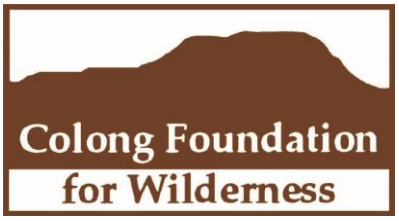

The case for rejecting the Coalpac 'contracted project' proposal and securing a reservation outcome

17 April, 2013

Executive Summary

The western portion of the Ben Bullen State Forest, in and adjacent to the Coalpac Project, has a distinctive pagoda landform with a specific suite of ecosystems and vegetation types. The restrictive definition proposed by Coalpac's consultants disregards these ecosystem associations and fails to encompass, or even consider, what would comprise a comprehensive, adequate and representative sample of pagoda landforms.

In a two week time-frame and with limited resources, community-based environment groups chose not to characterise the different types of pagoda-landscape complexes located across 60,000 hectares of 'pagoda country'. Instead, the pagoda landform complex, which is of particular interest to the Commissioners and the Department of Planning and Infrastructure in relation to the assessment of this proposal, was described in detail and assessed for significance and uniqueness.

The groups used a land system approach to integrate environmental features which are commonly treated separately [e.g. climate (particularly in relation to rainfall), geology, topography, soils and indigenous vegetation]. The name Ben Bullen Pagoda Land System (BBPLS) has been adopted for this distinct type of pagoda country. It is confined to the western portion of the Ben Bullen State Forest and encompasses the Coalpac 'contracted project' proposal. The land system has a unique sequence of platy pagoda landforms which include tableland vegetation types on the valley floor.

The BBPLS has three well-defined land units: the Cullen Plateau Unit; the Ben Bullen Range Pagoda Unit; and the Tablelands Grassy Woodland Complex Unit. Scattered platy and less common smooth pagodas occur throughout the Ben Bullen Range Pagoda Unit, particularly along the more gently sloping spurs that radiate from the Ben Bullen Range. The Tablelands Grassy Woodlands Complex comprises five woodland types from dry woodland of Inland Scribbly Gum and Capertee Stringybark to alluvial flats dominated by Ribbon Gum. The Cullen Plateau Unit only occurs in small areas of Coalpac's 'contracted project' proposal.

The BBPLS has five types of old-growth woodland developed on Permian coal measures. The coal measures provide soil nutrients that enrich these tableland grassy woodlands. This increases the productivity of these ecosystems, such that herbivores and insects flourish. The insects provide prey for bats, birds and other fauna which exploit the many niche habitats and refuges in the adjoining less fertile pagoda landforms.

The BBPLS within the 'contracted project' area is highly significant because other parts of this land system have been compromised and it cannot be replaced by other pagoda land systems.

To the north, most of the Baal Bone coal lease area has been damaged by extensive cliff falls and desiccated due to intensive coal mining. Across the Dividing Range in the upper Coxs River valley to the east, the woodlands on Permian strata have been cleared along the Wolgan Road. To the south, Triassic Narrabeen sandstones are absent, and so there are no pagodas.

Further north in the Capertee Valley, grassy tableland woodlands are absent; and still further north, the climate becomes drier and the vegetation types change as the Blue Mountains Pagoda Shrublands reach their northern limit.

Given its size relative to Newnes State Forest and the Gardens of Stone National Park, Ben Bullen State Forest has the highest overall plant and animal diversity, and Coalpac's 'contracted proposal 'area is clearly an essential element of that diversity. At least three of the five threatened species in Ben Bullen State Forest would be further impacted if the Coalpac proposal is approved. Two Box Gum Woodlands listed as CEECs and 204 ha of EPBC-listed *Eucalyptus cannonii* habitat are at risk of being cleared by Coalpac's 'contracted project' proposal. Three non-listed vegetation communities identified by the Office of Environment and Heritage as being poorly reserved also would also be lost: these are the Ribbon Gum Grassy Forest on alluvial flats community; the Mountain Gum - Apple Box - Blakely's Red Gum Grassy Forest; and the Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest community.

None of the pagoda landscape complex characterised as the unique Ben Bullen Pagoda Land System is protected in national parks or state conservation areas. It is irreplaceable and at its best in the Coalpac 'contracted project' area.

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1. Introduction

The Minister for Planning and Infrastructure, the Hon. Brad Hazzard, and the Minister for Environment and Heritage, the Hon. Robyn Parker, have both recognised the importance the Gardens of Stone Stage 2 reserve proposal. Ms Parker and the Office of Environment and Heritage have also acknowledged the reservation priority of the Ben Bullen State Forest (see ***Appendix 1***). These statements are consistent with NSW Government policy regarding the protection of high conservation value land, as exists within the Ben Bullen State Forest and the encompassing Gardens of Stone reserve proposal.

The western portion of the Ben Bullen State Forest, in and adjacent to the Coalpac Project, has a distinctive pagoda landform, ecosystems and vegetation. Its importance was acknowledged in the Review by the Planning Assessment Commissioners, who concluded:

"…the significance of the pagoda landform is at the top of the scale and thus the pagoda landform should be afforded special significance status and the highest possible level of protection" (p 76 PAC, 2012, main report).

Conversely, the Coalpac 'Contracted Project' limits significance to clusters of pagodas at least ten hectares in area, with high pagoda towers and with intervening wet gullies; this is a far too restrictive test of significance. Coalpac's arbitrary restrictions fail to capture a *Comprehensive*, *Adequate* and *Representative* (CAR) (RACAC, 1998 and see ***Appendix 2***) sample of pagoda landforms, conveniently excluding most of the pagodas within the original environmental assessment in their recently submitted 'Contracted Project'. The Commissioners took a different view emphasising that the:

"…*pagodas cannot be considered as structures in isolation"* (p76, PAC main report); and that

"…they provide a complex of habitat types for both flora and fauna, some species of which are rarely found elsewhere (e.g. Pagoda Daisy). They are also set in a complex arrangement of habitats characterized by a convoluted line of towering rock faces containing numerous overhangs and crevices giving way to steep slopes (talus slopes). At the bottom of these slopes there are deeply dissected wet gullies between the pagoda formations and these in turn give way to a forest floor dominated by several eucalypt vegetation communities. This complex is referred to in this section as the 'pagoda landform'. A number of fauna species, including species listed under the NSW Threatened Species Act and/or the Commonwealth Environment Protection and Biodiversity Conservation Act, utilise multiple parts of this habitat arrangement either seasonally (e.g. the Broadheaded Snake) or for daily living requirements (e.g. Brush-tailed Rock Wallaby and Eastern Bent-wing Bat)."(p 75, PAC, 2012 main report*).*

"The pagodas and cliff lines also contain evidence of Aboriginal occupation, including rock art sites" (p 75, PAC, 2012 main report).

The Department of Planning and Infrastructure has indicated it will be assessing a range of issues in regard to the impacts on the Coalpac Contracted project on pagodas, including clarification about what constitutes a 'pagoda landform' (as used by the Commissioners), or a 'pagoda landscape complex'. It also has a range of other specific issues relating to the distribution of pagoda complexes and the basis for their significance that were relevant to the assessment of the proposal.

The majority of these issues were considered by environment groups in Section 8. What constitutes a pagoda complex, however, is descriptively defined in Section 2 and the methodology of using a Land Systems[1] approach to establish significance is outlined in Section 3. In addition, to further appreciate the significance of the outcome of the Land Systems approach, the CAR reserve assessment method is applied to pagoda landforms in Section 4.

