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**Bylong Coal Project - R040/17**  
**Submission to PAC from the Bylong Valley Protection Alliance (BVPA)**

## **Introduction**

If approved, the Bylong Coal Project (Project) will have a devastating impact on the majestic Bylong Valley. Prime agricultural land, water resources and farmers' livelihoods will be permanently destroyed. Also destroyed would be Wiradjuri cultural heritage artefacts and culturally significant sites. This Project should not be approved. We have outlined below the serious and irreversible damage to the environment and prime agricultural land that will occur if the project is approved.

## **Summary of major concerns**

Below is a summary of our major concerns. Further detail on these concerns is provided in the body of our submission and the associated appendices which comprise independent expert advice on the Project commissioned by BVPA.

- Water security for farmers in the Bylong Valley will be seriously threatened by mine operations.
- The Department of Primary Industries – Water (DPI Water) Scorecard rates the Bylong Valley water resources as 'Highly Stressed' yet the implications of this fact are not acknowledged in the Department of Planning and Environment's (DP&E) Preliminary Assessment Report.
- If water availability is diminished by mining there is no plan to give priority to farms or to compensate farmers for loss of water.
- There is no requirement for DPI(Water) or the Proponent to establish a scientifically robust network of monitoring bores to assess the impact of the mine water take on the valley water resources, as a condition of approval.
- There will be permanent destruction of groundwater resources in the open cut pits and adjacent areas. Rehabilitation plans will not re-establish the aquifers.
- There are significant threats to Biophysical Strategic Agricultural Land.
- The rehabilitation plan is untested. The Proponents claim that the prime agricultural land above the mine voids will be returned to its current state is wildly optimistic.
- If the mine is approved there needs to be independent monitoring of the rehabilitation and a condition of consent should be that the voids are filled, as soon as coal extraction ceases.
- The long term adverse impacts on Dry Creek and Lee Creek are significantly underestimated.
- The cumulative impacts of increased salinity in the Goulburn River are underestimated.

- If the mine is approved an independent long term monitoring water quality program should be established by DPI (Water).
- The underground mine will be destructive of cliff lines in the State Forest and this effect has been downplayed by the Preliminary Assessment Report
- If the mine is approved measures should be taken to substantially reduce the risk of subsidence.
- The Preliminary Assessment Report, the EIS and RTS underestimate the social impacts which have already occurred due to the actions of KEPCO and ignores the fact that KEPCO has silenced many opponents of the mine who have been forced to sell.
- The NSW Government should prohibit the use of 'gag orders' in cases of 'forced' land acquisition. It cannot be said that the sales to date have been 'voluntary' as it is not a choice.
- There is no funded plan for the proper documentation, site investigation and archiving of Aboriginal cultural heritage artefacts and sites if the mine is approved.
- The Preliminary Assessment Report does not acknowledge the regional cumulative impacts of removing Indigenous artefacts and destroying sites of cultural significance.
- If the mine is approved sufficient funds should be provided for conservation and research of these artefacts and site records in perpetuity.
- There is no plan or funds identified in the Preliminary Assessment Report for the maintenance of Tarwyn Park and natural sequence farming as a site of National Heritage.
- The effects on biodiversity are underestimated and the proposed offsets will result in a net loss of biodiversity.
- The offsets adjacent to the National Park are proposed to be part of a bio-banking scheme which places them at risk of future trading. The site of proposed offsets adjacent to the National Park should be annexed to the National Park to give a higher level of protection.
- The potential adverse health effects from increased noise and dust from mine operations and associated heavy traffic on local roads have been underestimated.
- The contribution of the mine operations to increased PM2.5 in the regional airshed has been ignored.
- There is no assessment of the likelihood or severity of mine project abandonment.
- There is no recovery/mitigation plan for abandonment at any stage of mining.
- There is no requirement to fill the voids as a proposed condition of consent.

