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Nature Conservation Saves for Tomorrow

BMCS Submission re Project Approval 06_0021 Modification under Part 3A for Angus Place Colliery

1. Preamble

The Society once again draws attention to the outrageous practice whereby a substantial document (>100,000 KB) is placed on public exhibition (from 04/12/10-12/01/11) over the Xmas-New Year period. It has taken Angus Place Colliery and its various consultants at least a year leading up to the production of this voluminous document, yet the public exhibition period and opportunity to assimilate the document, and then make a submission is about 23 working days.

The Department of Planning may see the period as adequate, but it should consider the following:

- (a) The Society has about 900 members and is an entirely **volunteer** organisation run by a Management Committee. It has no paid consultants to call on and must rely on the expertise of a very small number of members who, as with many in government departments and even in coal companies, expect to take holidays over the Xmas-New Year period.
- (b) This is not the only massive document put out by State and/or Federal Governments relating to the Western Coalfield and requiring consideration by the Society over this holiday period – in fact, based on previous patterns, there seems to be a ‘deliberate’ attempt to place such documents on exhibition at a time when a properly considered evaluation is least likely – the author of this submission has two other such documents needing attention.
- (c) The Society appreciates that DoP may be constrained by statutory matters, but it must surely be clear that the present system is designed to accommodate ‘big-ticket’ organisations with salaried staff, whereas volunteer organisations with social and/or environmental concerns are substantially disadvantaged.
- (d) It is entirely unsurprising that the Part 3A process has been extensively criticised in recent media¹ as being complex, politicised and dysfunctional; and creating strong perceptions that public input has been marginalised and overly focusing on economic growth has been detrimental to the environment.

2. Critical risk issues

EARv1² Table 6.1 pp 41-42 records that the Risk Ranking of Environmental Considerations is: ‘significant’ in relation to greenhouse gas emissions (GGE); ‘significant-moderate’ (where significant is higher than moderate) in relation to surface water, groundwater, and flora and fauna; and ‘moderate’ in relation to subsidence and air quality (only the former will be considered by BMCS). The risk of cumulative impacts (p42) is deemed ‘low’, but BMCS may comment on this.

The Society’s main direct and indirect concerns for flora and fauna, as related to LWs 900W and 910, are: (i) clearing the vegetation for surface works, particularly with regard to the ‘inadvertent’ destruction of listed flora; (ii) destruction or modification of habitat linked to changes in terms of the quality and quantity of ‘natural’ surface water and emergency mine water discharges; and (iii) impacts to Newnes Plateau Shrub Swamps (NPSS) and other habitat in and near to the region affected by the two longwalls from possible groundwater changes. Item (i) is best handled through proper inspections and tagging to ensure that the risk to listed species is minimised – the area to be cleared is ‘small’ and the vegetation involved is well represented on Newnes Plateau. The concerns in items (ii) and (iii) are closely linked to

¹ Kelsey Munro, *Planning minister is too powerful, say green groups*, SMH, Tuesday December 28 2010, News p5.

² EARv1 applies to the Environmental Assessment Report Volume 1

matters raised in Sections 6 and 7 below. In the context of the consultant's report (EARv2 Appendix 7.7), they will receive no further consideration in the present submission.

An outline of the key findings related to the above risks is presented in EARv1 Table 1 pp iv-x within the Executive Summary.

3. Community consultation

Before moving to the identified critical issues, BMCS will comment briefly on the matter of consultation.

As used in EARv1 pp28-29, 'community consultation' is somewhat limited. The Society acknowledges involvement with the original subsidence management planning process, and ongoing involvement through the SMSRs³. However, the Society was not to the author's knowledge part of the consultation process in January 2006⁴, and is not represented on the Angus Place Community Consultation Committee.

Over relatively recent times (since April 2009), largely through Richard Tacon, Mary-Anne Crawford and Edwina White in relation to Centennial's *Newnes Plateau Consultation Strategy*, consultation and the information-flow have substantially improved. Only as a consequence of this interaction, was confirmation provided (by Mary-Anne Crawford – email 06/10/2010) that a modification to Angus Place's project approval had been placed on public exhibition.

The Society raises this matter because the prescriptive and restrictive nature of some Community Consultation Committees⁵ seemingly precludes adequate participation by concerned environmental organisations.

4. GGE and economic considerations

EARv2 Appendix 7.11 Table 25 p40 shows that the modified project GGE amounts to an estimated total of 1,023,210 tCO₂-e/annum, this comprising 0.63% of the total GGE for NSW in 2007. The information is recorded without comment in EARv1 Executive Summary, Table 1, pviii. Similarly, with little additional comment, the report (EARv1 pp75-77) notes that the consultant recommends utilising "...ventilation modelling to identify opportunities to reduce ventilation flow and therefore the energy used by the main fan as the production areas become closer to the mine pit bottom and ventilation circuit resistance is lowered"; identifying and implementing "...cost effective measures to improve energy efficiency"; ensuring "Regular maintenance of plant and equipment to minimise fuel consumption"; and considering "...energy efficiency during the plant and equipment selection phase."

The approach is classically reductionist in its consideration of GGE. It simplistically states that the additional contribution from new longwalls is only 0.63% of the total GGE for NSW 2007⁶, and effectively implies that this is of negligible significance, despite the Risk Ranking of Environmental Considerations rating GGE as 'significant' (Section 2 above). NSW and Australia are struggling to meet currently inadequate GGE targets, a price on carbon is seemingly inevitable, and 'clean coal with geosequestration' (CCS) is far from being a practicable solution to coal-fired power production. Indeed, even were CCS to become 'viable', the associated costs [without even more outrageous government (=taxpayer) subsidisation⁷ of the coal-fired power industry] would render 'clean coal' uncompetitive with eminently practicable 'renewables'. There seems to be no recognition that the coal-fired power industry is already a major cause of GGE. **How can worsening the situation be countenanced? Only in a reductionist's paradise could coal's role in GGE be so trivialised.**

A different approach is provided by the economic assessment (EARv2 Appendix 7.10) which focuses on the substantial economic benefits of the modification (EARv1 pix). According to the consultant (EARv2 Appendix 7.10 p7): "...any environmental impacts of the Modification, after mitigation by Centennial Angus Place Pty Ltd, would need to be valued at greater than \$51M to \$59M to make the Modification questionable from an **economic efficiency perspective**⁸." "The main environmental impacts of the Modification relate to greenhouse gas generation and the clearing of 4.2ha of native

³ SMSRs – refers to the 4-monthly Subsidence Management Status Reports.

