing temperature recording that would assist in designing further management actions and provide ongoing monitoring to confirm (or otherwise) success.

Given the demonstration of the probable lack of fire in the old workings around Boreholes 7 to 10, OEC believes that only one additional borehole is required at this stage to determine gas quality and temperature above old workings that are not flooded by sub-surface water.

3.4 Capping Heating Areas

This task has been progressed and is approximately 50% complete as per the Approved Plan of Works. Capping appears to have been successful and should be completed. Ongoing observation and monitoring will be required to confirm this observation.

A large section of the main heating valley has been capped and smaller isolated heating areas have been capped where observed within the open cut backfill sectors. To date all heating zones are located in areas mined prior to Coalpac purchasing the Mine in 2007.

Figure 2 shows the eastern sector of the main valley after capping. The area has not been seeded. On the day of inspection there was no visible evidence of heating emissions. No typical odours were detected. It is now known that the old mine workings beneath the undisturbed area in this part of the mine are flooded with sub-surface water.

Figure 2. Eastern Sector Main Valley. 20th January 2014.

Figure 3 shows the main valley looking towards the south from the upper section of the valley. On the day of inspection there were no visible signs of emissions from areas where capping has been installed. There was one localised area where traces of odour could be detected and this will require maintenance of the capping material.

It is understood that the capping of the areas identified in the Approved Plan of Works can only be completed once more backfill material becomes available following the recommencement of operations.

3.5 Gas Monitoring Results

In October 2013, Coalpac organised for gas samples to be collected from areas with visible emissions from the open cut backfill in the main valley. These were analysed by Coal Mine Technical Services in Wollongong for oxygen, nitrogen and argon, methane, carbon dioxide ethane, carbon monoxide and hydrogen.

Figure 3. Main Valley Looking towards the south. 20th January 2014.

All samples indicated that there is heating of carbonaceous material in each zone. The results reflect the difficulty in taking representative gas samples from surface emission areas. Interpretation of the results relies on comparing the composition of normal air with the composition of the sampled emission. It is very easy to contaminate emission samples with normal air during sampling ground surface emissions.

Gas sampling and analysis via a borehole will be a more useful tool in interpreting fire conditions within the old mine workings because it will be relatively easy to avoid atmospheric contamination and to obtain a representative sample of the gaseous environment created by the fire.

4 Observations

Table 3.1 provides a detailed summary of OEC's observations about implementation of the recommendations made in their January 2013 Report. The Table also includes an updated series of recommendations based on the observations and a review of the current monitoring practices and data.

Table 3.1 Summarised Observations on OEC January 2013 Report and New Recommendations.

RECOMMENDATIONS OEC Report January 2013	OBSERVATIONS AND COMMENTS. After Site Inspection 20th January 2014.	OEC RECOMMENDATIONS January 2014.
1.1 A capping strategy for the heating zone of the open cut backfill areas at Cullen Valley Mine should be implemented.	**This task has been progressed** and is approximately 50% complete (by area) as per the Approved Plan of Works. A large section of the main heating valley has been capped and isolated heating areas have been capped where observed within the open cut backfilled sectors. To date, all heating areas are located in areas mined prior to Coalpac purchasing the mine.	Continue and complete the capping programme to treat heating zones within the open cut backfill areas. The backfill material to complete this will only become available once operations recommence at the mine. Observe performance of previously capped areas and modify treatment as required.
1.2 The objective should be to place a maximum of 4.0m of inert material on the surface above heating zones. Based on the literature review a minimum cover depth of 1.2m would appear to be sufficient, but given the location and the objective of re-vegetation with a forest community a greater depth would be appropriate. The recommended maximum 4.0m depth of cover is a guideline and the actual depth of excavation of the heated material will depend on the circumstances. A thermal imagery monitoring camera will assist in defining the depth of excavation required. The inert material should extend 10m beyond the known heating boundary.	**These general objectives have been met and most often exceeded**. During 2013 Coalpac placed 115,000 banked cubic metres of capping material. The thermal camera provides the opportunity for an instantaneous assessment of heating/non-heating material and is a very useful tool in the day to day management of the heating. There is some evidence in the main heating valley of the effects of heating passing into adjacent areas of backfill. It is not evident whether this is a result of the fire migrating or results from the effects of hot emissions on the vegetation.	Continue and complete the capping programme to treat heating zones within the open cut backfill areas as per the Approved Plan of Works. The backfill material to complete this will only become available once operations recommence at the mine. Observe performance of previously capped areas and modify treatment as required. Undertake additional treatment in areas where any heating is shown to be migrating.
1.3 Wherever possible pockets of heating backfill should be excavated, quenched totally and emplaced with adequate compaction back into suitable sections of the backfill zone.	**Ongoing action required.** This practice has been implemented with apparent success particularly the northern heating area adjacent to the haul road and the highwall venting area behind the crusher. This apparent success can only be confirmed by observation over time. This practice should be continued as required. There are a number of identified heating areas still requiring capping treatment as per the Plan of Works.	Continue and complete the capping programme to treat heating zones within the open cut backfill areas. The backfill material to complete this will only become available once operations recommence at the mine. Observe performance of previously capped areas and modify treatment as required.
1.4 The strategy to re-vegetate the open cut area should be reviewed	**This task has been completed.**	Continue to implement the GSS Environment

RECOMMENDATIONS OEC Report January 2013	**OBSERVATIONS AND COMMENTS. After Site Inspection 20th January 2014.**	**OEC RECOMMENDATIONS January 2014.**
by a professionally trained botanist in relation to capped areas. It may be appropriate to have an initial re-vegetation program based on shallow rooted species with larger trees and shrubs introduced to an area once heating control has been established.	Coalpac commissioned GSS Environmental to review suitability of the rehabilitation revegetation seed mix in light of the heating impacts. They recommended a species mix based on grass and shallow-rooting shrub species with larger trees to be introduced once heating has been controlled. The new seed mix has been developed and will be applied when capping is demonstrated to have been successful.	recommendations.
1.5 Continue the investigations to determine the propensity to spontaneously combust for the coal and carbonaceous material at Cullen Valley Mine to formally eliminate this as a factor in managing the situation. The CVM Care and Maintenance MOP identified completion by 30th June, 2013.	**This task has been completed.** Coalpac commissioned RGS Environment Pty Ltd to complete this investigation. They provided Coalpac with a letter report dated 17th May 2013. RGS noted Existing geochemical information (RGS, 2011) indicated that coal and coal reject materials have relatively low sulphur content, and that most of the sulphur is present as organic and/or sulphate sulphur rather than reactive pyrite. The RGS assessment indicates that: • Materials represented by the coal samples typically have a low propensity to spontaneously combust; • Anecdotal evidence that coal materials at the site have a low propensity to spontaneously combust has been confirmed, and • There are no historic records of spontaneous combustion at Cullen Valley Mine and at Invincible Colliery.	The site material is not prone to spontaneous combustion. It is suitable for backfill provided adequate compaction and the elimination of additional air supply is achieved. Future fires should only be expected where an existing or external fire source is available. Only material with low carbonaceous content should be used as capping material in the heating area. While coal samples tested are not prone to spontaneous combustion, high carbonaceous material would potentially facilitate the spread of sub-surface heating within the open cut backfill.
1.6 The current practice of capping along the interface between the open cut backfill and the high wall crest should continue. To date this has significantly reduced visible emissions and ongoing maintenance should ensure these gains are retained.	**Coalpac has continued to implement this activity** with significant success in reducing the obvious emissions and odours along the interface. The photo on the front of this report shows a capped area after treatment.	Undertake maintenance as required and implement in areas where odours and emissions are observed.
1.7 Use the current level of knowledge to indicate potential locations of barrier trenches, which may be required if the capping strategy is unsuccessful. The location may change as the data base increases.	**This task has been completed.** Two potential locations for effective barrier trenches have been identified. These are suitable for installation of an effective fire barrier within the open cut backfill material.	**Co**ntinue to monitor and assess the need for barrier trenches. Undertake a review of Approved Plan of Works in further 12 months.

RECOMMENDATIONS OEC Report January 2013	**OBSERVATIONS AND COMMENTS. After Site Inspection 20th January 2014.**	**OEC RECOMMENDATIONS January 2014.**
The CVM Care and Maintenance MOP identified completion by 31st May, 2013.	The trenches provide an additional fire containment mechanism should sub-surface heating continue to spread to the east and north of the rehabilitated areas.	
1.8 Coalpac should utilise the temperature monitoring boreholes as a guide to determine the stage of the fire and establish extinguishment targets. **Section 4.5.2** (of our January 2013 Report) provides a discussion on a research model that provides a basis for establishing interim temperature targets. Based on the research model, an interim target would be that fire dormancy is established when the fire substrate temperature is within the 100 to 61°C range and fire extinguishment is established when a temperature of 60°C and below is achieved. These temperature levels should be adopted as an initial target that could be further refined over time based on site specific data. Annual ground temperature and observable parameter data will be correlated to determine whether site specific temperature targets for fire management can be developed for the Cullen Valley Mine.	**This task has been completed.** This matter is discussed in **Section 3.3**. Temperature monitoring boreholes 1 to 6 have provided reliable data over the first 12 months following their installation. Temperature probes 1 to 6 are now beyond their expected life and should be retired as the data is infrequent and not reliable. New temperature probes have been installed at locations 7 to 10 in the Lithgow Seam of the Old Tyldesley Colliery underground workings.	Coalpac should cease recording data from holes 1 to 6. OEC recommends that temperature probes 2, 5 and 6 be replaced.
2.1 Establish a water monitoring bore in the heating and fire zone to augment the information currently obtained from the single point of Tilley's Bore. The CVM Care and Maintenance MOP identified completion by 30th April 2013.	**This task has been completed.** A water monitoring bore (BHW11) was installed in 2013. This bore is located at the head off the main valley affected by heating and is located over old workings. It provides a more accurate measurement of sub-surface water level in the area of interest. Water level data is still recorded from Tilley's Bore. This Bore is located approximately 1.4km east of BHW11 and records demonstrate a water level approximately 1.5m lower in Tilley's Bore compared to BHW11. This is consistent with the regional sub-surface water levels which are known to dip towards the north east.	Continue to monitor water levels in BHW11 and at the Tilley's Bore. The more accurate measurement of sub-surface water levels in the immediate area provides a significant improvement in the understanding of the underground environment. Sub-surface water in the old workings provides a significant barrier to fire migration within the old workings.
2.2 Undertake a basic groundwater assessment study to determine the broad factors controlling water level in the underground	**This task has been completed.** See notes in **Section.3.2**. A general sub-surface water model has been developed and is described in **Section**	The model should be used in the future as a basis for developing fire control and extinguishment measures.

RECOMMENDATIONS OEC Report January 2013	**OBSERVATIONS AND COMMENTS. After Site Inspection 20th January 2014.**	**OEC RECOMMENDATIONS January 2014.**
workings. This is a critical determinant of the likely eventual spread of the underground fire. The CVM Care and Maintenance MOP identified completion by 30th September, 2013.	**3.2**.	
2.3 Establish two additional temperature monitoring bores along the interface between the backfill and high wall in the open cut in the area where fire was detected during open cut mining. The CVM Care and Maintenance MOP identified completion by 30th September, 2013.	**Coalpac has established 11 monitoring boreholes** in the heating area of Cullen Valley Mine. Based on the current status of monitoring Boreholes 2, 5 and 6 should be replaced as recommended in **Section 3.3**, Future monitoring requirements should be assessed as part of the annual review as more data is recorded and available.	OEC recommends that temperature probes be replaced at holes 2, 5 and 6.
2.4 Establish monitoring boreholes in the suspected location of the fire in the underground workings in order to obtain temperature and gas emission data. After the gas emission samples have been collected, the boreholes should be equipped for ongoing temperature monitoring. This data will confirm the presence (or absence) of the fire and provide some information about its intensity. Three holes should be drilled initially; two in the suspected fire zone and one into the workings adjacent to the most easterly backfill heating. The CVM Care and Maintenance MOP identified completion by 30th September, 2013.	**This task has been completed.** Five boreholes (Boreholes 7 to 11) have been established during 2013. Gas samples were obtained from three locations in venting areas in the open cut backfill area.	OEC recommends that one more borehole be drilled to establish gas quality and ongoing temperatures in the Old Tyldesley Colliery underground mine workings in the Lithgow Seam. This should be located above the known sub-surface water level in the vicinity of Borehole 6 as access conditions permit.
2.5 Subject to a review of the data obtained from these five boreholes (after 3 months of collecting the data), determine the need for further monitoring locations. The CVM Care and Maintenance MOP identified completion by 31st December, 2013.	**This task has been completed.** The recording of more accurate sub-surface water level has modified the monitoring requirements.	The retirement of Boreholes 1 to 6 has provided opportunity to review their need and OEC is recommending replacing Boreholes 2, 5 and 6 only. OEC recommends establishing an additional borehole to monitor gas and temperature within the Old Tyldesley Colliery underground workings above the flooded zone.

RECOMMENDATIONS OEC Report January 2013	**OBSERVATIONS AND COMMENTS. After Site Inspection 20th January 2014.**	**OEC RECOMMENDATIONS January 2014.**
2.6 Review the approval process and licensing requirements for all potential activity. The CVM Care and Maintenance MOP identified completion by 30th June 2014..	**This task has been completed.** It will be subject to review through the treatment process depending on monitoring results, the success of the Plan of Works actions and recommendations from specialist consultants. It appears that a combination of capping the heating zones and monitoring/observing the activity of any fire in the underground workings will be the work undertaken during 2014. It is likely that these activities can be undertaken under existing approvals, leases and licences.	No change.
2.7 Define availability and suitability of locally available, fine grained inert material suitable for slurry injection as part of the heating and fire control. The CVM Care and Maintenance MOP identified completion by 31st December, 2013.	**This task has been completed.** Fly ash from local power stations would be an ideal fine-grained material for this purpose. Should it ever be required Coalpac would seek supply and confirm chemical and physical suitability for this purpose.	No change.
2.8 Re-assess the approach to fire extinguishment in the abandoned underground workings based on experience obtained in the interim period and on the outcomes of the water study, fire location drilling, gas emission analysis and temperature monitoring data. The CVM Care and Maintenance MOP identified completion by 31st March 2014.	**This task has been completed.** Establishment of a more accurate level of the sub-surface ground water in the Old Tyldesley Colliery underground workings has improved the confidence in that water acting as a secure barrier to movement of any underground fire. It may be acceptable to not attempt to extinguish the fire in the isolated area of underground workings that does not contain any sub-surface water. However, if it is determined through monitoring that extinguishment is justified and that site access is possible and/or can be achieved with acceptable environmental impact, injection of slurry from the surface into the Old Tyldesley Colliery underground workings could be used to extinguish the fire.	OEC recommends that the Plan of Works for management of the sub-surface heating be reviewed on an annual basis (or more frequently if required) to assess progress and success of the recommended strategy in light of additional monitoring data. Outcomes of such a review should be reported in the Annual Environmental Management Plan for Cullen Valley Mine.