### **Threats to water security in the Bylong Valley**

Groundwater that is vital for maintaining productive agriculture in the Bylong Valley is obtained from relatively shallow aquifers and is highly dependent on seasonal rainfall. Most farms in the valley are totally dependent on alluvial groundwater for stock and irrigation. In periods of prolonged drought the groundwater resources become much less reliable. The

Preliminary Assessment Report ignores the findings of the DPI(Water) Water Sharing Plan Report card where the Bylong Valley water resources are described as Highly Stressed.<sup>1</sup>

We know from local experience that in the current environment during prolonged drought, groundwater recharge diminishes and the water table is significantly lowered. In the Millennium drought (2001-2009) many farmers had to deepen bores or sink new bores. It should also be noted that the ability to deepen wells or bores is severely restricted because the aquifers are shallow and underpinned by sandstone bedrock. Droughts also occurred in 1981-82 and 1995-98, so based on the last thirty years a drought can be expected at least once every decade. Unfortunately, the DP&E Preliminary Assessment Report does not adequately reflect the experience of long standing water users in the Bylong Valley or consider future environmental changes.

The Proponent relies on groundwater models which have not been thoroughly field tested in the Bylong Valley or tested over a long period in range of rainfall scenarios. It should also be noted that any pump tests carried out by the mine in the last year have taken place in very favourable conditions for seasonal recharge to the aquifers and does not represent the worst-case scenario of prolonged drought.

Even without proper consideration of these issues, the environmental assessment for the Project identifies significant water impacts and significant uncertainty in predicted groundwater yield. Evidence from local landholders of connectivity between bores raises significant concerns about the connectivity within the groundwater system and potential impacts on surrounding landholders from any future de-watering. Although KEPCO have undertaken further sensitivity analysis since the EIS was completed, the Proponent continues to inappropriately rely on a single model output alone for determining groundwater impacts. These uncertainties could have a significant impact on the outcomes experienced by Dry Creek and the other smaller creeks which feed into the Bylong River. Our expert advice is that given these uncertainties it would be appropriate to anticipate that impacts on baseflows will be worse than presently predicted (see Appendix 1 – Pells Consulting for further information).

Further expert advice received by BVPA identifies that the impact of the environment on the Project, in particular, the likely shortage of water for operation of the mine at some stages of development, is not adequately addressed and is problematic. The DP&E Assessment Report maintains that this is a risk for KEPCO, although it also requires them to demonstrate that there is adequate water supply before commencing with open cut or underground mining operations, and the Proponent has applied for additional water licences for water from the Permian Hard Rock Aquifer. If the granting of these licences will allow the Proponent to demonstrate that there is adequate water available to commence mining operations, if the mine project is approved there will be enormous pressure on DPI(Water) to grant these aquifer licences. The threat of mine closure, even on a temporary basis, could be used to trade environmental protection for jobs. Any further granting of licences will have consequences for all water users in the valley.

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<sup>1</sup> [http://www.water.nsw.gov.au/\\_data/assets/pdf\\_file/0010/548371/wsp\\_hunter\\_report\\_card\\_bylong\\_creek.pdf](http://www.water.nsw.gov.au/_data/assets/pdf_file/0010/548371/wsp_hunter_report_card_bylong_creek.pdf)

The three pits will require a substantial proportion of the licensed water allocation for the valley (up to 30%) and the mine water take will jeopardise the availability of farming water in the valley, leading to a further loss of agricultural production. Furthermore, if there is market competition for scarce water the cost of water for farmers will increase. Additionally, the uncertainty surrounding the availability of water is increased because the water usage in the Bylong Valley has not been metered so there is no record of the sustainable water yield. The excessive mine water take threatens the economic viability of many farms outside KEPCO's property holdings.

There will also be permanent damage to aquifers in the mine area and these aquifers will not be restored following the cessation of mining. KEPCO claims that this does not matter because they own the land under which the aquifers are located and therefore the destruction of aquifers is consistent with NSW Government Aquifer Interference Policy. This misapplication of a policy framework, which was designed to protect aquifers, is disingenuous and should be not supported by DP&E or the PAC.