⁴ Angus Place Colliery – Proposed Mining and Coal Transport – Environmental Assessment January 2006 prepared by International Environmental Consultants Pty. Ltd.

⁵ E.g., the Airly CCC and perhaps the Angus Place CCC.

⁶ And by implication this will be <0.63% for current GGE.

⁷ Such subsidisation could well attract the attention of the Australian Consumer and Competition Commission; see Brian Robins, Coalmine subsidy will harm competition..., SMH Dec 22 2010, News p6.

⁸ My emphasis - the consultant has done what was asked and made no attempt to confront the broader social, environmental and moral perspectives of GGE and climate change.

vegetation.” These are valued at ~\$6.1M and are therefore “...significantly less than the estimated net production benefits.”

In terms of the distribution of the benefits, the consultant indicates (EARv2 Appendix 7.10 p10): “*The net production benefits...are distributed between...Centennial Angus Place Pty Ltd and its shareholders in the form of net profits, the NSW government in the form of royalties, the Commonwealth Government in the form of company tax and the local region from the establishment of a Voluntary Planning Agreement to fund local community projects.*” The State and Commonwealth also gain from payroll tax and income tax respectively. It is conversely noted: “*Residual environmental impacts, such as clearing of native vegetation and greenhouse gas generation, would be borne by the general community⁹...*” And in EARv2 Appendix 7.10 p9: “*Cessation of mining after the Modification may lead to a reduction in economic activity in the region.....it is not possible to foresee the likely circumstances within which cessation of Angus Place would occur. It is therefore important for regional authorities and leaders to take every opportunity provided by the regional economic stimulus of Angus Place to strengthen and broaden the region’s economic base.*” Clearly, in the context of climate change, **a prudent government should already be broadening the Lithgow region’s economy in anticipation of the progressive curtailment of ‘dirty’ coal-fired power.**

The EAR regrettably fails to place any ‘cost’ on the broader picture. It has been argued¹⁰ that the costs of addressing climate change **now** (or ideally 5+ years ago) are significantly less than those of ‘business as usual’ and ‘too little, too late’. Yet the approach in the EAR largely disregards this. It sets strict economic benefits against the cost of a few hectares of native vegetation and a carbon price which will probably be borne by ‘Joe Public’. In doing so, it places the ‘dirty’ coal-fired power industry and the coal companies’ piecemeal modifications to existing approvals ahead of arguably the most significant problem confronting the State and the Commonwealth. **But hey! When have moral, environmental and social considerations ever withstood the greed of short-term monetary gain?**

5. Subsidence impacts

Subsidence carries a ‘moderate’ risk (Section 2 above). The key findings (EARv1 Table 1 ppiv-v; EARv1 Table 6.1 pp41-42) show the hydrologic regime (surface water and groundwater) carry ‘significant-moderate’ risks and are treated separately. This is strange! The EAR is looking at the impacts of longwall mining which, by design, causes subsidence and inevitably requires mine-water pump-out. In the absence of negligible subsidence, impacts on the hydrologic regime (*inter alia*) would correspondingly reduce¹¹, so it is surprising (inconceivable perhaps) that the cause (longwall mining and subsidence) carries less risk than the potential consequences.

The cliff-collapse in mid-2009 presumably reflected instability induced by subsidence linked to LW 920. The Society therefore appreciates the precautionary measures¹² adopted by the company with respect to LWs 910 and 900W. As well as reducing the likelihood of fracturing and cliff-collapse, the measures will hopefully lessen the risk of further damage to Kangaroo Creek (Section 6.3).

EARv2 Appendix 3.1 piv indicates that the surface above LWs 920 and 930 is expected to subside a further 0.15-0.7m due to the extraction of LW 910. This could reactivate fracturing associated with past damage to surface flows in Kangaroo Creek and might adversely affect West Wolgan Swamp (see Section 6.3.2).

EARv1 pp22-23 and EARv2 Appendix 3.1 ppiv-vi acknowledge a range of tensile and shear fractures which, where rock is exposed, could cause downward-tapering vertical fractures up to 90 mm wide above LWs 910 and 900W. They recognise that cracking could create public-access risks. Other aspects involving loss of surface flow in some spring-generated and/or ‘ephemeral’ creeks caused by ‘re-routing to sub-surface flow paths’, ponding or incision due to gradient changes, ‘healing’ of superficial fractures, and lack of hydraulic connectivity between the ‘surface’ and mine workings, are mainly of concern to the hydrologic regime and will be examined in Sections 6.3.2 and 7.

⁹ If a carbon tax or an emissions trading scheme is implemented, such greenhouse gas costs would become an operating cost of Centennial Angus Pty Ltd. But this would then become an indirect community cost because the coal price would be reflected in electricity costs, and the failure to stop using ‘dirty’ coal would be borne by all.

¹⁰ E.g., as in the Stern and Garnaut reports amongst others.

¹¹ This excludes those natural variations to precipitation, infiltration, run-off and evapotranspiration, which obscure mining-induced effects and are ‘gratefully’ embraced by consultants.

¹² EARv2 Appendix 3.10 p1 ppiv-v: cracking is considered improbable because all known cliff lines are well outside the 26.5° Design Angle of Draw such that the angular relationships between the LWs910 and 900W and cliffs more closely approximate 42 and 35° respectively; and LW910’s finishing point has been moved eastward by 100m.

The Society emphasises three matters: (i) the EAR recognises that various types of damage will occur; (ii) the consultants consider the envisaged damage to be either minor and acceptable, or unlikely; and (iii) even in ‘worst-case’ scenarios the emphasis is on ‘impact management strategies’ involving signage, monitoring and remediation, rather than prevention.