2. 'Pagoda landform'/'pagoda landscape complex' – a definition

Washington and Wray (2011) describe and thereby define pagodas as:

"… conical rock formations formed by differential weathering and erosion of the local sandstones. They come in two forms. Smooth pagodas have relatively regular conical-shapes (without terraces), while platy pagodas are stepped and terraced cones that resemble Asian pagodas, ziggurats or step-pyramids. On platy pagodas, erosionally resistant ironstone bands from 1 to several cm thick project from the surface and form the hard surfaces of the terraces. These bands can project laterally from the underlying sandstone for tens of centimetres, and display detailed 3-dimensional forms that can resemble chairs and tables, pipes and pulpits. Pagoda complexes are part of wonderfully intricate, ruin-like, landforms (emphasis added) *that resemble lost cities and temples, and are also often associated with slot canyons and weathering caves. Their significance only started to be appreciated in the 1980s."*

Washington emphasises that, within the descriptive definition in the cited paper, the pagodas are recognised as being within pagoda complexes. In elaboration, Washington states (2013, pers. comm.):

"Pagodas themselves are conical rock formations that can range from only 2 metres in height to over 60 metres. Pagodas are often found associated with cliff escarpments, but not always, and can be found on slopes and ridge-tops also. Pagoda complexes are made up of the conical pagodas themselves, associated slots and slot canyons, weathering caves, ironstone sculptures, talus slopes and gullies. Pagoda complex vegetation can range from heath to shrubland to woodland to tall forest (and in places to associated swamps). By their nature, pagoda complexes create a wealth of habitats and microhabitats that allow both a diverse flora and fauna. Several rare and threatened species are found in and around pagodas. One cannot put a lower size limit on what constitutes a pagoda complex. Certainly the 10 ha lower limit defined by Cumberland Ecology for Coalpac is

[1] *http://vro.dpi.vic.gov.au/dpi/vro/gbbregn.nsf/pages/gbb_landform_landsys*

extremely large, and would rule out many pagoda complexes of excellent quality and significance. Even the 'Lost City' on Newnes Plateau would not qualify as pagodas under that definition. By their nature, pagodas are often isolated or strung out in a line and individual pagodas are often only tens of metres across. To suggest they must be all together in an area bigger than 10 ha thus ignores the geomorphology of pagoda complexes, and defines many of them out of existence (emphasis added)*."*

The descriptive definition and Washington's subsequent comments have been formally endorsed by Dr Ann and Dr Robert Young and Dr Robert Wray (9/4/2013), all geomorphologists and authors of the distinguished book 'Sandstone Landforms' (2009).

Washington and Wray (2011), in regard to platy pagodas, stated:

"Platy pagodas are in our view distinct and significant features, as we are not aware of any other rock formations in Australia or overseas that mimic the geomorphology of platy pagodas (see Young, Wray and Young 2009)".

In regard to smooth pagodas they noted:

"Smooth pagodas … resemble cones or beehive structures found in the Bungle Bungles, Budawangs and other areas around Australia and the world (Young, Wray and Young 2009), such as the central-west USA where they would be called 'slickrock' slopes (Howard and Kochel 1988)."

Washington (pers. comm. 2013) considers that:

"*Smooth pagodas are not significant on the international level, in contrast to platy pagodas. However, there is a very good case for arguing that they are significant on the national level, this being an assessment which has been endorsed (pers.comm.) by the Youngs and Dr Wray* ". *"Smooth pagodas certainly represent a highly significant part of the geoheritage of NSW."*

3. Ben Bullen Pagoda Land System

A Land System[2] can be regarded as a limited set of distinctive land units[3], each of which comprises a tract of country showing a high degree of uniformity in landform, parent material, soil, climate, and vegetation.

Pagoda landscape complexes (effectively comprising the pagodas and their lithology, scenic value and ecosystems) in association with the slopes below them and the valley floors with their rock-types and ecosystems, as well as the rock-type and ecosystems above them, lend themselves to a form of 'land system' mapping as initiated by CSIRO. In consequence, to characterise the particular pagoda landform, which is of particular interest to the Commissioners, and attempt to establish its

[2] *http://vro.dpi.vic.gov.au/dpi/vro/gbbregn.nsf/pages/gbb_landform_landsys*
[3] *http://www.publish.csiro.au/?act=view_file&file_id=LRS34.pdf*

significance, a Land Systems method has been adopted. It involves an ecological approach to the extent that it integrates environmental features which are commonly treated separately (e.g. rainfall, geology, topography, soils and indigenous vegetation). There are distinctive patterns because climate, geology and landform interact over time to influence the distribution of soils and vegetation.

The name Ben Bullen Pagoda Land System (BBPLS) has been adopted to cover this distinct and significant pagoda-related land system which is confined to the western portion of the Ben Bullen State Forest and encompasses the proposed Coalpac Project Area.

The BBPLS has three well-defined land units. They are the *Cullen Plateau Unit*, the *Ben Bullen Range Pagoda Unit* and the *Tablelands Grassy Woodland Complex Unit*: each will now be characterised.

3.1 **The Cullen Plateau Unit**

This is the land unit found generally above the pagodas. It straddles the Great Dividing Range with an elevation over 1,000 metres on Triassic Narrabeen sandstone rocks. This Plateau Unit is gently undulating with local relief less than 50 metres and a rainfall of up to 900mm/p.a., which is drier than Newnes Plateau. Soils are infertile and vary from dry, shallow Lithosols on side slopes to moderately deep Earthy Sands and Yellow Earths on the flat crest of the Range (King, 1993, equivalent to Medlow Bath soil landscape).

The unit supports a dry sclerophyll open woodland of Inland Scribbly Gum (*E. rossii*) and Narrow-leaved Stringybark (*E. sparsifolia*) with a shrubby understorey (Note that Mr C. Jonkers has observed that "*E. oblonga* has not been recorded in Ben Bullen State Forest" *Pers. Comm.*, 13/4/2013).

The vegetation of this land unit is equivalent to Benson and Keith (1990) 10g 'Scribbly Gum - Stringybark Woodland'; and DEC (2006) MU 32 'Tableland Scribbly Gum - Narrow-leaved Stringybark Shrubby Open Forest'.

3.2 **The Ben Bullen Range Pagoda Unit**

This is arguably the most scenic unit. The geomorphology of this unit is very different from the previous unit. It occurs on the plateau margins and along narrow crests (less than 100 metres wide), 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. Platy and smooth pagodas are common and may be associated with benches and local scarps (up to 60 metres in height). Scattered platy pagodas occur extensively along the more gently sloping spurs of the Ben Bullen Range, sometimes massed at the terminal ends of spurs with low, discontinuous broken scarps.

Below the scarp, talus extends downslope over a vertical distance of about 100 metres, and has narrow parallel downslope drainage gullies. The talus slopes steeply for the first 50 metres horizontally then becomes more gently sloping for a

further 250 metres horizontally. These colluvial sideslopes, sometimes with large sandstone pagoda remnants, derive from the upslope Triassic Narrabeen sandstone.

On the convex slopes below more gentle spurs, such as those below the Ben Bullen Range, however, the Triassic colluvial materials quickly give way to soils derived from the Permian Illawarra Coal Measures.

Soils are highly variable, dry, shallow, infertile Lithosols and Siliceous sands on small rocky ledges above cliffs, some yellow and red earths on gently sloping spurs of the Ben Bullen Range (King, 1993, equivalent to Wollangambe soil landscape). Below the scarp, soils vary. Lithosols and Siliceous Sands are found on sideslopes and drainage lines, grading to various Yellow and Brown Podzolic Soils further downslope, including on the Permian Illawarra Coal Measures (King, 1993, similar to Hassans Walls soil landscape but more variable within this land unit, as soils derived from Permian geology are included).

Vegetation structure on the plateau margins ranges from dry sclerophyll open forest to woodland, low woodland, open-shrub and open-heath depending on soil depth, aspect and exposure of the pagoda occurrences with which these types are associated.

In the open-shrublands, common species include *Ericaceae* species and *Zieria* sp. with occasional stands of *Callitris endlicheri.* Banksias are notably absent, unlike the Pagoda Rock Complex vegetation (unit 21d of Benson and Keith, 1900). It is worth noting, however, that Benson and Keith map unit 21d extending along Ben Bullen Range and on Tyldesley Hill, unlike Cumberland Ecology's depiction of the Pagoda Rock Sparse Shrubland (see Env. Assessment, 2012, Appendix J, Figure 3.1).