### **Insufficient water for mine operations**

KEPCO has already obtained licences for a substantial volume of water available for use in the valley. However, there is no certainty that the mine will be able to source enough water to operate, especially in prolonged low rainfall periods.

Currently the mine does not have enough water licences to meet the projected high demand. In the Bylong Valley the water entitlement does not guarantee the actual licensed take because the volume of alluvial groundwater is highly variable. A water licence nominates the maximum take if that amount is available. The Preliminary Assessment Report does not give sufficient weight to the fact that under prolonged drought conditions there may not be enough water for the mine operation.

Expert advice provided to BVPA identifies that while detailed water modelling and reviews have been performed, the environmental assessment has failed to demonstrate that the Water Access Licences held by KEPCO will provide adequate water from the borefields to meet the water requirements of the mine, particularly during the open cut stage and during dry periods when water allocations in the Bylong River are likely to be reduced well below 100% (see Appendix 2 – Surface Water Issues for further information).

There is no plan for what do if there are conflicts between the mine and farmers over water availability. Will the mine get priority or will the farmers? If the mine is approved DPI(Water) must establish a robust testing regime for determining the water impacts of the mine with adequate monitoring bores.

### **Permanent loss of prime agricultural land**

The open cut mines and associated infrastructure will result in the destruction of 319 hectares of prime agricultural land. This land is referred to in the Preliminary Assessment Report as Biophysical Strategic Agricultural Land (BSAL). KEPCO claims that this land can be rehabilitated and can be used as prime agricultural land in 25 years' time however there is

little justification for this position and key assumptions regarding whether BSAL can be returned to its original condition post-disturbance have been overlooked.

Expert advice provided to BVPA also suggests that there are fundamental problems with the work undertaken to understand soil types, leading to the conclusion that the complexity of the soils and their properties in the Project area are not understood and therefore the assessment of the soil impacts is inadequate. The likely soil impacts following excavation will be erosion, increased sediment runoff and a decline in water quality of local drainage lines. In areas of low slope it is highly likely that subsidence will create issues with drainage and consequent water logging (see Appendix 3 – Adequacy of the Soil, Land Capability and Rehabilitation Plan for further information).

Significant concerns with impacts on agricultural land (even those areas proposed to be maintained as agriculture by KEPCO) therefore remain. This includes the fact that verified BSAL located within the predicted subsidence study area will be used as part of the Project's Biodiversity Offset Strategy and will therefore be unavailable for agricultural production into the future. The Proponent has not addressed issues of ponding (which will affect the chemical and physical fertility of affected soils, thereby impacting the agricultural productivity of verified BSAL); geotechnical stability risks of mine waste emplacements; and relocation and re-creation of BSAL soils. Soil handling techniques and profile mixing have the potential to affect soil fertility, effective rooting depth and soil drainage which has not been addressed in the assessment. There has also been no consideration of the impact of fragmentation of agricultural land uses (see Appendix 4 – Advice in Relation to Soils for further information).

There is no evidence provided in the Preliminary Assessment Report that this land can be rehabilitated and there is a real risk that this land will never be adequately rehabilitated for agricultural production, especially considering the track record of mining companies in rehabilitation and current concerns raised in the Auditor General's report regarding mine rehabilitation (discussed further below). The Project will also destroy nearly 700 hectares of land which is part of the Equine Critical Industry Cluster (ECCI). Long term rehabilitation and restoration of the landscape and soil properties of the site will be made more difficult by the presence of large, unconsolidated spoil heaps in which the soil is mixed and has lost the original soil structure and also in which the subsoil is sodic and possibly saline.

Expert advice provided to BVPA also identified the following impacts to agricultural lands:

- Cracking will have substantial degradation effects on the land;
- Predicted tensile strains will cause substantial cracking of stream beds, and substantial loss of water during flow periods; and
- Predicted tensile and compressive strains may result in cracking, heaving or stepping of the dam bases or walls, which may lead to leakage of stored water.