5 Recommendations and Conclusions

The following observations and recommendations are made as a consequence of the interim review we have undertaken:

1. The primary concerns identified in our January 2013 Report have not changed. They are
   - Control and minimise impact on the community;
   - Control and minimise environmental impact; and,
   - Avoid wastage of coal resource.

   These primary concerns should continue to underpin all actions as all parties proceed through the iterative process of developing and implementing strategies to manage and/or extinguish the fire.

2. Coalpac has progressed and completed the majority of actions generally in accordance with the Approved Plan of Works as described in the Cullen Valley Mine Care and Maintenance MOP.

3. Remediation works previously undertaken on the haul road noise bund have continued to function well with no evidence of reheating of the treated areas.

4. All plans showing sub-surface water levels should reflect the more relevant levels as determined from BHW11.

5. Water levels in Tilley's Bore together with those in BHW11 should continue to be recorded.

6. Sub-surface water assessment indicates that sub-surface water levels in the Old Tyldesley Colliery underground workings can be readily managed either by controlled extractions and/or inputs.

7. Coalpac should cease recording from the current Boreholes 1 to 6 and replace selected boreholes (Boreholes 2, 5 and 6) with more robust temperature probes. These could be positioned within the current boreholes or close nearby in freshly drilled boreholes.

8. Continue and complete the capping programme to treat heating zones within the open cut backfill areas once operations recommence or the mine is closed. Observe performance of previously capped areas and modify treatment as required.

9. Install an additional temperature probe within the old workings that are not flooded by sub-surface water. This probe would provide gas samples from the old workings and then provide ongoing temperature recording that would assist in designing management actions and provide ongoing monitoring to confirm (or otherwise) success.

10. Use the seed species revegetation mix as recommended by GSS Environment.

11. The site material is not prone to spontaneous combustion. It is suitable for backfill provided adequate compaction and the elimination of additional air supply is achieved. Material with a low carbonaceous content, such as sandstone, should be used as a capping material

12. The requirement to install barrier trenches to restrict the potential spread of sub-surface heating should be reviewed as part of the annual review of the Approved Plan of Works.

13. Fly ash from local power stations would be an ideal fine grained material for extinguishing an underground fire. The injection of fly ash is not considered to be required at this time. Further monitoring in the underground workings above the flooded zone will assist in identifying the need for this management strategy. Should fly ash injection ever be required Coalpac would seek a suitable supply and confirm its chemical and physical suitability for this purpose.

APPENDIX I

Status of Rehabilitation at Cullen Valley Mine & Invincible Colliery

22/04/2014

Ben Eastwood

Environmental Manager

Invincible Colliery

Castlereagh Highway

Cullen Bullen NSW 2790

Dear Ben

RE: Status of Rehabilitation at Cullen Valley Mine and Invincible Colliery May 2014

Coalpac engaged Kleinfelder consultants to provide an independent statement on the status and condition of its rehabilitation activities at its Cullen Valley Mine and Invincible Colliery based on previous monitoring surveys and observations. Kleinfelder notes the submissions made by individuals and organisations, particularly the rehabilitation and the photographic booklet prepared by the Blue Mountains Conservation Society, and provide an opinion on the rehabilitation works undertaken at Invincible Colliery and Cullen Valley Mine based on the flora and fauna survey work undertaken to date.

Kleinfelder has monitored the rehabilitation areas at Invincible Colliery and Cullen Valley Mine in 2010, 2011 and 2012. The objective of the rehabilitation monitoring is to assess a range of different aged rehabilitation areas within the subject site and to determine if they meet the requirements of self-sustaining native vegetation communities in terms of condition.

The performance criteria for assessing the progress of site rehabilitation were determined by surveying the condition of surrounding native vegetation. Condition was assessed by examining species diversity, plant density, stratum proportions and projective foliage cover (Ecobiological 2011).

Overall the rehabilitation blocks are assessed to be progressing well, as confirmed from the following findings of flora and fauna surveys undertaken to date:

- In terms of species diversity, the total number of plant species in survey plots was close to the target values.

- Plant density (number of plants per area) is currently short of target values; however this is expected given the young age of the rehabilitation and should increase with time assisted by natural recruitment.
- The stratum proportions are strongly dominated by the shrub, midstorey and overstorey layers, with a general trend of low numbers of ground layer species. This is expected given the dense over- and midstorey layers in the early years of establishment. Groundcover species are present and their density are expected to increase over time.
- Overall native foliage cover (cover abundance) is generally within target values.
- Plant heights can be seen to be steadily increasing with age of rehabilitation. The strong dominance of Acacia species in early rehabilitation areas has been observed to 'die back' as the Eucalypts emerge. This is a successional ecosystem characteristic. Successional species such as Acacias are important in establishing sufficient humic conditions in the topsoil to encourage establishment and proliferation of future ground cover layers.
- With any rehabilitated areas the major issue in its early stages of development is the lack of ground cover. Over time herbs and grasses will continue to establish and decaying vegetation will provide the necessary cover that terrestrial fauna require.
- Native fauna is seen to be progressively re-colonising the area and is aided by the presence of feed trees, refuge habitat (ground structure) and nesting materials.

The rehabilitation of the mined areas is a long term commitment that requires a substantial foundation (soil management, topographic design, native species introduction) and ongoing maintenance (weed control, erosion control, native species introduction).

The rehabilitation areas at Cullen Valley Mine and Invincible Colliery have been formed to current industry best practice standards (ripped across contours, benched, topographic and drainage consideration and up to 30 cm of top-soil (A-B horizons)). This has been witnessed in soil profiles across the site. Native flora species have been introduced as recommended (Global Soil Sciences 2007). The younger rehabilitation areas surveyed in 2012 have a particularly high abundance of logs and forest mulch, adding to the soil conditions and habitat values for pioneering fauna.

Maintenance will continue to be required in the early years of establishment of each area to adequately manage environmental factors (such as ground settling, erosion and sedimentation, drought, invasive weeds and pests).

The current rehabilitation areas are progressing towards achieving the rehabilitation target levels. The rehabilitated areas, as evidenced during surveys, are progressing toward a

sustainable and resilient vegetation layer (e.g. drought resistant), providing a stable land surface that protects against erosion and sedimentation, and providing habitat which will support native fauna species.

Evidence of usage by fauna species was observed during the assessment of rehabilitated areas at both sites. A total of 15 birds, 3 reptiles and 1 mammal were opportunistically observed within the rehabilitation areas. An individual White-eared Honeyeater was observed collecting nesting material (expired spider egg sacks on *Acacia spectabilis*) and a Crimson Rosella was seen foraging on *Acacia dealbata*. Both the Nobby Dragon and the Mountain Heath Dragon were found taking refuge under woody debris that had been brought into the rehabilitation area, indicating that the emplaced fallen logs are effectively providing shelter. These findings are encouraging because they indicate that native fauna can successively re-colonise from the surrounding native forest.

The above information points to the following:

- Rehabilitation is currently in an early and pioneering growth form and requires time to develop into mature woodland. Indicators to date suggest this will occur;
- While the rehabilitation areas will not (in the short to medium term) create a mirror image of the original vegetation community they can provide an important habitat and ecological value in the medium to long term;
- The rehabilitation areas provide a diverse range of native flora species with the planned degree of biodiversity;
- The high density of early and successional native species are providing good organic material through root structures and leaf drop accumulation;
- Dominant canopy species and ground cover species will continue to develop over time. This will further assist in providing an organic layer and establishing a soil profile;
- The close proximity of native woodland communities to rehabilitated areas has allowed natural recruitment into these areas. This can be further assisted with manual seed spreading;
- The land form, sediment control structures and vegetation cover in rehabilitated areas are minimising erosion, and ongoing maintenance will be required.
- There is evidence of regular use of the rehabilitation areas by a range of woodland birds, mammals and reptiles;

The rehabilitation areas are considered to have sound foundations aligned with industry best practice and standards. Given the right foundation has been constructed for the

rehabilitation in the early stages, and provided monitoring and maintenance of these areas is continued, the rehabilitation at Cullen Valley Mine and Invincible Colliery is likely to achieve the long term objectives and performance targets.

Sincerely,

Dan Pedersen BSc, BPAD-A, EngTech GIFireE
Senior Ecologist/Bushfire

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APPENDIX J

Economic Impact Assessment Review

Gillespie Economics

Environmental and Resource Economics: Environmental Planning and Assessment

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4 June 2014

Dorian Walsh
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Dorian

Re: The Australia Institute: Coalpac – Invincible and Cullen Valley Mine Proposal Submission

As requested, I have reviewed the above mentioned submission from The Australia Institute to the Proposed Coalpac Modifications for Invincible Colliery and Cullen Valley Mine and have provided a detailed response in Attachment 1.

The claims made by The Australia Institute are not credible and reflect a misunderstanding of both economic theory and practice and a misrepresentation of the views of others. Accordingly, the Economic Assessment of the Modifications is considered to provide a reasonable estimation of the net benefit to Australia and NSW from the proposed Modifications and the economic activity that would be generated in the regional economy.

Regards

Rob Gillespie
Gillespie Economics

ATTACHMENT 1 – RESPONSE TO THE AUSTRALIA INSTITUTE SUBMISSION

Economic Value of Coal

Issue: The Australia Institute (TAI) raises concerns with the use of a shadow price of coal of $70/t when the financial value of the coal is $50/t.

Response: Benefit Cost Analysis (BCA) is concerned with economic values rather than financial values. In economic analysis, the value of an output such as coal is its value in a competitive market, with many buyers and many sellers. As identified by Sinden and Thampapillai (1995) the world market for a good is larger and therefore more competitive than any domestic market. The world market is therefore an appropriate market from which to derive shadow prices. In the Economic Assessment of the Coalpac Proposed Modifications to Invincible Colliery and Cullen Valley Mine (the Modifications), the replacement cost for coal for the Mount Piper Power Station (MPPS) is used as an indication of its economic value in a competitive market. This replacement cost is based on advice given by NSW Trade and Investment and NSW Treasury (2013). These are reputable Government agencies. NSW Trade and Investment (2014) has also confirmed that the potential replacement cost for Coalpac coal could potentially increase from the current level of around $50/t to $70/t for coal supplied to MPPS.

In recognition of the previous misunderstandings about the difference between the financial value of the coal and its economic value, the Economic Assessment included sensitivity testing using the financial value of the coal. The Modifications are estimated to have net benefits to Australia and NSW regardless of the assumed economic value of the coal at $50/t or $70/t.

Benefits of Cheap Coal Not Passed on to Consumers

Issue: TAI considers that even if the assumed economic value of the coal used in the Economic Assessment for the Modifications is accepted, the benefits of cheaper coal from the Coalpac Modifications may be passed on to the MPPS, a foreign owned entity, but not get passed on to consumers.

Response**:** The extent to which lower cost coal is passed on to electricity consumers will depend not only on competition between electricity generators but also on competition in distribution and retailing. The deregulation of electricity providers (wholesalers and retailers) in NSW aims to promote competition, customer choice and encourage cheaper electricity. To the extent this deregulation is and will be successful, then the provision of cheaper coal to MPPS by Coalpac will be passed on to electricity consumers. NSW Trade and Investment (2014) has identified that if the Modifications are not approved it is expected that this would lead to further electricity price increases.

Royalties Overstated as the Calculation Does Not Include Deductions

Issue: TAI states that no royalty calculations are provided and that there are many deductions applied to royalties which are likely to reduce the estimate of royalties from the Modifications.

Response: TAI has repeatedly misunderstood how deductions influence royalties. TAI erroneously include deductions by subtracting them from a direct estimation of royalties. However, any allowable deductions are subtracted from the gross financial value of the coal before applying the prescribed royalty rate. Deductions therefore only have a small influence on the calculation of royalties.

Royalties for the Modification were calculated based on the application of the prescribed royalty rate to the estimated financial value of the coal from the Modification. No allowance was made for deductions because they only have a very minor impact on the estimate of royalties. For example, allowing for deductions for beneficiation of coal i.e. crushing of 84% of coal and simple washing of 16% of coal, and the Coal Research Levy, reduces the estimated royalties from the Modifications from $36.2M ($28.6M present value) to $35.6M ($28.1M present value). Any reduction in royalties

increases the other components of the net social benefits of the Modifications (i.e. profit and company tax), but does not change the overall net social benefits of the Modifications to Australia.

Operating Cost of the Mines

Issue: TAI suggests that the operating cost per tonne for the Modifications is $28/t which is very low and hence the profit and company tax from the Modifications is overstated in the Economic Assessment.

Response: The calculation performed by TAI is incorrect and in no way reflects the operating costs of the Modifications included in the Economic Assessment, which are based on detailed financial modelling of the Modifications.

Company Tax Overstated

Issue: TAI considers that the estimate of company tax generated from the Modifications are overstated as deductions reduce the average tax paid by the mining sector to 13.9% of gross operating surplus.

Response: The estimate of company tax payable in the BCA of the Modifications was calculated by applying the Australian Tax Office (ATO) corporate tax rate of 30% to the estimated gross profit (revenues less costs) of the Modifications.

