



COALPAC CONSOLIDATION PROJECT

RESPONSE TO SUBMISSIONS ON THE PAC REVIEW REPORT

for

Coalpac Pty Ltd

May 2013

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

COALPAC CONSOLIDATION PROJECT

RESPONSE TO SUBMISSIONS ON THE PLANNING ASSESSMENT COMMISSION REVIEW REPORT

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29 May 2013

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COALPAC CONSOLIDATION PROJECT

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1 BACKGROUND

1.1 INTRODUCTION

This document has been prepared following the consideration of additional submissions on the Coalpac Consolidation Project (the Project) provided to Hansen Bailey from the Department of Planning and Infrastructure (DP&I). These submissions were made over the period from 25 January to 24 May 2013 in response to the NSW Planning Assessment Commission (PAC) *Coalpac Consolidation Project Review Report* (PAC Review Report) and the Hansen Bailey (2012) *Coalpac Consolidation Project Response to PAC Review Report* (PAC Response Report).

This document includes discussion on those issues raised in submissions that have not already been discussed in the PAC Response Report and is structured as follows:

- **Section 2** summarises the additional submissions provided to Hansen Bailey by DP&I;
- **Section 3** provides a response to new issues noted in the additional submissions;
- **Section 4** provides a conclusion to this report; and
- **Section 5** lists the documents referred to in the preparation of this report.

1.2 ASSESSMENT PROCESS

Key steps in the assessment process for the Project to date are summarised below:

- Coalpac Project Application (No. 10_0178) for the approval of the Project under Part 3A of *the Environmental Planning and Assessment Act 1979* (EP&A Act) provided to the then Minister for Planning in October 2010;
- Director-General of DP&I issued his 'Environmental Assessment Requirements' (DGRs) for the environmental assessment of the Exhibited Project on 16 December 2010;
- Director-General of DP&I issued Supplementary requirements in consideration of relevant matters of National Environmental Significance for the environmental assessment under section 75F of the EP&A Act on 19 April 2011;
- The *Coalpac Consolidation Project Environmental Assessment* (Exhibited EA) deemed adequate by DP&I and placed on public exhibition from 10 April 2012 to 1 June 2012;

- DP&I requested that Coalpac provide the DP&I with its Response to Submissions (RTS) on 8 June 2012. Coalpac and its experts consulted further with the community and Government agencies and the RTS document was submitted on 10 August 2012;
- Minister requested that the PAC carry out a review of the Exhibited Project on 22 July 2012;
- The PAC delivered its Review Report on 14 December 2012 following public hearings in Lithgow and Cullen Bullen;
- DP&I requested that Coalpac prepare a response to the PAC Review Report;
- Submission of the PAC Response Report (Hansen Bailey 2013) on 8 March 2013;
- DP&I requested that Coalpac provide a Preferred Project Report (PPR) for the Contracted Project described in the PAC Response Report;
- Preferred Project Report (Hansen Bailey 2013b) submitted to DP&I on 9 April 2013; and
- Additional submissions received by DP&I from interested stakeholders from 25 January 2013 to 24 May 2013.

2 SUMMARY OF SUBMISSIONS

DP&I provided submissions to the PAC Review Report and PAC Response Report from nineteen stakeholders, including those from Government Agencies, Special Interest Groups (SIGs) and members of the public. These included:

- NSW Treasury;
- Colong Foundation for Wilderness (Colong Foundation);
- Colo Committee (Colo);
- Lithgow Environment Group (LEG);
- EnergyAustralia;
- Environmental Defenders Office NSW (EDO), acting for the Blue Mountains Conservation Society (BMCS);
- Centennial Coal Company (Centennial);
- BMCS;
- Greater Blue Mountains World Heritage Area Advisory Committee (GBMWHA);
- Environmental Liaison Office (ELO); and
- The public, including from Y. Bolotin, M. Botfield, I. Brown, K. Bunyon, L. Bunyon, L. Foley, R. Hawkins, L. Mickklesson, E. Rizana and R. Stiles.

One hundred and thirty four letters in support of the Project were also provided from local residents.

3 RESPONSE TO SUBMISSIONS

This section provides a response to each additional issue raised in the submissions and indicates by whom each issue was raised *(in italic text)*.

3.1 ECOLOGY

3.1.1 Definition of Significant Pagoda Landforms and Sandstone Outcrops

Colong, Colo, BMCS, Y. Bolotin

A number of submissions note their opposition to the way in which the Significant Pagoda Landform (SPL) and Sandstone Outcrops were defined and discussed in the PAC Response Report. These objections include a submission from Dr Haydn Washington (co-author of the Washington & Wray (2011) paper *The Geoheritage and Geomorphology of the Sandstone Pagodas of the North-Western Blue Mountains Region (NSW)*).

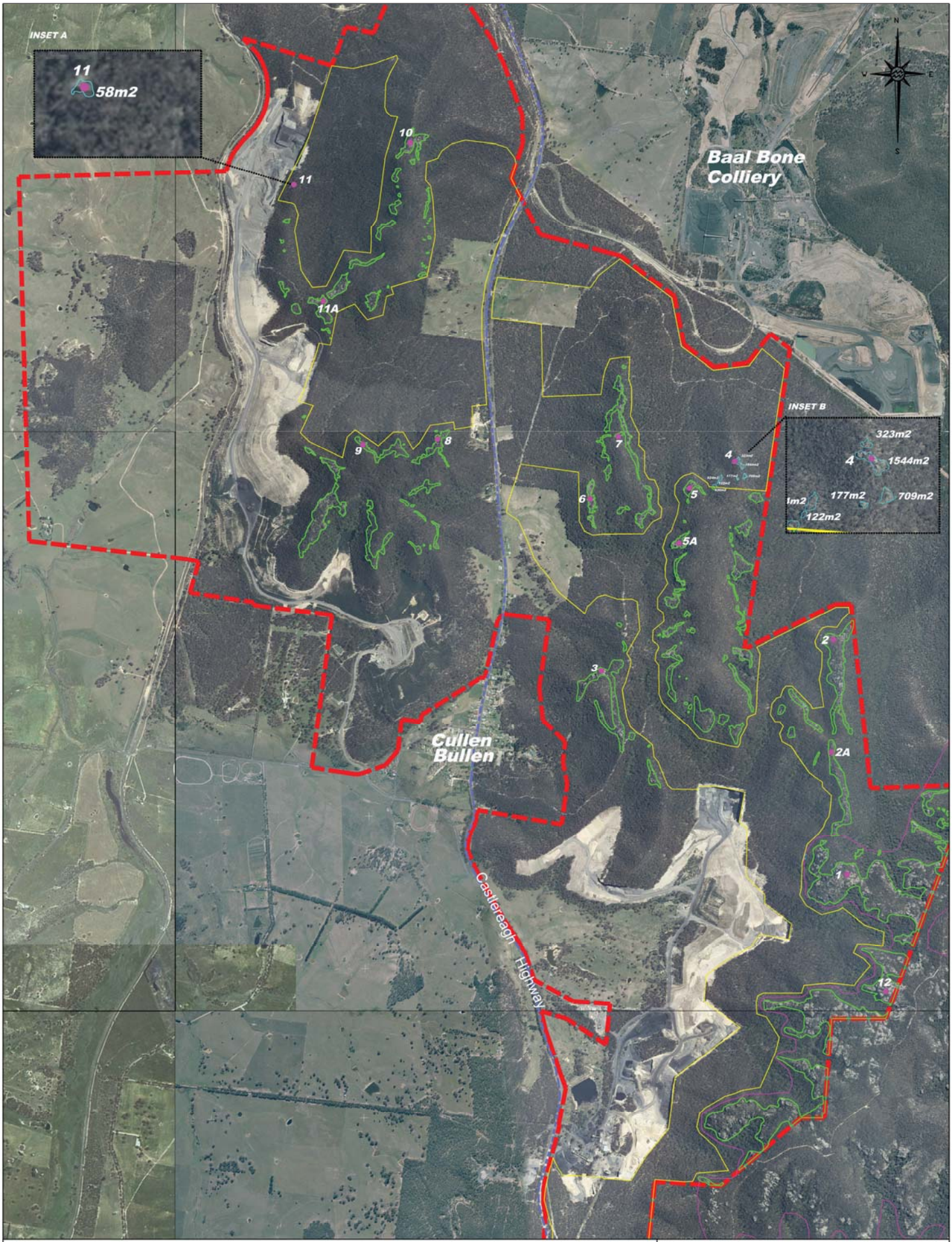
In defining SPL and Sandstone Outcrop features in the PAC Response Report, consideration was given to geological, ecological and aesthetic values to allow identification and more accurate mapping than the work relied upon by the PAC in its Review Report. The definition of SPL was used to develop the Contracted Project Disturbance Boundary to reduce and/or avoid potential impacts from open cut and highwall mining to significant landform complexes of pagodas, clifflines, sandstone outcrop features and gullies and their associated ecology.

The pagoda landforms and habitat within the SPL were attributed a higher value in terms of the management protections afforded by the Contracted Project mine plan. The individual or more discontinuous pagoda and escarpment landforms within the Project Boundary defined and mapped as Sandstone Outcrops (further to the north and west of the SPL) are also proposed to be more rigorously managed to minimise the potential for any direct impacts.

3.1.2 Impacts to Significant Pagoda Landforms and Sandstone Outcrops

Colong, BMCS, LEG

The submission co-authored by the Colong, BMCS and LEG (referred to hereafter as the Joint Submission) provided an overview figure and series of photographs from 15 locations outlining the extent to which they considered pagoda complexes occur in the Project Boundary. Of the 15 locations described in this submission, only two (Sites 4 and 11) are located within the Contracted Project Disturbance Boundary, the remainder being located outside of the proposed open cut mining footprint (see **Figure 1**).



Legend

EA Project Boundary

Contracted Project Footprint

Significant Pagoda Landform

Pagoda Photo Reference Point, as per Joint Submission

Sandstone Outcrops Inside Project Boundary (109.8ha)

Sandstone Outcrops Inside Open Cut Footprint (0.4ha) 0.36%

Sandstone Outcrops On Significant Pagoda Landform (57.6ha) 63.2%

Project Open Cut Boundary,SPL & Sandstone Outcrops With Photo Reference Locations

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

Figure: 1

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In accordance with the definition of Sandstone Outcrops adopted in the PAC Response Report (Section 3.5.1):

- Site 11 (a discontinuous outcrop covering a surface area of 58 m2) is afforded no special significance and is proposed to be disturbed by open cut mining. **Figure 1** confirms that Site 11 is an isolated outcrop with a surface area of only 58 m2 and constitutes only 0.005% of the area of rocky outcrops (both SPL and Sandstone Outcrops) in the Project Boundary. Site 11 is very small, it is isolated from other rock formations and extensive field investigations have confirmed that it has no rare or threatened ecology associated with it; and
- Site 4 is located within the Contracted Project Disturbance Boundary in the East Tyldesley mining area. The outcrops at Site 4 were all measured from aerial photographs (plan view) for the delineation of the Contracted Project Disturbance Boundary. More recent surveys conducted by helicopter and close-up photography of this area have provided more detailed information that has permitted better definition of the surface extent of this particular outcrop. This has led to a refined aerial surface area measurement of 1,544 m2 for one of the Sandstone Outcrops at Site 4 (previously defined as multiple features which were all <1,000 m2). This formation is therefore categorised as a Sandstone Outcrop (being an in situ, discontinuous landform less than 10 ha and greater than 0.1 ha in size).

In accordance with the Statement of Commitments presented in the PAC Response Report and PPR, the Sandstone Outcrop at Site 4 will therefore not be disturbed by open cut mining in the Contracted Project. Further, the blast management system committed to in the PAC Response Report will ensure that this site will be protected from the indirect impacts of blasting.

The photographic evidence provided in the Joint Submission when overlayed on the Contracted Project mine plan very clearly illustrates that the principle of 'avoidance' has been embedded in the open cut design. Of the 15 sites identified and photographed as having some aesthetic significance in the Joint Submission, 14 will be avoided by the Contracted Project. The remaining site (Site 11) is a far more isolated outcrop with a surface area of only 58 m2 and constitutes only 0.005% of the area of rocky outcrops in the Project Boundary, with no rational justification for avoidance of the site, thereby preventing further coal sterilisation.

Response to the submissions from SIGs on the pagoda complexes and the land system approach utilised to map these areas is provided below in **Section 3.1.3**.

3.1.3 Ben Bullen Pagoda Land System Concept

Colong, BMCS, LEG

Summary

A focus of the Joint Submission was that the specific landscape in the vicinity of the Contracted Project is unique and therefore should be conserved.

Joint Submission's use of Land System Concept

The approach described in the Joint Submission to categorise the landscape involved the identification and classification of what the authors refer to as the Ben Bullen Pagoda Land System (BBPLS), which they state is unique and that the best quality example of this land system occurs in the Project Boundary, concluding that it should be conserved in order for it to be adequately protected.

The BBPLS as defined by the Joint Submission includes the following three land units:

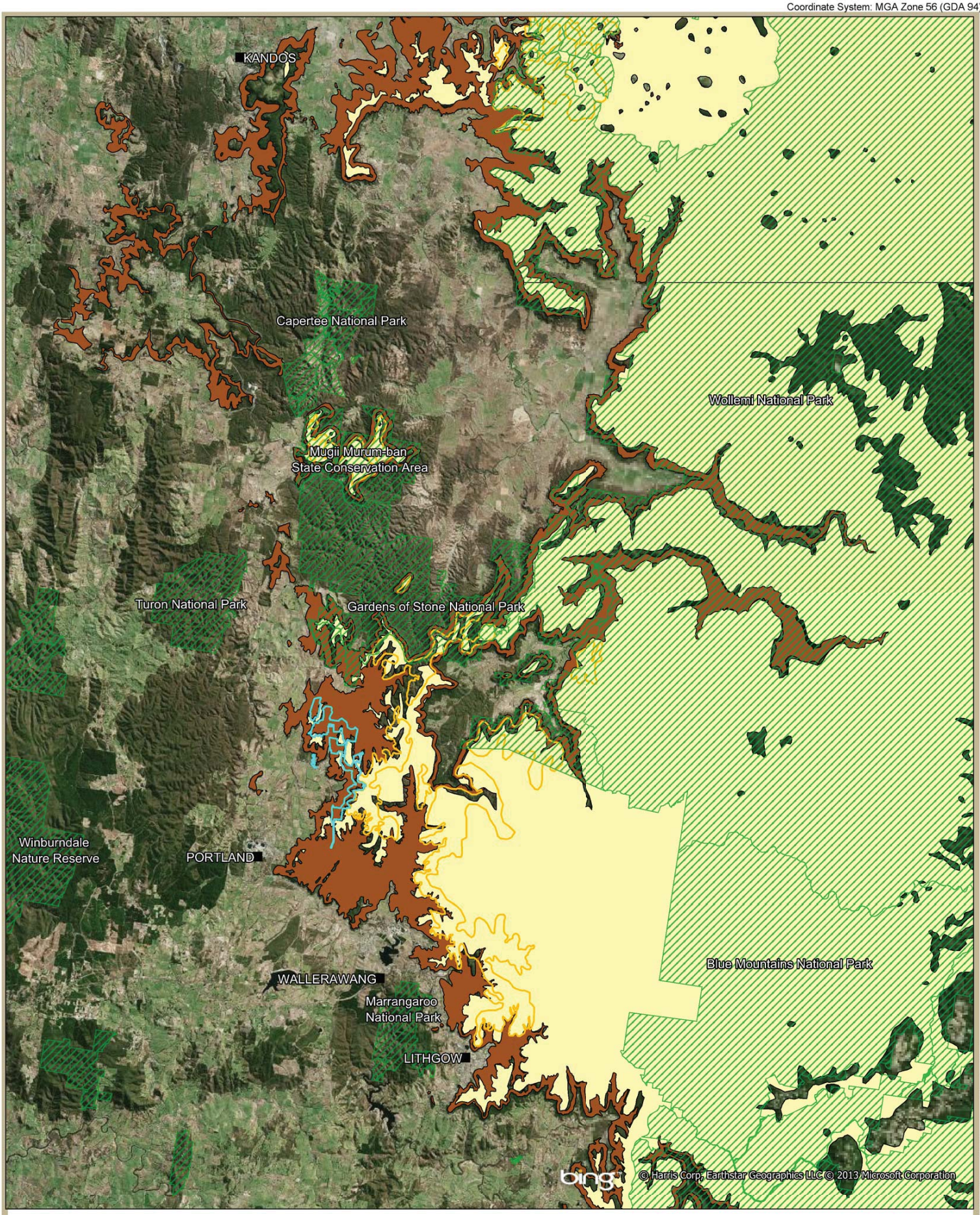
- The Cullen Plateau Unit – gently undulating Triassic Narrabeen Sandstones straddling the Great Dividing Range;
- The Ben Bullen Range Pagoda Unit – platy/smooth pagodas on the plateau margins and along narrow crests, and north and western trending lateral spurs of Burra Moko and Banks Wall sandstones of the Grose Subgroup that run off the Great Dividing Range; and
- The Tablelands Grassy Woodland Complex Unit - gentle undulating hills on rocks of the Permian Illawarra Coal Measures.