### **Reduced water quantity and quality downstream of the mine**

The Preliminary Assessment Report acknowledges that the mine will reduce the amount of water and increase the salinity of water flowing into the Goulburn River. However, these impacts could be much greater than acknowledged by DP&E. The Preliminary Assessment

Report ignores the cumulative impacts of increased salt flow into Goulburn River, and ultimately into the Hunter River. It is now well established that voids filled with mine waste and overburden will leach salts into the groundwater for many years following mine closures.

Expert advice provided to BVPA identifies that it has proved very difficult to accurately measure and quantify the potential combined contributions from coal mining operations resulting from point and diffuse seepage of saline water or loss of fresh groundwater inflows from regional Triassic-Permian groundwater system. The cumulative impact of opening yet another coal mine in a green field, highly vulnerable landscape has the potential to significantly increase the total salt load in the Goulburn River over coming years considering point and diffuse discharge of mine affected groundwater and mobilisation of geologically sequestered salts from disturbed mined areas (see Appendix 5 - Potential impacts and risks from the proposed Bylong Coal Mine development - Goulburn River catchment for further information).

### **Irreversible destruction of the Bylong Valley landscape and Lee Creek**

The Bylong Valley is heritage listed and a popular scenic route for tourists. To date there has been no mining in the valley. The Preliminary Assessment Report ignores the major landscape impacts of the three mines.

The mines will irrevocably destroy the iconic features and integrity of the valley. The mines will be a massive blight on the landscape. The current landscape cannot be restored following cessation of mining. The Bylong Valley is a relatively small valley and the mining impacts will destroy a significant proportion of the valley and impact the integrity of the whole valley. This will have a significant impact on the cultural landscape which contributes to the heritage significance of the valley (see further information below).

KEPCO plans to sandwich Lee Creek between two open cut mines. Lee Creek will be severely impacted by the mine operations. None of the consultants' reports commissioned by the Proponent give any measure of assurance that Lee Creek will retain its flow rate and riparian vegetation in the mine area for the proposed 25 years of mining or after the mine has ceased operating. In fact, expert advice has identified that impacts on this and other creeks are likely to be larger than predicted. It should also be noted that KEPCO intends to close the Lee Creek Road thus prohibiting access to a popular scenic drive in the valley.

### **Extensive social impacts**

The mine proposal has already had negative impacts on the people of the Bylong Valley. A large number of farms have been acquired by KEPCO and the area in the mine footprint has been depopulated. The long standing social connections around the small rural village of Bylong have been severed by the actions of KEPCO.

These impacts have not been adequately assessed or considered by the Proponent and DPE. Expert advice provided to BVPA (see Appendix 6 – Review of Social Impact Assessment) identifies a number of methodological and analytical deficiencies in the Social Impact

Assessment prepared by KEPCO's consultant. These include the fact that there is limited cross-analysis of the data, restricted reference to the environmental assessments, a significant lack of consideration of cumulative, long-term impacts, no recognition of displacement as a social impact, and no actual impact assessment. The Social Impact Assessment fails to account for local rural economies and social structure, and fails to address the role that the loss of the equine industry plays in local identity. The assessment does not include a 'no development' scenario, which is standard for any impact assessment and important for understanding change.

For those people remaining in the valley there will be much increased levels of noise and dust, as well as, light pollution at night. Traffic impacts will be markedly increased and the number of heavy vehicles will result in further damage to rural roads. These impacts will be exacerbated by predicted subsidence damage. Expert advice provided to BVPA identifies that the predicted ground strains for Bylong Valley Way are expected to cause un-trafficable and unsafe driving conditions along this roadway. The predicted strains are five times greater than what was considered an unsafe condition for roadways above other mine locations. This impact is not disputed by the Proponent.