Calytrix tetragona, *Leptospermum parvifolium*, *L. arachnoides* and *Leucopogon muticus* dominate the shrubland. There is a decline in Proteaceae species that is substituted by other plant Families becoming more dominant, such as Ericaceae, Lamiaceae, Myrtaceae, Orchidaceae, Rutaceae and Scrophulareaceae (Chris Jonkers, *Pers. Comm*. 11/4/2013). For these reasons, the vegetation unit, Pagoda Rock Sparse Shrubland, MU 43, (of DEC, 2006 and Cumberland Ecology, 2012) best fits the vegetation on and around the pagodas in the 'contracted proposal' area but only because no other vegetation unit provides an adequate description. It has been inadequately mapped by Cumberland Ecology. The extent of MU 43 is more like that of the Benson and Keith unit 21d.

Small occurrences of open-heath occur on the most exposed sites, such as above the 'banner-drop site' where the pagoda outcrop approaches the Gardiners Gap Fire Road. The open forest consists of Silvertop Ash (*E. sieberi*) and Sydney Peppermint (*E. piperita*) are located around the pagodas towards small gullies, while on more exposed sites a low woodland of mallees (*E. laophila/ E. stricta*) occur.

The steeper open forests, on exposed west and north facing talus slopes are characterised by Inland Scribbly Gum and Narrow-leaved Stringybark with a ground layer of litter and tussocks of Red-anther Wallaby Grass (*Joycea pallida*). An open forest with Blaxlands Stringybark (*E. blaxlandii*) and Sydney Peppermint occurs on more protected sites (OEH, 2012b).

The talus vegetation of this land unit grades into the Tablelands Grassy Woodlands Complex Unit described below.

3.3 **The Tablelands Grassy Woodland Complex Unit**

This unit has developed on gentle undulating hills on rocks of the Permian Illawarra Coal Measures with gentle colluvial slopes that run into shallow alluvial valleys with a local relief of 50 metres (900 to 950 metres, AHD). Like the previous unit, yellow podzolic soils have formed (King, 1993, equivalent to Cullen Bullen soil landscape). The most elevated parts of this unit support better developed examples of Inland Scribbly Gum, Capertee Stringybark (*E. cannonii*), Brittle Gum and Broad-leaved Peppermint woodlands with a more palatable, grassy understorey, despite tussocks of Red-anther Wallaby Grass (*Joycea pallida)* still being abundant (OEH, 2012b).

The alluvial flats are dominated by Ribbon Gum (*E. viminalis*) with an understorey or Snow Grass and abundant forbs or less frequently with shrub vegetation (*Callistemon linearis*, *L. juniperimum* and *Leptopsermum polygalifolium)*. The gently undulating footslopes and smaller drainage lines support Mountain Gum (*E. dalrympleana*), often with Apple Box (*E. bridgesiana*) and Blakelys Red Gum (*E. blakelyi*). The ground layer is grassy with palatable species dominating, and coarser grasses relatively uncommon or absent. This vegetation association is part of the Benson and Keith (1990) Tablelands Grassy Woodlands Complex Unit, 10h but was missed during that survey.

Where podzolic soils on the talus are largely derived from the Permian Illawarra Coal Measures, the Inland Scribbly Gum is less abundant or absent. The EPBC and TSCA listed Capertee Stringybark (*E. cannonii*) is found in association with Brittle Gum (*E. mannifera*) and Broad-leaved Peppermint (*E. dives*). The ground layer is grassy with palatable grasses dominating, and coarser grasses present but less abundant than the palatable grasses. This is the *E. mannifera – E. dives* woodland component of Benson and Keith (1990) mapping unit 10h.

Box woodlands occur on the footslopes beneath the dramatic escarpments of the western Hunter region, around the Goulburn River valley and Growee areas. These ecosystems, however, are much drier (receiving less than 650 millimetres per annum on average) and occupy lower elevations, less than 450 metres above sea level and so are not tableland woodlands. To the north-east towards Denman, the Western Hunter Footslopes Box Woodland may include white box (*Eucalyptus albens*) and its intergrade with grey box (*E. moluccana*), yellow box and red gums (*Eucalyptus tereticornis*,*E. blakelyi*) (OEH, 2012a). This woodland is also a valley woodland, not a tableland woodland, and so is distinctly different from the Tablelands Grassy Woodland Complex Unit.

4. The CAR reserve assessment and site irreplaceability

4.1 CAR assessment

Definitions of the CAR assessment terms are in ***Appendix 2***.

Although the CAR methodology was developed for native forest conservation, it may also be applied to conservation of geodiversity. In relation to pagoda landforms, it would ensure protection of adequate numbers of well described representative examples of diverse pagoda landscapes, thereby ensuring comprehensive reservation outcomes.

The complete characterisation of the range of pagoda-related landforms into land systems is beyond the brief of this paper. Nevertheless, ***the Ben Bullen Pagoda Land System, as defined in Section 3, establishes an association of three land units, comprising landforms and biodiversity characteristics, which are virtually unique to the western portion of Ben Bullen State Forest and particularly well expressed in the proposed Coalpac contracted project area*.**

It is anticipated that, as with the Ben Bullen Pagoda Land System, a spectrum of pagoda land systems could be established following appropriately detailed investigations. Each land unit in the Ben Bullen Pagoda Land System has a locality name and a distinctive suite of rocktype, landform, vegetation and soil characteristics. The specific suite of native forests and woodlands with old-growth characteristics developed on the Permian coal measures provide an additional unifying ecological relationship to the geomorphic unity of the platy pagodas on the Triassic sandstones and their outliers, and talus on the slopes below.

4.2 Site irreplaceability and pagoda geodiversity

The concept of *site irreplaceability* (Carwardine, 2007) recognises that there are usually many ways of constructing a system of protected areas. Some areas cannot be replaced without compromising the conservation goal because they contain unique features, or contain so much of a feature that other areas cannot compensate for their loss, or they contain all occurrences of one or more of the features which must be reserved. Other areas are replaceable to varying degrees. There might be one or a few choices for some areas and hundreds of choices for others.

Irreplaceability can be defined in two ways:

- the likelihood that an area will be needed to achieve an explicit conservation goal; and
- the extent to which the options for achieving an explicit conservation goal are lost if the site is made unavailable for nature conservation (RACAC, 1998).

Areas can be given values ranging from one (totally irreplaceable) to zero (not containing any features needed to achieve the conservation criteria). In between these two extremes, values reflect the number of replacements that exist for any particular area.

Irreplaceability guides conservation decisions because it indicates the likelihood of a particular area being needed as part of a CAR reserve system.

In the context of the suite of pagoda landforms, the Ben Bullen Pagoda Land System has no replicate sites outside the western portion of the Ben Bullen State Forest. The Ben Bullen Pagoda Land System is highly significant because it cannot be replaced by other pagoda land systems.

4.3 Determining a CAR sample of this irreplaceable land system for a desirable reserve outcome

The Coalpac 'contracted project' proposal area and Pine Dale Stage 2 proposal area contain the remaining less damaged parts of the Ben Bullen Pagoda Land System.

To the north most of the Baal Bone lease area has been damaged by extensive cliff falls; only its most northerly end, containing the headwaters of Baal Bone and Jews creeks, remains unaffected by intensive longwall mining. Regardless, this small area of state forest fails to replicate the contracted Coalpac proposal area: it has higher cliffs, is a generally more rugged landscape and smooth pagodas predominate. The forests in this area while on Permian Illawarra Coal Measures, are wetter Ribbon Gum (*E. viminalis*) forests (>70% cleared and logged) and have more closely associated *Melaleuca* shrub swamps than the woodlands of the proposed contracted Coalpac project.

Across the Dividing Range in the upper Coxs River valley to the east of Ben Bullen State Forest and the Coalpac Project Area, the woodlands on Permian strata have been cleared along the Wolgan Road. Further east again the Illawarra Coal Measures do not outcrop, except in a few steep valleys.

Where the grassy tableland woodlands are located in the south and also to the west of the Castlereagh Highway, the Triassic Narrabeen Group sandstones are absent, and so there are no pagodas.

Only in the western portion of the Ben Bullen State Forest, and particularly in the 'Contracted Project' Area, does the complete range of platy pagoda landforms develop alongside shallow valleys with grassy tableland woodlands on Permian bedrock. These Permian sedimentary rocks provide plant nutrients that enrich the ecosystems of this pagoda landscape. Its native vegetation has a greater productivity, and so supports more herbivores and insect prey for bats, birds and other fauna which roost and nest in the adjoining pagoda landforms of lower fertility.