The Joint Submission states that the BBPLS is unique because it is the only example of a landscape where pagoda landforms on Triassic sandstones occur adjacent to intact grassy tableland woodland located on the Permian Illawarra Coal Measures and as such it should be conserved. The extent of Permian and Triassic Geology in the region is shown on **Figure 2**.

To support their argument, the Joint Submission refers to the CAR (Comprehensive Adequate and Representative) system of prioritising areas for reservation. The CAR process for determining the adequacy of reservation of various different land types and systems is discussed further in **Section 3.1.4**.

Land System Concept

The land system approach was developed by Christian and Stewart (1953). A land system is defined *as '…an area or group of areas through which there is a recurring pattern of topography, soils and vegetation'* and this approach is considered to be an appropriate way of describing basic land resources in extensive areas where land use does not change within very short distances, and where detailed field descriptions are not practicable or necessarily warranted (Walker 1991).



Legend

- Contracted Project Disturbance Boundary
- Significant Pagoda Landform
- National Parks and Reserves
- Town

Geology

- Triassic Narrabeen Sandstone
- Permian Illawarra Coal Measures

Data Source:
Sydney 1:250,000 Geological Sheet 1966
Singleton 1:250,000 Geological Sheet 1969,
Geological Survey of New South Wales
NPWS Estate 2012

CUMBERLAND ECOLOGY

I:\...\13007\Figures\RTS_PPR_20130529\Figure 2. Permian_Triassic_Geology

Figure 2. Adjacent Permian and Triassic Geology within the Region

5 0 5 10 15 20 km

A land system comprises two or more land units which are small, more uniform components that are usually difficult to map individually. For example, on a land system comprising hilly country with valleys, the units might be the hill crests, the upper slopes, the lower slopes, the minor drainage lines and the major drainage lines (Walker 1991). CSIRO largely developed the concept and it has been widely used since by State Governments and regulatory departments across Australia at a macro scale.

The land system concept was originally intended for use in remote areas of central and northern Australia, including the western districts of NSW, where there are vast areas of land that do not change over short distances.

One of the key aspects of this concept is that the individual land units which together make up a land system can occur in more than one land system, and as such a land system is typically a unique combination of different land units.

Land system surveys are usually used as broad scale or reconnaissance surveys. Although they usually cover extensive areas, they do not provide the detail required for activities such as property management on small farms (Department of Land Resource Management 2013). They are usually applied to provide an initial understanding of large tracts of land prior to further detailed work taking place in a particular area.

Application of Land Systems

It is Cumberland Ecology's considered opinion that the application of the land system concept in this situation is fundamentally flawed and entirely inappropriate. This land system categorisation approach should only ever be applied to far larger land areas and should not be applied as an assessment tool for categorising individual properties or development sites.

The use of the land system concept in this context is misguided and is not faithful to the original concept as developed by CSIRO and applied to land resources in extensive areas where land use does not change within very short distances, and where detailed field descriptions are not practicable or necessarily warranted. In this case, land use does change over very short distances. Detailed field descriptions are available to confirm this.

Although the putative land system described by the Joint Submission contains the component features of a land system, the land system concept as presented by the Joint Submission, is incorrectly applied in this case.

The Joint Submission defines a land system rather narrowly (in contravention of the original intended application of the concept), and has identified a very small area that is termed the BBPLS. The application of a BBPLS on the scale utilised in the Joint Submission loses any real meaning in the context of the intent of the land system concept.

Cumberland Ecology generally agrees with the concept of defining a pagoda land system, however, if it were to be applied, it should include plateaus, pagodas and surrounding hillsides.

It is their considered professional opinion that the pagoda landscapes that occur within the Project Boundary are part of a much larger, pagoda landscape complex or land system (true to the intended application for land systems, e.g. as mapped by Washington and Wray 2011).

Cumberland Ecology's interpretation of the available data is that if a land system were to be identified for the pagoda landscapes, it would be more appropriate to include most of the pagoda complexes that occur in the region in a single land system, as they all share important basic characteristics that can be rapidly identified and classified without detailed field surveys. These features were identified in the Joint Submission by the inclusion of a direct quote from Dr Haydn Washington:

> *"Pagoda complexes are made up of the conical pagodas themselves, associated slots and slot canyons, weathering caves, ironstone sculptures, talus slopes and gullies"*

In general, the pagoda complexes in the region all contain sandstone plateaus on the Great Dividing Range, outcropping pagodas of varying kinds, and woodlands beneath on undulating hills. As indicated in the Joint Submission, pagoda landscape complexes exist on Newnes Plateau, in the Wollemi, Blue Mountains and Gardens of Stone National Parks, and in the Mugii Murum-ban State Conservation Area.

Cumberland Ecology considers that the most appropriate definition of the pagoda landscape complex or land system should pertain to all areas of pagoda landscapes in the bioregion that share broadly similar features including pagoda landforms, sandstone plateaus and slopes beneath. These areas could be grouped into a potential land system with the following land units:

- Sandstone Plateaus;
- Pagodas; and
- Undulating woodlands beneath.

This approach is more consistent with the original intent of the land systems approach, where extensive areas are mapped based on aerial photograph interpretation alone, with limited field verification.

Figure 3 shows the extent of these land units or land system in the region as mapped by Cumberland Ecology. These comprise Triassic sandstones bordered by all the areas identified as SPLs by Cumberland Ecology (Cumberland Ecology 2013) (Pagoda Unit), next to woodlands occurring on Permian Illawarra Coal Measures. This mapping shows that 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.

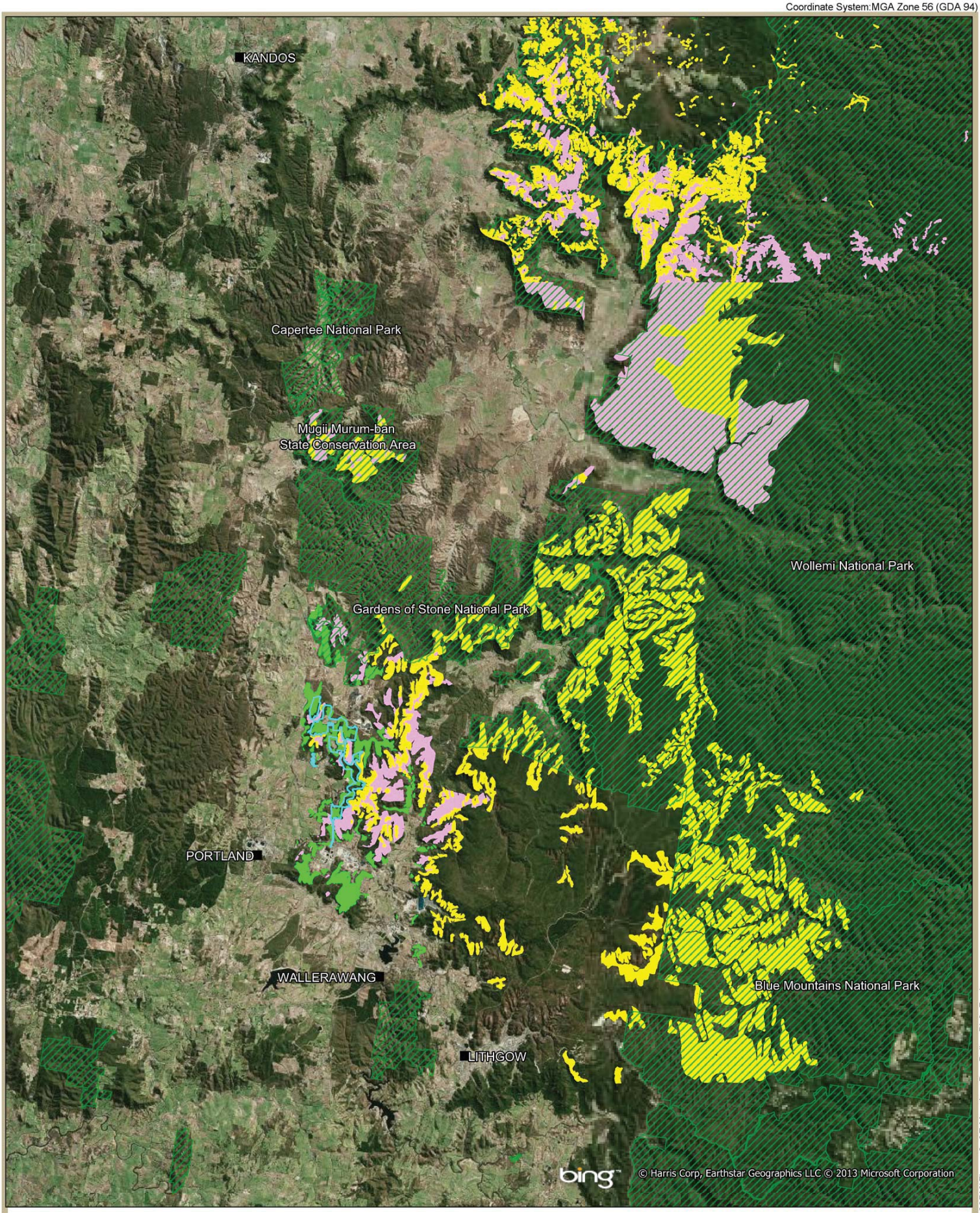


Figure 3. Cumberland Ecology Mapping of the Ben Bullen Pagoda Land System in the Region

Washington and Wray (2011) identified approximately 60,000 ha of *"pagoda country"* that is likely to be suitable for inclusion in such a land system and that share these broad characteristics. This was a broad definition that identified an area where the main concentrations of pagodas in the region were located (Washington and Wray 2011) and as such is not limited to the actual occurrence of pagodas, and includes surrounding landscapes. Furthermore, Cumberland Ecology identified substantial areas of SPL outside of the pagoda lands recognised by Washington and Wray to the north (Cumberland Ecology 2013), which could also be included in this land system (see **Figure 4**).

That notwithstanding, if the area of pagoda lands identified by Washington and Wray (2011) is taken to represent the extent of the pagoda land system that occurs in the region (60,000 ha), then the Project Boundary represents a small fraction (approximately 1.3%) of the total area of pagoda landscapes and the Contracted Project Disturbance Boundary a smaller fraction again. Accordingly it is very hard to understand the basis upon which the BBPLS is considered to be unique (as asserted by the Joint Submission). In fact it is well represented and conserved in the region with the vast majority of it falling within existing National Parks and other conservation reserves.

That notwithstanding, all the SPL in the Project Boundary will be conserved with only very small areas of the Sandstone Plateau unit, and certain areas of the lower slopes within the Contracted Project Disturbance Boundary being impacted by the open cut mining activities proposed.

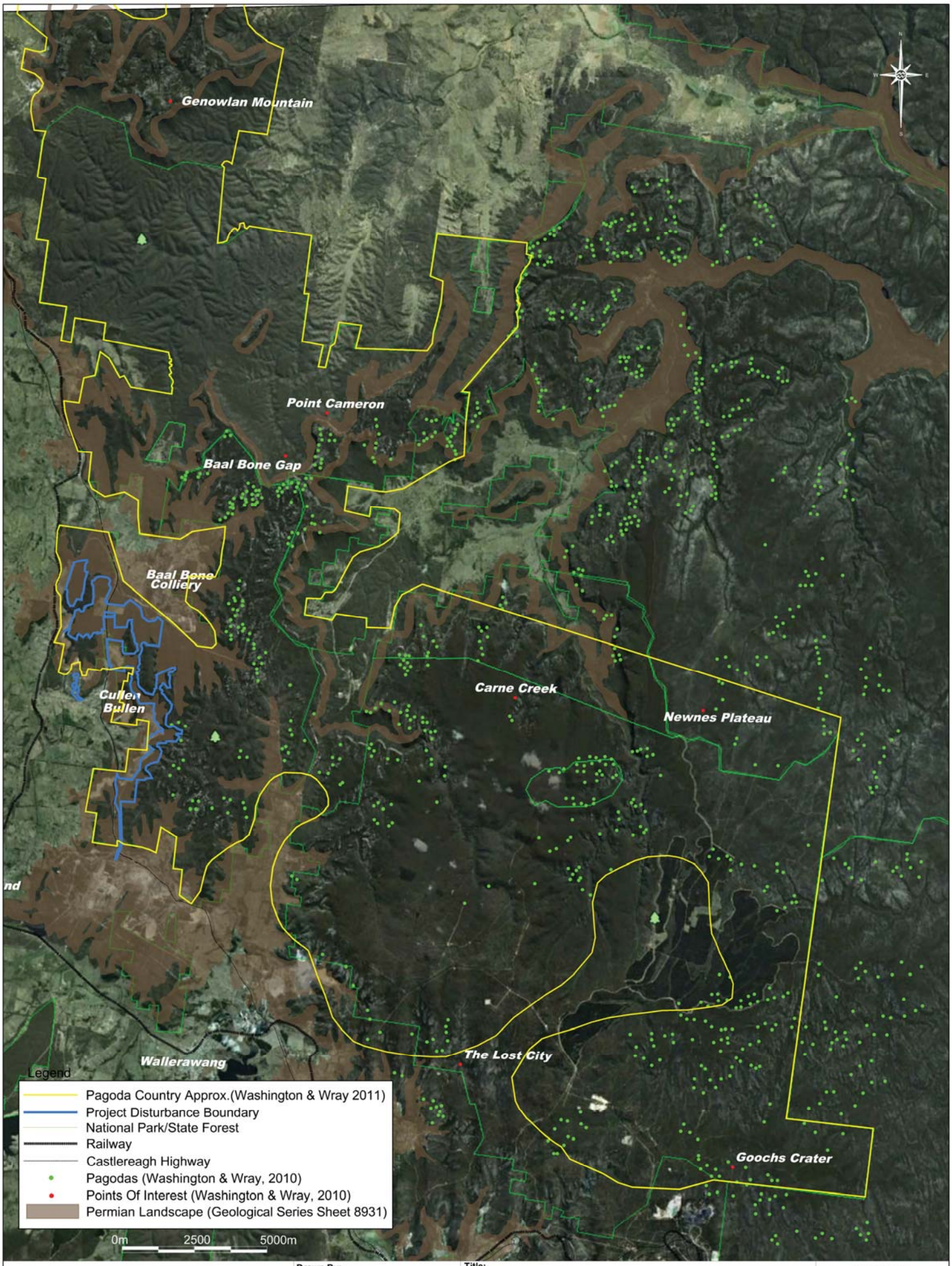
3.1.4 CAR Reserve System

Colong, BMCS, LEG

The Joint Submission refers to the CAR (Comprehensive, Adequate and Representative) system for prioritising lands for conservation, as described within JANIS (1997). Specifically this means:

- **C**omprehensive: the inclusion in the National Reserve System of examples of regional-scale ecosystems in each bioregion;
- **A**dequate: the inclusion of sufficient levels of each ecosystem within the protected area network to provide ecological viability and to maintain the integrity of populations, species and communities; and
- **R**epresentative: the inclusion of areas at a finer scale, to encompass the variability of habitat within ecosystems.