6. The hydrologic regime – surface water concerns

The Society is using ‘hydrologic regime’ to cover both surface water and groundwater aspects. However, Section 6 will predominantly deal with surface water, while Section 7 will focus on groundwater. It is convenient to separate surface water and groundwater¹³, despite the two being inextricably linked; separation is a function of location at a given time rather than lack of interaction and interdependence over time.

6.1 LDP006 and the 940-910 dewatering bores

EARv1 p12 states that LDP006 is “...an emergency discharge point from the 940 dewatering bore on Newnes Plateau. This licensed discharge point is only operated under emergency conditions. Emergency conditions are considered to exist when the bore water cannot be fed into the Springvale Delta Water Transfer Scheme. The emergency discharge point was developed as a contingency and is licensed accordingly. Water is discharged to the Wolgan River from LDP006 via Narrow Swamp North.”

EARv1 p25 refers to the 910 dewatering bore as follows: “To effectively manage the groundwater in the proposed longwall workings, it is necessary for an additional dewatering bore to be established at the eastern end of Longwall 910. Water from this dewatering bore would be managed in a similar fashion to other underground water. This ensures a settling period prior to it being pumped to the surface and directed into the existing Springvale Delta Water Transfer Scheme.”

It is clear that the 940-910 pump-outs are intended for the Springvale Delta Water Transfer Scheme (SDWTS) **unless emergency conditions prevail. The Society understands that the problems which once beset the SDWTS have been resolved, but remains unconvinced that protracted ‘emergency’ discharges will never recur.** Indeed, regular and/or protracted discharges to LDP006 could result from: either the Wallerawang Power Plant owners or Centennial Coal deciding temporarily or permanently to stop the transfer scheme; Wallerawang Power Plant being decommissioned in view of its age; Lake Lyell being full such that the transfer scheme becomes temporarily superfluous; the transfer water’s chemistry being less suited to power plant operations; and imposed economic constraints linked to carbon pricing in relation to coal-fired power generation. In any of the foregoing circumstances and for other unforeseen reasons, the emergency use of LDP006 will be required, and the environmental consequences of its location and use must be considered.

Comparison of EARv2 Appendix 7.3 Tables 4.2 and 5.1 shows that the total 940-910 discharge to the SDWTS will increase to 2604 ML/yr from the current 940 discharge of 1341 ML/yr¹⁴. The increased discharge (2604-1341=1263 ML/yr) is said to amount to ~3.5 ML/dy (EARv2 Appendix 7.3 pvi), which equates to a total 940-910 discharge of ~7.2 ML/dy (=3.5x2604/1263). **Should discharge to the SDWTS not be practicable (irrespective of the reason) ~7.2 ML/dy would pass through LDP006 and into the Wolgan River.** However, as noted in EARv2 Appendix 7.3 pvii, this is a daily average, whereas operational variations could result in much larger ‘daily’ volumes being discharged on some occasions.

The Society contends that the physical and chemical impacts of such discharges at the immediate discharge point, along the gully and steep gradient they will follow down into Narrow Swamp North, then along Narrow Creek, and down into the Wolgan River, are unacceptable.

Should such a discharge point be essential¹⁵, **the Society believes that the use of LDP006 must be severely constrained, both as to duration and volume of discharges, through directing ‘excess’ discharge to LDP001; and LDP006 must be subject to rigorous design conditions to ensure minimisation of damage. In both cases, it is essential that the discharges be treated to ‘drinking water’ standards.**

¹³ This division will be used in the present submission following the practice in the EAR to use separate consultants for the assessments in Appendices 7.3 and 7.4.

¹⁴ These data are independent of the ‘Total Rainfall/Runoff Input’ – variations in ‘Total Rainfall/Runoff Input’ for dry versus wet years will be accommodated through the LDP001 and LDP002 discharge volumes.

¹⁵ This assumes that: the Modification will be approved subject to hopefully rigorous conditions, LDP001 is not a viable alternative, and discharge to Kangaroo Creek from the west end of LW910 is not practicable.

6.2 Water quality

EARv2 Appendix 7.3 pvii states: “As the Project includes extension of existing underground operations and no additional surface disturbances (other than the construction of clean water diversions), the impact on water quality as a result of the Project is considered to be negligible.” **This logical is valid, but it only gives comfort if water quality is not adversely affected by the existing operations; otherwise, the Project compounds an already adverse situation.** The Society will examine this further by considering whether: (i) the existing discharges comply with EPL 467, (ii) EPL 467 is adequately prescriptive in terms of the spectrum of contaminants covered and the trigger values of those contaminants; and (iii) there is an appreciation of the differing standards required for discharges into the Wolgan-Colo system and the Greater Blue Mountains World Heritage Area (GBMWA) versus the Cocks system which is already impacted by rural, coal mining and power generating activities. Regrettably, none of these provisos are met, although EARv2 Appendix 7.3 Section 4.8 pp4.26 to 4.31 provides an excellent background to what the consultant is investigating.

6.2.1 Compliance with EPL 467 [item (i)]

The specified trigger values for EPL 467 and the site-specific trigger values recommended by the consultant are in EARv2 Appendix 7.3 Table 4.16 p4.50. For pH, total suspended solids (TSS) and oil and grease (O&G), all LDPs except LDP003 were within the EPL limits (EARv2 Appendix 7.3 pvii). **The LDP003 deficiency is under investigation by Centennial Angus Place and should be rectified.**

6.2.2 EPL 465 inadequacy [item (ii)]

Although not Angus Place’s fault, EARv2 Appendix 7.3 Table 4.16 p4.50 demonstrates the total inadequacy of EPL 465 in terms of all classes of contaminant; only 3 of the 7 types of physicochemical contaminant are covered, and none of the dissolved metals, total metals and nutrients is specified. **The obvious conclusion: the EPL bar is set far too low to adequately preserve water quality from a local and downstream environmental perspective.**

The Society believes the EPL 465 inadequacy should be urgently addressed by government and Centennial. Additional support for this view is provided by EARv2 Appendix 7.3 pvii in relation to the ANZECC/ARMCANZ (2000) default trigger values: “...several additional parameters...exceeded the recommended concentration limits. These primarily included electrical conductivity, iron, lead and zinc”¹⁶.