Well to the north on the Airly-Genowlan mesa and the rocky range that separates the Wolgan and Capertee Valleys, pagoda-forming sandstones are present. The grassy tableland woodlands found in Ben Bullen State Forest are, however, absent from the steep talus of both the Gardens of Stone National Park and Mugii Murum-ban State Conservation Area (Benson and Keith, 1990 – see vegetation map).

Although grassy woodlands are present around Pantoneys Crown, they have developed on the Nile Subgroup and Shoalhaven Group of Permian sedimentary rocks (Yoo, 1992) at a lower elevation of 600 to 700 metres. They receive a much lower rainfall than Ben Bullen State Forest and, being too low to develop tableland

vegetation, have distinctly different vegetation. These have been mapped by Benson and Keith (1990) as being within the Capertee Valley Woodland Unit (10j) which, around Pantoneys Crown, consist of the ironbarks, *Eucalyptus fibrosa* subsp. *Fibrosa* and *E. crebra*. The Black Cypress Pine *(Callitris endlicheri)* is particularly conspicuous.

Further north again, around Dunns Swamp in Wollemi National Park the pagodas are typically smooth and have few ironstone seams compared with those in Ben Bullen State Forest. At 660 to 840 metres they are topographically lower than the pagodas in Ben Bullen State Forest. The drier climate (approximately 700 mm/p.a.) gives rise to Banksias, emergent cypress pines (*Callitris* spp.) and scrub she-oaks including *Allocasuarina gymnanthera* (OEH, 2012a); other distinct species include *Leionema scopulinum*, which was discovered only a decade ago.

The western Blue Mountains Pagoda Shrubland in north-west Wollemi National Park is at the northern limit of the Sydney Montane Heaths statewide class (OEH, 2012a). This vegetation type is more extensive in Ben Bullen State Forest and on Newnes Plateau. Washington (2013, pers. comm.) has confirmed that the vegetation associated with the pagodas of the northern Wollemi is quite different from the Coalpac area.

5. Biodiversity of Ben Bullen State Forest including the 'contracted project'

The native vegetation of Ben Bullen State Forest, of which the 'contracted project' is part, was compared with that of the other state forests and national parks of the region by Mr Chris Jonkers using the Atlas of NSW Wildlife[4].

He found that Ben Bullen State Forest has the highest number of plant species (642), after Newnes State Forest (775), and more plant species than all other NPWS Reserves in the region. The forest contains the highest number (5) of Actual Recorded Threatened Plant Species, after Newnes State Forest (7) and more than the Gardens of Stone National Park.

It contains more Animal species (222) than all other local State Forests, except for Newnes SF (284) and more than other local NPWS Reserves, except for the Gardens of Stone National Park (281).

Ben Bullen State Forest has the third highest number of recorded threatened animal species (21), after Newnes State Forest (31) and the Gardens of Stone National Park (29).

Ben Bullen State Forest contains more Vegetation Communities (11) than all other local state forests, and more than all local NPWS Reserves, except for the Gardens of Stone National Park (12).

[4] http://www.bionet.nsw.gov.au/

The forest contains 3 EECs/CEECs listed under State and Commonwealth legislation:

- Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions;

- White Box - Yellow Box - Blakely's Red Gum Woodland; and

- Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions (Tablelands Frost Hollow Grassy Woodlands).

5.1 **Potential and cumulative destruction of native vegetation**

In addition to the White Box - Yellow Box - Blakely's Red Gum Woodland and Box Gum Woodland Derived Native Grassland listed as CEECs, the contracted proposal would destroy 204 ha of *Eucalyptus cannonii* habitat and 15,428 trees listed as EPBC vulnerable. Also, non-listed vegetation communities that would be cleared by the proposal have been identified by the OEH as being poorly reserved. These include the *Ribbon Gum Grassy Forest on alluvial flats* community; the *Mountain Gum - Apple Box - Blakely's Red Gum Grassy Forest*; and the *Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest* community (see also section 8.10 below).

The Box Gum Woodland and Derived Native Grassland EECs have been inadequately mapped within the contracted project. The NSW Wildlife Atlas records that the EEC indicator species, Blakely's Red Gum (*Eucalyptus blakelyi*) and Yellow Box (*Eucalyptus melliodora*), cover a wider area of the contracted proposal than that mapped by Coalpac's consultants.

Cumulative losses of Grassy Box Woodland in the wider region related to mining include the following projects: Moolarben Coal Complex Stage 2, 123ha; Ulan Coal Continued Operations, 69ha; Maules Creek mine, 700ha; Mt Arthur Coal Project, 694ha; and Mt Penny Coal Pty Ltd, 315ha. These mine related losses total 2,171ha, yet in 2005 the Commonwealth Listing Advice for Grassy Box Woodland stated that 93% of the NSW population had been cleared.

Benson and Keith (1990, pg 330) indicated that plant communities associated with Permian and Devonian rocks on the western part of the Wallerawang map sheet were very poorly conserved. They stated: "Other woodland communities in the western part of the area (in map units 10h, 10m & 10n), and the Coxs River Swamps (20b) are not represented in any local reserves". Since 1990, some of the 10h unit has been cleared, mainly by mine expansion.

According to OEH: *The Unit 10h* [the Tablelands Grassy Woodland Complex] *represents the extent of vegetation on Permian sediments reasonably well. The limits of this mapping include the fact that Unit 10h comprises four different vegetation types that they* [Benson and Keith] *have identified, plus one that they*

missed [Ribbon Gum with a ground layer of palatable grasses and relatively abundant forbs]. *However, it is the best available representation of all vegetation on Permian sediments.*

Three of the five threatened species in Ben Bullen State Forest have been impacted by Cullen Valley Mine and Invincible Colliery operations: *Persoonia marginata; Eucalyptus cannonii;* and *Eucalyptus aggregata*. The contracted project would further impact upon these species. No targeted surveys have been conducted by Coalpac for the other two recorded threatened species in Ben Bullen State Forest (*Derwentia blakelyi* and *Thesium australe*), both of which are highly likely to occur within the 'contracted proposal' area.

5.2 **Pagoda refugia habitats threatened by the 'contracted project'**

Pagoda landforms provide niche habitats for rare plant species. Such habitats are particularly prone to cliff and over-hang collapses, and drying out as a result of highwall mining. A number of ROTAP listed plants, other plants with a very restricted range, and a number of fern and orchid species are found in pagoda niche habitats of the contracted project.

The Wildlife Atlas contains just 8 records for *Epacris crassifolia* subsp. *macroflora* for whole of NSW, and only 1 record post 1980. The Lithgow Environment Group has recorded two sites, one in and one near the Project Boundary (near Cave Art site).

There are only 25 records of *Prostanthera saxicola var. montana* for NSW in the Wildlife Atlas, and these are mostly in national parks. On Tyldesley Hill it is found with *Leptospermum parvifolium, Kunzea parvifolia* and *Calytrix tetragona* in heath areas amongst the pagodas.

Ben Bullen State Forest, including the 'contracted project', is a hotspot for *Prostanthera howelliae /granitica* (53 records). It occurs exclusively in niche habitats within Pagoda landforms. It is often associated with the ROTAP species *Leionema lamprophyllum* ssp *orbiculare* and *Philotheca obovalis*, the relatively uncommon *Phebalium squamulosum* ssp *ozothamnoides*, and the ROTAP listed *Leucochrysum graminifolium* often occurs on nearby pagodas.

Philotheca obovalis (ROTAP 3RCa) is restricted to the Blue Mountains (except for an isolated record at Kydra Mountain, near Cooma), exclusively in niche habitats within pagoda landforms. In the 'contracted project' it invariably occurs with *Eucalyptus stricta*, *Allocasuarina distyla*, *Hakea dactyloides*, and *Calytrix tetragona*, and is often associated with the ROTAP species *Leionema lamprophyllum* ssp *orbiculare*, *Prostantehra howelliae*, and the relatively uncommon *Phebalium squamulosum* ssp *ozothamnoides*. The ROTAP listed *Leucochrysum graminifolium* often occurs on nearby pagodas. Briggs and Leigh (1995) considered that insufficient information was available on population sizes within Wollemi National Park.