The Joint Submission makes the claim that the BBPLS is a unique land system, and that the CAR system should therefore be used to determine a sample of it for reservation. The submission then makes the case that only the area within the Project Boundary contains a unique example of this land system, and that the entirety of it in the Project Boundary needs to be preserved in order to satisfy the CAR criteria.



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

Drawn By: D. Eustace	Title: Washington & Wray "Pagodas Of The Western Blue Mountains Map"		FIGURE 4
Date: 29/05/13			
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This analysis provided in the Joint Submission is predicated on the assumption that the BBPLS is a unique "regional scale" ecosystem of itself. As already noted, the BBPLS as defined in the Joint Submission (if it were to be applied) is considered to form part of a much larger regional scale ecosystem associated with and represented by the pagoda complex landscapes identified by Washington and Wray (2011) and the previously mapped SPL identified by Cumberland Ecology which could more appropriately be considered a land system. The BBPLS cannot be considered alone as a "regional scale" ecosystem and therefore it is not valid to attempt to find a Comprehensive, Adequate and Representative sample of it for reservation.

It is appropriate however to apply the CAR system to ensuring adequate representation of regional scale ecosystems in conservation reserves. If the pagoda landscapes as a whole are considered to represent a regional scale ecosystem or land system, then it is important to conserve a CAR sample of this system for conservation.

Significant areas of pagoda landscapes are already represented in conservation reserves in the locality within the Gardens of Stone National Park, Wollemi National Park and Mugii Murum-ban Conservation Reserve.

It is important to note that the conservation of pagoda landscapes and associated landforms in the Project Boundary is not necessary to comply with the CAR system for reservation of these landforms. Large areas of similar landscapes are present outside the Project Boundary that are available and appropriate for conservation and may be used to meet the CAR criteria.

Additionally, as explained within the previous submission by Cumberland Ecology (2013), no SPL or Sandstone Outcrops will be disturbed by open cut mining proposed for the Contracted Project and none of these features will be detrimentally impacted by structured and closely regulated highwall mining or blasting activities.

A key point made in the Joint Submission was that the BBPLS is a unique land system which is irreplaceable. This is simply not the case. The SPL and Sandstone Outcrops in the Project Boundary and surrounding areas are only a small part of an extensive network of pagoda landscapes or land system that occurs over a much wider area (i.e. the 60,000 ha described as 'pagoda country' in Washington and Wray, 2011).

As such, it is not accurate to state that the BBPLS is unique and irreplaceable. Areas of similar landscapes occur, and are already conserved, outside the Project Boundary, and only a very small proportion of pagoda landscapes in the region are represented in the Project Boundary area.

3.1.5 Conservation of Pagoda Landscapes

Colong, BMCS, LEG

The Joint Submission posed a series of questions for DP&I to consider. Each of these questions is reproduced in bold italic text below, followed by a response from Cumberland Ecology. Much of this information has been presented previously in the PAC Response Report but it is reiterated here in response the questions raised in the Joint Submission for clarity.

What is an appropriate definition for the pagoda landscape complex, including gullies, aprons and slopes associated with the rocky outcrops?

Cumberland Ecology consider that an appropriate definition of the pagoda landscape complex would be one that incorporates all of the 60,000 ha of pagoda lands mapped by Washington and Wray (2011), and some adjacent areas of hillsides as explained below.

The Joint Submission asserts that the pagoda landscapes in and near the Project Boundary comprise a unique complex that they have defined as the BBPLS, and that it should be protected. That definition includes three land units: the Cullen Plateau Unit, the Ben Bullen Range Pagoda Unit and the Tablelands Grassy Woodland Unit.

As discussed previously, Cumberland Ecology considers the definition proffered by the Joint Submission to be misleading because it focuses on the Contracted Project area solely in and around the Ben Bullen State Forest. **Section 3.1.1** to **Section 3.1.2** has already provided a more appropriate approach to preservation of these features as proposed for the Contracted Project.

How much of the platy pagoda landscape complex occurs in the region?

It is unknown precisely how much platy pagoda landscape complex occurs in the region, but platy pagodas are known to not be confined to lands within either the Project Boundary, or to Ben Bullen State Forest.

Mapping of the pagoda landscape areas has been undertaken by Washington and Wray (2011), but only on a broad scale. This mapping was digitised and then enhanced based on aerial photograph interpretation by Cumberland Ecology in the response to findings of the Review PAC (Cumberland Ecology 2013). While neither the Washington and Wray (2011) nor the Cumberland Ecology mapping differentiate between smooth and platy pagodas, it is evident from publically available aerial photography of the regional pagoda landforms or land system that platy pagodas occur in a much wider area of the “pagoda country” than within the Contracted Project Disturbance Boundary or the Ben Bullen State Forest, including the Newnes Plateau, Wolgan Valley and the Gardens of Stone National Park (see **Figure 4** and **Plate 1** to **Plate 3**).

In discussing the occurrence of platy pagodas within the Project Boundary, the Joint Submission makes reference to a supporting map and associated photographs from 15 locations in the Project Boundary.

The submission notes that the photograph sites:

> *"…were chosen to substantiate the presence of classical pagodas along ridges and spurs throughout the area of the Coalpac proposal. Numerous other pagodas were not photographed due to difficulty of access and the limited time available. Of the sites selected, only two (1 and 12) are in Coalpac's restrictively defined 'Significant Pagoda Landform'. Coalpac classes all the other pagodas as seemingly insignificant 'Sandstone Outcrops' and proposes to highwall mine under them with impunity. Coalpac actually proposes to open cut two other sites (4 and 11), so rather than 'just' being damaged, pagodas in those areas will be totally eradicated."*

The assertion made in the Joint Submission is correct in that the majority of references sites used in the submission are proposed to be under mined by low impact highwall mining methods being classified as Sandstone Outcrops.

As reiterated in the PAC Response Report, highwall mining beneath Sandstone Outcrops will be closely managed in order to minimise any potential surface subsidence impacts to a negligible level. Further, the blast management system described in the PAC Response Report will also provide a further management controls to minimise any potential indirect blasting impacts from open cut mining.

The selection of the 'reference sites' in the Joint Submission does not in any way indicate the significance and prevalence (or otherwise) of these rock features.

The pagodas of photograph Site 1 and Site 12 referred to in the Joint Submission are located within the SPL and will not be impacted by the Contracted Project.

Two of the photograph sites (Sites 4 and 11) are located within the Contracted Project Disturbance Boundary as discussed in **Section 3.1.2**. The remaining sites referred to in the Joint Submission are located outside of the Contracted Project Disturbance Boundary and as such will received negligible impacts as a result of highwall mining or blasting within the open cut areas proposed.

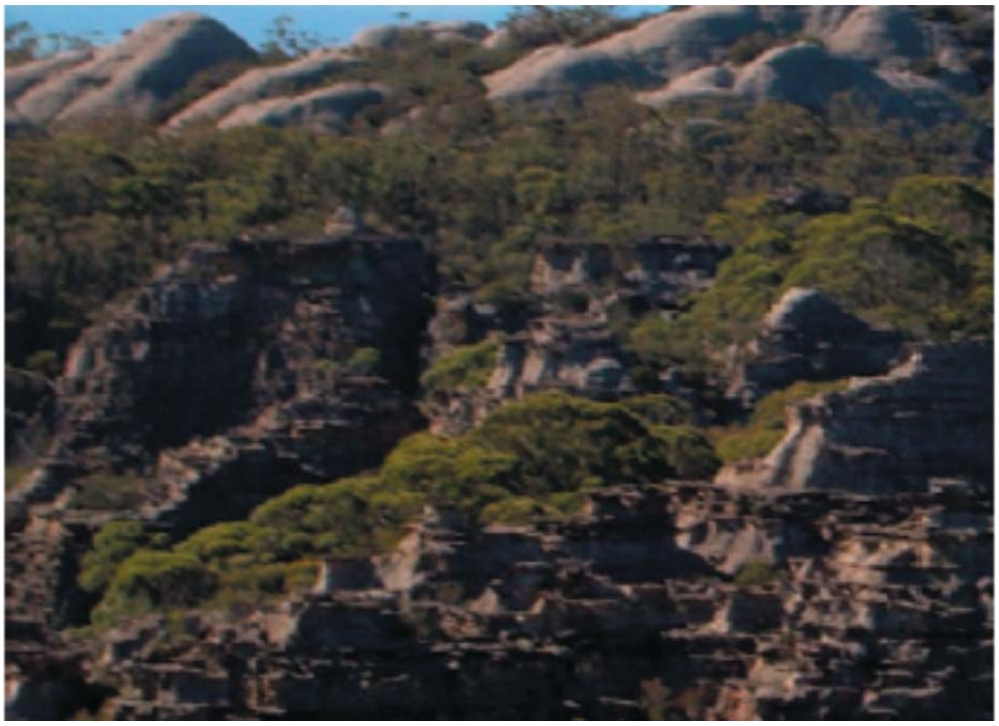


Plate 1
Smooth pagoda at Point Cameron, with platy pagodas in strata below
Source: Washington & Wray (2011)

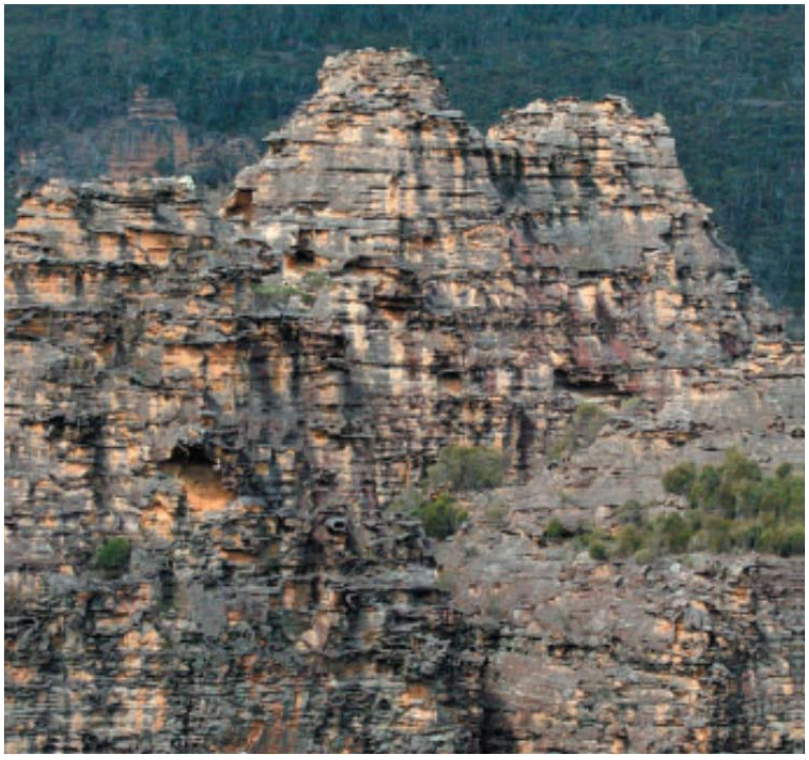


Plate 2
Platy pagodas at Bungleboori Creek, Newnes Plateau
Source: Washington & Wray (2011)

Plate 3
Platy pagodas at Gooches Crater
Source: Washington & Wray (2011)

How much exists within the project boundary or immediately adjacent to the project disturbance footprint? For example, to what extent is the area within the open-cut mining area considered part of this landscape complex?

As discussed in the PAC Response Report (Cumberland Ecology 2013), the Contracted Project has essentially excised all pagodas and their immediate surrounds from the Contracted Project Disturbance Boundary.

The definition of the "BBPLS" coined in the Joint Submission includes three land units:

- The Cullen Plateau Unit;
- The Ben Bullen Range Pagoda Unit; and
- The Tablelands Grassy Woodland Complex.

These units have been mapped as described within the Joint Submission. The mapping included the following parameters for each land unit:

- The Cullen Plateau Unit –Triassic Narabeen Sandstones overlaid by Benson and Keith (1990) unit 10g, DEC (2006) unit MU32 and Benson and Howell (1995);
- Pagoda Rock Sparse Shrubland Unit – Triassic Narrabeen Sandstones overlaid by the Benson and Keith (1990) vegetation unit 21d, and Benson and Howell (1995); and
- The Tablelands Grassy Woodland Complex Unit - Permian Illawarra Coal Measures overlaid by the Benson and Keith (1990) vegetation unit 10h and Benson and Howell (1995).

The distribution of these land units in the region beyond the Project Boundary based on regional mapping undertaken by Cumberland Ecology (following the description of each unit in the Joint Submission) can be seen in **Figure 3** and includes:

- 15,613 ha of the Cullen Plateau land unit;
- 34,432 ha of the Ben Bullen Range pagoda unit; and
- 1,852 ha of the Tablelands Grassy Woodland Complex.

If the definition proffered in the Joint Submission was adopted, the open cut mining as proposed for the Contracted Project would have the following impacts (see **Figure 5**):

- Removal of 7.8 ha (0.05%) of the Cullen Plateau land unit;
- Removal of 10 ha (0.03%) of the Ben Bullen Range pagoda unit; and
- Removal of 249 ha (13.4%) of the Tablelands Grassy Woodland Complex.

The mapping within the Project Boundary on which this is based is considered to be inaccurate, as according to mapping undertaken by Cumberland Ecology, no pagodas or sandstone plateau areas within the SPL will be impacted, and only the woodlands on Permian geology will be impacted to some degree (and rehabilitated to woodland after completion of mining as discussed in **Section 3.1.14**).

Cumberland Ecology take a broader view of the pagoda landscape complex or land system (as discussed previously in the PAC Response Report) and consider it to include broad areas of pagoda lands in the locality and region (i.e. encompassing at least the 60,000 ha mapped by Washington and Wray).

If Tablelands Grassy Woodland Complex is included in the definition as claimed by the Joint Submission, then even the Washington and Wray (2011) figure of 60,000 ha would not include the full extent of this community. This is because the Washington and Wray (2011) mapping has not included mapping of "Tablelands Grassy Woodland Complex". That grassy woodland complex includes a wide variety of woodland types including those dominated by Ribbon Gum (*Eucalyptus viminalis*) and Mountain Gum (*E. dalrympleana*).