### **Heritage impacts**

A large number of Indigenous cultural artefacts and indigenous sites of cultural significance have been identified in the mine area. The Proponent acknowledges that the sites and artefacts will be impacted. The impacts to Aboriginal heritage are significant in the terms of both the numbers and types of sites that will be lost by the mine. The report states that 144 Aboriginal sites will potentially be impacted by the project. Aboriginal heritage sites are a non-renewable resource. However, KEPCO proposes to remove and store the artefacts and accepts likelihood of subsidence destroying the sites. There is no agreed plan or financial commitment for curating the removed artefacts or for making them available to Wiradjuri people. Therefore, the mine will destroy a proportion Wiradjuri cultural heritage. Furthermore, the Preliminary Assessment Report does not acknowledge the cumulative impacts on Aboriginal cultural heritage in the region.

There are also impacts on heritage sites of recent settlers in the area. In particular, natural sequence farming at Tarwyn Park is a significant site for agricultural heritage. It is acknowledged that KEPCO plans to manage Tarwyn Park in accordance with natural sequence farming but there is no guarantee that they will do this and from experience with other mines it is likely that they won't. The Preliminary Assessment Report does not provide any detail on how natural sequence farming will be maintained for the life of the project and following mine closure. The Proponent has not identified where the expertise to maintain natural sequence farming will be found. Public access will no longer be available to Tarwyn Park in the form of field days for the interested members of the public and farmers. The Proposal puts at risk a site that has the potential to be listed as a site of local and state heritage significance (for more information see Appendix 7 – Report on Tarwyn Park Bylong Valley Heritage Assessment) and fails to adequately consider damage to the fabric of the building structures and the cultural landscape in which the site occurs.

## **Permanent damage to cliff lines and ecology**

The Preliminary Assessment Report acknowledges that the cliff lines above the underground mine are almost certain to be damaged by subsidence.

The Preliminary Assessment Report implies this is 'acceptable' because the damage will not be visible to passing motorists. This view of what is 'acceptable' demonstrates a cavalier attitude to environmental destruction which seems to pervade the environmental assessment and the DP&E report. Expert advice received by BVPA suggests the proposed remediation of cracking by infilling cracks or re-grading the surface is not feasible and the envisaged damage to cliff lines is not consistent with current environmental requirements in NSW.

The proposed offsets are inadequate and will result in a net loss of biodiversity. Expert advice provided to BVPA demonstrates there will be significant unmitigated impacts on biodiversity (see Appendix 8 - Outstanding biodiversity issues with the Bylong Coal Project for further information). Examples of these impacts are summarised below.

The regent honeyeater, a critically endangered species, has been confirmed as occurring within the Project Study Area but breeding events recorded in the next valley have not been considered as part of the impact assessment. This is a significant oversight given that the *Regent Honeyeater Recovery Plan* identifies Munghorn Gap as a likely breeding area. If approved, the Project will also sever a regionally significant habitat corridor, that includes a likely dispersal path linking the key Regent Honeyeater breeding habitat in Capertee Valley with Munghorn Gap and the Hunter. The Framework for Biodiversity Assessment (FBA) has not been followed adequately in this regard and insufficient offset areas are provided for this species.

The Response to Submissions states that the Study Area does not support a population of the endangered Brush-tailed Rock-wallaby, even though one was sighted and there are known sightings at Mt Penny. These records may represent an undocumented population as rock-wallabies have a high site-fidelity. Under the FBA there should be no loss of breeding or shelter habitat for the Brush-tailed Rock-wallaby as cliff-line habitats are considered irreplaceable. Despite this, the total cliff habitat, including the buffer, within the Subsidence Study Area is 16.23 ha. The predicted rate of cliff collapse is likely to be an under-estimate. A total of 26.45 ha of habitat for the Brush-tailed Rock-wallaby has also been identified within the Project Disturbance Boundary, of which there will be 100% loss. All irreplaceable cliff line habitat should be protected from harm and the project should be amended to protect these areas.