EARv2 Appendix 7.3 pvii also states: “While the electrical conductivity of discharges from Angus Place Colliery were found to be higher than the recommended level for upland rivers, they remained in the lower end of the brackish scale. In order to determine if there has been an unacceptable adverse impact on the environment within Kangaroo Creek and Cocks River, Centennial Angus Place proposes to undertake toxicity and ecological assessments. Furthermore, investigations into transfer and/or treatment options for mine water will be progressed should such measures be identified as being required through the toxicity and ecological assessments.” **The Society contends that ANZECC/ARMCANZ (2000) triggers were set for sound reasons, not the least of which is the prevention of adverse environmental impacts.** Results in the ‘brackish scale’ have adverse impacts on an ecosystem’s flora and fauna (including micro-fauna). A long-term study of toxicity while mining and discharges continue will ensure that adverse impacts are perpetuated. Will mining and discharges continue to be sanctioned while another long-term study is conducted to see whether the ecosystem is permanently damaged or recovers over time?

If the above is not enough, EARv2 Appendix 7.3 Discussion p4.49 recommends: “Centennial should analyse to a lower limit of reporting (LOR) for Hexavalent chromium at least to the same value as the default ANZECC/ARMCANZ (2000b) 95% species protection trigger of 0.002 mg/L. The majority of samples are currently below the LOR, however the recorded LOR (0.01 mg/L) is an order of magnitude greater than the ANZECC/ARMCANZ (2000b) trigger.” Also: “The limit of reporting for the majority of copper, lead, zinc and total phosphorous samples remains above the default ANZECC/ARMCANZ (2000b) 95% species protection trigger. More recent samples have been analysed to a more sensitive limit of reporting, below the ANZECC/ARMCANZ (2000b) trigger. This sensitivity of analysis should continue...”

In relation to monitoring downstream of LDPs, EARv2 Appendix 7.3 Discussion p4.49 notes that only two of the five Angus Place LDPs are suitably monitored. The consultant also reports “...that site specific trigger values...should be applied to the water outside the mixing zone of any point source.” The Society contends that this encourages reliance on

¹⁶ The quoted section continues as follows: “A review of the background ambient concentrations indicated that higher concentrations of iron and zinc were a characteristic of the natural catchment and therefore no treatment has been investigated”. This will be addressed under item (iii) and is also criticised by Keith Muir in the Colong Foundation’s submission.

dilution by the existing stream rather than pre-treatment of the discharge. The ‘mixing zone’ extends downstream as a function of variables such as discharge volume, stream-flow volume, stream-flow rate, and contaminant type. Determining the mixing zone’s extent as a function of all the variables would be a major long-term research project; and for what purpose? There will still be an adverse impact in the mixing zones for the various contaminants, or is that degree of impact acceptable as collateral damage?

6.3.3 Differing standards [Item (iii)]

EARv2 Appendix 7.3 p4.28 indicates that trigger values¹⁷ may reflect ANZECC/ARMCANZ (2000b) default values, licence limits, site-specific derived values, or local ecotoxicity testing. The consultant compared ambient values with site-specific derived values, ANZECC/ARMCANZ (2000) default data, and EPL 465 limits, as a basis for selecting the ‘site-specific trigger values’ which are, in general, **the highest value** in the comparison (see EARv2 Appendix 7.3 Table 4.16 p4.50). The process seems rigorous, but because of data limitations there are few site-specific derived values and even fewer (though usually high!) EPL values, so the ‘selected’ site-specific trigger values in Table 4.16 are high EPL limits and a preponderance of ANZECC/ARMCANZ (2000) default data.

The Society has several concerns with the approach. Firstly, why select the highest value rather than the lowest (notionally the background data) or perhaps the mean? **Selecting the highest value effectively gives the company the right to pollute.** Secondly, ambient or background data is fine provided that a natural unpolluted background exists. If not, **the ambient results are a construct of a contaminated environment and enable a view that new activities will have negligible impact.** Thirdly, in the case of the Angus Place, the ambient are from Kangaroo Creek upstream measurements because they are (EARv2 Appendix 7.3 p4.32) “...representative of the background condition of Kangaroo Creek” and located “upstream of all of the Angus Place licensed discharge points.” This is true, but Kangaroo creek “... is disturbed by past and current mining activity, giving water quality data that show elevated turbidity, salinity, iron, manganese and sulphate readings due to fracturing of the stream bed and redirection of flows through the fractured near-surface rock...In other words, the reference point is not a baseline undisturbed environment like Carne Creek to the east...”¹⁸. Lastly, if a contaminated background from one catchment is applied to an adjacent ‘pristine’ catchment, it effectively downgrades any adverse impact. As argued in the Colong submission¹⁸: “If there is to be a local base line approach, then two local standards should be developed. One...should be determined for the Cocks River receiving waters...Another standard should be determined for the Colo River receiving waters...For the former catchment the default triggers under the ANZECC/ARMCANZ...for slightly to moderately disturbed systems may be appropriate” but the latter feeds “...the World Heritage Area and the Emirates Eco-resort and the high conservation/ecological value ANZECC/ARMCANZ...system would be the appropriate guide...”

6.3 Increased-reduced-lost surface water flows

6.3.1 From the proposed dewatering modifications

Cocks River and Kangaroo Creek: EARv2 Appendix 7.3 p5.1 states that “As the Project will not result in any proposed amendments to the discharges from Angus Place Colliery, nor will there be any longwalls under this watercourse, there will be no increased impact on Cocks River.” **This is not true for three reasons.** (i) If the SDWTS as proposed (i.e., a constant throughput of 2604 ML/yr) variations due to wet and dry years will be accommodated by varying flow volumes through LDP001 and LDP002 (x-refer Section 6.1 footnote 14). These discharge into Kangaroo Creek and the Cocks River (EARv2 Appendix 7.3 Fig. 4.4) and inevitably influence the flow volume and chemistry. (ii) If the SDWTS were to ‘shut down’ and LDP006 not be used, 2604 ML/yr (7.2 ML/dy) would need to be pumped from LDP001 in addition to the predicted 1405 ML/yr under the current proposal (EARv2 Appendix 7.3 Table 5.2 p5.7). This is why the consultant recommends that “...the current volumetric licence condition nominated within Environmental Protection Licence 467 for Licensed Discharge Point 001 (30 ML/day) be maintained.” (iii) Finally, if the Society’s recommendations regarding severely constraining the duration and volume of discharges through LDP006¹⁹ are followed, discharges through LDP001 would correspondingly increase.