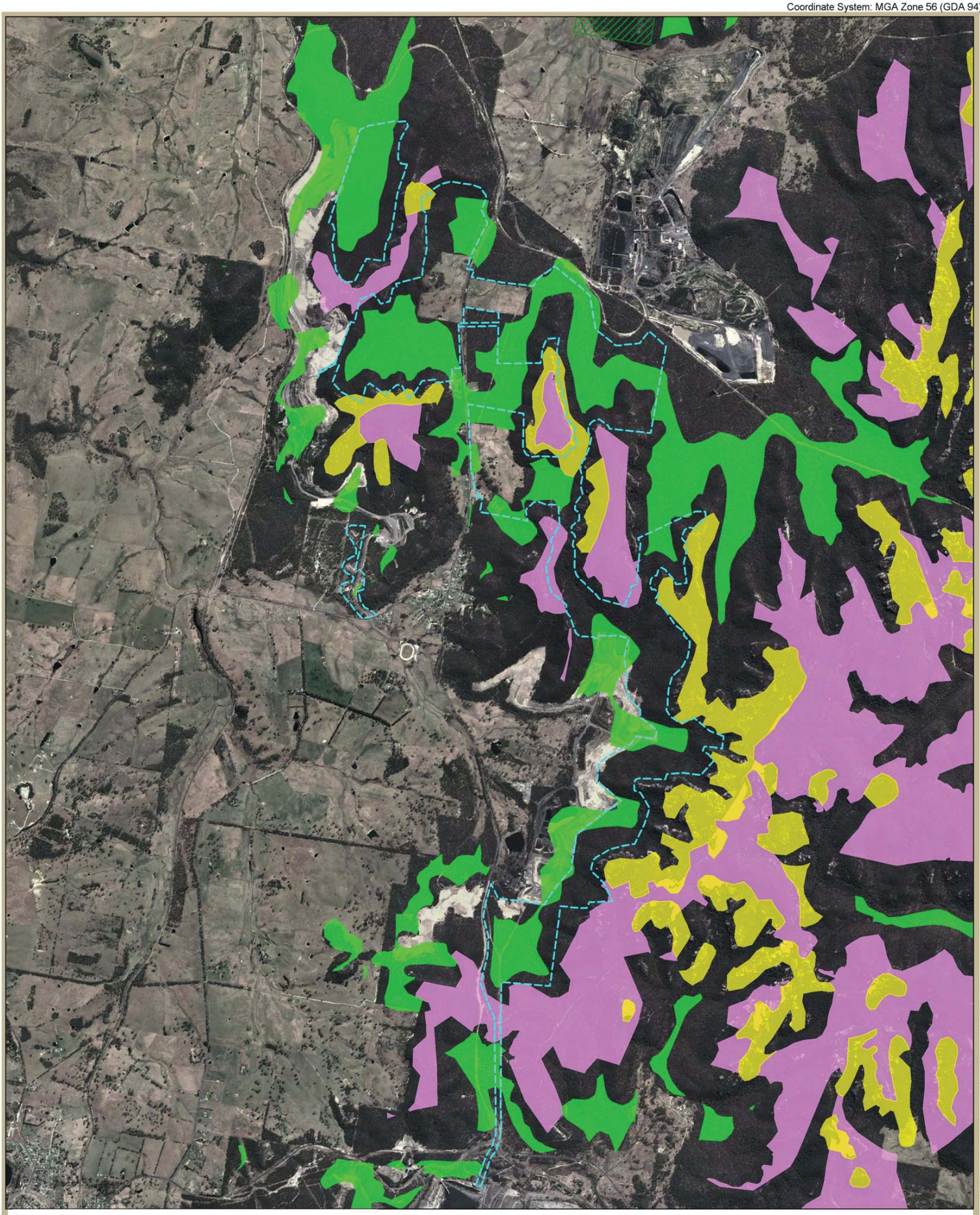


Figure 5. Cumberland Ecology Mapping of the Ben Bullen Pagoda Land System adjacent to the Project

Furthermore, the definition and extent of the "Tablelands Grassy Woodland Complex" used by the Joint Submission is inconsistent in places. On page 10 of the Joint Submission it seems to exclude Box Gum Woodlands and also Inland Scribbly Gum (*E. rossii*). Accordingly, it is likely that the pagoda landscape complex as defined by the Joint Submission is even larger than 60,000 ha, making this assumption extremely conservative.

That notwithstanding, if the Washington and Wray (2011) estimate of 60,000 ha is used for the extent of pagoda landscapes in the region, the Contracted Project Disturbance Boundary (762 ha) is a maximum of 1.3% of the pagoda landscape complex.

How significant or special is the platy pagoda landscape complex from a local, regional, national and international perspective?

The Joint Submission states that the platy pagoda landscape is of international significance, and that the smooth pagodas are of national significance.

It is beyond the scope of the Contracted Project to comment on the national or international significance of the pagodas but it is clear that they are significant geological features. The Contracted Project however, will not directly disturb any Sandstone Outcrops or pagodas that occur within the SPL. The Contracted Project Disturbance Boundary has been reduced by 196 ha (or 20%) to that described in the Exhibited EA and the area affected by highwall mining reduced by 66 ha to avoid all pagodas within the SPL. The Sandstone Outcrops proposed to be undermined by highwall mining will be closely managed and regulated, as will blasting activities within adjacent open cut mining areas. As such, regardless of the significance of otherwise of these features, the management measures committed to by Coalpac will ensure that any impacts are minimised to a negligible level.

What are the attributes of the pagoda landscape complex that contribute to its significance?

In this section, the Joint Submission states that it is the particular combination of land units making up the BBPLS that makes it so significant. Cumberland Ecology takes the view that the attributes present in the Project Boundary are widespread within the pagoda landscape complex or land system in the region (see **Figure 3**). These include steep rocky escarpments and pagodas, valleys and slopes containing Tableland Grassy Woodland vegetation and a wide variety of habitat for native species. These attributes are common to many areas of pagoda landscapes in the region. This is demonstrated by the analyses presented in the response to this issue in the PAC Review Report by Cumberland Ecology (2013).

How much of this landscape is already protected in National Parks, and what level of protection is appropriate for pagoda landscapes outside National Parks?

The Joint Submission focuses on the BBPLS and comes to the conclusion that none of it is protected and therefore it should be protected in a conservation area.

Cumberland Ecology takes the view that this landscape or land system is well represented in National Parks and conservation reserves in the region, and that there is no requirement to conserve the small portion that occurs in the Project Boundary. These landscapes or land system include significant sections of the Wollemi National Park, Blue Mountains National Park and Gardens of Stone National Park, and in the Mugii Murum-ban State Conservation Area (see **Figure 3**).

How significant is the platy pagoda landscape in (and near) the project in the context of the regional distribution of this landscape?

Platy pagodas occur in other parts of the pagoda landscape or land system but they have not been mapped separately to the smooth pagodas. They commonly occur with smooth pagodas (as can be seen in the SPL), and are prevalent within the 'pagoda country' (Washington and Wray, 2011) throughout the western Blue Mountains region. They are by no means unique to the Project Boundary (see above).

The Joint Submission states that the platy pagoda landscape in the Project Area is unique and highly significant, and they document a list of pagodas that occur in the Project Boundary.

As described previously, the pagoda landscape in the Project Boundary is widespread in the region, and conservative estimates indicate that over 60,000 ha occur. In this context, the pagoda landscape in and surrounding the Project Boundary is not considered to be unique or so significant as to prohibit the proposed development and particularly not when the low level of impact proposed for pagodas is taken into consideration.

How significant from a local/regional biodiversity perspective is the vegetation that would be cleared as a result of the Project?

The Joint Submission states that the vegetation to be cleared is highly significant from a biodiversity perspective, and gives particular examples of *Eucalyptus cannoni* and *Persoonia marginata* as plants within the Contracted Project Disturbance Boundary.

Although some *E. cannoni* will be removed, the Contracted Project has avoided a further 74 ha area of habitat for this species. In the case of *Persoonia marginata*, the submission's assertion is incorrect; no *Persoonia marginata* will be impacted, and the Contracted Project avoids all known occurrences of this species, at a significant impact on revenue to the Project and the people of NSW.

The vegetation that would be cleared as a result of the Contracted Project is, for the most part, not listed as an Endangered Ecological Community (EEC), and these vegetation types are relatively widespread. Woodlands adjacent to pagodas are common within the broader pagoda landscape complex, and these woodlands would provide habitat for a similar suite of species as those in the Project Boundary. It is not considered that the vegetation to be cleared is of higher regional significance than the other examples of pagoda landscape complexes.

What ecological function does this vegetation have in the context of the pagoda landscape complex and more broadly from a habitat connectivity perspective?

The Joint Submission uses this section to discuss how the woodland vegetation adjacent to pagoda formations is an important component of habitat for many species that utilise both kinds of habitat. This is not disputed, and it is agreed that many species utilise both kinds of habitat and that it provides a particular kind of habitat.

That notwithstanding, there are many large areas of similar pagoda habitat in the region that provide these functions and that will remain in the landscape, the majority of which are already conserved.

The SPL and Sandstone Outcrops will remain in the Project Boundary and the woodlands on the slopes beneath these features within the proposed open cut mining footprint will be rehabilitated back to woodland habitat, thereby continuing to provide these kinds of habitat in the long term. It is important to note that the removal of this woodland is not simultaneous, but progressive over the Project duration of 21 years, permitting progressive rehabilitation, and thereby, progressive habitat regeneration.

The submission also discusses the high biodiversity values of this part of NSW, and the Greater Blue Mountains World Heritage Area. This is acknowledged, however this high biodiversity does not depend on the woodland habitats in the Project Boundary, and the region will still contain an extremely high representation of National Parks and protected vegetation.

What level of significance does this vegetation have in the context of the potential reservation of the Ben Bullen State Forest under the NPW Act? i.e. would the clearing of this vegetation prevent any future reservation of Ben Bullen State Forest.

The Joint Submission makes the statement that the Project would reduce the values of Ben Bullen State Forest and therefore reduce the value of the proposed State Conservation Area.

The proposal for a State Conservation Area is a private proposal and at present there is no Government policy for conservation of the Ben Bullen State Forest (see **Section 3.1.14**).

The Ben Bullen State Forest could be reserved in future, irrespective of whether or not mining occurs. The Contracted Project Disturbance Boundary only covers approximately 11% of the total area of the Ben Bullen State Forest. The remainder of the Ben Bullen State Forest could be conserved.

In addition and as stated in the previous response to the PAC by Cumberland Ecology (2013), many landscapes that had previously been disturbed by open cut mining occur in the National Parks and other conservation reserves of NSW and in other parts of Australia. Coalpac's strong track record with regard to rehabilitation (193 ha rehabilitated to date) would allow the rehabilitated areas within the Project Boundary to be added to any future conservation area.

The open cut mined areas would be progressively rehabilitated and such areas would contribute significantly to the biodiversity of the region, as have many other previously mined areas in Australia.

3.1.6 Vegetation Community Mapping

Colong, Colo, BMCS

In their submission of 18 March 2013, the Colong Foundation noted that:

> *"Cumberland Ecology in Appendix E, reply to the Coalpac PAC report write: 'The slopes and forested valley floor has been mapped as "10i Talus-slope Woodland" not "10h Tableland Grassy Woodland Complex" by Benson and Keith (1990) (see Figure 5.3)' (Section 5.1.4, page 5.15). This statement by Cumberland Ecology is incorrect.*
>
> *That is, the published 1990 map shows the slopes and forested valley floor as "10h".*
>
> *The remark: 'the "10h Tableland Grassy Woodland Complex" does not occur in the Project Boundary or adjacent the Project Boundary (Figure 5.3).' is also incorrect.*
>
> *The Figure 5.3 have different vegetation typing to the typing on the map published in Cunninghamia Volume 2, Number 2, 1990 for the same shaped areas. Cumberland Ecology should have checked with the published map in Cunninghamia Volume 2, Number 2, 1990, before making the above statements.*
>
> *Cumberland Ecology has not explained how areas shown as "10h" on the 1990 published map have become areas of "10i" on the map in Appendix E, published by Cumberland Ecology in March 2013. The latter vegetation type is quite rare, and the former is common, so this difference is important.*
>
> *The Colong Foundation for Wilderness considers the omission of an explanation for the change in vegetation typing made in figure 5.3 by Cumberland Ecology could be an example of unprofessional conduct. "*

A response from Cumberland Ecology on this vegetation mapping issue is included in **Appendix A**. The discrepancies between the vegetation map units published in the hard copy maps and in the information supplied to and adopted by Cumberland Ecology have now been acknowledged and rectified by Office of Environment and Heritage (OEH).

3.1.7 Vegetation Community Impacts

Colong, BMCS, LEG

The Joint Submission states that the non-listed communities that will be cleared in the Contracted Project are poorly represented in conservation reserves and therefore they should not be removed from the Project Boundary.

Non-listed Vegetation Communities

These vegetation communities are not considered to meet the criteria of the *Threatened Species Conservation Act 1995* (TSC Act) or *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for listing as an EEC, and are therefore not considered to be a critical constraint on the Contracted Project.

The non-listed vegetation communities occur widely within the region, particularly along the western flanks of the Blue Mountains between Hartley and Rylstone.

Representative areas are currently included in the proposed biodiversity offset package and Coalpac has committed that the total area of offset lands conserved for the Project will be increased to a 4:1 ratio with the inclusion of at least an additional 1,000 ha of mostly forest and woodland vegetation. These additional biodiversity offsets will include further areas of the non-listed vegetation communities.

Box Gum Woodland EEC

The Joint Submission states that the area of Box Gum Woodland in the Contracted Project Disturbance Boundary is larger than that stated by Cumberland Ecology, based on the Atlas records of the characteristic dominant trees *Eucalyptus blakelyi* and *E. melliodora*.

These conclusions are based on a flawed approach. Vegetation mapping cannot be undertaken solely on the basis of database records and the presence of historical records of individual species does not prove that a particular community occurs.

While Cumberland Ecology acknowledges that these species are indicator tree species for Box Gum Woodland, it does not follow that the recording of an individual species would correspond to the definition of Box Gum Woodland.

A range of other factors need to be taken into consideration, including the dominance in the canopy layer of these species, and the co-occurrence of other diagnostic species. The SEWPaC policy statement (DEH 2006) asks a series of questions to guide an assessor on determining the presence of CEEC Box Gum Woodland and Derived Native Grassland. These are provided below:

- *"Is it or was it one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?"*
- *"Does the patch have a predominantly native understorey (understorey consists of more than 50% perennial species)?"*

- *"Is the patch 0.1 ha or greater in size?"*
- *"There are 12 or more understorey native species present (excluding grasses).There must be at least one important species (SEWPaC provide a list of characteristic species and identifies important species)."*

Where areas of vegetation in the Project Boundary conformed to all four questions it was considered Box Gum Woodland and Derived Native Grassland listed under the EPBC Act was present.

Cumberland Ecology has verified the extent of this community in the field and has taken a conservative approach to mapping the boundaries of this community. Accordingly it is considered that the vegetation mapping presented in the Exhibited EA is representative.

3.1.8 Biodiversity in the Ben Bullen State Forest and Contracted Project Boundary

Colong, BMCS, LEG

Considerable weight in the Joint Submission was placed on the relatively high diversity of Ben Bullen State Forest in terms of flora and fauna species (in particular orchids), vegetation communities and endangered species compared to other NPWS reserves and State Forests.

This was determined by comparison of data held in the Atlas of NSW Wildlife (Atlas) for Ben Bullen State Forest and other reserves in the region. Atlas data was further used in the Joint Submission to support the assertion that Ben Bullen State Forest is an area where the abundance of several threatened flora species is particular high.

While intuitively appealing, the conclusions drawn from such analysis relying on Atlas data is inherently flawed and is contrary to the intent of the Atlas. The following is a direct quote from the OEH Atlas of NSW Wildlife website (OEH 2013): *"Data in the Atlas, whilst extensive, is nevertheless 'patchy"*.

The Atlas covers all areas of NSW and also includes some records from neighbouring states, but will not provide information on the full distribution of a species. The Atlas is neither a comprehensive inventory of all species nor of all locations of species occurrence in NSW. Except in areas where detailed survey information has been incorporated into the Atlas database, the search results for a particular area are based on a mix of reported sightings. For example, sightings often follow patterns of human movement, such as along roads.

It is also important to realise that the number of recorded sightings for a species does not necessarily correspond in any way to the actual abundance of that species in NSW.

Contributors often focus their efforts on recording threatened and endangered species, with the result that rare species may have more recorded sightings in the Atlas than common species. A common species in an area may not be recorded in the Atlas, *"because no-one has thought to report its occurrence"*.

The Ben Bullen State Forest is located in an area that has a long history of mining development, and therefore it has been well studied in comparison to other areas. As a result, there are more records of threatened species in this area compared to others in the locality simply as a function of the increased survey effort that has been undertaken. It has a high diversity of native plant and animal species (as was acknowledged in the flora and fauna assessment in the Exhibited EA by Cumberland Ecology); however Atlas data cannot be used to demonstrate that it has a relatively higher diversity than other nearby areas.

ROTAP Species

The Joint Submission also places significant weight on species that are not listed under any Australian conservation legislation, but are listed as ROTAP (Rare or Threatened Australian Plant) species. It is important to place the true conservation status of these species into context.

The list of ROTAP species was published by the Commonwealth Science Investigation and Research Organisation (CSIRO) in 1981, with revisions published in 1988 and 1996. Originally it was the only nationally recognised list of threatened plants, although it had no legal status. When the Commonwealth Endangered Species Protection Act 1992 was proclaimed, the ROTAP list was used as a basis for the publication of schedules to the Act. A third list of threatened flora and fauna was produced by the Australia New Zealand Environmental Conservation Council (ANZECC) from 1996. In 2000, the Federal EPBC Act was proclaimed which superseded the *Endangered Species Protection Act 1992*, and published a single list of threatened flora which superseded the three previous lists. As the EPBC list has legal force, the ROTAP list is now little used in ecological impact assessment.