Information presented in the RTS acknowledges that there is a perched aquifer in the Dry Creek system. However, the assessment does not acknowledge the local effects that may create in terms of water retention at the surface, particularly in areas of uneven topography, and the likely presence of groundwater dependent ecosystems (GDEs) in the area has not been revisited. Impacts on the physical nature of the creek as a result of subsidence are admitted and it is suggested that any damage could be remediated.

However, there is no good evidence that cracked rock creek beds can be repaired, decreasing level of water retention for these GDEs.

The Proponent has failed to apply the offset hierarchy of avoid, mitigate, offset as there are a number of proposed irreversible impacts on biodiversity that can be avoided, including the Bylong River Link and the loss of breeding habitat for the Bush-tailed Rock-wallaby and the Large-eared Pied Bat.

It is also unclear why the proposed biodiversity offsets adjacent to the National Park will not be incorporated into the park. Surely if the intention is to retain the offsets in perpetuity then to incorporate them into a National Park would provide the highest level of security. Excluding the adjacent offsets from the National Park raises the question about how long these offsets will remain as offsets.

### **Adverse health effects**

The Preliminary Assessment Report states that there will be no adverse health effects associated with the mine because the regulatory standards have been met. However, the World Health Organisation has not been able to ascertain safe levels of exposure to PM2.5. There is good evidence that the current NSW standards for particulates, especially PM2.5, are set at levels which will not protect all members of the public from adverse health effects. The potential health effects on residents in close proximity to the mine have been ignored by DP&E. Also ignored by DP&E has been the loss of amenity for every resident of the Bylong Valley. It cannot be concluded that because current air quality standards are met then there will be no adverse health impacts from increased levels of dust and diesel particulates.

Noise impacts will definitely reduce the amenity of residents and the application of the Industrial Noise Policy (INP) by the Proponent's consultants does not take into account the very low background levels of noise currently in the Bylong Valley. While consistent with the INP, the application of the policy in relation to background noise levels fails to recognise that residents of the valley will experience noise levels that are 15-20 dB above the background noise levels, a level of noise that should be considered offensive under the *Protection of the Environment Operations Act 1997*. Further, the low frequency noise assessment was not carried out in accordance with the INP and is likely to result in larger noise impacts on residents than predicted as the appropriate noise penalty has not been applied (see Appendix 9 - Acoustic Review of Noise and Blasting Impact Assessment for further information). The Proponent has not proposed to undertake appropriate reasonable and feasible noise mitigation and the conclusions about noise impacts on remaining residents in the Preliminary Assessment Report are not justified.

There is also the likelihood that increased levels of noise, dust, increased heavy vehicle traffic and social disruption would contribute to higher levels of stress for the remaining residents.

### **Risks to rehabilitation, risk of unfilled voids**

The Preliminary Assessment Report does not identify the risks to rehabilitation. For example, the risk of mine abandonment for economic reasons or the risk of insufficient water for rehabilitation due to prolonged drought have not been identified.

The Proponent states that the voids will be filled and rehabilitated. It is planned that when the western open cut is exhausted then it will be filled with overburden and waste from the eastern open cut. Subsequently the western open cut will be filled with material extracted from the underground mine. However, there is a real risk that by the time the underground mine is planned to commence the economics of coal production could have changed dramatically and that KEPCO may decide not to proceed with the underground mine. If this happens then there will be insufficient material to fill the eastern void.

It is relevant that a recent report to the NSW Parliament on Mine Security Deposits by the NSW Auditor-General<sup>2</sup> has found that the regulation and financing of mine rehabilitation is inadequate. The Auditor General makes numerous recommendations to improve mine rehabilitation. In particular, the amount of the mine security deposit generally needs to be much larger and oversight of rehabilitation needs to be much more stringent. For this Project the level of detail about rehabilitation needs to be greater and the risks clearly identified.