In its submission, TAI suggests that the effective company tax rate is likely to be 13.9% of gross operating surplus and not 30% as required by the ATO, due to potential rebates, tax exemptions and depreciation allowances. One study is quoted to support this claim. However, this study calculates the effective tax rate for the entire "mining sector" (not the coal mining sector only or individual coal mining projects) in relation to Gross Operating Surplus (GOS) not gross profit. GOS does not consider the costs of production such as consumption of fixed capital, interest, royalties, land rent payments and direct taxes payable on inputs. Therefore, it is the incorrect denominator to use for estimation of the effective tax rate.

In response to repeated claims about the effective tax rate paid by the mining sector, the Minerals Council of Australia commissioned Sinclair Davidson, Professor of Institutional Economics at RMIT University and a Senior Fellow at the Institute of Public Affairs, to investigate these claims (Davidson 2012). Professor Davidson found that "an analysis of Australian Taxation Office (ATO) data indicates that the mining industry pays a substantial sum of money in corporate taxation and pays at a rate close to 30% of its taxable income".

The Economic Assessment is therefore considered to provide a reasonable estimate of the company tax generated by the Modifications.

Non-Market Value of Employment Based on Discredited Studies

Issue: TAI considers that the inclusion of a non-market value associated with employment is inappropriate. TAI refers to a review by Professor Bennett (2011) that states that the value is "contentious" and that the studies this value is based on have been rejected by the NSW Land and Environment Court (LEC) and NSW Supreme Court.

Response: It is recognised in the Economic Assessment for the Modifications, p. 19, that these non-use values for other people's employment may be contentious in the context of a fully employed economy. However, the economy is rarely at full employment and it is unlikely to be at full employment over the proposed life of the Modifications. For instance, the unemployment rate in Lithgow in the December quarter 2013 was 7.9% (Department of Employment 2014), which is 39% higher than the national unemployment rate of 5.7% for the same period. Nevertheless, the results of

the BCA are reported "with" and "without" the non-use values for employment being included. Under both scenarios the Modifications are estimated to have net benefits to Australia and NSW.

The view of TAI questioning the existence of nonmarket values for employment is inconsistent with economic theory and the results of empirical studies. Professor Bennett, who is referred to by TAI, is one of Australia's most senior academic economists. In particular, his field of expertise is non-market valuation. Professor Bennett has included the social value of employment in a number of his research studies, including the following peer reviewed and published studies:

- Morrison, M., Bennett, J. and Blamey, R. (1999) *Valuing improved wetland quality using choice modelling, Water Resources Research (* Vol. 35, No. 9, pp. 2805-2814);
- Bennett, J., Van Bueren, M. and Whitten, S. (2004) *Estimating society's willingness to pay to maintain viable rural communities*, Australian Journal of Agricultural and Resource Economics (Volume 48, Issue 3, pages 487–512);
- R.K. Blamey, J.W. Bennett, J.J. Louviere, M.D. Morrison and J.C. Rolfe (2002) *Attribute Causality in Environmental Choice Modelling*, Environmental and Resource Economics (23: 167–186, 2002);
- Blamey, R., Rolfe, J., Bennett, J., and Morrison, M., (2000) *Valuing remnant vegetation in Central Queensland using choice modelling*, The Australian Journal of Agricultural and Resource Economics(44(3): 439-56); and
- Gillespie, R. and Bennett, J. (2012) Valuing the Environmental, Cultural and Social Impacts of Open Cut Coal Mining in the Hunter Valley of NSW, Australia, Journal of Environmental Economics and Planning.

TAI states that the studies on which this value for employment is based has been rejected by the LEC and the NSW Supreme Court. However, this is incorrect. As identified in Section 2.4.2 of the Economic Assessment, the value for employment included in the BCA of the Modifications was sourced from a choice modelling study undertaken for the Bulli Seam Operations, not the Warkworth Extension Project and hence the LEC and NSW Supreme Court have never considered the study in question.

Notwithstanding this, it is acknowledged that the LEC made a number of criticisms of the choice modelling study undertaken in relation to the Warkworth Extension Project. However, these largely reflect a misinterpretation of micro-economic theory and methods by the LEC. Section 3 of Attachment 2 provides a detailed review of these misinterpretations. A peer review of the Warkworth Extension Project choice modelling study by experts in the field found the study suitable for publication in the international Journal of Benefit Cost Analysis.

It should also be pointed out that the NSW Supreme Court did not reject the economic studies as claimed since its rulings solely related to issues of procedural fairness.

Environmental Costs are Assigned a Zero Value

Issue: TAI identifies that the economic assessment includes no values for any environmental costs associated with the Modifications. All impacts are considered "insignificant" and assigned a zero value.

Response: The BCA took three approaches to the consideration of environmental costs. The first was to identify that the estimated total net production benefits of the Modification to Australia (i.e. $219M), is a threshold value or reference value against which the relative value of the residual environmental impacts of the Modifications, after mitigation, may be assessed. The threshold value indicates the price that the community must value any residual environmental impacts of the Modifications (be willing to pay) to justify in economic efficiency terms the 'no development' option. This approach overcomes any contention about valuing any residual environmental impacts of the

Modifications and leaves the trade-off consideration up to the decision-maker's view on the community's value for the residual environmental costs.

The second approach used was to qualitatively consider, and where possible value, the main environmental, cultural and social impacts of the Modifications for the well-being of people, based on the assessment of biophysical impacts provided in the Modifications EA. In this respect, there is the practical principle of materiality. Only those impacts which are likely to have a material bearing on the decision need to be considered in BCA (NSW Government 2012). The NSW Government (2012) guidelines give the example - "if the gross costs and benefits are around $100 million and the estimated NPV [Net Present Value] is say $20 million, costs or benefits valued at less than $1 million are unlikely to be material". Based on this guide and the biophysical consideration of residual environmental impacts provided in the EA for the Modifications, it is difficult to conceive of any of the identified impacts being material from an aggregate economic efficiency perspective. This is particularly the case given that the project has been considerably altered to avoid potential impacts identified in earlier considerations by Government.

TAI provides no evidence that any of the environmental impacts considered in the Economic Assessment would be material from an aggregate economic efficiency perspective.

In relation to biodiversity impacts the Economic Assessment identifies that the impacted vegetation, and associated fauna, is likely to have non-use values to the community that would be lost as a result of the Modifications and that these values could potentially be estimated using non-market valuation methods. Similarly, the provision of biodiversity offsets is also likely to have non-use values to the community that would be gained as a result of the Modifications. Provided that the values held by the community for the offsets are equal or greater than values that would be lost, no additional economic costs (apart from the costs of providing the offsets) warrant inclusion in the BCA. In this respect, it is noted that a Biodiversity Offset Strategy is required for the Modifications that would improve or at least maintain biodiversity values in the long term.

The third approach used in the Economic Assessment is to recognise that there may be some disagreement about the estimated economic values of the residual environmental impacts of the Modifications and couch the estimated net social benefits of the Modifications in a threshold value framework. The Economic Assessment, p. 20, clearly identifies that "While the major environmental, cultural and social impacts have been qualitatively considered and where possible quantified in the Modification BCA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than between $219M and $227M for the Modifications to be questionable from an Australian economic efficiency perspective". This again allows the decision-maker to consider any material impacts that it identifies in the course of its consideration that were not valued in the Economic Assessment.

Input output modelling Results Should be Given Little Weight

***Issue*:** TAI states that the input-output (IO) analysis of the Modifications will overstate the positive impacts of the projects due to unrealistic assumptions. TAI state that because of unrealistic assumptions this type of modelling has been described as "biased" by the Australian Bureau of Statistics, "deficient" by the NSW LEC and its usage an "abuse" according to the Productivity Commission.

Response: Economic activity is important to the continued viability of rural communities. The Modifications will provide direct additional economic activity to the regional economy. This is indisputable. Regional expenditure by employees and by Coalpac in the operation of Invincible Colliery and Cullen Valley Mine as proposed in the Modifications will also provide flow-on economic activity to the regional economy. NSW Trade and Investment (2014) has identified that many local industries in the area relied on the Cullen Valley Mine and Invincible Colliery operations, including mine equipment maintenance firms, mining equipment supply firms, coal preparation plant

maintenance and supply firms. The debate is over the magnitude of this direct and indirect regional economic activity.

TAI state that IO analysis will overstate the regional economic impacts of the Modifications due to unrealistic assumptions. The two "unrealistic" assumptions quoted are:

- The lack of supply-side constraints; and
- Fixed prices.

However, neither of these assumptions of the method are particularly problematic when IO analysis is undertaken at a regional level rather than the national level. At the regional level, the regional economy has access to resources, labour and capital, from both inside and outside the region and indeed across Australia. Indeed relative to the demand for labour and capital generated by the Modifications in the region, there is little supply side constraint. In the absence of effective supply side constraints, price impacts at the regional level from a single project are likely to be minimal or unobservable. No economic study has found regional price effects as a result of a single project.

TAI has also misrepresented the criticisms of IO analysis by the ABS, the NSW Land and Environment Court and the Productivity Commission. The main concern that economists have with the use of all methods which examine the economic activity of projects (e.g. input-output analysis, CGE, Keynesian multipliers etc.) is their correct interpretation.

As clearly identified in Section 3.1 of the Economic Assessment of the Modifications:

"The BCA reported in Section 2 is concerned with whether the incremental benefits of the Modification exceed the incremental costs and therefore whether the community will in aggregate be better off 'with' the Modification compared to 'without' it. In contrast, the focus of regional economic impact assessment is the effect of an impacting agent on an economy in terms of a number of specific indicators of economic activity..."

IO analysis is a suitable methodology for predicting changes in the structure of regional economies and is consistent with the NSW DP&I *Draft Guidelines on Economic Effects and Evaluation in EIA* (James and Gillespie 2002, p.18) which states:

> *"If a proposal is predicted to have significant economic impacts at the regional or State scale, it is appropriate to assess these economy-wide effects.....These impacts can be assessed by means of a multi-sectoral or input-output model which identify regional impacts in terms of changes in the value of output for separate sectors of the regional economy, as well as changes in value-added, income and employment."*

The assumptions underlying IO analysis are well documented, including in Attachment 3 of the Economic Assessment for the Modifications.

The reference TAI makes to ABS concerns with IO analysis relate to it providing a *"biased estimates of the benefits or costs of a project".* It is agreed that IO analysis is not a good indicator of costs and benefits but this is not how IO analysis has been used in the Economic Assessment. A separate BCA has been undertaken to examine costs and benefits of the Modifications.

The concerns of the Productivity Commission referred to in the TAI submission relate to using IO analysis to *"make the case for government intervention."* It is agreed that this would be an inappropriate use of IO but this is not how IO analysis has been used in the Economic Assessment of the Modifications. A separate BCA has been undertaken to make the case for approval of the Modifications. The IO analysis provides additional information on regional economic activity associated with the Modifications.

TAI also makes reference to the Warkworth Extension Project Judgement by the NSW LEC which criticised the IO analysis for not *"assisting in weighing the economic factors relative to the various environmental and social factors, or in balancing economic, social and environmental factors"* (Bulga Milbrodale Progress Associated Inc. v Minster for Planning and Infrastructure and Warkworth Mining Limited 2013).

However, this is an inappropriate criticism of the IO method, since it does not pretend to do this. IO analysis is solely concerned with estimating the level of economic activity associated with a project and this was how it was used in the economic assessment of the Modifications. It provides one piece of information for consideration by the decision-maker, alongside all the other pieces of information provided via other aspects of the environmental impact assessment process.

No Peer Review

Issue: TAI states that the Economic Assessment has not been subject to Peer Review prior to publication and that had it been independently reviewed, many of the shortcomings identified by it would have been identified and addressed earlier in the planning process. In this respect, TAI casts dispersions on the professional integrity of Dr Jeff Bennett who peer reviewed the Economic Assessment of previous versions of the project (including the Coalpac Consolidation Project, now withdrawn) and has professional links with Robert Gillespie.

Response: The approach and assumptions used in the Economic Analysis of the Modifications has previously been peer reviewed by Dr Jeff Bennett (2013). Dr Bennett addressed all of the issues raised by TAI and found that Gillespie Economics "has used conceptually appropriate tools of economic analysis and that those tools have been applied in an acceptable manner". The Economic Assessment of the Modifications simply applies the same methods approved by Dr Bennett to a revised mine plan.

Dr Bennett is a highly respected academic environmental economist. He is Professor of Environmental Management at the Australian National University with around 40 years of experience as a researcher, teacher and consultant in the field of environmental and resource economics. He is a Fellow of the Academy of Social Sciences in Australia and a Distinguished Fellow of the Australian Agricultural and Resource Economics Society. His specific areas of expertise are incorporating environmental impacts into economic assessments and the role of the private sector in environmental conservation. He has published over 100 papers in refereed journals and is the author or editor of over a dozen books. He has acted as an advisor to numerous Commonwealth and State Government departments and authorities (currently for Food Standards Australia and New Zealand and the NSW Marine Estate Authority), was a pro-bono member of the board of Wetland Care Australia and was Director of the Environmental Economics Research Hub, funded by the Commonwealth Department of the Environment.

It is for these reasons that Professor Bennett was used as a peer reviewer of the previous Economic Assessment undertaken for Coalpac and Robert Gillespie chose to study at the ANU under Professor Bennett's tutelage. The work of Professor Bennett and Robert Gillespie in the field of environmental economics is of high academic standard and has been published in international peer reviewed academic journals.

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Attachment 2 – Response to Land and Environment Court Issues

A GUIDE TO ECONOMIC ASSESSMENT FOR DECISION MAKERS

An Outline of Economic Methods

and

A Response to the Land and Environment Court Issues with the Economic Assessments of the Warkworth Extension Project

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1 INTRODUCTION

Methods used by economists to evaluate projects can be confusing to decision-makers. Many guidelines and texts exist but they can be confusing for those without an economics background.

Environmental groups opposing developments are currently exploiting this fact in submissions, media campaigns and evidence to Planning and Assessment Commissions and the Land and Environment Court.