Pseudanthus divaricatissimus (ROTAP 2R) most probably occurs within the 'contracted project' given that it has been recorded less than 2km away; it is restricted to pagoda landforms in the local area, does not tolerate disturbance, and should be avoided wherever possible.

The Wildlife Atlas contains 30 records for *Leionema lamprophyllum* ssp *orbiculare* (ROTAP 2R-P3) in Ben Bullen State Forest, including the 'contracted project' area. Only 2 records for this plant in the adjacent Newnes State Forest, 3 records in the Dunns Swamp area, and 1 from Corricudgy State Forest indicate that Ben Bullen State Forest is the core habitat for this restricted plant.

Phebalium squamulosum ssp *ozothamnoides* (Alpine Phebalium) is another pagoda landform species. *Epacris purpurascens* var. *onosmiflora*, is found at western limits of its ecological range in the 'contracted project' area at the pagoda known as the Kings Chair. *Zieria apalathoides* is at its eastern limit of its range in Ben Bullen State Forest and here it is also restricted to pagoda areas. Two of the four records for *Zieria compacta* in Ben Bullen State Forest come from the pagoda landscape in the 'contracted project' area. Other plants with a restricted range include *Acacia asparagoides* (2R) which mainly occurs in Ben Bullen State Forest, and *Acrotriche rigida* which is at its southerly limit in *Eucalyptus blakelyi* - *E. rossi* grassy woodland in the northern part of the 'contracted project' area.

5.3 **The 'contracted project' is an orchid hotspot**

Wildlife Atlas records show that Ben Bullen State Forest is second only to Hassans Walls Reserve for orchid biodiversity in the Lithgow LGA.

Three Lithophytes and Epiphytes, and at least thirty two terrestrial orchids have been recorded in the 'contracted project' area (Lithgow Environment Group records and NSW Wildlife Atlas http://www.bionet.nsw.gov.au/).

6. Aboriginal Heritage in and adjoining the contracted project area

Ben Bullen State Forest, including the project area in particular, is extremely rich in Aboriginal shelters. Yuri Bolotin and Michael Keats have found two shelters, and both have significant Aboriginal stencil art.

The larger shelter, a cave located within the eastern boundary of the project area, was found on the 28th June 2012. The cave is 10m x10m x 3m at the aperture, but larger inside. It faces west, has a significant level floor area together with a mound and a small internal water source. At least ten hand stencils executed in red ochre have been identified. The cultural heritage survey which accompanied the Coalpac development application did not locate this cave site.

A second cave was located on 19 November in Ben Bullen State Forest, also with eight hand stencils in red ochre readily visible. The cave is about 4m wide by 2m deep by 2m high and faces east. The cave is located about two kilometres east of the project area.

The location of these two art sites suggests that a more thorough survey of the contracted project area would locate more Aboriginal art and cultural heritage.

7. Recreational and scenic resources of the contracted project area

Reservation of Ben Bullen State Forest, including Coalpac's 'contracted project' would provide, in addition to nature conservation benefits, enhanced public health and well-being through recreation and appreciation of scenic beauty.

The scenic and recreational opportunities of the Coalpac area are illustrated by reports of six walks compiled by Michael Keats and Yuri Bolotin.

The walks are:

Walk 1 – Pagodas and Grikes of Tyldesley Hill and beyond (W1 + 2);

Walk 2 – Tyldesley Hill and the Ridge to the North Walk (W2);

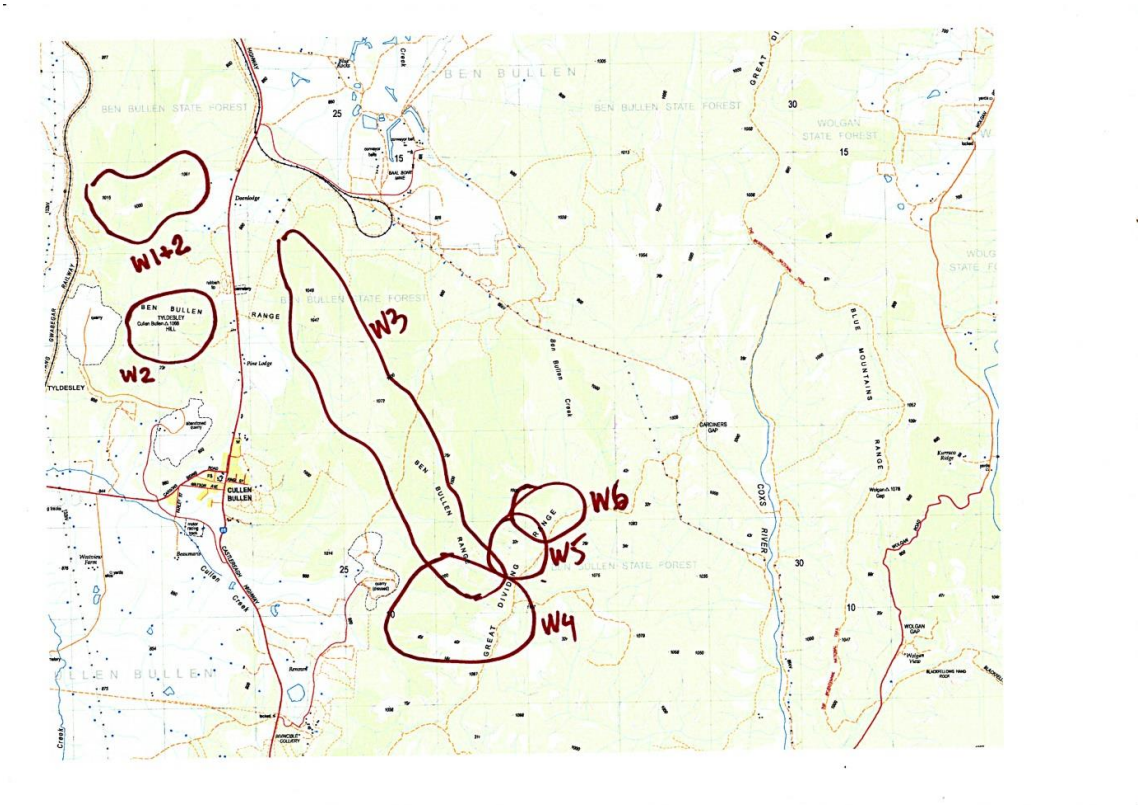
Walk 3 – Ben Bullen Range Walk (W3);

Walk 4 – West off the Great Dividing Range (W4);

Walk 5 – Ben Bullen Pagoda Walk 1 (W5); and

Walk 6 – Ben Bullen Pagoda Walk 2 (W6)

These walks, the approximate localities of which are indicated on the map below, emphasise the highly varied woodlands, the range of pagoda types and sizes, the existence of 'canyons', and the association between natural overhangs and Aboriginal heritage. All of this is easily accessed by foot and/or vehicle from the Castlereagh Highway.



Bushwalking groups which opposed the Coalpac proposal include the NSW Confederation of Bushwalkers; Canberra Bushwalking Club; Mountain Devils Bushwalking and Social Club; and The Coast and Mountain Bushwalkers Club of NSW Inc. Many of the 758 group and individual objectors who raised concerns remarked upon the adverse impacts on the recreational and scenic resources of the pagoda country in the region. Those of particular note include Bathurst Community Climate Change Action Network Group; Blue Mountains Conservation Society; Canberra Bushwalking Club; Canopy Native Forest Committee; Colo Committee; Colong Foundation for Wilderness; Columban Mission Institute; Cumberland Bird Observers Club; Environmentally Concerned Citizens of Orange; Environment Liaison Office of NSW; Greater Blue Mountains World Heritage Advisory Committee; Hawkesbury Environment Network Inc; Lithgow Environment Group Inc; Hunter Environmental Lobby; Nature Conservation Council of NSW; No Tillegra Dam Action Group (32216); NSW Greens; NSW National Parks Association; Oatley Flora and Fauna Conservation Society; Redgum Bushland Committee; Rivers SOS Alliance; Rivers SOS Committee; Ryde-Hunters Hill Flora and Fauna Preservation Society; Total Environment Centre; and the Western Sydney Conservation Alliance Inc.