Cumberland Ecology has placed most emphasis on the legal status of flora and fauna species, as listed under the EPBC Act and the state TSC Act, and has placed relatively little emphasis on ROTAP species.

This is because the three previous lists of threatened species have been superseded by the EPBC Act, and it is widely acknowledged that this is the most current list for threatened biodiversity. The ROTAP list was last updated in 1996, and as such it is now 17 years out of date.

Since 1996, numerous species have been formally listed as threatened on both the TSC Act and the EPBC Act. The species that remain solely on the ROTAP list (such as the majority of plants discussed in the joint response) have not been listed as threatened on either the TSC Act or the EPBC Act. The reason for this is presumably that they do not meet the criteria to list them as threatened.

As such, for the purposes of ecological reporting for this Project, ROTAP species are not considered to be threatened species and are not accorded the same consideration in the Cumberland Ecology assessment as species listed under the EPBC Act and/or the TSC Act. Furthermore, these species have been shown to be unlikely to be affected by the Contracted Project as they occur outside of the Contracted Project Disturbance Boundary.

Endangered Ecological Communities

The Joint Submission also stated that more ecological communities were present within Ben Bullen State Forest than most other reserves in the region and made reference to the EECs that have been recorded from within Ben Bullen State Forest. It is agreed that there is a relatively high number of ecological communities in the Ben Bullen State Forest, but it is not true to say that significantly more exist here than in conservation reserves in the region.

Three EECs have been recorded from the Ben Bullen State Forest, however it is important to recognise that of these, only one of them, the Box Gum Woodland, will be impacted by the Contracted Project; the remaining two have been avoided by changes to the Exhibited Project and will not be disturbed.

Moreover, the Contracted Project has been varied to reduce the impacts on Box Gum Woodland and to avoid clearance of the major patch of that vegetation that was initially located within in the Project Disturbance Boundary. A suite of mitigation measures have also been proposed to compensate for the removal of areas of Box Gum Woodland that will result in the protection of substantial areas of this community within the proposed biodiversity offset package.

3.1.9 Pagoda Habitats as Refugia

Colong, BMCS, LEG

The Joint Submission mentions several plants that depend on pagoda habitats and state that pagoda habitats in the Contracted Project Disturbance Boundary are important for their survival. The importance of pagoda habitats for these species is well known, and it is widely acknowledged that pagodas represent important habitat for a range of plant species.

However, the plants mentioned in the Joint Submission are mostly ROTAP listed species, which are not formally listed as threatened species (as discussed above in **Section 3.1.8**). As discussed previously in the PAC Response Report, these are not threatened species and are not afforded the same degree of importance as listed threatened species when considering potential impacts.

As stated in the previous response by Cumberland Ecology (2013), the ROTAP species occur predominantly on plateaus, cliffs and pagodas. SPL habitats and plateau habitats within the Project Boundary will not be significantly impacted by the Project, with no surface disturbance occurring to the pagodas in these areas. No SPL or Sandstone Outcrop habitat will be removed, and appropriate controls will be implemented to remove the risk of impacts from highwall mining and blasting. In contrast to fauna species, pagoda dependant plant species depend solely on habitat in pagoda areas and similar rocky habitats. These habitats will remain in the Project Boundary and in the wider locality, and these species will not be impacted by the Project.

3.1.10 Impacts to Threatened Species

Colong, Colo, BMCS, ELO, Y. Bolotin, M. Botfield, I. Brown, R. Hawkins, L. Foley

A number of submissions refer to known or potential impacts of the Project to specific flora and fauna species listed under NSW and Federal legislation (TSC Act or EPBC Act) or under the Rare or Threatened Australian Plants (ROTAP) listings. Such species include but are not limited to the:

- Broad-headed Snake;
- Brush-tailed Rock Wallaby;
- Large-eared Pied Bat;
- Eastern Bentwing-bat;
- Clandulla Geebung; and
- Capertee Stringybark.

Broad-headed Snake

The submission by Ian Brown on the Broad-headed Snake raises five main issues:

- The location of the Broad-Headed Snake record near the Project Boundary;
- The Biosphere survey (2013) did not assess the location of the one proven record as suitable habitat;
- The Broad-headed snake was observed in high summer in what is usually considered to be winter habitat (rock outcrops);
- The snake is highly cryptic and therefore population numbers may easily be higher than observed; and
- Mitigation measures proposed for the Contracted Project are inadequate.

In response to the additional submission on the Broad-headed Snake, it is noted that the Atlas location data for the record made by Ian Brown is clearly erroneous, as indicated by the Biosphere report (2013) prepared by Dr Arthur White (appended to the PAC Response Report) and in Ian Brown's submission.

Although the area where the Broad-headed Snake was found was not mapped as suitable habitat by Biosphere in their review for the PAC Response Report, it is still considered that there is little high quality habitat for this species within and surrounding the Project Boundary based upon the extensive experience of Dr Arthur White.

The reason for Dr White reaching this conclusion was due to the lack of appropriate crevices and cracks in the sandstone outcrops. Although one individual snake was recorded, the habitat features present do not indicate that high numbers are likely to occur in this area. Whilst the individual recorded is clearly part of a local population, it is not expected that this population is extensive based on the availability of rock shelter resources in that area, particularly exfoliating sandstone.

Cumberland Ecology acknowledges that the Broad-headed Snake is highly cryptic and difficult to detect, and therefore the survey work to date has focussed on habitat assessment rather than targeted assessment of the species. Cumberland Ecology also recognises that some individual snakes may, on a seasonal and transient basis, be present in the disturbance footprint that may be impacted, which is why a range of appropriate mitigation measures have been developed (see below).

Although the snake was recorded in rocky habitats in summer, most available evidence indicates that they mostly utilise tree hollows in this period (Webb and Shine 1997, 1998). A certain amount of variation in seasonal movement is to be expected with animals, and particularly with a poorly understood species such as this one. Moreover, some variation could be expected due to temperature fluctuations, with snakes moving out of rocky areas later in colder weather / seasons. The mitigation measures that propose to remove rocky areas in summer to avoid impacting on this species have been developed for the Contracted Project based on the best available scientific evidence regarding this species' habitat preferences and movement patterns although it is recognised that some variation may occur. It is considered likely that by adopting this approach, impacts will be minimised to the majority of the Broad-headed Snakes that may occur, although there is potential for unexpected behaviour resulting in additional impacts.

As stated within the Preferred Project Report (Cumberland Ecology 2013), the vast majority of potential Broad-headed Snake habitat falls outside the Contracted Project Disturbance Boundary and lies within established and extensive conservation areas. The reduced open cut footprint created to protect the SPL will mean that no potential habitat will be directly impacted in the area around the SPL. The proportion of impacted habitat is very low in comparison to the amount of potential habitat to be avoided by the Contracted Project.

The mitigation measures have been developed based on the best available evidence and information. The area within the Contracted Project Disturbance Boundary does not comprise high quality habitat, and therefore it is not likely that there will be large numbers of this species present, and translocation will only occur of a very limited number of individuals (if any).

Due to the poor quality of the habitat in the immediate surrounding areas, they are likely to benefit from the addition of artificial habitat such as bushrock. Artificial bushrock has been found to be used by prey species of the Broad-headed Snake, and therefore is a valid mitigation measure where these kinds of structures are lacking due to the nature of the sandstone outcropping.

This kind of habitat will also add value to the rehabilitated open cut areas, as well as currently vegetated areas in the Project Boundary that lack appropriate fissures and cracks to support this species or its prey.

Biosphere (2013) noted that reptile poaching is likely to be the reason that Broad-headed Snake numbers are often low, even in areas with potential habitat, and therefore efforts to reduce this practice are likely to have longer term benefits than avoiding the removal of an area that has low habitat quality in any case.

Threatened Flora Species

The Joint Submission states that the Contracted Project will impact further on *Eucalyptus aggregata* and *Persoonia marginata*.

This is incorrect. The Contracted Project will avoid any impacts to both these species and habitat for both is present in the proposed biodiversity offset areas.

All known habitat for *Persoonia marginata* has been avoided and it has also been excised from the currently approved open cut mining area of Cullen Valley Mine. In addition, the Contracted Project also avoids all known habitat for Persoonia marginata where it occurs within the Project Boundary.

With regard to *Eucalyptus aggregata*, Coalpac are conserving rather than impacting the species. *Eucalyptus aggregata* was recorded in the existing onsite Biodiversity Offset area of Invincible Colliery. No *Eucalyptus aggregata* individuals have been recorded in the Contracted Project Disturbance Boundary or will be impacted by the Contracted Project.

It is stated in the Joint Submission that *Derwentia blakelyi* and *Thesium australe* have both been recorded within the Ben Bullen State Forest, and yet no targeted surveys were undertaken for these species and that they are highly likely to occur in the Contracted Project Disturbance Boundary.

These two contentions of the Joint Submission are somewhat misleading. *Derwentia blakelyi* was considered to have a moderate to high likelihood of occurrence in the Exhibited EA, and therefore targeted surveys were indeed undertaken by Cumberland Ecology for this species. Despite targeted searches being undertaken for this species, none were recorded in the Project Boundary which encapsulates the Contracted Project Disturbance Boundary.

Contrary to the statement made in the Joint Submission, *Thesium australe* has not been recorded within the Ben Bullen State Forest according to the Atlas. No targeted surveys were undertaken for this species as Atlas database searches undertaken for the Exhibited EA indicated that it had not been recorded within the Lithgow LGA, a much larger area.

A recent search of the Atlas (08/05/13) also confirms that *Thesium australe* has still not been recorded on that database in the Lithgow LGA. Accordingly, it was considered to have a low likelihood of occurrence and therefore targeted searches for this species were not considered necessary. Although this species still does not appear on the Atlas, this species has since been recorded near Blackmans Flat (approximately 5 km to the south of the Project) during surveys undertaken for the Neubeck Coal Project (Centennial Coal 2012) and Pine Dale Coal Mine (R.W. Corkery 2011).

Nevertheless, despite numerous field surveys by Cumberland Ecology and others, *Thesium australe* has not been recorded in the Project Boundary.

Given that numerous field surveys have been undertaken in the Project Boundary by Cumberland Ecology and others, and these species have not been recorded, it is reasonable to assume that they are unlikely to occur. Accordingly, the statement in the Joint Submission that these species are "highly likely" to occur in the study area is not based on the available evidence.

Other Threatened Species

Further discussion on the changes to the Exhibited EA mine plan, the predicted impacts to these species and the management and mitigation measures proposed for the other threatened and ROTAP species is provided in Section 3.5.1 of the PAC Response Report and in **Section 3.1.8** of this response.

More generally, the significant alterations made to the Contracted Project mine plan have reduced the mining impact footprint and avoid potential habitat areas for other threatened species within the SPL. Further, the commitment to develop a comprehensive Biodiversity Offset Strategy (BOS) in consideration of the presence of Threatened flora and fauna species will ensure that the Contracted Project will not have a significant impact on any identified Threatened species within the bioregion.

3.1.11 Existing Impacts to Cliffs and Escarpments

Colong, BMCS, LEG

The Joint Submission asserts that most of the Baal Bone Colliery lease area (north of the Project Boundary) has been damaged by extensive cliff falls and that only its most northerly end, containing the headwaters of the Baal Bone and Jews Creeks, remains unaffected by intensive longwall mining. The Joint Submissions have also asserted (on Page 3, Paragraph one and Page 12, Section 4.3, Paragraph two) that the vegetation in these areas has been desiccated (i.e. subject to extreme drying out) by the longwall mining process.

This presumably refers to cracking resulting from underground longwall mining subsidence causing loss of surface water on the plateau.

Limited evidence is provided to support the claims made by the Joint Submission that substantial or extensive cliff falls have incurred significant ecological impacts or resulted in the desiccation of vegetation.

These claims were investigated in the field, and contrary to the discussion in the Joint Submission, relatively little of this area is showing evidence of cracking related to underground longwall mining with no apparent evidence of desiccation. A geotechnical engineer and CEO, Dr Ian Follington from Coalpac, and Dr David Robertson, Director of Cumberland Ecology, examined representative parts of the Baal Bone Colliery lease area that has been subjected to longwall mining subsidence.

They documented the condition of the rock formations and vegetation in the Baal Bone Colliery lease area, and although some minor cracking is evident, the rock features are intact and have not collapsed or been substantially damaged in a way that would in any sense create significant ecological impacts.

It was noted that the vegetation on the areas subject to longwall mining is in relatively good condition, although it has suffered from impacts due to a variety of non-mining activities. The majority of the damage occurring to the vegetated habitats in this area is from the creation of roads, power line easements and access associated with these activities. Access by recreational 4WD vehicles and trail bikes has caused extensive erosion and there is also evidence that this access has also allowed the collection of bush rock as was discussed in our previous response to the PAC (Cumberland Ecology 2013).

The observations from the field investigation outlined above are fully supported by the findings of the most recent Subsidence Management Status Report No.14 produced by Baal Bone Colliery for longwall panels 29 to 31 (Wallerawang Collieries 2012). This is the fourteenth in a series of monthly reports covering subsidence monitoring and related environmental impacts at Baal Bone Colliery. This report found the following;

- Monitoring of groundwater bores for both levels and quality has continued with no observable major impact on groundwater levels due to mining;
- There has been no change in the fauna species richness over the area pre- and post-mining. Baseline surveys were undertaken in 2005 and regular surveys have been undertaken since that time;
- There has actually been an improvement in the flora species richness over the area pre- and post-mining. This was attributed to higher rainfall received over the period rather than mining impacts; and
- Baal Bone Colliery has a program in place to remediate areas impacted by subsidence cracking.

It is also noted that the Contracted Project proposes open cut and highwall mining, not longwall mining. Longwall mining is an underground mining method that extracts up to 75% of the coal, and is designed to cause surface subsidence as a result of this high extraction rate.

There is no evidence that longwall mining has had any detrimental ecological impact in the Baal Bone Colliery site. The highwall mining method proposed for the Contracted Project has been assessed to result in negligible surface subsidence (as it is only proposed to extract a maximum of 42% of the coal). It is therefore anticipated that there will not be any detrimental ecological impacts from the highwall mining method.

It is also important to point out the following differences between the Baal Bone Colliery site and the Coalpac Consolidation Project Boundary and proposal:

- No power line easements will be constructed through the SPL or Sandstone Outcrops within Project Boundary, and none will be constructed on the plateau area to the east of the SPL; and
- No significant ecological impacts are predicted for flora and fauna of the SPL, Sandstone Outcrops, pagodas or the plateaus referred to within the Joint Submission except for their sites 4 and 11, as discussed in **Section 3.1.2**.

A series of photographs from the Cumberland Ecology review has been included below (see **Plate 4** to **Plate 18**) to illustrate the current condition of pagoda rock formations within the Baal Bone Colliery longwall mining area. **Figure 6** also shows the locations of these photograph points.