This document provides a simple dot point summary of some of the methods that are used by economists and where they fit within a decision-making framework. The focus is on:

- benefit cost analysis (BCA);
- choice modelling (CM); and
- regional economic assessment (input-output (IO) analysis and computable general equilibrium (CGE) modelling).

In context of the information provided on these methods, a detailed response is then provided to the main economic findings provided in the Land and Environment Court Judgement on the Warkworth Extension Project.

2 ECONOMIC METHODS

2.1 Benefit Cost Analysis

2.1.1 Introduction to Benefit Cost Analysis

1. BCA is the primary way that economists evaluate projects and policies and is the main method for addressing requirements in the Environmental Planning and Assessment Act 1979 for assessment of economic effects.

2. BCA evaluates whether the well-being (welfare) of the community is in aggregate improved by a project i.e. whether there is an increase in economic efficiency.

3. BCA is concerned with the single objective of economic efficiency. It does not address equity or other objectives of government. Decision-makers therefore need to consider the economic efficiency implications of a project, as indicated by BCA, alongside the performance of a project in meeting other, often conflicting, government goals and objectives.

4. BCA provides a comparison of the present value of aggregate benefits to the community, as a result of a project, with the present value of the aggregate costs.

5. If aggregate benefits are greater than aggregate costs then a project is welfare improving for the community and hence is desirable from an economic efficiency perspective.

6. Costs and benefits are defined and valued based on supply and demand – the aggregation of values held by individuals in the community. These values are revealed in markets or by nonmarket valuation methods such contingent valuation and choice modelling.

7. Values in BCA are anthropocentric i.e. things only have value to the extent that humans value them.

8. BCA is generally undertaken at the national level i.e. to examine the costs and benefits of a project to Australia. However, where major impacts spill over national borders e.g. greenhouse gas emissions, then BCA should be undertaken from a global as well as national perspective. BCA at a sub-national perspective e.g. NSW, is not recommended as it results in a range of costs and benefits from a project that accrue to Australia being excluded, making BCA a less valuable tool for decision-makers.

9. BCA does not include effects in secondary markets i.e. downstream users of a good or service or backward linkages i.e. suppliers of inputs to production.

2.1.2 Benefit Cost Analysis of Mining Projects

1. Mineral ores are intermediate goods i.e. they are an input to other production processes such as production of electricity and steel making. Only the costs and benefits of mining and delivery to port or domestic user are relevant to a BCA of a mining project.

2. BCA of mining proposals invariably involves a trade-off between:

   - the net production benefits of a project – comprised of royalties, company tax and net profits; and
   - the environmental, social and cultural impacts (most of which are costs of mining but some of which may be benefits).

3. Net production benefits can be estimated in monetary terms based on market data on the projected financial[1] value of coal less the capital and operating costs of projects, including opportunity costs of capital and land already in the ownership of mining companies. This is normally commercial-in-confidence data provided by the proponent.

4. The value of coal that is relevant for inclusion in the analysis is not the value of coal today but the projected value of coal over the life of the project. This requires projection of the value of the coal, which is normally estimated in United States Dollars, and projection of the Australian Dollar: United States Dollar exchange rate.

5. The consideration of environmental, social and cultural impacts in BCA relies on the assessment of other experts contributing information on the biophysical impacts. Only where biophysical impacts are identified by specialists can they be included in BCA.

6. The environmental impact assessment process results in detailed (non-monetary) consideration of the environmental, social and cultural impacts of a project and the proposed means of mitigating the impacts.

7. At its simplest level, BCA may summarise the consequences of the environmental, social and cultural impacts of a project (based on the assessments in the EIS/EA), for people's well-being. These qualitatively described impacts can then be considered alongside the monetised net production benefits, providing important information to the decision-maker about the economic efficiency trade-offs involved with a project.

8. At the next level of analysis, attempts may be made to value some of the environmental, social and cultural impacts. Valuation methods include using benefit transfer or, subject to available resources, primary non-market valuation methods.

9. Benefit transfer involves using information from the EA/EIS on the physical magnitude of impacts e.g. clearing of 2ha of native vegetation, and applying per unit value estimates e.g. $1000/ha, obtained from non-market valuation studies undertaken in other policy contexts.

10. Primary non-market valuation methods include choice modelling and the contingent valuation method where a sample of the community is surveyed to ascertain their willingness to pay to avoid a unit change in the level of a biophysical attribute. Other methods include the property valuation approach where changes in environmental quality may result in changes in property value.

11. To avoid double counting of impacts, only residual impacts, after mitigation, offset and compensation, require additional consideration.

12. In attempting to value the impacts of a project on the well-being of people there is also the practical principle of materiality. Only those impacts which are likely to have a material bearing on the decision need to be considered in BCA.

13. Even where no attempt is made at valuing environmental, social and cultural impacts or there are debates about the level of impacts, BCA lays out the economic efficiency trade-off. The monetised estimate of net production benefit provides a threshold value that non-monetised impacts must exceed for the project not to be desirable from an economic efficiency perspective.

[1] In limited cases the financial value may not reflect the economic value and therefore it is necessary to determine a shadow price for the coal.

2.2 Introduction to Choice Modelling

1. The benefit/value of an environmental good to a person is measured by their willingness to pay for it.

2. The benefit/value of an environmental good to the community is the sum of the willingness to pay of all individuals in the community.

3. Choice Modelling (CM) is a non-market valuation survey method used to estimate respondents' preferences/values for environmental, social and cultural changes.

4. The values estimated in CM applications are consistent with the principles of BCA and can be incorporated into BCA studies.

5. The CM questionnaire describes within choice sets, the base case and alternative impact scenarios of a project in terms of different levels of environmental, social and cultural attributes, including a payment/cost attribute.

6. CM does not ask a direct willingness to pay question.

7. By observing people's choices between alternatives with differing levels of each attribute it is possible to determine the trade-offs respondents are willing to make between these attributes. Because one of the attributes is monetary it is possible to estimate respondent willingness to pay (WTP) for changes in the levels of the environmental, social and cultural attributes.

8. While the attributes included in CM studies must be relevant to policy makers they fundamentally must represent changes in outcomes that respondents value (are demand relevant). Respondents are therefore primarily responsible for determining what environmental attributes to include in CM studies.

9. There is a limit to the number of environmental attributes included in CM studies due to cognitive burden. In environmental policy applications of CM, attributes numbers tend to be limited to around five or six.

10. Attribute level ranges for environmental, social and cultural attributes should be sufficient to capture the range of impacts that may occur because of a project. The upper level of attributes must be higher than the highest impact that is possible from project options.

11. The upper level of the cost attribute that is included in choice sets reflects a level of disposable income that few people are willing to give-up.

12. The population sampled depends on the significance level of the issue and aims to capture a sample of the main population that would hold values for the impact. The literature has found a distance decay relationship where values held by respondents decline with distance from the site of interest. Therefore unless an impact is of national significance some subset of the population is sampled.

2.3 Assessment of Regional Economic Impacts

2.3.1 Input-Output Analysis

1. IO analysis is a cost effective and simple method for estimating the market economic activity i.e. financial transactions and employment, in a specified region that is associated with a project.

2. IO analysis was developed by Wassily Leontief for which he received the Nobel Prize in Economics.

3. IO analysis is a static analysis that looks at impacts in a particular year e.g. a typical year of a projects operation.

4. IO analysis has historically been applied at the regional level to assess the impacts of individual projects.

5. IO analysis involves the development of an input-output table representing the buying and selling of goods and services in the economy. These fixed average ratios are used to estimate the direct and indirect impacts of a change in expenditure in a region.

6. IO analysis identifies the direct and indirect additional (positive) regional economic activity associated with a project in terms of a number of indicators of economic activity – output, income, value-added[2] and employment.

7. Economic activity measures used in IO are not measures of benefits and costs relevant to a BCA.

8. IO analysis does not attempt to examine nonmarket environmental, social or cultural impacts.

9. The estimation of impacts in IO analysis are based on a number of simplifying assumptions – most notable is that the regional economy has access to sufficient labour and capital resources (from both inside and outside the region) so that an individual project does not result in any regional price changes e.g. wages in other industries or house rentals, which would lead to contractions ("crowding out") of economic activity in other sectors in the region.

10. For the assessment of the impacts of individual projects on small open regional economies e.g. the Hunter Valley, this is a reasonable assumption.

11. Nevertheless, the results of IO modelling can be seen as representing an upper bound for the net economic activity associated with a project.

2.3.2 Computable General Equilibrium Modelling

1. CGE modelling is an alternative more expensive, complicated but theoretically more sophisticated method for estimating the economic activity associated with a project.

2. The CGE modelling can be dynamic or comparative static[3] and has historically been applied at the State and National level for major policies and developments.

3. CGE modelling estimates the additional net (positive and negative) regional economic activity associated with a project in terms of a number of economic indicators – including value-added and employment – but also real income, government tax revenue and components of value-added.

[2] Value-added is the difference between the gross value of business turnover and the costs of the inputs of raw materials, components and services bought in to produce the gross regional output.

[3] Comparative static models compare one equilibrium point with another but do not trace the impact path along the way. Dynamic models give year by year impacts of a shock.

4. Economic activity measures used in CGE modelling are not generally measures of benefits and costs relevant to a BCA.

5. CGE modelling does not attempt to examine nonmarket environmental, social or cultural impacts.

6. CGE modelling is underpinned by an IO database as well as a system of interdependent behaviour and accounting equations which are based on economic theory (but mostly without econometric backing at the regional level).

7. The equations in CGE models ensure that any change in demand in a region, no matter how small, translates into some change in prices and hence there is always some 'crowding out' of other economic activity in the region.

8. CGE results can be very sensitive to changes in these behavioural assumptions.

9. 'Crowding out' of other economic activities estimated via CGE modelling does not reflect losses of jobs but the shifting of labour resources to higher valued economic activities.

2.3.3 Comparison of IO Analysis and CGE Modelling

1. Both IO analysis and CGE modelling are identified in the Department of Planning and Infrastructure's draft *Guideline for Economic Effects and Evaluation in EIA* (James and Gillespie 2002) as appropriate methods for examining regional economic impacts i.e. impacts on economic activity – the size and structure of an economy.

2. Which modelling approach best represents the true situation depends on whether and to what extent price changes occur at a regional level as a result of individual projects. This is an empirical issue and would depend on the migration of labour into the region, commuting of labour and timely management of land releases by Councils. Few studies exist that examine this issue.

3. Regional economic activity is just one piece of information that decision-makers may take into account in considering a project.

4. The main concern that economists e.g. the Productivity Commission, have with both IO and CGE is using the results to justify a project when the appropriate economic justification for a project is its economic efficiency – as indicated by BCA.

3 RESPONSE TO THE LAND AND ENVIRONMENT COURT ISSUES

3.1 Response to BCA Issues

3.1.1 The BCA Does Not Include All the Things a Decision Maker Must Consider

The Judgement identifies the BCA and the CM on which the BCA depends as deficient as *"it does not consider all the relevant matters that need to be considered by an approval authority in determining a project"* (452).

This is an inappropriate criticism since BCA does not purport to address all the relevant matters that need to be considered by a decision-maker. BCA is only concerned with a single objective of the EP&A Act and governments i.e. economic efficiency. Even in context of economic efficiency, it is impractical and unnecessary to value all the impacts of a project. The focus of BCA is to identify the economic efficiency trade-off framework and where possible value the main economic costs and benefits.

BCA does not address other objectives of the EP&A Act and governments. Decision-makers therefore need to consider the economic efficiency implications of a project alongside the performance of a project in meeting other conflicting goals and objectives of the EP&A Act and government.

3.1.2 The BCA is Trying to Supplant the Decision-Making Role of the Court

The Judgement considers that the BCA *"seeks to supplant the Court's essential task, …, of applying the appropriate weight to the relevant matters"* (para 484).

This is incorrect. BCA provides information relating to a single objective of the EP&A Act and Governments. Decision-makers therefore need to weigh up the economic efficiency implications of a project with the implications of a project for other conflicting goals and objectives of the EP&A Act and government.

Within the BCA framework, it is the community's weights and values for impacts that are important, with this information obtained from market transactions and nonmarket valuation studies.

3.1.3 The BCA Does Not Value all the Non-market Impacts Identified in the EIS

The Judgement considers that there "*are non-market values that have either not been, or have been inadequately been, taken into consideration in the BCA, including impacts of noise and dust, impacts on amenity values and ecosystem services. The omission of these non-market values is a deficiency of the BCA" (para 482).*

BCA is a way of logically and rationally organising information on the economic efficiency benefits and costs of a project. Standard guidelines on BCA identify that rarely can all benefits and costs of a project be valued, and rarely can the most important items be valued with certainty (Sinden and Thampapillai 1995). The level to which costs and benefits are valued is therefore not prescribed in any guidelines. Valuation of all the potential impacts of a project is idealistic and unrealistic.

Where nonmarket valuation is included in a BCA, it generally focuses on the main potential impacts of a project or policy. This is what the BCA and CM of the Warkworth Extension Project focused on – the major categories of potential impact of the Project.

Contrary to the statements in the Judgement, nonmarket valuation methods were used to value all of the following main environmental, cultural and social impacts of the Project, based on the assessment of impacts in the EA:

- Greenhouse gas emissions – valued using an estimate of the global and Australian damage cost of carbon
- Noise and dust impacts – valued by incorporating the full cost of property acquisition rather than the partial property devaluation for properties significantly impacted by the Project.
- Groundwater and surface water impacts – valued by inclusion of an allowance in the capital and operating costs for the acquisition of Water Access Licences and lowering of private bores if impacted;
- Visual amenity impacts – valued by including the capital and operating costs of mitigation measures in the production costs of the mine;
- Aboriginal heritage impacts – valued using the results of the Project CM study;
- Clearing of Endangered Ecological Communities (EEC) – valued using the results of the Project CM study;
- Provision of EEC offsets – valued using the results of the Project CM study;
- Non-market employment impacts – valued using the results of the Project CM study;
- Traffic and transport impacts – valued using estimates of increased vehicle operating costs and vehicle accident costs from increased kilometres travelled because of the closure of Wallaby Scrub Road.