From items (i) to (iii), it should come as no surprise that the consultant states “...there will be a possibility [of] an increase in discharges from Angus Place Colliery through LDP001...as a result of [the] extension of the life of mine.” **It is**

¹⁷ These are (EARv2 Appendix 7.3 p4.28) “...the key performance indicators measured for the ecosystem, below which **there exists a low risk** that adverse biological (ecological) effects will occur. They indicate **a risk of impact if exceeded** and should ‘trigger’ some action...”

¹⁸ Quotation from Keith Muir’s submission for the Colong Foundation regarding Project Approval 06_0021 Modification

¹⁹ Refer to Section 6.1 last paragraph. “...the Society believes that the use of LDP006 must be severely constrained, both as to duration and volume of discharges, through directing ‘excess’ discharge to LDP001...”

specious to suggest that increased discharges to Kangaroo Creek and Coxs River will have no environmental consequences in and beyond the mixing zones.

Wolgan River and Narrow Creek: Section 6.1 addresses the consequences of ‘emergency’ discharges from LDP006. The Society here restates its position: **the physical and chemical impacts of such discharges at the immediate discharge point, along the gully and steep gradient they will follow down into Narrow Swamp North, then along Narrow Creek, and down into the Wolgan River and the GBMWA, are unacceptable.** Only if other discharge options are totally impracticable, **not just more expensive**, should LDP006 be permitted; and only then provided its use and design are heavily constrained.

6.3.2 From mining-induced surface effects

Cracking is a common occurrence in response to horizontal compressive and tensile stress distributions developed during subsidence accompanying longwall mining (EARv2 Appendix 3.1 Fig 5b). The consultant (EARv2 Appendix 3.1 p28) provides a definition and explanation of types of cracking and specifically notes that “...it can occur during and subsequent to the longwalls.”

Valley closure and bulging (or upsidence) and associated fracturing (cracking) are also a response to horizontal compression during subsidence (EARv2 Appendix 3.1 p33). They may occur during and subsequent to the passage of the longwalls. Upsidence is more common in terrain with steeply incised valleys and horizontally bedded, interstratified rocks of differing competence. EARv2 Appendix 3.1 p34 states: “*The development of upsidence or minor surface cracking may cause localised deviation of surface flows in rocky, ephemeral creek beds into sub-surface routes. The re-routed surface flows would be expected to re-surface downstream of the impacted area...*”

In discussions of such upsidence and generalised cracking within watercourses, consultants seem to play-down the effects on surface flows. For example (EARv2 Appendix 3.1 p28)²⁰: “*The impacts in most cases should be self-healing, due to sediment bed load that is likely to accumulate in the cracks after several storm events...*” The Society is concerned about so-called ‘self-healing’ of cracks which may be part of bowed-up and disrupted layering, and in the case of tensile cracking may extend to 20 m deep (EARv2 Appendix 3.1 p28). There is no question about detritus being washed into cavities, irrespective of their shape, but the following must be considered: (i) the lighter and finer grained component may well be flushed out; (ii) such fill as remains reduces the cross-sectional area of the flow path but does not preclude flow; and (iii) irrespective of the amount of fill, the permeability of unconsolidated sediment will be higher than the encompassing rock and a flow path will remain. **The Society strongly believes that despite some partial healing, full surface flow will not be re-established.**

The submission from the Colong Foundation (K Muir, Colong Foundation Submission re Project Approval 06_0021 Modification) raises similar concerns.

Kangaroo Creek and its tributaries: In relation to LW 900W, the possibility of there being “...minor surface cracking within the Kangaroo Creek **tributaries** as a result of mining” is acknowledged (EARv2 Appendix 7.3 p5.4) (x-refer Section 5 above). The extent to which the cracking may affect any flows in the tributaries is ‘unlikely’²¹. The Society accepts this based on EARv2 Appendix 3.1 Figs 17a, 22 with respect to eastward-flowing tributaries. Conversely, the westward-flowing tributaries have already been subjected to LWs 920-950 (and the Springvale’s LWs to the south), and will be further influenced by the approved LWs 960-970.

There is no question that upsidence and cracking have influenced surface flows in Kangaroo Creek (e.g. EARv2 Appendix 3.1 p34; EARv2 Appendix 7.4 pp7, 15; Springvale SMSR No14 Nov 7 2010 Attachment 6 pp2, 8; B Marshall, BMCS Submission to Angus Place Colliery²²; K Muir, Colong Foundation Submission re Project Approval 06_0021 Modification). The damage commenced with LWs 920 and 930, has been perpetuated with LWs 940 and 950, and will no doubt be exacerbated by LWs 960-980. **The only debate is whether the damage to surface flow is permanent or whether ‘self-healing’ will achieve total or partial recovery. Unfortunately for the affected ecosystems, the debate is academic; they are already adversely impacted.**

From the viewpoint of the Modification, the response will inevitably be that LWs 900W and 910 will not exacerbate the impact on Kangaroo Creek and the associated ecosystems!

²⁰ One might equally well cite Angus Place’s Subsidence Management Status Reports (e.g. SMSR No 10 p16) or Aurecons’s reports (covering Springvale’s and Angus Place’s longwalls) attached to Springvale’s SMSRs (e.g. SMSR November 7 2010, Attachment 6 p2).

²¹ Defined as less than a 10% probability under a worst-case scenario in EARv2 Appendix 3.1 Table 9 p26

²² Available from BMCS Admin or the present author as AngusPlaceAugDec2008Reports_BMCSSubmission090601.doc

West Wolgan and Narrow Creeks: upsidence cracking occurs in Narrow Swamp from LWs 920-940 (EARv2 Appendix 3.1 p34), but this is unlikely to be reactivated by LW 910 based on EARv2 Appendix 3.1 Fig 17a.