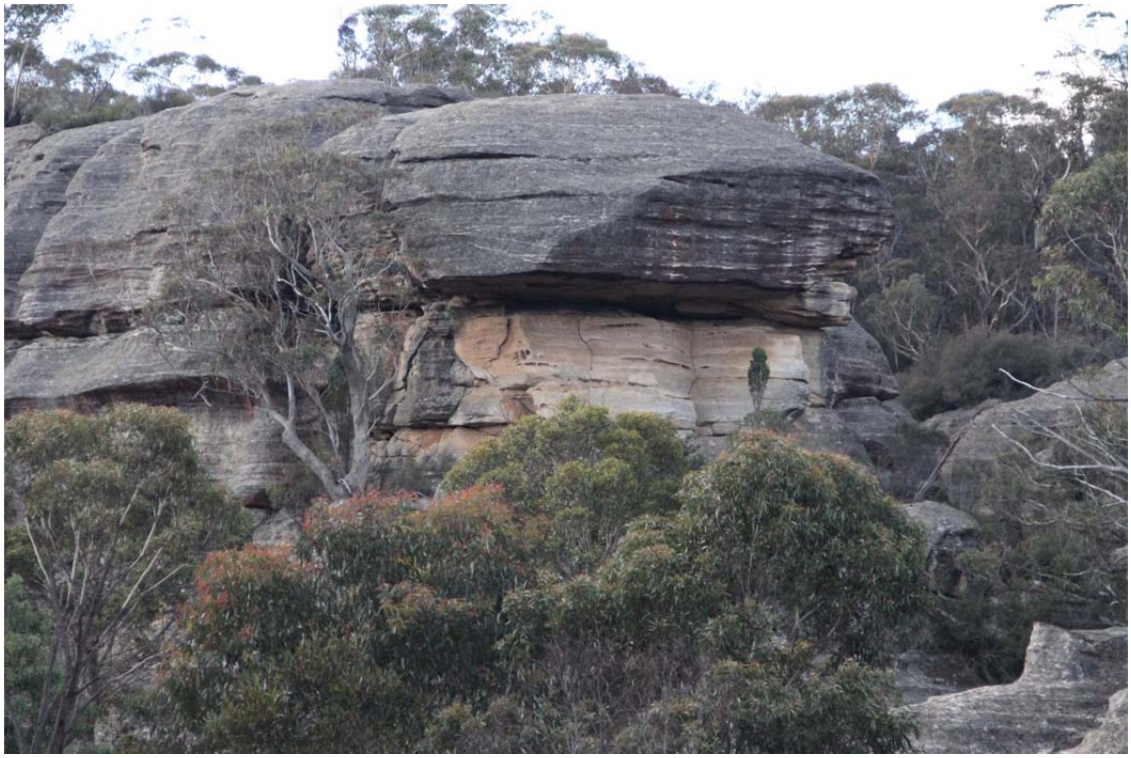
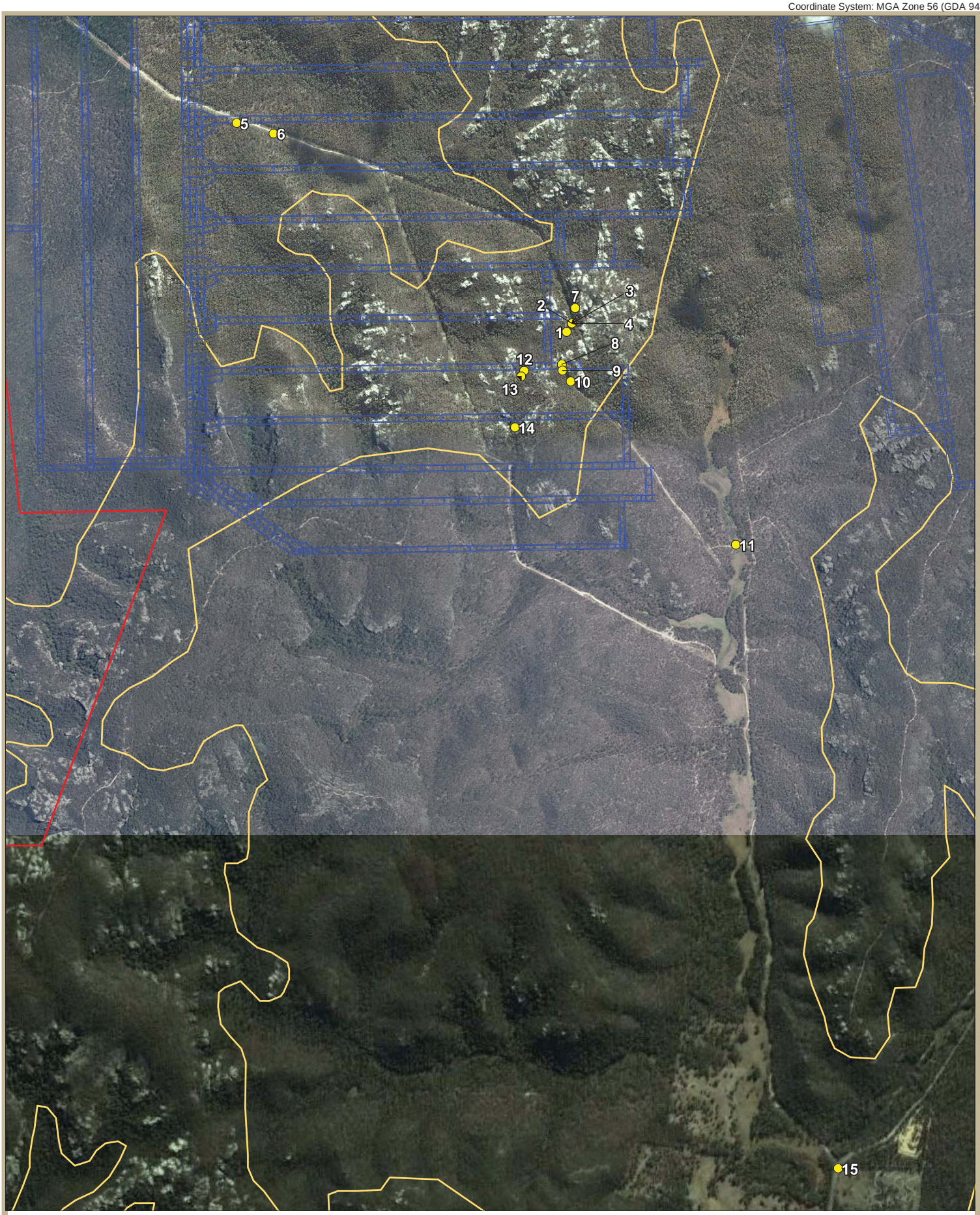


Plate 4
Smooth pagodas impacted by mining with fresh fractures, with wetter gully forest at base

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Project Boundary
- Significant Pagoda Landforms
- Baal Bone Colliery Underground Workings
- Photograph Location

Image Source:
Coalpac 2011
Image © 2011 DigitalGlobe
© 2011 Cnes/Spot Image

CUMBERLAND ECOLOGY

I:\...\13007\Figures\RTS_PPR_20130529\Figure 6. Baal Bone Colliery Photos

Figure 6. Baal Bone Colliery Photograph Locations

250 0 250 500 750 1000 m

Plate 5
Ferns growing at base of system shown in Plate 1

Plate 6
Powerline easement allowing access to four-wheel drives and trail bikes
Adjacent to Plate 2 site

Plate 7

Runoff from track use

Adjacent to Plate 2 site

Plate 8

Dam above longwall mined area

No evidence of mining impact or associated desiccation

Plate 9
View of pagodas adjacent to longwall panels
No discernible evidence of impacts.

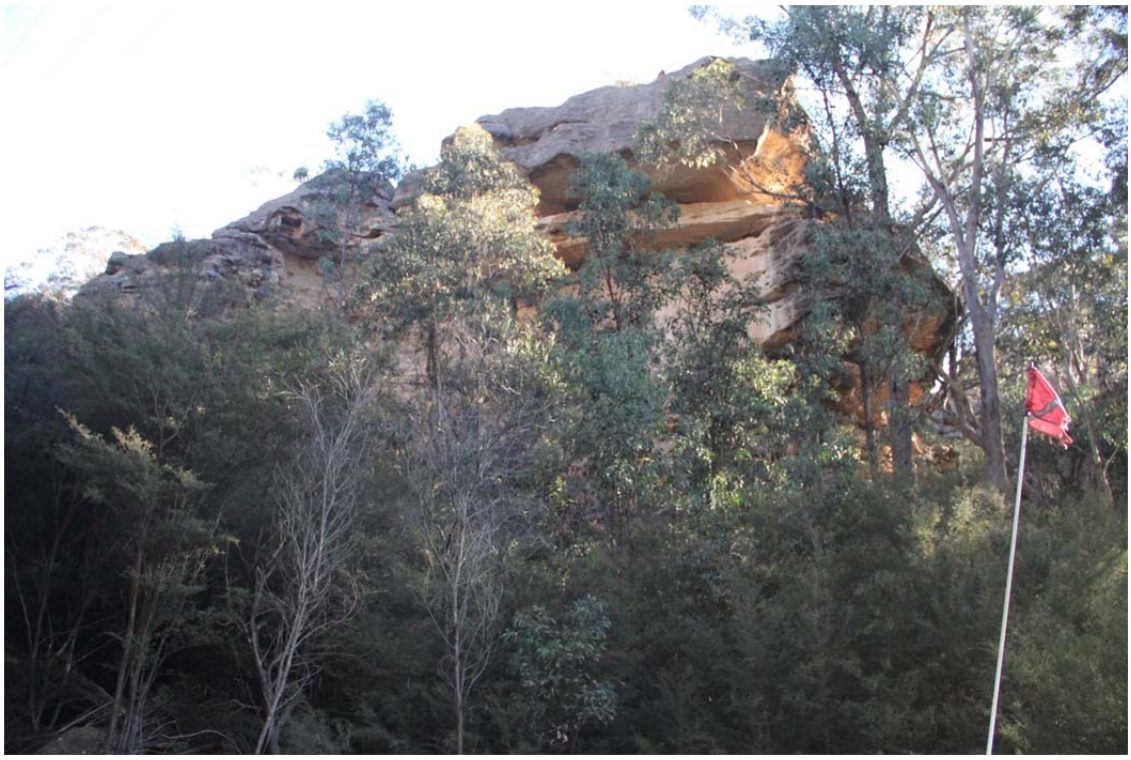


Plate 10
Pagoda face which has been affected by nearby longwall extraction

Plate 11

Smooth pagodas showing mild horizontal cracking as a result of surface subsidence

Plate 12

Smooth pagodas impacted by longwall mining with fracturing

Note healthy condition of flora.

Plate 13
Smooth pagodas impacted by longwall mining with fracturing
Note healthy condition of flora.

Plate 14
Long Swamp, remote from the impacts of longwall mining

Plate 15

Pagoda showing cracking due to longwall mining

Such cracking would not have significant ecological implications.

Plate 16

Undamaged cave within the pagodas which has been under mined by longwall panels

Plate 17

Rockfall as a result of undermining by longwall panels

This rockfall is unlikely to have significant ecological implications

Plate 18

Pagodas to the west of Angus Place Colliery

3.1.12 Adequacy of Biodiversity Offsets

EDO (on behalf of BMCS)

The EDO submission on behalf of BMCS expresses concern that the biodiversity offset package is fragmented and inadequate in that it cannot compensate for the impacts of the Contracted Project. This submission states that *"on face value it (the offset package of the Coalpac Project) appears to suffer from the same problem (as the Warkworth Project) which is that of exchanging fragmented areas requiring extensive rehabilitation work for a single area of high quality habitat adjoining areas of high quality habitat proposed for reservation."*

The EDO submission is misleading and incorrect, both in its description of the proposed offsets as fragmented, and in its comparison with the Warkworth Project or more specifically the Bulga Milbrodale Progress Association v Minister for Planning & Ors (2013) NSWLEC 48 (Bulga case) covered in the NSW Land and Environment Court.

The proposed biodiversity offset areas are not contiguous but they are all connected to other larger areas of native vegetation, including National Parks and State Forests. The properties currently included in the biodiversity offset package were included because they contain types of vegetation and/or habitats that would be impacted by the Contracted Project and because of their location in proximity to National Parks and State Forests.

Representative areas of vegetation are currently in the proposed biodiversity offset package and Coalpac has committed to increasing the total biodiversity offset package to a ratio of 4:1 with the inclusion of at least an additional 1,000 ha of predominately forest and woodland vegetation. This additional area will include further biodiversity offsets for the non-listed vegetation communities.

The EDO drew a comparison between the Bulga case and the Contracted Project. In the Bulga case, the proposed mining project would impact upon Warkworth Sands Woodland. This woodland is endemic to the project site and its immediate surrounds, providing very few opportunities for offsetting that EEC. Justice Preston found that when it was considered that most of the offset was currently grassland rather than Warkworth Sands Woodland, the offset ratio for this highly restricted vegetation community dropped below 2:1. Justice Preston also stated that avoidance was the primary means of reducing an environmental impact and that offsetting should be used as the final means of compensating for otherwise unavoidable losses.

In the case of the Contracted Project, avoidance measures have been used extensively and the Contracted Project is very significantly different from the Exhibited Project assessed in the EA in terms of ecological impacts. The Exhibited Project was to impact sizeable areas of Box Gum Woodland and habitat for *Persoonia marginata*. Proposed mining activities were also closer to the SPL than those for the Contracted Project. The Contracted Project mine plan has been further refined to avoid all known habitat for Persoonia marginata, most Box Gum Woodland vegetation, and all pagodas within areas mapped and defined as SPL and Sandstone Outcrop.

The biodiversity offset package proposed for the Contracted Project will result in an average 4:1 ratio for native vegetation and a higher ratio is to be provided for Box Gum Woodland.

It is also important to note that Coalpac has already mined and successfully rehabilitated 193 ha of woodland and forest in existing approved operations at Cullen Valley Mine and Invincible Colliery and that the rehabilitation is growing back into a well vegetated landscape ranging from 6 months to 10 years in age (see **Section 3.1.14**). Under the Contracted Project, all land cleared will be rehabilitated to forest and woodland using similar proven techniques.

3.1.13 Gardens of Stone Stage 2 Proposal

Colong, Colo, BMCS GBMWHA, ELO, Y. Bolotin, R. Hawkins, L. Foley

A number of submissions make reference to the conservation values of the lands within the Project Boundary and raise concerns that the Contracted Project is located in an area which has been identified by OEH for reservation as a State Conservation Area or component of the private Gardens of Stone Stage 2 (GOS2) proposal. We note that the supporting evidence for this was mostly dated 2011.

In meetings with Coalpac during February and March 2013, both OEH and the Office of the Minister for the Environment and Heritage advised that there were no existing proposals generated by Government or under consideration by Government, to extend the existing Gardens of Stone National Park.

OEH and the Office of the Minister for the Environment further advised that no decision regarding the specific issue of any future conservation plans for Ben Bullen State Forest would be made until after the project application had been determined. It is noted that there are numerous examples where mined out areas have been added to the States' conservation estate including at the Blue Mountains National Park.

3.1.14 Mine rehabilitation as mitigation

Colong, Colo, BMCS, ELO, L. Foley

Five submissions assert that rehabilitation of the Project Disturbance Boundary by Coalpac following mining impacts should not be attributed any value or given any credence as an effective means of mitigating impacts of the Contracted Project or reinstating the biodiversity and habitat values back to their original levels.

This position is consistent with that of the Review PAC which also noted that *"rehabilitation cannot restore existing vegetation associations or ecological balance of the area"* and that *"rehabilitation to mature woodland is unproven for open cut mines in NSW"*.

As noted in Section 4.5.5 of the PAC Response Report, Cumberland Ecology assert that with adequate preparation and a commitment to ongoing management, forest and woodland can be reinstated in the Contracted Project Disturbance Boundary, based upon the current 193 ha of rehabilitation work done on site and information available from other mining development sites nearby. While rehabilitation is not likely to provide a facsimile of the original vegetation, it is asserted that rehabilitation can provide valuable habitat for many native plants and animals and maintain an ecological balance in the area in the long term.

This is supported by the assessments of rehabilitation performance at Cullen Valley Mine and Invincible Colliery completed by Ecobiological (2010, 2012) which found that existing rehabilitation blocks are progressing well and achieving the majority of performance and vegetation structural targets, including those for:

- Soil structure;
- Species diversity and density of plantings;
- Height of developing flora species and structural layers;
- Diversity of flora and fauna species present;
- Stratum proportions; and
- Native foliage cover.

The flora species mix in the rehabilitated area is in many cases more diverse, by design, than the surrounding forest and woodland vegetation as a result of systematic logging of the area over a protracted period. There is good evidence of additional flora and fauna species moving into the rehabilitated areas demonstrating the progressive integration of rehabilitated and undisturbed areas.

3.2 STABILITY AND SUBSIDENCE

3.2.1 Open cut and highwall mining stability and subsidence impacts

Colong, Colo, BMCS, ELO, GBMWHA, Y. Bolotin, M. Botfield, E. Rizana, R. Hawkins, L. Foley

A number of submissions reiterated objections to the application of the highwall mining method and the proximity of proposed open cut and highwall mining areas to significant surface features, noting the potential impacts that may occur to pagodas, clifflines, sandstone outcrops, Aboriginal heritage rock shelter sites and their associated ecology as a result.