8. Response to issues that the Department of Planning and Infrastructure are assessing

The Department of Planning and Infrastructure has indicated that there are a number of issues that it will need to consider its assessment of the Coalpac 'Contracted Project'. These matters are considered below within the paradigm of NSW Government policy, and the Commissioners' findings and recommendations. They are also considered in the context of land-system characterisation, the CAR reserve assessment method and the concept of site irreplaceability.

The responses below draw upon the preceding sections of this document because much of what is of interest to the Department's assessment of this proposal appears to be focused around definitions and the use of 'significance and unique' when stressing the environmental values of pagodas and ecosystems. The interdependence of factors producing scenery and vegetation led us to adopt land-systems concepts.

The overall result of this assessment and the responses below are believed to be the most helpful way to assist the Department of Planning and Infrastructure clarify the importance of the Coalpac project area for conservation.

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

A generic definition for all pagoda landscape complexes (plural) is provided by Washington and Wray (2011) and elaborated upon in Section 2 above.

Coalpac's 'contracted project' area contains just one pagoda complex. It has been characterised as the Ben Bullen Pagoda Land System, which contains three specific land units. The Ben Bullen Pagoda Land System provides the most appropriate

definition for the pagoda landscape complex as it considers the pagoda landform (i.e. the Ben Bullen Range Pagoda Unit) in its landscape context.

The long-term interplay between the Triassic sandstones and the Permian Illawarra Coal Measures under the influence of climate and geographic orientation has produced topography, slope-aspect relationships, and three distinct land units with specific suites of old-growth woodland types with dependent biodiversities. Where the pagodas exist at the edge of a sandstone-dominated terrain, the apron will comprise sandstone-derived talus. Where the pagodas are associated with sandstone outliers on a Permian substrate, the sandstone-dominated talus will rapidly give way to Permian-derived colluvium.

The Ben Bullen Pagoda Land System is the most appropriate way of defining the pagoda landscape complex in the proposed Coalpac project area.

8.2 How much of the platy pagoda landscape complex exists in the region?

Washington and Wray (2011) note that pagodas are found over an area of approximately 60,000 hectares. The description of pagodas must be examined in a landscape context for the reasons outlined by the Commissioners. The pagoda landscape also could not be described over such a large region into lands units and land systems in a two week time-frame. For the project area, the percentage of pagodas which are platy versus those which are smooth, also could not be estimated in the time available.

Having characterised the Ben Bullen Pagoda Land System, consideration was given to other pagoda landscape complexes[5] to see whether potential existed for replicate systems. It was concluded that the Ben Bullen Pagoda Land System is limited to Ben Bullen State Forest and reaches its best expression in the areas of the Coalpac and Pine Dale proposals.

Elsewhere in the Ben Bullen State Forest, potential replicates are either degraded by intensive coal mining, or comprise a different land system.

8.3 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?

Platy pagodas exist throughout most of the proposed Coalpac project area where the topography exceeds 1000 metres and discontinuous cliff lines may be present below them. Support for this statement is provided by the accompanying document entitled *"A pictorial record of pagoda heritage within the Coalpac proposal"* **(*Annexure A*).**

The platy pagoda landscape complex in Coalpac's 'contracted project' comprises most of the intact example of the Ben Bullen Pagoda Land System.

[5] *Other types of pagoda landscape complexes exist on Newnes Plateau, in Wollemi, Blue Mountains and Gardens of Stone NPs, and in the Mugii Murum-ban State Conservation Area.*

Two of the three land units of the Ben Bullen Pagoda Land System (namely, the Tablelands Grassy Woodland Complex Unit and the Ben Bullen Range Pagoda Unit) would be affected by the proposed **open-cut mining**.

Only small areas of the Cullen Plateau Unit are present in the 'contracted project' proposal. This interestingly demonstrates that an area larger than the proposed Coalpac project area is needed to reserve the best remaining components of the Ben Bullen Pagoda Land System.

Most of the area within the Coalpac boundary would be affected directly or indirectly by the proposed open-cut and highwalling operations. The envisaged **highwalling** would disturb virtually all the pagoda landscape complex in the Coalpac 'contracted project', while **open-cut mining** would remove the talus slopes which comprise a large proportion of the Ben Bullen Range Pagoda Unit as noted by Drs. Washington, Wray, Young and Young. Talus protects the underlying softer rocks beneath the sandstone cliffs and pagodas by inhibiting undercutting by wind and rain, and consequent cliff collapse.

The other undamaged portions of this Land System and its associated platy pagoda complex exist in the proposed Pine Dale project area and on the east facing slopes running off the Great Dividing Range.

Those parts of the Land System with east-facing aspects have a different local climate and soil development, and therefore their ecosystems differ. Further, the stratigraphy of the Permian and Triassic sequences dips to the north-east and thins towards the western edge of the Sydney Basin and this also affects ecosystem development. For example, swamps and tableland swamp forests are present on the flats, and even a few stands of Brown Barrel trees (*Eucalyptus fastigata*) are found in narrow sheltered gullies; and as previously stated, the Tablelands Grassy Woodland Complex Unit has been cleared along the Wolgan Road, limiting any occurrence in the east.

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

All platy pagoda landscape *complexes* are of *international* significance. All smooth pagoda landscape *complexes* are of *national* significance. Given the international significance of platy pagodas and the national significance of smooth pagodas, the limited distribution of both, and the threats to these areas, no single pagoda landscape complex is 'expendable'.

A unique feature of the Ben Bullen area is the sequence of pagoda landforms stretching through to tableland vegetation types on the valley floor. Most other clusters of pagodas:

- occur in a sandstone dominated landscape where tableland vegetation types are absent (e.g. the Wollangambe Region); or
- are situated above narrow valleys characterised by talus slopes with a restricted flat, valley floor (e.g. the Wolgan Valley); or

- occur above valleys which are largely cleared (e.g. the Capertee Valley is heavily cleared below the pagoda clusters in Wollemi, and the Cudgegong Valley is also heavily cleared downstream of the Dunns Swamp pagodas).

The unique Ben Bullen Pagoda Land System has an irreplaceability value of one, as good substitutes are lacking. A CAR reserve system for pagoda geodiversity would include the best and most representative example of the Ben Bullen Pagoda Land System, which is located in the proposed Coalpac project area.

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

The western portion of Ben Bullen State Forest, in and adjacent to the Coalpac Project, has a distinctive pagoda landform with a specific suite of ecosystems and vegetation types. The three land units comprising the Ben Bullen Pagoda Land System characterise the landform, soil, geology and vegetation attributes of this particular pagoda landscape complex.

The BBPLS within the 'contracted project' area is highly significant because other parts of this land system have been compromised and it cannot be replaced by other pagoda land systems.

The scenic splendour of the pagoda's morphology is apparent at a range of scales – from the total pagoda landscape, to the intricacies of the iron-rich banding, ironstone 'sculptures', the sheet-like ledges (often stippled), surface patterns of the iron-rich layers and roll fronts and the internal structure and colour tones in the sandstone, as enhanced by the sandstone's differential weathering. This intricacy and visual variety is further enhanced by the delicate pagoda shrub vegetation growing amongst the pagodas, and views out from the pagodas to a highly variable forest below, full of musical bird song.

The recreation and scenery attributes of the Ben Bullen Pagoda Land System (the pagoda landscape complex) are described in section 7 and ***Annexure A***.

The Aboriginal heritage attributes of the Ben Bullen Pagoda Land System (the pagoda landscape complex) are described in section 6 above.

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

None of this particular pagoda landscape complex as characterised by the Ben Bullen Pagoda Land System is protected. Given that the coal resources available by underground mining methods are now exhausted, national park reservation of the Ben Bullen State Forest (dedicated to the centre of the Earth, like Wollemi National Park) is appropriate and justified to protect this land system.