EARv1 p51 indicates that minor ponding to a depth of 0.1m could occur towards the downstream extent of West Wolgan Creek overlying longwall 910. The estimated volume of the predicted ponding, based on this depth, is 0.05 ML. The impact on flow transfers downstream is considered to be ‘negligible’. The Society accepts this.

7. The hydrologic regime – groundwater concerns

As mentioned at the commencement of Section 6, surface water and groundwater are interdependent. At the surface, the interdependence is obvious in terms of the location of swamps, and whether streams are gaining from groundwater or losing to it, particularly in the ephemeral nature of some watercourses. With increasing depth below surface the ‘obvious’ connection between surface water and groundwater is less apparent unless, as with the deeply incised topography of the Blue Mountains, one sees springs emitting at stratigraphic levels well below any seen on the higher parts of the plateau. Then the time element becomes important. Where was the recharge site, how much horizontal and vertical migration was involved in reaching the exit point, and over what period of time? Once again, separation is a function of location at a given time rather than lack of interaction and interdependence over time.

There is considerable looseness in relation to the groundwater regime, both as to detail and level of certainty. EARv2 Appendix 7.3 Fig. 4.13 uses the 2005 CSIRO work²³, whereas EARv2 Appendix 7.4 Fig. 2 cites CSIRO 2010²⁴ and EARv1 Fig. 2.3 cites Aurecon²⁵ (after CSIRO). This leads to such uncertainties as AQ5 being variously considered as unconfined but including localised perched aquifers (Fig 4.13) versus confined and overlain by various perched unconfined aquifers (Figs 2 and 2.3), the less permeable layers between aquifers being termed impermeable (Fig 2.3) aquicludes versus semi-permeable (Fig. 2) aquitards in the text (EARv2 Appendix 7.4 pp8, 22), and the inferred hydrogeological section (Fig 2) being based on work at Springvale Colliery.

More fundamental uncertainty exists over the permeabilities (horizontal versus lateral) of the aquifers, whether the permeability is primary or secondary (fracture-controlled), whether the layer-cake hydrogeological section extends over the Angus Place region, and whether vertical hydraulic connectivity exists through the semi-permeable aquitards, including the Mt York Claystone. This is heavily emphasised in EARv2 Appendix 7.4 p8, but the consultant and others still seem to treat the hydrogeological model as absolute rather than the currently best available cartoon. This point is emphasised because, although the principal stratigraphic units are established, the stratification (particularly in the coarser grained rocks) is lenticularly discontinuous and thereby greatly influences the transmissivity of the aquifer.

7.1 Previous mining

EARv2 Appendix 7.4 p22: *“Underground mining in this region has been carried out for over a century, so that it is reasonable to assume that there has been at least some impact on the local hydrogeological regime...Obviously, the extraction of the longwall panels in Angus Place Colliery has had the greatest influence on the local hydrogeological regime in the vicinity of the proposed longwalls 900W and 910...the coal measure strata above the Lithgow Seam have already been depressurised and partially drained of groundwater”*. This is true. However, the consultant concludes from this that the drainage creates no regional hydrological impacts because the Coal Measures provided negligible contribution to stream flow and vegetation.

The Society believes the opinion is overstated: (i) Coal Measures crop out in some of the deep gorges of the Grose and Colo River systems where AQs 1 and 2 would certainly contribute to base flow and, through cliff-related seeps, support the associated ecosystems; (ii) depressurisation disrupts the regional groundwater flow and results in an inward flow (down-dip, along-strike, down from the fractured overlying rocks, and in some cases up-dip when the rocks are very shallowly dipping) along the local hydraulic gradient – in crude terms, the void ‘sucks’ – this could potentially impact ecosystems developed on the Coal measures along the up-dip tract of the Western Escarpment; and (iii) as the zone of collapsing hydraulic head climbs into the upper ‘A’ zone and perhaps even the ‘B’ zone (EARv2 Appendix 3.1 Fig 26), the hydraulic gradient facilitates groundwater ‘bleeding’ into fracture-controlled dilatancies (EARv2 Appendix 3.1 Fig 25, 26).

In terms of the known stratigraphy, EARv2 Appendix 7.4 p14 suggests that depressurisation and partial draining due to past mining extends from 100 m to a conservative 150 m above the Lithgow Seam, which means that the upper limit

²³ CSIRO 2005, *Preliminary Numerical Modelling of Mine Water Make at Angus Place Colliery*.

²⁴ CSIRO 2010, *Hydrological Assessment for LW910 and LW900W at Angus Place Colliery*

²⁵ Aurecon, October 2010, *Assessment of Hydrogeological Impacts Angus Place Project Modification*

approximates the base of the Mt York Claystone (EARv2 Appendix 7.4 Fig 2). Based on the properties of the Mt York Claystone (aquitard/aquiclude), the consultant contends that (EARv2 Appendix 7.4 p14) “...the hydrogeological regime in the Banks Wall Sandstone above the Mount York Claystone has been relatively unaffected by the mining to date.”

EARv2 Appendix 7.4 Fig 4 is offered in support of the consultant’s contention. However, in addition to showing the extent of fracture-facilitated pressure reduction extended to about 130-140 m²⁶ above the Lithgow Seam in piezometers between Springvale’s LWs 410 and 411, the Colong Foundation²⁷ has pointed out **Fig 4 clearly demonstrates that longwall mining produces dilatationary effects which cause lowering (by up to 50 m) of the groundwater level. The lowering, or total collapse in the context of AQ1 and AQ2, is recorded throughout the stratigraphic column** (EARv2 Appendix 7.4 Figs 2, 4).