The BCA was one of the few in NSW, for public or private sector projects, that has included primary nonmarket valuation.

One of matters identified in the Judgement as being omitted was ecosystem services (para 482). This is despite the Judgement identifying that the economists agreed that *" it is difficult to say whether there would be any impact on environmental services values as a result of the Project" (para 482).* If biophysical impacts of a project are not identified by environmental specialists then they cannot be incorporated into the analysis, even in a qualitative manner.

Also, as identified by the NSW Government guidelines, there is also the practical principle of materiality. Only those impacts which are likely to have a material bearing on the decision need to be considered in BCA (NSW Government, 2012). For example, if the net present value of a project is $20 million, costs or benefits valued at less than $1 million are unlikely to be material (NSW Government, 2012).

3.1.4 The BCA Does Not Value the New Impacts Identified in the Judgement

One of the deficiencies of the BCA raised in the Judgement, relates to the fact that the BCA did not include "*the relevant matters at the level of particularity required, or in accordance with the factual findings and inferences I have made in relation to the relevant matters" (para 452).* This partly relates to the fact that the Judgement is in disagreement with the proponent's environmental specialists about the noise, dust and ecological impacts of the Project. However, it is circular argument to suggest that the BCA should somehow have foreseen this disagreement

Even this disagreement about the level of impacts does not negate the value of the BCA to the decision-maker. Based on the assessments undertaken in the EA, and the valuation undertaken of those assessments, the Project was identified as having net social benefits to Australia of $1.253B.

While the major environmental, cultural and social impacts (as assessed in the EA) were quantified and included in the Project BCA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $1,253M for the approval of the Project to be questionable from an Australian economic welfare perspective. In other words, the additional (economic welfare) impacts that are identified in the Judgement, that were not identified in the EA would need to be valued at greater than $1,253M, to reject the project on economic efficiency grounds.

Put another way there is an opportunity cost to Australia of $1,253M, including $252M in royalties to NSW and $515M in company taxes, from rejecting the proposal because of the additional environmental impacts identified in the Judgement.

3.1.5 The BCA does Not Incorporate Equity Considerations

The Judgement is critical of the economic analysis because it has not addressed intra and intergenerational equity. The Judgement considers that "*These failures to consider adequately intergenerational and intra-generation equity limit the utility of the BCA and CM to the Court for the purposes of evaluating, weighting and balancing the relevant matters to be considered in determining the Project" (Para 495)*

However, this is an inappropriate criticism of BCA since BCA is only concerned with a single objective of the EP&A Act and governments i.e. economic efficiency. That is, whether the aggregate benefits of the Project exceed the aggregate costs. Welfare economics and BCA are explicitly neutral on the distribution of costs and benefits. There are no welfare criteria for determining what is a fair, an equitable or a preferable distribution of costs and benefits. As identified by Sinden and Thampapilla (1995, p. 210) "the method can hardly be criticised for something it does not pretend to do". "Matters relating to distributional effects are usually left to the political process" (James and Gillespie 2002).

The fact that BCA does not consider equity (and other) issues should not limit the utility of it to the Court as its goal is to examine one, and only one, of many conflicting goals and objectives of relevance to the decision-maker. Decision-makers should have regard to the economic efficiency implications of the Project alongside the performance of the Project in meeting other conflicting goals and objectives of the EPA Act and government.

3.1.6 The BCA Did Not Consider the Distributional Justice for the Components of Biodiversity

A particular entity that the Judgement identifies the BCA failed to consider in regards to distributive justice was the *"components of biological diversity, such as the EECs and threatened fauna within the disturbance areas, which would also suffer the burdens of the Project"* (para 490).

However, BCA is not concerned with distributional considerations. It leaves judgements about distribution to the political process. BCA is also not concerned with ethical issues about the rights or feelings of plants and animals. It is therefore inappropriate to criticise and discount the BCA for something it does not pretend to do (Sinden and Thampapillai 1995).

Like the EP&A Act which is concerned with *"all aspects of the surroundings of* ***humans****, whether affecting any human as an individual or in his or her social groupings",* BCA is anthropocentric. The environment has values for consideration in BCA to the extent that humans value it.

3.1.7 The BCA Did Not Consider Appropriately the Principle of Ecologically Sustainable Development

The Judgement also criticises the economic assessment because "*With respect to intergenerational equity, the BCA and CM did not consider adequately, or accord sufficient weight to, this principle of ESD"* (para 493).

However, BCA is only concerned with a single objective of the EP&A Act and governments i.e. economic efficiency. BCA does not explicitly address other objectives of the EP&A Act and governments such as ESD. It is therefore inappropriate to criticise and discount the BCA for something it does not pretend to do (Sinden and Thampapillai 1995). ESD considerations are therefore generally addressed in other sections of EISs.

Nevertheless, BCA and nonmarket valuation are not inconsistent with the principles of ESD. Nonmarket valuation directly addresses the principle of improved valuation of environmental impacts. This valuation is

based on the values held by individuals in the society i.e. current generations. There is no way to measure the value that future generations hold for impacts of current day projects as they are not here to express it. Nevertheless, as identified by Boardman *et al.* (2001) this is not considered a serious problem for BCA because:

- few policies involve impacts that only appear in the far future. Consequently, the willingness to pay of people alive today can be used to predict how future generations will value them;
- most people alive today care about the well-being of their children, grandchildren, and great grandchildren, whether or not they have yet been born. They are therefore likely to include the interests of these generations to some extent in their own valuations of impacts. Because people cannot predict with certainty the place that their future offspring will hold in society, they are likely to take a very broad view of future impacts; and
- discounting used in BCA also reduces the influence of costs and benefits that occur a long way into the future.

Furthermore, increased wealth (e.g. royalties and taxes) generated by projects that have a net benefit to the community can be used to improve the services (e.g. health, school and community services) and environment (e.g. protected areas) that are passed on to future generations.

3.2 Response to Choice Modelling Issues

3.2.1 The Australian Population Should Have Been Sampled

The Judgement considers that *"the distribution of the surveys to NSW was too limited and that the broader Australian community could well place values on the ecological and Aboriginal cultural heritage impacts of the Project*. *The national-wide concern and campaigns to protect natural areas in Tasmania (such as Franklin-Gordon, Lemonthyme and Southern Forests, and more recently, the Tarkine) and in Queensland (Daintree and the Wet Tropics) are illustrations" (para 470).*

CM practitioners have to determine the population that may hold values for the attributes under consideration. Recognising the distance decay function for values reported in the literature (Rolfe and Windle 2012), the geographical extent to which a project impacts people is a key consideration: Is the project of local, state or national concern. For example, in Australia the National Land and Water Audit CM study (van Bueren and Bennett 2000) investigated the costs of land and water degradation across Australia and hence the sampling strategy for that study involved the Australian population. In contrast, a study commissioned by the NSW EPA on water reforms and environmental flows in major rivers in NSW (Morrison and Bennett 2004), sampled NSW households as well as households living in the catchments of the major rivers.

The Warkworth Extension Project and its non-market value impacts were not considered of national significance and hence sampling was undertaken of NSW households. The view expressed in the Judgement, that the environmental issues in this Project can be likened to the Franklin-Gordon, Daintree and Wet Tropics, and hence can be considered of National significance, is highly questionable.

Even if it is considered that a broader population should have been sampled, the implication of this for the BCA would be that the negative nonmarket impacts (clearing of EEC, Aboriginal heritage impacts) and positive nonmarket impacts (EEC offsets and employment) of the project have been understated. The economic efficiency trade-off question then becomes whether the additional net impacts are valued at greater than $1,253M.

3.2.2 Deficiencies in Information Provided in the CM Questionnaire

Introduction

The Judgement considers that the *"information provided to survey respondents was not, ….., sufficiently accurate to enable them to make informed and meaningful choices"* (paragraphs 471).

Using ecological impacts as an example the Judgement considers that the information provided regarding Endangered Ecological Communities (EECs) was "*inaccurate, indiscriminate and uninformative*" (para 471).

Inaccurate Information on EECs

The Judgement elaborates that the information was *"inaccurate as there are four, not three, EECs affected by clearing"* (para 472).

However, the main EECs impacted by the Project are Warkworth Sands Woodland, Central Hunter Box Ironbark and Hunter Lowland Redgum Forest. While there is a minor occurrence of a fourth EEC, called Central Hunter Spotted Gum Ironbark Forest, it is extremely similar to the Central Hunter Box Ironbark. So much so that Cumberland Ecology amalgamated it with Central Hunter Box Ironbark for the purposes of offsetting. Consequently, for the purpose of the CM, which examined the value of the community for the clearing of EEC and the offsetting of EEC, it was also amalgamated with Central Hunter Ironbark. The questionnaire therefore referred to three EECs being impacted by the Project. However, the ultimate focus of the CM was on the total area of EECs cleared not the level of each EEC cleared.

Other information inaccuracies referred to in the Judgement included that "*the total area to be cleared (under the existing consent and the Project approval) is less than stated (around 765ha instead of 900ha)"* (para 472).

However, this criticism misunderstands the nature of CM. Because CM studies are undertaken before the precise impact of a policy has been determined, the range in impact levels for each environmental attribute must represent an upper and lower bound of potential impacts. The upper bound of potential impacts of the Project was estimated prior to completion of the EIS as 900 ha. The upper bound is **not** meant to represent the actual level of impact as suggested in the Judgement. The fact that the upper bound level of impact is higher than the actual level of impact is also not a cause for concern. This is common to every application of CM.

From the choices that respondents to the CM questionnaire make, it is possible to estimate how much respondents are willing to pay to avoid an additional hectare of EEC being cleared. It is this unit value or implicit price that is then applied to the actual area cleared as a result of a project to estimate the economic welfare impact.

Indiscriminate Information on EECs

The Judgement considers that the information provided to respondents is indiscriminate *"in that it groups the four disparate and heterogeneous EESs to be cleared by the Project…..into one homogenous category of EECs"* (paragraph 472).

In CM the policy situation and environmental and non-environmental values being estimated need to be summarised into a representative set of attributes (Rolfe and Wang 2008). These attributes should represent the most important characteristics and trade-offs of the policy choice (Rolfe *et al.* 2008). However, the number of attributes should not be so large as to create a cognitive burden for respondents (Mogas *et al*. 2002). There is therefore discretion about attributes to include (Rolfe and Wang 2008) and there is a trade-off between choice complexity and information elicitation (Rolfe *et al.* 2008).

In environmental policy applications of CM, attributes numbers tend to be limited to around five or six. In the Warkworth CM application six attributes that were selected to represent the major potential non-market environmental, cultural and social impacts of the Project were:

- clearing of EEC;
- offsetting of the clearing of EEC through:
  - planting of EEC in the region; and
  -protecting existing EEC in the region.
- impact on highly significant Aboriginal sites;
- impact on rural families in the small rural community;
- years that the mine provides 975 jobs.

EEC was treated as a single amalgamated attribute. While at a micro-level EECs are clearly heterogeneous, in the context of the broader level of assessment that is provided by CM, they can and should be treated as a single attribute. There are no CM studies in the world where vegetation attributes of the same level of significance are disaggregated into individual communities. Indeed most studies where vegetation is cleared utilise a single vegetation attribute.

While the attributes must be relevant to policy makers they fundamentally must represent changes in outcomes that respondents value (are demand relevant) (Bennett, 1999; Blamey *et al.* 2000; Blamey *et al.* 1998). The attributes that matter are those that are relevant to individuals in the community (Hensher *et al.* 2005, p. 72). The relevant attributes for inclusion in CM are determined through qualitative research methods such as interviews, focus groups and literature reviews (Adamowicz *et al.* 2008; *Hensher et al.* 2005). For the Warkworth CM study, attributes and there descriptors were developed and tested in a series of four focus groups. These focus groups confirmed the relevance of these attributes to them. Not a single focus group participant considered that there should be an attribute for each of the EECs.

Uninformative Information about EECs

The Judgement identifies that the CM questionnaire "*is uninformative not only in failing to inform respondents of these matters but also of other information relevant to valuing the EECs to be cleared, including at a general level, what are the endangered ecological communities, why their conservation is important, and what are the threats to their long term survival, and more particularly, what are the relative condition and quality of the EECs to be cleared compared to equivalent EECs in the Hunter Valley, what are the relative condition and quality of the EECs to be cleared compared with those which would remain, and what are the threats to these EECs and whether and to what extent the Project exacerbates, abates or otherwise affects the EECs and their ongoing survival"* (para 473).

The aim in CM is to identify, capture and use as much as possible of the information that an individual takes on board when they process a situation leading to a choice (Hensher *et al.* 2005, p. 72.). However, balance is required to ensure that not too much or too little information is provided and that the respondents understand the information provided to them.

The information provided in the CM questionnaire was developed in consultation with the proponent and its consultants and fine-tuned in a series of four focus groups. The questionnaire that was implemented contained a number of follow-up questions to ascertain the respondents' views about the information that was provided. Refer to Table 1. Contrary to the views expressed in the Judgement, the majority of respondents did not consider that they required more information than provided. The vast majority of respondents also reported that they understood the information provided (refer to Table 1).

Table 1 – Information in CM Questionnaire

	Strongly Disagree (Score 1)	Disagree (Score 2)	Neither Agree or Disagree (Score 3)	Agree (Score 4)	Strongly Agree (Score 5)	Average Likert Score
I understood all the information provided	2%	5%	18%	56%	18%	3.8
I needed more information than was provided	7%	31%	39%	19%	3%	2.8
I found answering Q1-6 confusing	14%	41%	31%	12%	2%	2.5

The Judgement also states *"that the survey respondents were not provided with factual findings and inferences of the kind made in Part 3 of the Judgement as to the value of and impacts on the EECs to be cleared by the Project"* (para 473).

This is not surprising since the CM study was based on the information and assessment of impacts available from experts at the time that the CM was undertaken. However, given the fact that CM deals with the policy trade-offs at a broader level than the consideration of EEC impacts in the Judgement, it is questionable whether the considerations in the Judgement would result in any substantive changes.