Section 3.6 of the PAC Response Report provides a discussion on the additional impact assessment and review process completed for the open cut highwall stability and highwall mining subsidence impacts in response to issues raised in the PAC Review Report.

In order to provide further substantiation of the Coalpac's assertions of stability of the highwall in proximity to pagodas, clifflines and sandstone outcrops, additional slope stability analyses were carried out and reported in the PAC Response Report and the Preferred Project Report (PPR) for the Contracted Project.

Highwall slope stability

These analyses showed that the minimum global Factor of Safety (FoS) of the final highwall profile was 1.36, which is stable. The stable FoS of 1.36 is at a location where the geometrical and geological conditions present a theoretical worst case scenario, and only occurs for a duration of approximately 8 to 12 weeks before the highwall is backfilled with spoil.

The backfilled material acts as a support against the exposed open cut highwall further 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 geotechnical expert in highwall stability (Geotek Solutions 2013) concluded that the open cut highwall slope design is appropriate and will not lead to instability of the overlying clifflines.

Highwall Mining Design

Where highwall mining is proposed beneath pagodas, clifflines and sandstone outcrops outside of the Ben Bullen Significant Pagoda Landform (SPL) area, the design of highwall mining panels shall be carried out so as to limit any vertical movement (i.e. negligible surface subsidence) to less than 20mm.

This will be achieved with minimum FoS limits of 1.3 for web pillars and 3.0 for barrier pillars. The pillar design is such that even in the unlikely event that there is localised failure of all of the smaller web pillars then the barrier pillars would have sufficient strength to maintain the overall stability of the extracted area acting alone.

The design methodology and site specific criteria have been reviewed by geotechnical experts experienced in this field and are considered to be more than adequate. Further, this work has been peer reviewed by Professor Bruce Hebblewhite (2013) from University of New South Wales and found to be acceptable to mitigate the risk of instability.

It is important to understand that the final design parameters and risk assessment will be reviewed by the NSW Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) mining subsidence approval authority prior to commencement of any highwall mining.

Further monitoring of design performance will be carried out and the results used to ensure that the design input parameters and outcomes are aligned, and are consistent with the assessment made in the Exhibited EA and PAC Response Report.

Based on the work outlined above and the further monitoring and management measures committed to be used in the highwall mining process going forwards, this activity will not lead to the instability of the overlying features.

The Contracted Project as described in the PAC Response Report and subsequent PPR reduces the proposed open cut and highwall mining footprint from that assessed in the Exhibited EA to provide additional certainty in regard to the protection of the integrity of the SPL and Sandstone Outcrops in response to the concerns that have been raised in submissions.

This was done as a further concession despite the demonstrable very high confidence levels in the stability of the proposed open cut and highwall mining activities.

No highwall mining is proposed under or in close proximity to any Aboriginal heritage rock shelter sites. In addition, further assessments have been undertaken in relation to the proximity of the recently identified (September 2012) Aboriginal heritage rock shelter site located within the Project Boundary to proposed mining activity. This has confirmed that this site is at least 475 m from any proposed highwall mining activity and as such will not be impacted in any way by the Contracted Project (see **Section 3.6.1**). This site is at least 409 m from the closest open cut mining area proposed for the Contracted Project.

3.2.2 Highwall mining within Significant Pagoda Landform

Colong, Colo, BMCS

Three submissions referred to the areas of highwall mining operations that are proposed beneath the SPL Boundary as mapped in the PAC Response Report.

As described in Section 2.2.5 of the PAC Response Report, the proposed highwall mining footprint has been reduced by 66 ha in response to the concerns raised, despite those concerns not being based on any specific scientific grounds in relation to potential geotechnical or ecological impacts (see **Section 3.2.1**).

In order to eliminate any community concern, the highwall mining footprint has been reduced and will not extract any coal beneath pagodas, cliffs and escarpment features within the identified SPL, thereby committing to avoidance in accordance with ESD principles.

3.2.3 Definition of Surface Subsidence

BMCS

A component of the submission from BMCS questioned the assumption in the subsidence and geotechnical studies in the PAC Response Report that surface subsidence of less than 20 mm resulting from highwall mining would have no capacity to destabilise cliff faces or pagodas.

As noted in Section 4.13.9 of the RTS, a mining induced surface subsidence limit of 20 mm was adopted in the Exhibited EA. In NSW, subsidence of up to 20 mm can occur in areas which are not impacted by mining, in response to changes in factors such as soil moisture content, variations in water table and other climatic fluctuations (Holla and Barclay 2000).

Therefore, a cut-off subsidence of 20 mm is used to fix the lower limit of background surface subsidence resulting from mining influence in NSW. It is therefore accepted that ground surface movement below 20 mm is part of the natural processes affecting surface features or infrastructure and as such lies within the range of common natural variations in near-surface ground conditions.

3.3 AIR QUALITY

3.3.1 Air Quality Modelling Methods

Colong, R. Stiles, BMCS, K. Bunyon

Several submissions raised additional questions on the air quality modelling approach used by PAEHolmes for the Exhibited EA and the Contracted Project, including issues with the assumptions and data used to predict air quality impacts of the Project.

As noted by Pacific Environment (2013), the air quality impact assessment for Year 2 of the Contracted Project was undertaken using the same meteorological dataset and dispersion modelling methodology as used in the Exhibited EA.

This included the use of the TAPM and CALMET/CALPUFF models in conjunction with surface observations from five meteorological monitoring sites, as well as local terrain data, to provide a three-dimensional representation of the meteorology within the modelling domain assessed for the Project.

The only changes to the assessment methodology used in the modelling of the Contracted Project air quality impacts included:

- Updating the mine plan and emissions source locations to reflect the removal of the Hillcroft mining area and sand extraction component previously assessed for the Exhibited Project; and
- Using revised model inputs for wind-blown dust emissions to reflect site-specific silt and moisture content measurements that were collected in response to a recommendation for such made by the Environment Protection Authority (EPA) in their submission to the Exhibited EA. This site specific data was gathered in early 2013 and used by Pacific Environment in the Contracted Project assessment to populate the emission estimate equations, replacing the industry default estimates used in the air quality assessment for the Exhibited EA.

These two changes resulted in a materially significant improvement in the air quality impacts predicted for the Contracted Project in comparison to those for the Exhibited EA, with worst-case (Year 2) results showing all Cullen Bullen township residences up to 50% below the maximum threshold air quality criterion.

3.3.2 Modelling of Contracted Project Years

Colong, Colo, BMCS, R. Stiles

A number of submissions noted that air quality impacts of the Contracted Project were only presented for Year 2 in the PAC Response Report and raised concerns that impacts to receivers for other periods had not been fully assessed.

Remodelling of air quality impacts for Year 2 of the Contracted Project was completed as that year of operations was determined to be the worst-case year, i.e. the year of greatest impact potential. Year 2 of mining operations reflected both the key changes to the mine plan proposed for the Contracted Project and also the closest proximity of proposed operations to private receivers, including Cullen Bullen residences.

In response to the submissions on this issue and to confirm that Year 2 of the Contracted Project represents the worst case air quality impact scenario, Pacific Environment have remodelled the other years assessed in the Exhibited EA (i.e. Years 8, 14 and 20) to reflect the major changes to the mine plan for the Contracted Project. These results are presented in **Appendix B** and confirm that the significant reductions in air quality impacts predicted for Year 2 of the Contracted Project in comparison to Year 2 of the Exhibited EA are generally consistent across all other years (i.e. Years 8, 14 and 20).

These results are conservative as they do not reflect entirely the contraction in surface disturbance which has resulted from the Contracted Project.

3.3.3 Meteorological Data

BMCS, Colong, BMCS, K. Bunyon

A number of submissions sought clarification over which meteorological dataset was used in the modelling of air quality impacts for the Exhibited EA as compared to the Contracted Project. The following hourly meteorological data for 2009 was used consistently as input to the CALMET/CALPUFF modelling component of the both the Exhibited EA and Contracted Project assessment:

- Cullen Valley Mine meteorological station;
- Invincible Colliery meteorological station;
- Mount Piper Power Station (MPPS) meteorological station;
- Bureau of Meteorology (BoM) Bathurst Airport meteorological station (approximately 38 km southwest of the Project); and

- BoM Mount Boyce meteorological station (approximately 44 km southeast of the Project).

A discussion of how the meteorological data was utilised in the modelling process for air quality impacts is provided in Section 6 of the Air Quality Impact Assessment for the Project (PAEHolmes 2012). A component of this included consideration of the distribution of atmospheric stability classes, including the frequency at which the very stable conditions associated with temperature inversions would occur.

3.3.4 Air Quality Impacts to Receivers

R. Stiles

One submission noted that data from the air quality modelling results for the Contracted Project were excluded for residences and properties located to the north and east of the Project (ownership IDs 1-180).

This was the case as these residents were not predicted to incur exceedances of the air quality impact criteria in the Exhibited EA and the Contracted Project has been shown to result in a further reduction in air quality impacts to these receptors.

Air quality modelling results that reflect the changes to the mine plan for the Contracted Project and confirm impact predictions for all residential receivers are presented in **Appendix B**.

It should also be noted that ownership ID numbers are attributed to each lot in the vicinity of the Project Boundary and do not necessarily correspond to residential receivers. Lots with residences that were considered in air quality modelling for the Exhibited EA and Contracted Project are indicated on Figure 2 and Figure 3 of the Exhibited EA.

3.3.5 Air Quality Monitoring

R. Stiles

One submission made reference to literature surrounding adverse human health impacts of $PM_{2.5}$ particles and referred to the PAC Review Report recommendation that monitoring data for these particulates be recorded and published by Coalpac at a greater frequency.

As noted in Section 4.2.28 of the RTS, Coalpac has committed to set up and maintain a compliance monitor measuring $PM_{2.5}$ and PM_{10} in the vicinity of Cullen Bullen Public School (i.e. close to the centre of Cullen Bullen) to monitor long-term and short-term levels, with the location to be confirmed in consideration of relevant standards and siting requirements. The results from this monitor will be published on Coalpac's website on a monthly basis.

3.3.6 Health Impacts

Colong, Colo, BMCS, GBMWHA, ELO, R. Stiles, E. Rizana, K. Bunyon, L. Bunyon, M. Botfield, L. Foley

A number of submissions reiterated concerns that the Project would result in adverse health outcomes for Cullen Bullen and surrounding areas and make reference to the relative levels of disadvantage and poor level of health outcomes in the local community.

Sections 3.2 and 3.3 of the PAC Response Report provide a summary of the air quality and noise impacts predicted for Year 2 of the Contracted Project against the relevant NSW impact assessment criteria required by the DGRs.

These assessments present the worst-case amenity impacts of the Contracted Project to receivers surrounding the Contracted Project and conclusively confirm that neither health nor amenity air quality criterion will be exceeded in Cullen Bullen as a result of the Contracted Project without any positive contribution being taken into account for the real-time monitoring and response management program.

To provide further certainty of outcome, the Contracted Project commitments require a real-time monitoring program to be established and maintained which will monitor and manage mining impacts in real-time to provide further assurance against adverse impacts.

The Contracted Project is predicted to meet NSW air quality criteria at all residences in the township of Cullen Bullen, and the relevant management commitments will further ensure that the potential for adverse air quality impacts is further reduced.

3.4 NOISE

3.4.1 Noise Modelling Methods

R. Stiles, Colong, BMCS

A number of submissions made reference to the reduction in noise impacts predicted in the remodelling of noise emissions for Year 2 of the Contracted Project assessed by Bridges Acoustics (2013) and raised concern that the reduction in modelled noise levels may be the result of a different assessment methodology being used.

As noted in Section 6 of Bridges Acoustics (2013), the major changes to the Contracted Project from a noise impact perspective are:

- Removal of the Hillcroft mining area and associated access infrastructure (including the Wallerawang-Gwabegar Rail Line overpass bridge and Red Springs Road crossing); and
- Removal of the sand extraction component of the Project located in the Cullen Valley mining area, including the requirement for associated crushing and screening infrastructure and the transport of product sand by road from the site to market.

The same noise modelling methodology was used by Bridges Acoustics in both assessments. The above changes to the Project mine plan resulted in the differences in predicted noise impacts between the Exhibited EA and Contracted Project.

One submission questioned why noise impacts would be reduced in Cullen Bullen as a result of the Contracted Project. This noise improvement for the residents of Cullen Bullen can largely be attributed to the removal of the sand transport components from the Contracted Project.

3.4.2 Modelling of Contracted Project Years

R. Stiles, Colong, Colo, BMCS

A number of submissions noted that noise impacts of the Contracted Project were only presented for Year 2 in the PAC Response Report and raised concerns that impacts to receivers for other periods had not been fully assessed.

Remodelling of noise quality impacts for Year 2 of the Contracted Project was undertaken as that year of operations was determined to be the worst case year of greatest impact potential. Year 2 of mining operations reflects both the key changes to the mine plan proposed for the Contracted Project and also the closest proximity of proposed operations to private receivers, including Cullen Bullen.

In response to the submissions on this issue and to confirm that Year 2 of the Contracted Project represents the worst case noise impact scenario, Bridges Acoustics has remodelled the other years assessed in the Exhibited EA (i.e. Years 8, 14 and 20) for the Contracted Project.

These results are presented in **Appendix C** and confirm that when compared to the other years modelled in the assessment for the Exhibited EA (i.e. Years 8, 14 and 20); the Contracted Project would result in fewer receivers being significantly or moderately affected by noise impacts. More generally, all residences would experience a minor reduction in noise impacts due to the removal of operations from the Hillcroft mining area and the removal of the sand extraction component previously proposed.

3.4.3 Infrasound Impacts

BMCS

The submission from BMCS noted that the acoustic assessment did not mention infrasound (sound that is lower in frequency than 20 Hertz), noting concerns about health and structural implications of very low frequency noise/subsonic vibration. BMCS believe that this issue should be addressed.

Infrasound impacts were not mentioned in the acoustic impact assessment for the Exhibited EA or Contracted Project because consideration of such impacts was not required by the DGRs. However, infrasound impacts to receivers are considered unlikely to occur due to:

- No complaints of adverse infrasound impacts being made to Coalpac in response to noise from the ICPP in the period 2009-2013;
- Infrasound associated with coal mining activity principally being generated by coal processing infrastructure such as crushers and vibrating screens. The existing operation of this equipment within the Cullen Valley Crusher, Invincible Crusher and Invincible Coal Preparation Plant has not caused any reported infrasound issues and the location and design of the proposed East Tyldesley Coal Handling and Preparation Plant (ETCPP) is such that infrasound impacts to closest receivers are not anticipated; and
- Infrasound is rarely reported as an issue associated with coal mines due to the significant source to receiver distances associated with mining development, particularly in rural areas with low background noise levels such as the receivers located around the Contracted Project Boundary.

3.5 BLASTING

Colong, BMCS, Colo, L. Bunyon

A number of submissions oppose the progressive blast monitoring and control procedures as proposed in the PAC Response by Terrock (2013) for the management of potential blast vibration impacts from the Project on SPL, Sandstone Outcrops, Aboriginal heritage rock shelter sites, residential dwellings and other infrastructure.

The opposition to the proposed management approach as noted in these submissions relates to the PAC Review Report recommended buffer zones not being adopted, the Precautionary Principle not being applied, an inability to evaluate the assertions made by Terrock due to monitoring data not being presented and the lack of certainty in ensuring negligible impacts to these features and infrastructure.

In relation to standoff distances, the program of progressive blast impact investigation, monitoring and review procedures proposed by Terrock (described in Section 3.4 of the PAC Response Report) provides a robust scientific methodology to determine appropriate standoff distance(s) and ground vibration limits required for the protection of the SPL and Sandstone Outcrops. This approach takes the PAC review concept of a standoff, and further develops it to dynamically establish a standoff appropriate to the ground conditions at each location, thereby optimising the standoff in each area.

Clearly what is proposed is a precautionary approach with a programme of measurement and verification, to be used to enhance an already proven blast model prior to approaching any sensitive rock structures.