The consultant (EARv2 Appendix 7.4 p17) emphasises that minor fluctuations in pore pressure levels in AQ4-A are almost certainly due to strata relaxation above the goaf. The possibility of any hydraulic connection between AQ4-A, or any of the upper aquifers that support the swamps is rejected. This may be so, but it provides another example of groundwater being impacted by mining; **and in anticipation of being told the impact is temporary and the groundwater level will return to ‘normal’ over time, I am aware of nothing in the EPBC Act which says a NPSS can be damaged provided there is ‘hope’ of recovery.**

EARv2 Appendix 3.1 p30 describes the ‘B’ zone as characterised by discontinuous sub-surface fracturing due to flexural folding of the strata, thereby leading to increased horizontal and vertical rock mass permeability. The style of deformation usually does not provide a direct flow path or connection to the ‘A’ zone and mine workings, but it may interact with surface fracturing and result in adjustments to surface and sub-surface flow paths. Based on EARv2 Appendix 3.1 Fig 28, broad-scale interaction between the ‘B’ zone and surface cracking seems improbable for cover depths exceeding 300 m. **Nevertheless, limited interaction where the topography is deeply incised, or there is through-going faulting, is not precluded** (see Section 7.3 below).

7.2 Proposed mining (LWs 900W, 910)

Because the two panels lie within an area which has been mined for several decades, the consultant argues (EARv2 Appendix 7.4 p17) that any impacts on the hydrogeological regime (both local and more regional) will have already happened, and that the possibility of any additional impacts is ‘highly unlikely’. Everything is couched in terms of a ‘likelihood’ which may or may not turn out to be correct. **Should the consultant be proved wrong in any part, then it will be time to claim atypical or unique circumstances, as indeed happened with East Wolgan Swamp²⁸.**

The consultant suggests (EARv2 Appendix 7.4 p19) that depressurisation of volumes to be mined by the new longwalls and a minimal groundwater contribution from the overlying strata will result in minimal groundwater-make. This seems in keeping with EARv2 Appendix 7.4 Fig 5, but is at odds with the suggestion made in Section 7.1 item (iii), and seemingly discounts the 3.5 ML/dy anticipated from the 910 dewatering bore (Section 6.1).

7.3 Vertical hydraulic connectivity

The consultant has extensively emphasised (e.g. EARv2 Appendix 7.4 p22) the role of the Mt York Claystone (MYC) and its role in shielding the overlying Banks Wall Sandstone and its aquifers from the impacts of longwall mining, by: (i) being at or above the upper limit of the continuous fracturing in the ‘A’ zone; (ii) having less brittle materials properties which favour flexing and bedding-plane delamination rather than fracturing; and (iii) having aquiclude/aquitard properties which impede hydraulic connectivity between the ‘B’ zones discontinuous fracturing and the high permeability ‘A’ zone. In doing this, the consultant has aimed to counteract suggestions that (EARv2 Appendix 7.4 p20) the upper aquifers drain into the lower aquifers over a long period of time (perhaps decades) to the detriment of NPSS. He noted that for drainage to occur there would need to be a reasonable hydraulic connection between the upper and lower aquifers, but that support for this was lacking in any of the available piezometer data. He supported his position by an example (in terms of the interpretation rather than the encompassing details) from pumping at Clarence Colliery.

²⁶ What happens at Springvale is a guide to what could be happening elsewhere. But rocks do not comprise homogeneous layers of uniform thickness and uniform mechanical properties devoid of incipient fractures; and the overburden thickness, which affects the vertical extend of zones ‘A’ and ‘B’, varies as a function of topography. The bottom line is that variations in behaviour will be the norm.

²⁷ Keith Muir, Submission for the Colong Foundation regarding Project Approval 06_0021 Modification

²⁸ It would seem that the likelihood of concerned environmental groups being able to warn companies and consultants of potential problems and actually have them listen and not attempt to explain them away until the proof of damage (still ascribed to unique circumstances at East Wolgan swamp, with the implication that it is a one-off occurrence) jumps up and hits them between the eyes, is extremely remote!

The Society responds as follows:

- (a) It is not possible to evaluate the tests without knowing the period of pumping, the nature of the mining process (i.e. was it longwall?) in the area being tested, and whether the rocks had re-pressurised prior to the pumping – so the tests will therefore be taken at face value. Nevertheless, if one is talking slow bleeding through one or two aquitards, pumping should have been for months rather than weeks.
- (b) The interaction of the ‘A’, ‘B’ and surface zones is *inter alia* a function of the depth of cover, seam thickness, mechanical properties of the stratigraphic units, and the distribution of secondary structures. For example, it was noted in Section 7.1 that “...*broad-scale interaction between the ‘B’ zone and surface cracking seems improbable for cover depths exceeding 300 m*”, so more localised interaction could be possible where the cover is deeply incised. Likewise, pre-existing fracturing associated with faulting or heterogeneities linked to variations in layer thickness (especially the coal seam) could cause localised upward extension of the ‘A’, ‘B’ and surface interfaces.
- (c) The general layer-cake approach adopted in the various models and analyses undertaken is unrealistic. Rock sequences may be correlated over a wide area, but the internal character of a stratigraphic unit may vary intensively; bedding may be lenticular and have conglomeratic phases, and cross bedding further varies the mechanical properties. As a function of bedding thickness and competence the layers are crossed by pre-existing joint systems and separated from each other by bedding-plane partings, all of which influence the water-bearing (‘aquifer’) characteristics, the horizontal and vertical permeabilities, and the caving and failure characteristics within the ‘A’, ‘B’ and surface zones. In essence, sedimentary rocks and rock masses are anisotropic in their properties over a range of scales. Simplistic models are useful, but they do not handle the level of variation that will be encountered when attempting to explain the consequences of longwall mining.
- (d) The MYC is typically finer grained than the sandstone sequences and comprises thinly bedded claystones, siltstones and lenticular beds of fine- to medium-grained sandstone. As with the other semi-permeable layers in EARv2 Appendix 7.4 Fig 2, it is an aquitard in that its vertical hydraulic conductivity is very low (typically several magnitudes less than the horizontal hydraulic conductivity), but largely due to vertical link-fracturing it does transmit water over time.
- (e) In terms of the bulk hydraulic conductivity, the Hawkesbury Sandstone and intercalated shale layers of the Mangrove Mountain district have horizontal/vertical conductivity ratio in the order of 10-20. I do not have equivalent figures for a Narrabeen Group sequence.

The Society remains of the view that low and possibly localised (via fault and fracture zones) vertical hydraulic conductivity is enhanced by longwall mining and could influence groundwater levels associated with NPSS. The Society recognises that dilational effects during subsidence take place over a much shorter timeframe and are of a magnitude which might mask the effects of vertical conductivity.