3.2.3 The CM Study Did Not Ask Respondents What They Would Be Prepared to Pay

The Judgement is critical of the CM study because it *"did not ask respondents what they were prepared to pay"* (para 479).

Dating back to the US National Oceanic and Atmospheric Administration panel findings in 1993 (Arrow *et al.* 1993), best practice non-market valuation does not directly ask people their willingness to pay for an environmental outcome. This is to overcome strategic bias[4]. Instead, alternative approaches to eliciting the willingness to pay (WTP) of respondents have been developed. The state of the art method is CM, the method used for the Warkworth study. CM does not directly ask people their WTP. Instead, through the use of sophisticated econometric techniques the choices made by respondents can be modelled and the WTP of the respondent for unit changes in the levels of environmental attributes can be estimated.

3.2.4 Cost Values Included in the CM Study

The Judgement is critical of the upper level of cost ($625) included in the CM choice sets. "*The Choice Modelling survey attributed values to each of the choices, range in from zero up to $625, ….." "I agree with Mr Campbell that modelling a situation based on a willingness to pay of survey respondents presented with a range of (cost) levels that has nothing to do with costs, is of limited assistance in the situation confronting a decision maker"* (para 479).

The cost levels used in CM should not be determined with reference to any other costs or benefits of the Project. The cost variable reflects an amount of money (disposable income) that respondents might be willing to give up for changes in the levels of different environmental attributes. The upper level of the cost attribute that is included in choice sets reflects a level of disposable income that few people are willing to give-up. In this way, the modelling captures those that are willing to give up a lot of disposable income and those that are willing to give up very little. The upper bound is determined based on reference to the upper level found in other studies and on evidence from focus groups. This involves getting focus group attendees to answer the questionnaire and examining the proportion of responses where they were willing to give up a high amount and also directly asking them about the cost levels included in the questionnaire and what would be their maximum level they would be willing to give up.

[4] When the respondent does not provide a true answer, in order to influence the outcome.

The assertion in the Judgement that because the value included in the choice sets has nothing to do with costs it is of little value, is fundamentally methodologically incorrect.

3.2.5 CM Study Published in International Peer Reviewed Journal

The CM study undertaken for Warkworth has been published in the Journal of Environmental Economics and Policy (Gillespie and Bennett 2012) and as such has been the subject of rigorous independent (double-blind) peer review by economic experts in the field.

3.3. Response to Input-Output Analysis Issues

3.3.1 CGE Analysis Would Be Superior to IO Analysis

Having regard to the assumptions underlying the Hunter Valley Research Foundation (HVRF) IO analysis the Judge identified that he is *"not persuaded that it is appropriate to accept the conclusion drawn in the IO analysis* (Para 459). It is implied by the Judgement that CGE would have been superior.

IO analysis is consistent with the DP&I guidelines (James and Gillespie 2002). While more complex models such as CGE models can conceptually deal with the positive economic activity impacts of a project and any offsetting negative economic activity impacts, for small regional economies, it is unlikely that these more complex models will surpass the simpler input-output model. Firstly, the small open economy condition minimises the need to address offsetting impacts (see explanation below). Secondly, given the considerable difficulties associated with estimating a large number of coefficients and parameters required for CGE models when there is virtually no local data available, many exogenous assumptions are required to be made by the modeller (e.g. impact of in-migration on house prices and rentals) and so the increased 'fuzziness' is likely to more than offset the increase in model sophistication. Consequently, CGE models are mostly used at the State and National level for significant policy issues.

3.3.2 IO Assumes there is a Ghost Pool of Highly Skilled Yet Unemployed People in the Hunter Region

The Judgement (para 460) mistakenly identifies that *"the IO analysis assumes that there are unemployed resources available* ***within the Hunter region*** *to meet any increase in workforce demand" (para 460).* The Judgement accepts Dr Denniss' evidence that, *"the assumption of the IO model that there is a ghost pool of highly skilled yet unemployed people* ***in the Hunter region****, from which labour for the extension of the existing mine would be drawn, is unrealistic"* (para 460).

However, IO analysis does not make this assumption. Most of the direct labour resources for the Warkworth Extension would come from the existing employees at the mine. No ghost pool of highly skilled yet unemployed labour is required. The additional direct employment may come from employed or unemployed labour resources that already reside in the region, migrate into the region or reside outside the region and commute.

Where the regional labour market is tight a large proportion of the additional labour resources required will not come from the region at all but will migrate into the region or commute into the region. There is evidence that of considerable proportion of new mining jobs are being filled by an in-migrating or commuting workforce. For example, there was an increase in the population of the Hunter Region by 2,088 between 2006 and 2011 with the number of residents of the Hunter Region employed in the mining sector increasing by 1,502 during this period (ABS 2006; ABS 2011). In 2011, 3,678 people who were employed in the mining sector in the Hunter Valley resided outside the region (ABS 2011b).

3.3.3 The Singleton Economy is Near Full Employment

The Judgement (para 460) identifies that *"employment generated from the extension of the Warkworth mine would involve currently employed skilled workers transferring from other industries, but the vacancy thereby create in the other industries may not necessary be filled*" (para 460).

This is a static view that ignores the dynamics of the labour market and ignores the regional focus of IO analysis and the mobility of the labour force. It also ignores the fact that the majority of direct labour required for the Project will come from the existing Warkworth Mine workforce. Additional labour requirements will come from either the local labour force, in-migration or a commuting labour force.

Even where a mining project utilises already employed labour resources from inside the region, there is a filter effect where these jobs are filled by other employed or unemployed labour resources[5], which creates vacancies that are then filled by other employed or unemployed labour resources[5] etc, with these employed and unemployed labour resources[5] coming from both inside or outside the region. The potential labour force to meet demand in the region is considerably greater than just the labour force in the region.

Offsetting impacts (crowding out of economic activity) are likely to be small because the Australian economy is not at full-employment and the regional economy is not a closed economy as assumed in the Judgement. While unemployment rates in Singleton LGA and Upper Hunter at the time were relatively low (2.7%) the unemployment rate for Muswellbrook LGA was 4.7%, the unemployment rate for Newcastle was 5.0% and the unemployment rate for NSW was 5.2% (Department of Education, Employment and Workplace Relations 2013). In December 2013, the unemployed labour force levels were 983 in the Hunter Valley, 84,000 in Newcastle, 192,600 in NSW and 635,300 in Australia. Unemployment levels for the Hunter Valley and Newcastle have been rising since March 2012 (Department of Education, Employment and Workplace Relations 2013).

It is also not true that the Hunter Valley economy is a closed economy. There are interactions between economic agents within the regional economy and those outside the regional economy. Because labour is a mobile resource, particularly in the medium to long run, projects within the region utilise employed and unemployed labour resources[5] from both inside and outside the economy.

These labour resources can migrate into the region or reside outside the region and commute. Consequently, the reference in the judgement to unemployment levels in the region is irrelevant.

3.3.4 The IO Analysis Does Not Look at Environmental or Social Impacts

A more fundamental issue raised in the Judgement with respect to the IO analysis is that *"it only looks to economic impacts, not environmental or social impacts, and then only to economic impacts measured with references to goods and services with a market value, not those without a market value*" (para 463). *"It does not assist in weighting the economic factors relative to the various environment and social factors, or in balancing the economic social and environmental factors"* (para 451).

However, IO analysis is not meant to and does not purport to examine anything apart from the economic activity in the region associated with a project. Just as ecological analysis only looks at one piece of information relevant to decision-making and the noise impact analysis only looks at one piece of information relevant to decision making, IO analysis only looks at one piece of information relevant to decision-making. It is not appropriate to criticise it for something it is not meant to do.

[5] Including the continual addition to the labour force from school leavers and TAFE and University graduates

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APPENDIX K

AECOM Inspection of Rock Art Sites

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30 May 2014

Ben Eastwood
Environmental Manager
Invincible Colliery
Castlereagh Highway
Cullen Bullen, NSW, 2790

Dear Mr Eastwood

Re: Site Inspection of Two Rock Art Sites

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by Coalpac Pty Ltd (Coalpac) to assess a potential Aboriginal rock art site located in proximity to Cullen Valley Mine as reported by the Lithgow Environment Group (LEG) in their submission dated 28th April 2014 for the Coalpac Modifications. This assessment included:

- A review of the AHIMS database;
- A review of previous Aboriginal Cultural Heritage Surveys for the area including AECOM (2011);
- A site inspection; and
- Image processing techniques.

A site inspection was carried out at the two locations on the 13th of May 2014. Field participants for this site inspection included Luke Kirkwood (Principal Archaeologist, AECOM), Ben Eastwood (Environmental Manager, Coalpac) and Ian Follington (CEO, Coalpac). The BMCS Art Site 1 was inspected as a good example of local aboriginal art practices and styles for reference in assessing the significance of the potential Aboriginal rock art site located in proximity to Cullen Valley Mine. These inspections involved locating each site, evaluation of scientific significance of each site, the recording of obvious art motifs, inspection of each site for artefacts and the close inspection of art to ascertain comparative features.

The main purpose of this study was to compare the location of the hand stencil as reported by LEG in their submission (an excerpt is provided in Appendix A) with the previous inspection of the area carried out in 2010 and determine the significance of the reported rock art.

2.0 AHIMS Site# 45-1-2741 - BMCS Art Site 1

BMCS Art Site 1 is a significant rock art site located in a cave up a steep, isolated gully to the east of the proposed Modification Boundary (Plate 1). The cave measures approximately 10m x 10m x 3m at its entrance extending 8m to the back wall of the cave. Within the cave are over 20 different visible motifs of stencilled hands and arms in red ochre, including a child's hand. Although well protected within the cave, the pigment is faded with some motifs difficult to discern without enhanced imaging techniques (see Plate 3 to Plate 6). All motifs are painted in locally sourced red ochre obtained from a possible quarry site approximately 100-200 metres away (Plate 2). A photographic record of all visible motifs was made and dimensions and location data recorded.

Plate 1 **View of AHIMS Site# 45-1-2741 - BMCS Art Site 1**

Plate 2 **Nearby potential Ochre Quarry site adjacent BMCS Art Site 1.**

Plate 3 View of back wall of BMCS Art Site 1, unprocessed. Hand stencils in the central portion of the photograph are visible to different degrees of clarity.

Plate 4 View of back wall of BMCS Rock Art Site 1, processed through enhanced imaging. Hand stencils are clearly evident contrasting with the natural colour of the sandstone.

Plate 5 **BMCS Rock Art Site 1 - dual hand stencil showing the faint detail exhibited by the rock art at this site**

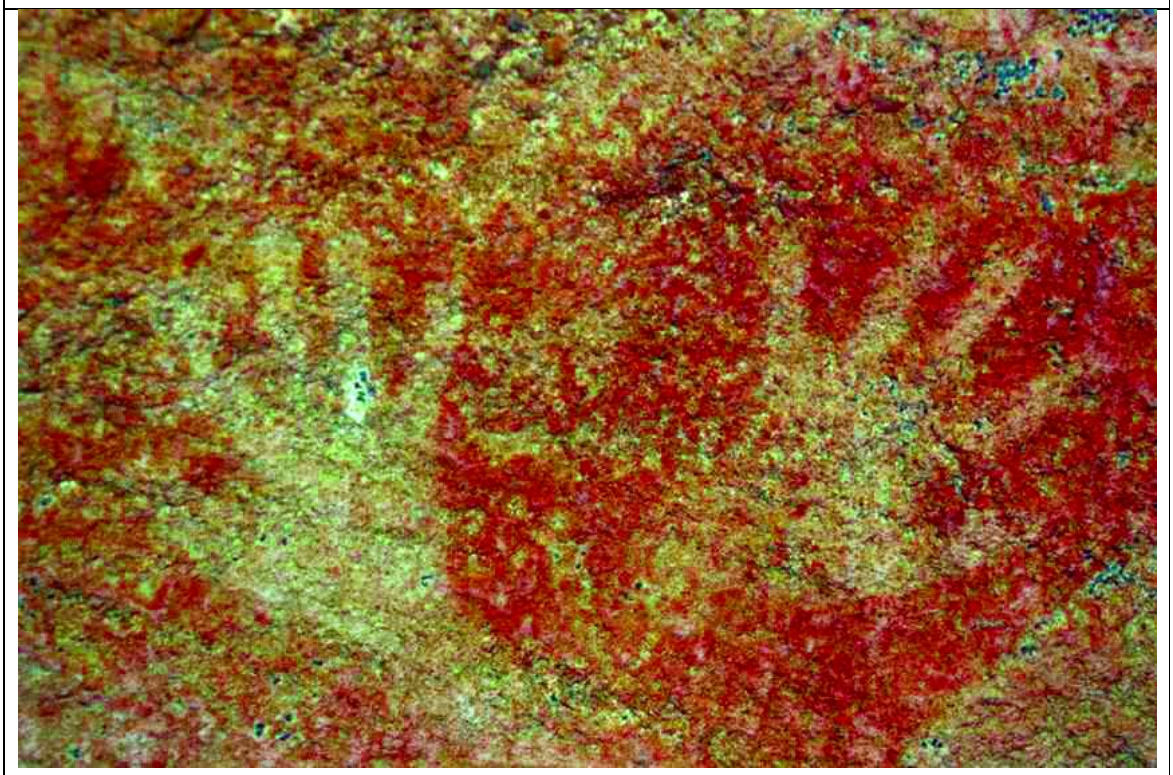

Plate 6 **BMCS Rock Art Site 1 - dual hand stencil enhanced using D-Stretch. Note that pigment application is not uniform, typical of both traditional stencilling techniques and the preservation state of old rock art**

3.0 Cullen Valley Art Site 1

The LEG reported the discovery of an aboriginal hand stencil in a cave site in their submission dated 28th April 2014 regarding the Coalpac Modifications. LEG note in their submission that they identified the site on the 6th April 2014 (see Appendix A). A hand stencil in this location had not previously been reported or recorded as confirmed by the AHIMS database search (AHIMS Extensive Search #134835).