Other pagoda landscape complexes are protected in national parks and a state conservation area, but **not** the one characterised by the Ben Bullen Pagoda Land

System. Most of the other pagoda landscape complexes occur in landscapes where tableland vegetation types are either absent or have been cleared.

Given the international significance of the platy pagodas and national significance of smooth pagodas and the small amount of pagoda landscape overall, protection for all the pagoda landscape complexes at the highest possible level is appropriate.

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

Significance of the platy pagoda landscape in the proposed Coalpac project area is very high. It is the only example of a type of a pagoda landscape where platy/smooth pagoda landforms on Triassic sandstones have combined with a specific suite of old-growth grassy woodland types developed on Illawarra Coal Measures.

Platy pagodas are found in the proposed Coalpac project area wherever Triassic sandstone is present above 1000 metres, and not just the south-eastern corner of the proposal. The accompanying document entitled *"A pictorial record of pagoda heritage within the Coalpac proposal"* provides adequate evidence to support this statement (see ***Annexure A*****)**. This particular platy pagoda landscape, primarily The Ben Bullen Range Pagoda Unit and the Tablelands Grassy Woodland Complex Unit, of this land system extends entirely across Coalpac's contracted project proposal.

The other elements of its regional distribution are found in the Pine Dale proposal area (potentially subject to destruction) and to the north where the landscape has been degraded by intensive coal mining.

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

Although the vegetation units extend outside Coalpac's 'contracted proposal' area, they are either not found in association with a pagoda landscape complex or are associated with examples which have been degraded by intensive coal mining.

The area proposed to be cleared is clearly significant regionally in terms of the large number of the vulnerable *E. cannonii* and *Persoonia marginata* found there. Furthermore, the presence of intact grassy tableland woodland on Illawarra coal measures adjacent to a pagoda complex is certainly state significant, and perhaps nationally significant.

Grassy tableland woodlands have been heavily cleared, and outside of protected areas the long-term further clearing of these woodlands in association with coal mining and urban expansion is very likely. These particular grassy tableland woodlands on Illawarra Coal Measures are **not** found in other reserves, including the Turon, Nattai, Morton, Gardens of Stone, Wollemi, Kanangra-Boyd National Parks or in the Mugii Murum-ban State Conservation Area. Other grassy tableland woodlands are found in these parks.

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

The pagoda complex provides a multitude of habitats precisely because of its geomorphology. If Coalpac removes the valley bottom and talus slope vegetation it markedly reduces habitat options for many species in the project area.

The Permian sedimentary rocks provide plant nutrients which enrich the ecosystems of this pagoda landscape. The native vegetation thus has greater productivity, and so supports more herbivores and insect prey for bats, birds and other fauna that roost and nest in the adjoining pagoda landforms of lower fertility.

A number of fauna species, including species listed under the NSW Threatened Species Act and/or the Commonwealth Environment Protection and Biodiversity Conservation Act, utilise multiple parts of this habitat arrangement either seasonally (e.g. the Broadheaded Snake) or for daily living requirements (e.g. Eastern Bent-wing Bat and perhaps the Brush-tailed Rock Wallaby). The Lyre Bird and other more common birds and marsupials benefit from the combination of a nutrient rich habitat adjoining the various refuges and habitat niches offered by this particular pagoda landscape complex. A native carnivorous land snail, from the family Rhytididae *(Austrorhytida capillacea)* found in a narrow sandstone slot is just one of the interesting discoveries on the project site. It has been reported to the Australian Museum.

The Ben Bullen Pagoda Land System on the western side of the Great Divide is the westernmost pagoda landscape complex. It connects three major components of the Greater Blue Mountains World Heritage Area. The Ben Bullen Pagoda Land System links the Gardens of Stone National Park through the Newnes Plateau to the Blue Mountains and Wollemi National Parks. It is also a biodiversity hotspot, characterised by rich old-growth forests and remarkable rock formations not found in any other region of Australia. It is key linkage for migrating woodland birds, such as the iconic Regent Honeyeater that needs connecting high quality vegetation as it travels to vital feeding and breeding areas in the Capertee Valley.

8.10 **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 clearing of the proposed Coalpac 'contracted project' area would seriously degrade the best undamaged example of the Ben Bullen Pagoda Land System. It would remove most of the Tablelands Grassy Woodland Complex Unit where it is in association with platy pagodas in a less rugged landform that is accessible for recreation. In 2006, descriptions by DEC of the vegetation communities to be cleared for the 762 ha open-cut noted that six are poorly reserved (i.e. DEC 2006 MU's [13, 13a], 15, 20, 32, [33, 33 DNG], [34, 34 DNG] and perhaps also 36 - see Cumberland Ecology, 2013; and DEC, 2006, and **Appendix 3 below**).

The Tablelands Grassy Woodland Complex vegetation unit in the western part of Ben Bullen State Forest and in the context of the pagoda complex landform has an irreplaceability of ***one***. That is to say it is irreplaceable. Outside the proposed Coalpac 'contracted area' and the proposed Pine Dale project area to the south there are almost no good substitutes for its reservation. Inferior examples exist in areas degraded by intensive mining or as false-replicates which have different vegetation types in the east or more rugged landforms and different vegetation types to the north of this state forest.

The reservation of Ben Bullen State Forest without the proposed Coalpac project area would be a poor outcome from a CAR reserve viewpoint. The geological and biological heritage will be completely destroyed in the proposed open-cut area, while the values of adjoining lands in the Gardens of Stone proposal would be severely impacted and permanently degraded.

The perimeter of the open-cut areas will be over 40 kilometres in length and visible from the Castlereagh Highway at many points as well as Gardiners Gap Fire Road. The uphill faces of the open-cut will carve into the hillslopes of the Great Dividing Range, creating ugly highwall scarps up to 100 metres in height over a total distance of at least eight kilometres. These massive cuts could not be effectively back-filled or rehabilitated but would remain as a permanent visual blight. They would represent major visual pollution adjacent to what the Greater Blue Mountains World Heritage Advisory Committee has described as a 'gateway' to the World Heritage Area.

If the proposed open-cut proceeds, the public would always be reminded of this blight when visiting many of the reserves in the region. This must affect public attitudes towards one of the most scenic areas of the Blue Mountains and reduce future tourism to the area. It would detract substantially from the values of the Greater Blue Mountains World Heritage Area, which the Commonwealth has described as a 'national landscape' (Tourism Australia, 2013).

The removal of grassy tableland woodlands in the Coalpac area would also represent a decrease in the buffer area adjacent to the Greater Blue Mountains World Heritage Area. The Greater Blue Mountains World Heritage Advisory Committee has repeatedly stressed the crucial importance of retaining adjacent buffer areas to the WHA. The Committee specifically wrote to the PAC making this point.

Having made all the above points, it is important to realise that much in the remainder of the Ben Bullen State Forest would still merit reservation. Nevertheless, it would be an inferior reserve outcome if the last intact example of the geodiversity and biodiversity of the Ben Bullen Land System were omitted (see Sections 4 and 5, and ***Annexure A***).

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Appendix 1

The Gardens of Stone – statements of intent

Brad Hazzard in response to a question by Clover Moore in Parliament on 25 November 2011:

"We are not only trying to protect our strategic agricultural lands, our vigneron lands and our equine land; we are also trying to ensure that our high conservation lands are protected as well. In her question the member for Sydney mentioned the Pilliga Forest and the Gardens of Stone, which are both amazing areas of high conservation value. I can assure the member that we intend to protect all areas of high conservation value through the process that we are developing."

www.parliament.nsw.gov.au/prod/parlment/hansart.nsf/V3Key/LA20111125021?open&refNavID=HA8_1

The Hon Robyn Parker letter of 2 August, 2011 to the Colong Foundation:

'I have asked the Office of Environment and Heritage to actively investigate the Gardens of Stone Stage 2 Proposal and to examine options for maximising conservation outcomes.'

Mr Alistair Henchman, Director, Metropolitan Parks and Wildlife letter of 7 May 2011 to the Colong Foundation:

'the Department has demonstrated its conservation commitment to this area, which recognises existing mining interests. The planning process applied to Mugii Murum-ban SCA will provide a model for further cooperation with the Department of Trade and Investment, Regional Infrastructure and Services, colliery owners, and relevant stakeholders, for reservation of Ben Bullen/Wolgan State Forests...'