It is also industry best-practice and is carried out on a daily basis at many mining operations around the world, i.e. it is proven blasting practice.

Coalpac acknowledge that the commitment to carry out blasting with negligible impacts to the SPL and Sandstone Outcrops will require a significant level of monitoring, modelling, and measurement in order to demonstrate and prove current understanding of the ground response to blasting on site.

This follows on from the experience already attained at both Cullen Valley Mine and Invincible Colliery over more than 10 years, where successful blasts have been carried out with negligible impacts in close proximity to mine offices, infrastructure and rail lines and cuttings as well as near Aboriginal heritage sites, pagodas and clifflines.

As a further control measure it is proposed that an independent scientific review committee with expert regulatory and technical representation from Government be established to oversee the implementation of the blast monitoring and control procedures proposed by Terrock.

This commitment, together with the robust nature of the proposed blast management program, will provide sufficient certainty that the potential for blasting activities to impact upon the SPL or Sandstone Outcrops is negligible.

3.6 ABORIGINAL HERITAGE

3.6.1 Impacts to Aboriginal cultural heritage sites

Colong, Colo, BMCS, Y. Bolotin

Several submissions noted that there are additional Aboriginal cultural heritage rock shelter sites located within the Project Boundary which were not identified in the Exhibited EA.

Coalpac was notified by OEH and DP&I in September 2012 of one additional Aboriginal rock shelter site with cave art that is located within the Project Boundary since submission of the Exhibited EA. This site is located in the Ben Bullen State Forest outside of the Project Disturbance Boundary and at least 409 m from any proposed mining activity and will not be impacted in any way by the Contracted Project. Information to support this was submitted to OEH in September 2012.

This additional site located within the Project Boundary was reviewed by Coalpac personnel on 19 September 2012, with representatives of the local Aboriginal community, National Parks and Wildlife Service (NPWS) and Forestry Corporation of NSW present during the field inspection.

At the request of the local Aboriginal community, the location of this additional rock shelter site will not be made known to the general public; however it will still be assessed and included in the Aboriginal Archaeological and Cultural Heritage Management Plan to be prepared for the Contracted Project, in consultation with OEH and local Aboriginal community stakeholders.

The second additional site noted in submissions is located approximately 2 km east of the Contracted Project Disturbance Boundary and will not, in any way, be impacted by the Contracted Project.

Coalpac is committed to continuing engagement with the local Aboriginal community in the management of Aboriginal cultural heritage issues for the Contracted Project.

Recent correspondence has been received from two of the relevant Native Title holder groups affected by the Project supporting the proposed assessment and management of archaeological and cultural issues for the Contracted Project, which are attached in **Appendix D**.

Both parties are committed to working with Coalpac in support of the ongoing initiatives for both conservation of Aboriginal archaeology and site rehabilitation. Coalpac has also signed an agreement with Native Title parties to provide long term education, training and employment opportunities to their members to ensure a close working relationship to safeguard Aboriginal history and culture.

3.7 SURFACE WATER

3.7.1 Impacts to sub-catchment areas

K. Bunyon

One submission referred to the impacts from the Contracted Project on a small creek which runs through Cullen Bullen and feeds into Dulhuntys Creek and noted that the Contracted Project mine plan shows that this drainage line will be impacted by development of a mitigation bund (in the East Tyldesley mining area).

As noted in Section 4.8.18 of the RTS, the drainage line referred to is an unnamed tributary of Cullen Creek. It has a catchment area of approximately 226 ha upstream of Cullen Bullen township. The proposed Pine Lodge mitigation bund will be constructed across this drainage line on the eastern side of the Castlereagh Highway. The catchment area upstream of the Pine Lodge mitigation bund will be disturbed by mining and the construction of the ETCPP and associated mine water dam.

The construction of the ETCPP and associated mine water dam, as well as proposed open cut mining in the East Tyldesley mining area will result in a maximum of 77 ha of catchment area being captured by the Contracted Project surface water management system.

The remaining catchment area (149 ha, or 66%) on the eastern side of the Castlereagh Highway will still drain to Cullen Creek, however it will be treated by a sediment basin and diverted around the northern end of the Pine Lodge mitigation bund, before flowing south towards Cullen Bullen. This capture of surface water flows from within the Contracted Project Disturbance Boundary will reduce flows to the unnamed tributary to the Cullen Creek during mining operations and prior to the catchment being rehabilitated.

During the construction of the mitigation bund, an appropriately designed diversion channel will be constructed along the western toe of the bund to convey runoff from the upper catchment (from both the eastern and western side of the Castlereagh Highway) where the Pine Lodge mitigation bund is proposed to obstruct the unnamed tributary line.

The diversion channel will be designed to ensure the outcomes specified in the *Management of Stream/Aquifer Systems in Coal Mining Developments* (DIPNR 2005) are achieved and to cater for the full post-mining catchment draining to the creek. Hence the capacity of the proposed diversion channel will match or possibly exceed the flow capacity of the existing creek channel.

3.8 ECONOMICS

3.8.1 Coal Supply for NSW Electricity Generation

Treasury, EnergyAustralia, Centennial, Colong, LEG, BMCS, R. Stiles, L. Bunyon

A number of submissions made reference to claims made by Coalpac as to the need for the Contracted Project to be developed in order to secure a coal resource which could efficiently supply low cost coal to MPPS. Key concerns discussed in these submissions regarding the supply of coal to MPPS included the following:

- The poor quality and relatively small volume of the Contracted Project coal resource and the availability of superior coal resources in the region;
- Ability of other approved coal mining operations in the Western Coalfields (Lithgow, Ulan and Rylstone regions) to supply product coal to MPPS, including Springvale Colliery, Angus Place Colliery, Airly Colliery, Neubeck Coal Project and Pine Dale Coal Mine;
- Expansion of Coalpac open cut operations to extract coal that could otherwise be provided to MPPS by existing underground mining operations; and
- Approval issues around the development of the MPPS conveyor (see **Section 3.9.1**); and
- The current oversupply of electricity generating capacity in NSW.

As noted in the RTS and PAC Response Report, the continuation of Coalpac mining operations as proposed for the Contracted Project would enable the continued supply of an appropriate quality and priced thermal coal to the MPPS. Ensuring the long term stability and cost of coal supply to MPPS, as NSW youngest, cleanest and most efficient coal fired power station, is critically important to ensure the secure and cost competitive supply of power to the NSW electricity grid and to address the increased electricity demands forecast by AEMO (2012).

This position is supported by the additional submissions provided by NSW Treasury and EnergyAustralia, which note the uncertainty around the availability of, and market implications involved in, securing alternative sources of coal for MPPS and Wallerawang Power Station.

In particular, recent modelling completed for EnergyAustralia has confirmed that without continued supply of Coalpac coal in the long term, associated wholesale price increases could translate into retail price increases from 4% to 12%, dependent of customer type (i.e. commercial, industrial, small business, residential) and contract. This modelling also shows an increase in aggregate cost over the next decade between $3.8B and $6.1B in present value terms.

The coal quality to be produced by the Contracted Project is more than adequate to meet the specification of the target markets. This leaves other coal resources available to meet lower ash export markets, which is in the best interests of the State in terms of utilisation of resources.

The other established mines in the district, by their nature as underground operations, have higher operating costs than those for the Contracted Project. The only other current open cut operation is small in scale and would require additional planning approvals to be able to expand to meet the coal supply needs of the local power stations. There is proposed expansion to open cut operations in the area and this supply, once approved, could be joined with that from the Contracted Project to reinforce the low cost coal supply the power stations require to remain competitive.

The NSW Treasury submission also notes that there is also the potential that the offer prices for coal supply to the MPPS and Wallerawang Power Stations could be increased and coal volumes on offer reduced in the event that the Project does not proceed.

3.8.2 Project Employment

Colong, BMCS, R. Stiles, E. Rizana, L. Bunyon

A number of submissions noted that the employment benefits of the Contracted Project were overstated and consider that greater employment would be generated in the region from the development of lower impact underground coal mining operations.

A discussion on the potential to develop the Contracted Project as an underground mining operation is provided in Section 4.17.18 of the RTS, which confirms that the development of an underground operation does not represent a financially viable or practical option due to a large proportion of the central and southern extents of the Project Boundary being located above areas which have previously been extensively mined in the Lithgow Seam (the lowest seam in the vertical sequence) via underground methods and as such, are only amenable to open cut mining. In the far north of the Project Boundary, the Lithgow Seam thins to a point where it is no longer present.

Further, where the Lithgow Seam is present in the northern areas, the reduced seam thickness, limited reserve size, low depth of cover, sensitive overlying topography (including the presence of pagodas and publically visible Sandstone Outcrops), poorer coal quality and other contributory factors did not represent a feasible option on environmental or economic grounds.

The Contracted Project workforce of 120 personnel as proposed in the Exhibited EA is considered by Coalpac to be appropriate for the scale of operations proposed, with all employees to be sourced from the local area (predominately Cullen Bullen, Portland, Capertee, Wallerawang, Lithgow and Bathurst) as they are now. In addition, Coalpac have also committed to a scheme to employ at least one local apprentice or trainee per year over the life of the Contracted Project.

3.9 COALPAC MITIGATION AND MANAGEMENT COMMITMENTS

3.9.1 MPPS Conveyor Location and Impacts

Centennial

In their submission dated 25 January 2013 Centennial Coal noted that the PAC Review Report contained two matters which required clarification.

The PAC Review Report (page 149) stated that the Proponent had advised the PAC on 30 November 2012 that the issue relating to Centennial Coal's concerns had been resolved. Centennial Coal quite correctly provided the clarification that no agreement has been reached on the matter to date. The statement in the PAC Review Report was made in error and the Proponent provided no advice to the Commission to that effect.

The Proponent continues to work with Centennial Coal with respect to their concerns and is awaiting further information from Centennial Coal to be able to advance discussions and resolve this matter. It is anticipated that a satisfactory outcome to this discussions can be achieved without the requirement for intervention by the planning process.

The second matter which concerned Centennial Coal relates to a statement provided by Delta Electricity and as such is a matter between Delta Electricity and Centennial Coal.

3.9.2 PAC Review Report Recommendations

Colong, Colo, BMCS

A number of submissions made reference to the series of recommendations included in the PAC Review Report. While not considered in this response, Coalpac provided a response to the recommendations of the PAC in the PAC Response Report and Preferred Project Report for the Contracted Project.

Of the 83 recommendations made by the PAC in their review:

- 11 were considered inconsistent with the current DGRs or the environmental impact assessment policies of NSW
- 2 were considered to no longer relevant due to changes to the Contracted Project.
- 57 (81%) in full off the remaining 70 recommendations were accepted in full and
- 10 recommendations were adopted with qualification.

Three PAC recommendations would result in significant impacts on the viability of the Project and are considered both inappropriate and unwarranted and thus were not accepted by Coalpac.

Both documents also included a revised Statement of Commitments for the consideration of DP&I which summarises all management and mitigation measures to be implemented by Coalpac for the Contracted Project.

4 CONCLUSION

This document provides a response in consideration of the additional issues raised in submissions to both the PAC Review Report and PAC Response Report. These responses are included in order to provide further clarification on the assessment, management and mitigation of impacts from the Contracted Project. Key conclusions are summarised below:

- If the 60,000 ha area of pagoda country lands identified by Washington and Wray (2011) is taken to represent the conservative extent of the pagoda land system that occurs in the region, then the Contracted Project Disturbance Boundary represents a small fraction (762 ha, or approximately 1.3%) of the total area;
- The majority of what would fall into a pagoda land system is already conserved within existing National Parks and other conservation reserves in the region. The pagoda landscapes in and surrounding the Project Boundary are not considered to be unique or so significant as to prohibit the proposed development and particularly not when the proposed low level of impact to these features is taken into consideration;
- The conservation of pagoda landscapes and associated landforms in the Project Boundary is not necessary to comply with the CAR system for reservation of these landforms. Large areas of similar landscapes are present outside the Project Boundary that are either within existing conservation reserves or available and appropriate for conservation and may be used to meet the CAR criteria;
- The BBPLS is not unique nor irreplaceable. Areas of similar landscapes occur and are already conserved in the region outside the Project Boundary. Only a very small proportion of pagoda landscapes in the region are represented within the Project Boundary;
- SPL or Sandstone Outcrops will not be disturbed by open cut mining proposed for the Contracted Project and none of these features will be detrimentally impacted by the structured and closely regulated management measures committed to by Coalpac for highwall mining and blasting activities;
- The Contracted Project Disturbance Boundary has been reduced by 196ha or 20% of that described in the Exhibited EA and the area affected by highwall mining reduced by 66 ha to avoid all pagodas location within the SPL. This is at a significant loss of revenue for the Project and the people of NSW and highlights the extent of the application of the principle of environmental impact avoidance applied to the Contracted Project;
- Some *E. cannoni* will be removed, however the Contracted Project has avoided a further 74 ha area of habitat for this species to that described in the Exhibited EA. No *Persoonia marginata* will be impacted, and the Contracted Project avoids all known occurrences of this species;

- The removal of forest and woodland vegetation is not simultaneous, but progressive over the Project duration of 21 years, permitting progressive rehabilitation, and thereby, progressive habitat regeneration;
- Coalpac has already mined and successfully rehabilitated 193 ha of woodland and forest in existing approved operations at Cullen Valley Mine and Invincible Colliery and that the rehabilitation is growing back into a well vegetated landscape ranging from 6 months to 10 years in age. Under the Contracted Project, all land cleared will be rehabilitated to forest and woodland using similar proven rehabilitation techniques;
- The Office of the Minister for the Environment and OEH have advised that there are no existing proposals generated by Government or under consideration by Government to extend the existing Gardens of Stone National Park. They have further advised that no decision regarding the specific issue of any future conservation plans for BBSF would be made until after the Project application had been determined;
- The BBSF could be reserved for conservation in the future, irrespective of whether or not mining proposed for the Contracted Project occurs. The Contracted Project Disturbance Boundary only covers approximately 11% of the total area of the Ben Bullen State Forest. This could be reserved at the completion of mining. The remainder of the Ben Bullen State Forest is available for immediate conservation;
- The Contracted Project is predicted to meet NSW air quality criteria at all residences in the township of Cullen Bullen, and the relevant management commitments will further ensure that the potential for adverse air quality impacts is further reduced;
- The Contracted Project would result in fewer receivers being significantly or moderately affected by noise impacts. More generally, all residences would experience a minor reduction in noise impacts primarily due to the removal of operations from the Hillcroft mining area and the removal of the sand extraction component previously proposed;
- Native Title holder groups affected by the Contracted Project are committed to working with Coalpac in support of the ongoing initiatives for both conservation of Aboriginal archaeology and site rehabilitation. Coalpac has also signed an agreement with Native Title parties to provide long term education, training and employment opportunities to their members to ensure a close working relationship to safeguard Aboriginal history and cultural heritage;
- The coal quality to be produced by the Contracted Project is more than adequate to meet the specification of the target markets. The continuation of Coalpac mining operations as proposed for the Contracted Project will enable the continued long term supply of an appropriate quality and priced thermal coal to the MPPS;
- MPPS is critically important to ensure the secure and cost competitive supply of power to the NSW electricity grid and to address the increased electricity demands forecast by AEMO (2012);

- As evidenced by Lithgow City Council's latest submission to DP&I the Contracted Project has the full support of the Council and is recognised as being critically important to the economy of the Local Government Area.
- Of the 83 recommendations made by the PAC in their review:,
    - 11 were considered inconsistent with the current DGRs or the environmental impact assessment policies of NSW and
    - 2 were considered to no longer relevant due to changes to the Contracted Project.
    - 57 (81%) in full of the remaining 70 recommendations were accepted in full; and
    - 10 recommendations were adopted with qualification.
- Three PAC recommendations would result in significant impacts on the viability of the Project and were considered both inappropriate and unwarranted and thus were not accepted by Coalpac.

Further discussion on the management and mitigation commitments made by Coalpac is presented in the PAC Response Report and Preferred Project Report documents prepared for the Contracted Project by Hansen Bailey.

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