AECOM visited the site as part of this assessment on 13 May 2014 and noted the following.

- The overhang is typical of the area.
- The majority of the potential habitation zone is sloping bed rock with only a small area at the entrance of the rockshelter showing any potential for deposit (albeit small).
- Spalling is present across the middle of the back wall (on which the hand stencil was located) and looks to be resulting from salt crystal growth. A single two tone pigmented left hand stencil was observed in the centre of the back wall of the overhang.
- No other rock art motifs of this type were observed in or around this location.

3.1 Previous Assessment

Cullen Valley Art Site 1 was previously inspected by two qualified archaeologists from AECOM and three Aboriginal stakeholder representatives during the original heritage assessment for the Coalpac Consolidation Project EIS on the 9th December 2010. A photo taken at the time of this inspection in 2010 of this site is provided in Plate 7. Identified as part of pedestrian survey transect 20, extra attention was paid to this rock overhang and the areas immediately outside due to the fact that it was one of very few suitable potential habitation shelters in this part of the survey area. Photographic evidence of the assessment of this overhang by the field team clearly shows North-East Wiradjuri Aboriginal Corporation representative Donna Whillock (right) inspecting the back wall of this overhang (a distance of less than 5m away). There was no rock art or artefactual material noted by either AECOM archaeologists or Aboriginal representatives during the inspection of this overhang in 2010. There was no evidence of a hand stencil observed on that day. Interviews with the archaeologists present during the 2010 survey confirmed that the hand stencil was not at the site at the time the site was surveyed on 9 December 2010.There was certainly no hand stencil of the type, size and clarity reported by LEG in their submission (and included in Appendix A).

Plate 7 AECOM Survey Inspection of Cullen Valley Art Site 1 (9/12/2010)

3.2 The Hand Stencil

This section provides and assessment of the hand stencil reported by LEG in their submission dated 28 April 2014 (Appendix A) at Cullen Valley Art Site 1.

3.2.1 Description

The motif comprises a two tone pigmented left hand stencil located centrally on the back of the overhang. It is positioned 1,100mm above the bedrock ground surface, the motif is composed of both a whitish grey 'pigment' (Maunsell Colour - 10YR/8/1) on the right hand side and grey 'pigment' (Maunsell Colour - 10YR/6/11) on its left hand side. The pigment of the hand stencil was noted as being quite thick and easily observed from the entrance to the rock shelter. As a result, it contrasts significantly with the preservation of the hand stencils in BMCS Art Site 1 as described in Section A and Plate 5 & Plate 6. In addition to this, similar coloured material, which appeared to have fallen onto the bedrock, was observed directly below the hand stencil. The stencil was also noted as being placed over an area of existing spalling indicating it could not be of significant age. There was clear evidence that water regularly runs down the back wall further supporting a limited age for the hand stencil.

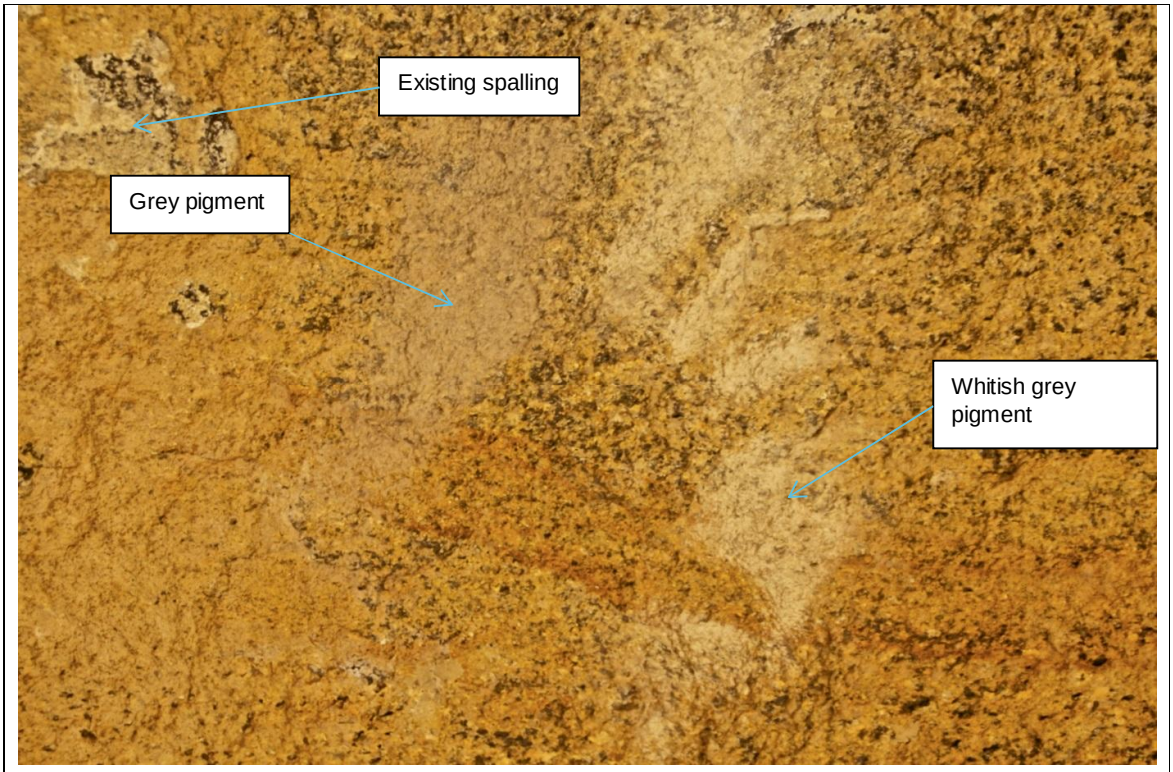

Plate 8 **Close up of hand stencil at Cullen Valley Art Site 1.**

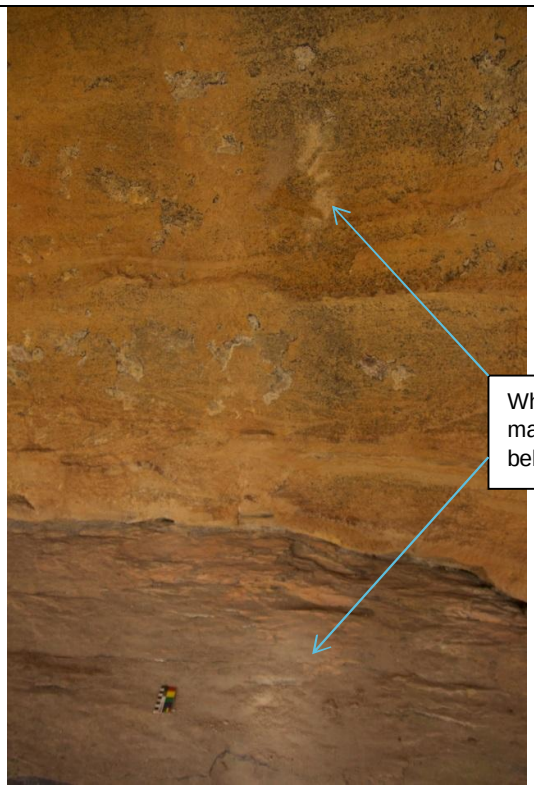

Plate 9 **Similar coloured pigment to hand stencil located directly beneath stencil on overhang floor at Cullen Valley Art Site 1.**

3.2.2 Comparison of 2010 survey and 2014 site inspection

A recreation of the conditions of the photo taken during the 2010 survey (Plate 6) was undertaken in order to gain an appreciation of the visibility of the stencil relative to the people in the original photo. The original photo taken in 2010 was divided into two main areas where people were present on the day. Photos were then taken from these approximate locations to appreciate what is visible from these locations (Plate 10).

It was immediately apparent upon arrival at the rock shelter during the current inspection that the hand stencil was easily visible on the back wall of the overhang and not something that could be easily overlooked. Likewise photos taken from the positions identified in the recreated shot showed how unlikely that this hand print would have been overlooked by two qualified archaeologists and three representatives from local Aboriginal community groups (Plate 11 and Plate 12).

Plate 10 **Recreation of the 2010 inspection photo, refer to Plate 6. Person on the right is Position 1, Person on the left is Position 2.**

Plate 11 **View of back wall of overhang from Position 1, stencil is very clear, large and in a prominent location.**

Plate 12 **Back wall of overhang from Position 2, hand stencil is still visible with an unobstructed view.**

3.2.3 D-Stretch Analysis

Cullen Valley Art Site 1 was analysed using decorrelation stretch image enhancement algorithms provided by the D-Stretch plug-in (Plate 13, Plate 14, Plate 15, Plate 16). D-Stretch is a commonly used tool in the analysis of rock art in order to deconstruct individual painting events and enhance faded motifs that may have once been readily identifiable.

Two things are immediately apparent upon processing of the single hand stencil at Cullen Valley Art Site 1 using D-Stretch (Plate 16).

- Firstly, the two tone nature of the hand stencil is not a trick of the available light, but an actual reflection of the use of two very different 'pigment' types.
- Secondly, analysis of the hand stencil shows that spalling (peeling of the rock surface) has occurred before the application of the stencil.

The spalling which is present across the entire back wall of the overhang shows up a dark blue colour when processed using D-Stretch. Fragments of rock found at the base of the back wall suggests that the process of spalling is an ongoing and recent natural phenomenon. As such, the presence of pigment over the top of pre-existing spalling indicates a recent age for the motif.

Plate 13 Back wall of overhang from Position 1

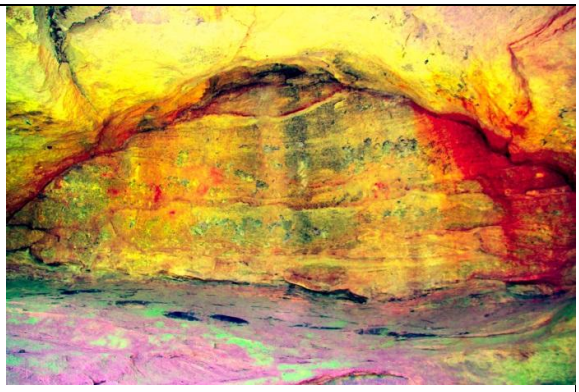

Plate 14 D-Stretch processed image of back wall of overhang

Plate 15 Detail of hand stencil showing slight shading differences in hand stencil pencil

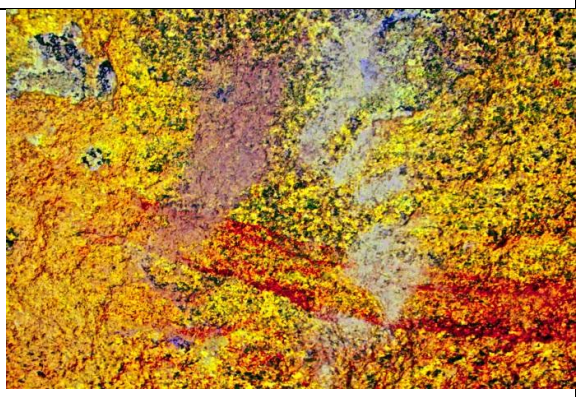

Plate 16 D-Stretch process image of hand stencil showing two distinct pigments. Spalling can be seen in the top of the image (dark blue) indicating that the hand stencil was made after spalling had occurred.

3.2.4 Estimate of Age

Traditional Aboriginal rock art is difficult to directly date. Indirect methods such as dating of mud wasp's nest overlying rock art to infer a minimum age are often used. Based on our assessment the following key points must be considered in the evaluation of the possible age of this hand stencil:

1) The now obvious rock art stencil was not there on the 9 December 2010 when the site was inspected and surveyed by two qualified archaeologists and three representatives from local Aboriginal community groups.

2) The style of the hand stencil is atypical for the area showing evidence of a two–step application of pigment which is unheard of in the general area and is in marked contrast to the BMCS Art Site 1. This differs from traditional Aboriginal hand stencil artwork.

3) The pigment used for the creation of the hand stencil appears to be sourced from the base of the overhang floor not far from the location of the hand stencil.

4) The application of the pigment appears fresh and does not show the natural exposure to the elements and time that is typically associated with rock art in this area.

5) There was freshly disturbed pigment found directly below the hand stencil indicating that it had been created relatively recently.

6) The hand stencil overlies a pre-existing spalling event.

7) The site is located in close proximity to a vehicle track and turning area with relatively easy walking access.

Based on the above evidence, it is likely that the hand stencil has been added in the years following the AECOM field survey undertaken on the 9 December 2010. As such, the hand stencil in question is a maximum of 3.5 years

old, and likely to be less than this given the fragile nature and likely method of emplacement of the pigment used to create it. No possible reason for the recent addition of the hand stencil is inferred as part of this study.

3.3 Other Potential Motifs

Detailed photography and D-Stretch analysis was undertaken of the entire Cullen Valley Art Site 1 area to determine if any further areas contained potentially faded rock art motifs (Plate 17 to Plate 20). The findings of this analysis were ultimately inconclusive. The photo enhanced images identified two possible locations for hand stencils. While the motifs present similar qualities to those identified at BMCS Art Site 1, the significant deterioration of the back wall through spalling (bright blue in the D-Stretch imagery) means that, while suggestive, it is difficult to conclude that these are examples of rock art. It should be noted that the sites are not clearly visible with the naked eye and inconclusive with enhanced photo imagery.