Relevant Strategic Land Use and Planning statements of intent by the NSW Government

Media Release, Minister for Planning and Infrastructure (21 May 2011)

Minister for Planning and Infrastructure, Brad Hazzard, said, "Prior to the election, the NSW Coalition announced that it would introduce a Strategic Regional Land Use Policy to strike the right balance between our important agricultural, mining and energy sectors, while ensuring the protection of high value conservation lands. We are now delivering on that commitment."

Strategic Regional Land Use Policy*: *Triple bottom line assessment to protect our regions

The NSW Liberals and Nationals believe in a triple bottom line approach to development. This will achieve a better balance in the growth of regional areas through a combination of:

1. strategic land use planning to better understand the constraints to, and opportunities for growth;

2. reforms to the planning assessment process to improve monitoring, compliance and cumulative impact assessment;

3. reforms to mining and coal seam gas legislation to protect strategic agricultural land and associated water resources; and

4. tougher planning assessments while strategic land use plans and planning reforms are developed.

This approach will ensure that regional NSW can enjoy the benefits of economic growth while maintaining our critical agricultural and environmental assets.

The NSW Liberals and Nationals will prepare strategic land use plans for the State on a regional basis, using a multi layered approach. [...] The process will identify the best places for agriculture, mining, coal seam gas extraction, viticulture, thoroughbred breeding, conservation, urban development and all other types of land uses in regional areas.

Strategic land use plans will be prepared using triple bottom line assessments of the environmental, social and economic values in regional areas.

These assessments will inform our decisions about the best way to use land and identify the environmental, social and economic values that need to be protected. In some cases, this will involve trade-offs between two land uses competing to use the same area of land.

The NSW Liberals and Nationals believe that agricultural land and other sensitive areas exist in NSW where mining and coal seam gas extraction should not occur.

Appendix 2

In relation to the conservation of ecosystems, the definitions for Comprehensive, Adequate and Representative (DEWR, 2007) are:

Comprehensive:

refers to the inclusion within protected areas of samples of each of the ecosystems discernible at the bioregional scale. It is the primary criterion because the likelihood of including functional assemblages of all species within a bioregion will be greatest when the full range of ecosystems present within an area is selected. The most appropriate ecosystem classification for reserve design will include attributes of vegetation structure and flora/fauna composition in conjunction with environmental attributes. Currently, there is no consistent description and mapping of such ecosystems at an appropriate scale across all Australian bioregions. Where bioregions currently lack such vegetation mapping, the best use should be made of all other available environmental classification and mapping information to define ecosystems.

Adequate:

refers to how much of each ecosystem should be included within a protected area network in order to provide ecological viability and integrity of populations, species and communities. The number of individuals (and hence area) needed for the long-term conservation of species varies appreciably between organisms. Species naturally occurring at very low densities (and/or requiring very large home ranges) and species, which may need to track resources which ebb and flow across extensive landscapes will need large areas maintained. The area requirements for such species can be estimated and these will provide some guidelines for minimum area requirements for the particular ecosystems in which they occur. In the absence of such estimates, the criterion of adequacy can be considered by aiming to conserve at least a substantial proportion of the extent of every ecosystem. As a general rule, the greater the extent reserved, the more likely that the ecological functioning and species composition of an ecosystem will be maintained.

However, there is no single threshold value that guarantees this persistence, for any or all ecosystems. Some ecosystems are much more threatened and less resilient than others and these may need higher levels of and more urgent, protection.

Replication across the range of geographic, environmental and biotic domains should be considered. The principle to apply is that ecosystems are represented within the protected area network at more than one site, hence providing some greater safeguard against catastrophic events.

Representative:

is comprehensiveness considered at a finer scale, and infers that the variability within ecosystems is sampled within the reserve system. The consideration of representativeness aims to ensure that information on species distributions and intrinsic/genetic variations is included in the reserve system.

The essential thing is that known species and genotypes are adequately reserved with the aim of maximising their viability within a bioregion, not necessarily that they are represented in every ecosystem in which they have been recorded.

Appendix 3

Poorly conserved vegetation unit to be cleared for Coalpac's 'contracted project' proposal

MU 13 TABLELAND GULLY RIBBON GUM – BLACKWOOD – APPLE BOX FOREST:

- Area within Project Boundary 111.81 ha;
- Area within Contracted Project Mine Plan to be cleared 91.15 ha; and

MU 13a TABLELAND GULLY RIBBON GUM – BLACKWOOD – APPLE BOX FOREST DERIVED NATIVE GRASSLAND:

- Area within Project Boundary 16.62 ha; and
- Area to be cleared 15.03 ha.

DEC, NSW description for MU 13 finds that the '*Reservation status is difficult to assess given the absence of comparable mapping to the west, however it is more than likely that it is poorly reserved and suffered moderate levels of clearing. Rough grazing is still evident in many stands of this community in the study area.*'

MU 20 CAPERTEE ROUGH-BARKED APPLE – REDGUM – YELLOW BOX GRASSY WOODLAND:

- Area within Project Boundary 46.18 ha; and
- Area to be cleared 14.96 ha.

DEC, NSW description for MU 20 notes '*It is poorly reserved and has been heavily cleared and fragmented by past agricultural land uses. Most remnants of this community exhibit evidence of high levels of disturbance.*'

MU 32 TABLELAND SCRIBBLY GUM – NARROW-LEAVED STRINGYBARK SHRUBBY OPEN FOREST:

- Area within Project Boundary 332.43 ha; and
- Area within Contracted Project Mine Plan to be cleared 74.80 ha.

DEC, NSW description notes ...*'there are only isolated examples in the adjoining reserve system*.'

MU 33 TABLELAND BROAD-LEAVED PEPPERMINT – BRITTLE GUM – RED STRINGYBARK GRASSY OPEN FOREST:

- Area within Project Boundary 13.71 ha;
- Area to be cleared 0.00 ha; and

MU 33 DNG (Derived Native Grassland):

- Area within Project Boundary 215.23 ha;
- Area to be cleared 0.00 ha.

DEC, NSW description states that for MU 33 '*Like many of the grassy communities of the rolling tablelands landscape, the levels of past clearing are high with few stands protected within the reserve system.*'

MU 34 TABLELAND SLOPES BRITTLE GUM – BROAD-LEAVED PEPPERMINT GRASSY FOREST:

- Area within Project Boundary 260.85 ha;
- Area within Contracted Project Mine Plan to be cleared 182.86 ha; and

MU 34 DNG (Derived Native Grassland):

- Area within Project Boundary 57.07 ha; and
- Area within Contracted Project Mine Plan to be cleared 49.23 ha.

DEC, NSW believes that '*Within the study area, the recent addition of Mount Walker* [note this area is on Granite] *to the reserve system greatly improves the reservation status of the community. However across its range reservation status remains poor and clearing and grazing activities persist in accessible terrain.*'

MU 36 TABLELAND APPLE BOX – BURSARIA GRASSY OPEN FOREST: May occur in areas where Coalpac failed to identify *Bursaria spinosa*.

The DEC, NSW description does not state this MU's reservation status, but it does for the closely related Map Units 33 and 34 above, both of which are poorly reserved.

MU 37 COX'S PERMIAN RED STRINGYBARK – BRITTLE GUM WOODLAND:

- Area within Project Boundary 92.02 ha; and
- Area within Contracted Project Mine Plan to be cleared 5.05 ha.

DEC, NSW considers that MU37 probably doesn't exist in the 'contracted project', and what Coalpac identified as MU 37 was probably MU 35. OEH considers that MU35 is also a *poorly reserved* community.

Also, MU 11 TABLELAND GULLY SNOW GUM – RIBBON GUM GRASSY FOREST:

- Area within Project Boundary 0.09 ha;
- Area within Contracted Project Mine Plan to be cleared 0.00 ha.

DEC, NSW description considers that '*Clearing has drastically reduced the likely former extent of this community like many communities found on richer soils near permanent water. As it lies within landscapes that remain dominated by agricultural land uses it is poorly protected in the reserve system.*'