7.4 Long-term recovery?

Depressurising the aquifers in the Coal Measures and pumping out mine-water make at say 10 ML/dy inevitably creates confined drawdown around the active workings. EARv2 Appendix 7.4 p21 suggests that the drawdown extends in the order of 1200 m away from the workings and that this is likely to increase with ongoing pump-out over the envisaged mine-life. He indicates that once mining is completed, and pumping ceases, the drawdown radius will contract slowly, as the strata re-pressurise and the mine fills with water. He gives the example of the Lithgow State Mine which shut down in 1964 and four decades later yielded a seam-level water head close to the pre-mining level. He therefore concludes (p21) that “...*the regional hydrogeological regime at Angus Place should eventually be restored, even though it may take several decades to re-establish.*”

The notion that major disruption to the hydrologic regime by many years of pumping will ultimately turn out fine, is similar to the view that upsidence-induced loss of surface flows will be resolved by ‘self-healing’ **over time** and any damage to ecosystems is therefore temporary. **The Society opposes this justification of the indefensible.**

An unresolved consequence of re-pressurising a closed mine is that it creates an underground reservoir of polluted groundwater which progressively migrates down flow and may therefore contaminate other parts of the aquifer. Canyon Colliery could be an example of this problem surfacing in a tributary to the Grose River.

8. Cumulative impacts

Cumulative positive and negative impacts are outlined in EARv1 ppix-x and 83-88. The presentation seems to suffer from spin to the extent that emphasis appears to have been placed on positive parts of both types of impact.

The Society will restrict its comments to the few matters mentioned in the present submission, but firstly reports EARv1 p 85: "It is recognised that there are a number of industries with potential for impact in the area including Angus Place Colliery, the two power stations and underground and open cut coal mines. Whilst these individual operations might themselves comply with environmental standards and legislation, the combined or cumulative effect needs to be considered to gauge whether or not this might result in environmental limits and criteria being exceeded." **Or could it be that they are individually excessive and cumulatively a nightmare?**

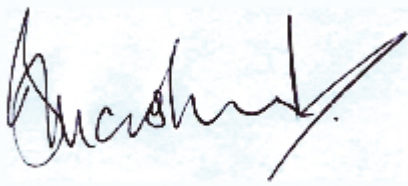
- (a) The foremost impact is that related to GGE. Any proposal which involves supplying coal to the coal-fired power industry is unacceptably contributing to GGE and climate change. It concurrently ties the economy of the broader Lithgow region to coal mining and coal-fired power generation, despite both industries having finite futures. It is clear that this impact is particular to the Modification but also applies to Angus Place and the many open cut and underground coal mines. The cumulative disaster is enhanced by inter-industry feedback: coal mining is there to support the power industry and the latter is there because it is close to the resource. A final component of the impact is that it impedes the development of sustainable industries in the Lithgow area and possibly creates public health issues.
- (b) Topographic subsidence is the next concern. Most of the other things to be commented upon 'flow-on' from subsidence, but rather than clutter the issue, the topographic aspect is isolated. Subsidence by say 1 m over two longwalls is seemingly minor, but it and the monitoring points, access tracks, surface works and enhanced visitation (= weeds and disturbance) constitute a local impact which enlarges with each longwall and with each additional coal company. Cumulatively, in conjunction with Forests NSW, sand mining, and high-impact recreation, it comprises a widespread adverse impact.
- (c) The surface water impacts are considerable. From the local viewpoint the potential discharge of mine-water make into the Wolgan catchment and the GBMWSHA can *inter alia* affect water quality, whereas discharging it into the Cocks River could exacerbate an unsatisfactory situation. The problem is cumulative in that the two longwalls add to the impact of other Angus Place longwalls, and even more cumulative when one considers the time over which this has been taking place and the many other coal and power companies creating discharge pollution. A major part of the problem can be sheeted home to inadequately rigorous licence conditions, rather than lack of compliance (although this still is a factor).
- (d) Surface water losses due to subsidence are mainly a local issue, although not limited to Angus Place. The impact mainly arises from the disruption of natural watercourses and its consequences for dependent ecosystems. Remediation is a poor alternative to protection zones. The increase to flows is principally a consequence of discharges to creeks. The impacts are reduced water quality and erosion to creek beds and banks with destruction of habitat.
- (e) The impacts of longwall mining to the groundwater regime are substantial. Enormous amounts of mine-make are pumped out, the aquifers are depressurised and there are arguably impacts on the upper aquifers and dependent ecosystems. At the end of mining, re-pressurisation possibly occurs and potentially creates new problems. This is a local problem which is cumulative within Angus Place and extends to other active collieries; the contaminated closed and abandoned mines are a regional unresolved impact.

9. Summary of the Society's Position

The Blue Mountains Conservation Society:

- Opposes all new developments aimed at producing coal for the 'dirty' coal-fired power industry because of GGE and climate change implications, and bolstering an industry which impedes development of renewable power generation and precludes movement to industries with sustainable employment potential.
- Rejects any argument based on the notion that because a region is adversely impacted additional damage is minimal and of little import.
- Rejects the view that recovery over the longer term in any way compensates for or is a solution to current damage.

- Supports the need for more rigorous testing standards and enforcement of compliance in the context of mine-water discharges into pristine river systems and water supply catchments. The aim should be for all discharges to meet ANZECC/ARMCANZ drinking water standards.
- Opposes the discharge plans in the Modification, particularly as they apply to potential discharges via LDP006 into the Wolgan catchment and thence to the GBMWhA. Untreated mine-make discharges into the Kangaroo Creek-Coxs River system are also opposed.
- Acknowledges that subsidence-induced dilatancy is a factor in lowering the watertable and potentially compromising groundwater-dependent ecosystems.
- Recognises the need for protection zones because of uncertainty regarding vertical connectivity between aquifers above and below the Mt York Claystone and the potential impact of longwall mining on NPSS.

A handwritten signature in black ink, appearing to read 'Brian Marshall', with a long, sweeping horizontal stroke extending to the right.

***Dr Brian Marshall,
For the Management Committee***

11 January 2011