Plate 17 **Left motif**

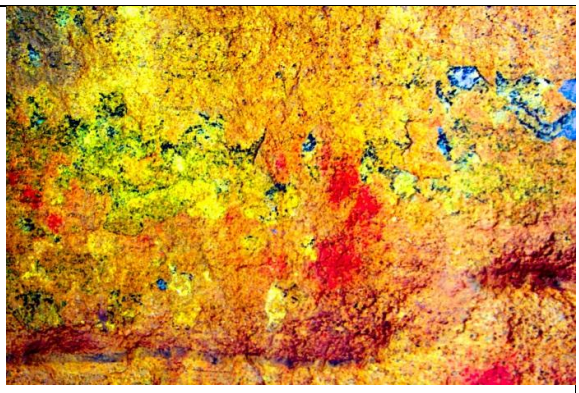

Plate 18 **D-Stretch process image of left motif**

Plate 19 **Detail of right motif**

Plate 20 **D-Stretch process image of right motif**

3.4 Other Potential Habitation Sites

LEG also identified in their submission a number of potential habitation sites within the same escarpment feature as Cullen Valley Art Site 1 with three examples shown in Photo 3 & 4 of their submission. None of the sandstone overhangs identified in Photo 3 & 4 exhibit any characteristics typical for habitation rock shelter sites in Australia: i.e. a flat habitation area and readily accessible. The examples presented instead show extremely narrow ledges under sandstone overhangs with difficult access routes, as illustrated by the positioning of the individual shown in the photos. There was no evidence of Aboriginal occupation presented for these potential habitation sites. It is extremely unlikely that these areas are habitation areas and should be disregarded as such.

4.0 Key Findings & Recommendations

The following key findings are made with respect to the two 'sites':

- BMCS Art Site 1 is a significant rock art site with multiple hand stencil motifs and associated ochre quarry. This site is indicative of traditional Aboriginal rock art for the area.

- Cullen Valley Art Site 1 is an overhang with a questionable hand stencil which does not exhibit any of the hallmarks of a genuine traditional Aboriginal hand stencil (choice of pigment, application of pigment, choice of canvas etc.);
- Cullen Valley Art Site 1 was investigated extensively by the AECOM 2010 field crew, which also included representatives of the Aboriginal community, with no reports of rock art being recorded.
- Cullen Valley Art Site 1 is likely to be a modern replica of a traditional Aboriginal hand stencil that has been made in the last 3.5 years, maximum.
- The Cullen Valley Art Site 1 overhang was carefully assessed and again found not to contain any authentic or definitive traditional Aboriginal rock art.

Based on these findings, the following recommendations are made:

- Based on the above assessment and information available, the Cullen Valley Art Site 1 is not considered significant and no further recommendations are required for this site.
- The Cullen Valley Art Site 1 should not be added to the AHIMS database as representing a traditional Aboriginal cave art site.

Yours faithfully

Luke Kirkwood
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AECOM

Appendix A

Lithgow Environment Group Submission

Appendix A Lithgow Environment Group Submission

Lithgow Environment Group Inc.

PO Box 3081 Bowenfels, NSW 2790
www.lithgowenvironment.org
Preserving the Balance of Nature

The Director
Major Infrastructure Assessment
Department of Planning
GPO Box 39, SYDNEY NSW 2001

28 April 2014

Dear Sir/Madam

RE: Part 3A Modification 4 – Invincible Mine Extension (07_0127 MOD 4) and
Part 3A Modification 2 – Cullen Valley Mine Extension (DA 200-5-2003 MOD 2)

The Lithgow Environment Group (LEG) unanimously opposes the proposed Modifications for the Invincible and Cullen Valley coal mines because we believe they will adversely impact upon an internationally significant pagoda landform complex located on the western edge of the Great Dividing Range in Ben Bullen State Forest. Open-cut mining is incompatible with this part of Ben Bullen State Forest, and it should instead be fully reserved in a State Conservation Area as soon as possible.

LEG members regard this as a stealth reincarnation of the twice-rejected Coalpac Consolidation Project – and if it is approved a never ending stream of Modifications and Extensions will ramp the mines up to the originally intended scale - just like Invincible's seven (7) Modifications and Extensions between 2006 - 2010. We believe that local residents and environmental groups have a right to know what they are really lodging a submission on – not unwritten agendas of a death by a 1000 cuts.

The Invincible modification proposal is less than one kilometre and Cullen Valley is only 2.6km from Cullen Bullen township. Dust from coal trucks and blasting on this project will lead to increased morbidity and mortality in the community from respiratory and cardiovascular disease.

LEG members totally oppose the Modifications for the following reasons:

1. INADEQUATE ABORIGINAL & CULTURAL HERITAGE ASSESSMENT
2. INADEQUACIES IN THE FLORA ASSESSMENT
3. INACCURATE DESCRIPTIONS OF VEGETATION COMMUNITIES
4. IMPACT ON THREATENED PLANT SPECIES
5. IMPACT ON ROTAP LISTED SPECIES
6. IMPACT ON OVERALL SPECIES RICHNESS
7. IMPACT ON FAUNA
8. INADEQUATE BIODIVERSITY OFFSETS
9. ADVERSE IMPACTS ON THE SIGNIFICANT BEN BULLEN PAGODA LANDSCAPE
10. INADEQUATE REHABILITATION
11. IMPACT ON WORLD HERITAGE VALUES
12. UNACCEPTABLE WATER POLLUTION ISSUES
13. INTENSIFICATION OF MINING AFTER APPROVAL
14. UNACCEPTABLE DUST and NOISE LEVELS and BLASTING IMPACTS

1. **ABORIGINAL ARCHAEOLOGY & CULTURAL HERITAGE**

1 (a) Aboriginal Heritage

Section 6.15 Aboriginal Heritage, page 109 of the Environmental Assessment [1.] states that:

> *"A total of 15 Aboriginal archaeological sites are known to occur in the vicinity of Cullen Valley Mine and Invincible Colliery. Of these sites, four occur within the Modification Disturbance Boundary at Invincible Colliery and will be directly impacted by this Modification; no sites have been found in the Modification Disturbance Boundary at Cullen Valley Mine."*

Figure 21 and summary in **Table 21** claims to represent –

> *"The locations of all Aboriginal sites identified within the Modification Boundaries and in proximity to the existing Invincible Colliery and Cullen Valley Mine."*

And on page 111: *"As noted above, no Aboriginal archaeological sites or artefacts have been located in the Modification Disturbance Boundary at Cullen Valley Mine."*

And on page 109: *"All sites recorded from the detailed filed* (sic) *surveys undertaken for the above assessments have been registered on the AHIMS database."*

Yet on 6 April 2014 members of Lithgow Environment Group found an Aboriginal Hand Stencil in a cave within the proposed Disturbance Area of Cullen Valley Mine (Lat -33.265050°, Long 150.028320°). Several other Potential Habitation Sites (ie. cave overhangs) occur in this same escarpment.

Photo 1 & 2: Aboriginal Cave Art Site within the proposed Disturbance Area of Cullen Valley Mine

Photo 3 & 4: Three of many other Potential Habitation Sites within the Disturbance Area of Cullen Valley Mine

LEG contacted the Heritage Division, NSW Office of Environment & Heritage, and Mr Stewart Watters, Senior Team Leader Heritage Databases advised on 10 April 2014 that no recorded sites occur within the search area, and this site is not registered on the AHIMS Database (see below).

> **From:** Stewart Watters [mailto:Stewart.Watters@environment.nsw.gov.au]
> **Sent:** Thursday, 10 April 2014 2:59 PM
> **To:** Julie Favell
> **Subject:** RE: Aboriginal hand Stencil Site - Ben Bullen State Forest
> **Importance:** High
>
> Hi Julie,
>
> Please find attached a search conducted on your behalf. The search has found no recorded sites within the search area. Please double check the co-ordinates used to ensure that the correct area has been searched.
>
> You can conduct these searches yourself via Aboriginal Web Services. Registration is required. The basic search is of no charge. Other extensive and site card requests do incur a charge Further information can be found at
> http://www.environment.nsw.gov.au/licences/WhatInformationCanYouObtainFromAHIMS.htm
>
> As it does not appear that the site is listed you can complete an AHIMS Site recording form and submit it to OEH. Further information can be found towards the bottom of this page
> http://www.environment.nsw.gov.au/licences/DECCAHIMSSiteRecordingForm.htm
>
> Please let me know if you require further information.
>
> Regards
> Stewart
>
> Stewart Watters
> Senior Team Leader Heritage Databases
> Heritage Division
> Office of Environment and Heritage
> NSW Department of Premier and Cabinet
> PO Box 1967, Hurstville BC, NSW 1481
> T: 9585 6448
> W: www.environment.nsw.gov.au

This Cave Art site is clearly within the proposed Disturbance Area of Cullen Valley Mine, and LEG has serious concerns that mine subsidence induced by highwall mining beneath this escarpment will destabilise the cliffs and collapse this cave, resulting in the permanent loss of irreplaceable Cave Art and potentially other yet to be reported/recorded habitation sites, cave art sites, and aboriginal artefacts.

Further, LEG has been approached by members of the aboriginal community in the Windy Gully Road area of Cullen Bullen. They have raised concerns about a cave art site in that vicinity, as well as a trail of 'white rocks' which apparently mark a traditional walking path. This area is likely to be impacted by highwall mining in the proposed Invincible Open-cut area. Yet LEG can find no mention of either of these aboriginal heritage items in the EA[1].?

The DoPI will recall that on 28 June 2012 bushwalker Mr Yuri Bolotin and his party discovered a cave shelter with Aboriginal Hand Stencils and Stone Artefacts within the previous Coalpac Consolidation Project Proposal Area north of Invincible Mine. The OEH advised that this site had not previously been

recorded or registered on the AHIMS Database either. Appendix K (AECOM 2012) for that EA did not identify any cave art sites within the Project Boundary, nor any rock shelter or PAD sites in that vicinity.

LEG also reminds the DoPI that despite eight (8) Aboriginal Heritage assessments over 30 years for the adjacent Baal Bone Colliery, in April 2011 LEG found a previously unreported and unrecorded Cave Shelter with Rock Art near the eastern end of Baal Bone Colliery LW 19.

It is an offence under the *National Parks and Wildlife Act 1974* not to notify the Director-General of the OEH of the location of an Aboriginal Heritage object or site.

LEG questions the veracity of the Aboriginal Heritage Assessment for the Proposal, and formally requests –

- An independent Aboriginal Archaeological and Cultural Heritage Impact Assessment of the Aboriginal Cave Art Site within the proposed Disturbance Area and including edge-effects of Cullen Valley Mine at Latitude -33.265050°, Longitude 150.028320°;

- A comprehensive re-assessment of other unidentified Potential Habitation sites, rock shelters, and caves within the proposed Disturbance Area of Cullen Valley Mine;

- A comprehensive re-assessment of all potential Archaeological & Cultural Heritage Sites, including edge-effects, in the Windy Gully Road area of Cullen Bullen; and

- A comprehensive re-assessment of all potential Aboriginal Heritage Sites within the proposed Disturbance Area's, including edge-effects, of Modification 4 – Invincible Mine (07_0127 MOD 4), and Modification 2 – Cullen Valley Mine Extension (DA 200-5-2003 MOD 2).

1(b) Non-Aboriginal Heritage

Tyldsley Trig *(Lat: -33.284361°, Long: 150.026639°)* is one of the oldest non-aboriginal heritage items in the Cullen Bullen area, and may well be one of the oldest remaining Trig Points in the Lithgow LGA. It has been a major landmark on every map ever printed of the Cullen Bullen area since mapping first commenced in NSW, and is likely to date back to the mid-1800's. Tyldsley Trig was not identified in the previous Coalpac Consolidation Project EA, nor does it appear to be identified in the current EA, despite the fact it was undermined by prior highwall mining at Cullen Valley, and is less than 1.2 km from the Proposal.

LEG has also found several old and potentially historic open mineshafts in the Cullen Valley Mine and Invincible Mine Disturbance areas, and a potentially historic old saddle in a cave in the Invincible area.

Photo 5, 6 & 7: Tyldsley Trig, old open Mine Shaft, and an old Saddle found in a cave overhang

APPENDIX L

MPPS Rehabilitation Photographic Review

This Appendix provides qualitative data collected at Mt Piper Power Station rehabilitation, which is 18 years old.

Photograph 1 Shows strong growth of Eucalyptus on areas that have had been disturbed

Photograph 2 Numerous large trees and strong ground cover

Photograph 3 Shows the size of the growth on areas that have had been disturbed

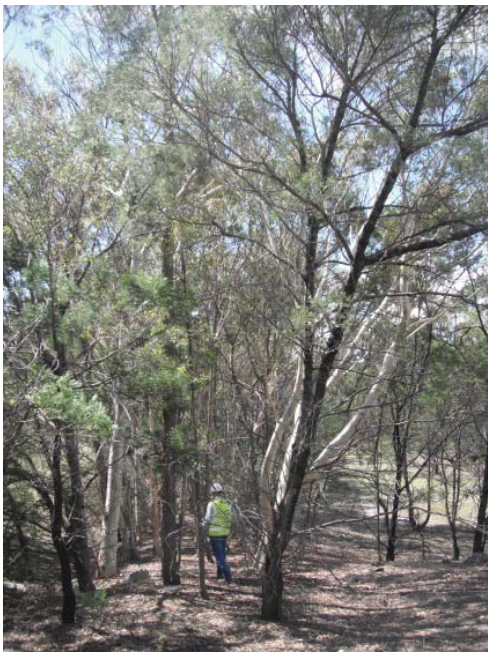
Photograph 4 Strong growth of ground cover and established trees

Photograph 5 A *Eucalyptus* and *Acacia* both >10m high in a heavily disturbed area

Photograph 6 The heavily disturbed area has both strong overstorey and dense shrubs

Photograph 7 Evidence of seed production within the rehabilitated area.

Photograph 8 Evidence of flower and seed production within the rehabilitated area.



Photograph 9 A combination of *Eucalyptus* and *Acacia* thriving to a height >10m

Photograph 10 Evidence of midstorey and over story trees within the heavily disturbed area.

Photograph 11 Strong growth of *Eucalyptus* trees and some younger Acacias

Photograph 12 Established trees but poor ground and shrub cover

Photograph 13 Young *Eucalyptus* striking from natural seeding.

Photograph 14 The boundary where the rehabilitation meets the natural growth. The ground cover in the natural growth is significantly denser.

Photograph 15 Grove of Eucalyptus on the mine waste dump

Photograph 16 Native open woodland adjacent to rehabilitated area.

Photograph 15 Aerial view of photo locations at Mt Piper Power Station.