### **Economic impacts**

These issues stand against the supposed economic benefits of the mine. However we strongly dispute these supposed benefits. As stated by The Australia Institute (TAI) in their submission to the EIS and their evidence at PAC Public Hearing, the Project is not financial viable at long-term coal prices. DP&E's position that this is an issue for the company is flawed – it is the local community and the environment that will bear the cost if the mine is unviable and either closes down or tries to reduce their commitments to the community and the environment to increase their profitability.

In developing their assessment, the Proponent failed to use the new Guidelines for the economic assessment of mining and coal seam gas proposals in NSW and have not properly considered the costs of the Project. The Proponents assume that the implementation of the proposed mitigation measures mean there is no economic impact resulting from impacts on the environment or the local community. As can be seen from this submission, there will clearly be significant outstanding impacts on both the community and environment. These factors have not been accounted for.

More broadly, it is extremely concerning that there continue to be proposals for new greenfield mines in 2017. There is clear scientific evidence that proposals for existing coal mines through to the 2040's will provide more coal than can be burnt if we are to avoid dangerous climate change. Given the strong transition to renewable energy currently underway, there is no economic benefit in a new coal mine in the Bylong Valley.

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<sup>2</sup> <https://www.audit.nsw.gov.au/publications/latest-reports/mining-rehabilitation-security-deposits>

## **Unfair processes**

In our experience, the approval process has been heavily weighted towards the Proponent. The time and resources available to the Proponent are disproportionately large when compared to the time and resources Bylong Valley residents have had to prepare a case for protecting the biophysical environment and social cohesiveness of the Bylong Valley.

One example of the apparent bias towards the Proponent is the way in which DP&E sorted submissions on the EIS on the basis of proximity to the three proposed mines. If the person objecting to the mine is classified as distant from the mine then it appeared that DP&E gave less consideration to that view. The problem with this approach is that the mine impacts are in fact widespread. Water impacts will be measurable in the Goulburn River and ultimately in the Hunter River. Dust impacts and diesel particulates will add to the increased levels of PM2.5 in the regional airshed. Mine operations, coal transport and coal burning will contribute to global greenhouse gas concentrations. In contrast, the Proponent gets full consideration of their views even if their headquarters are many thousands of kilometres away.

Perhaps the most unfair aspect of the process is the acquisition of at least 18 farming properties in advance of any serious consideration of the merits of the Project. Once the properties have been acquired many other people sell in expectation of a mine approval. Consequently, the whole social fabric of the valley is disrupted, even before the Project has been approved.

One of the most disturbing aspects of the 'forced' sales is that KEPCO includes a 'gag clause' in the sale agreement which silences all those people who have left the valley. The 'gag clause' means that much of the opposition to the mine is silenced and attempts by DP&E and PAC at genuine consultation (and social impact studies) are farcical because those people most affected have been silenced. The large-scale property acquisition by KEPCO created a juggernaut which appeared unstoppable to many people. This way of planning short circuits the checks and balances that are supposed to exist for planning in a democratic country and amounts to planning by force.

The removal of the rights of merit appeal also weights the PAC process heavily towards the Proponent. It is also noted that the PAC panel visited the mine site on 10 May as a guest of the Proponent. This visit hosted by the Proponent creates the perception that the PAC's independence is compromised. In contrast, as far as we know, the PAC has not visited any of the families in the area that will be experiencing the negative impacts of the development.

It should be noted that individual BVPA members did not register to speak at the PAC panel as part of the protest against the perceived cursory nature of PAC Public Hearings in which the community loses their procedural rights to access the court, and the history of determinations which favour the Proponent.

## **Conclusion**

If approved, there will be numerous significant and irreversible adverse impacts arising from the Project. Many of these adverse impacts have been ignored or understated in the environmental assessment. Our submission has outlined our major concerns with the project.

This Project should not be approved because it will destroy agriculture, scarce water resources and the social fabric of Bylong Valley. The Project will destroy Indigenous sites and relocate Indigenous artefacts. There will also be threats to the natural environment which will not be 'fixed' by offsets.

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Our Ref: S006.R2

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## **KEPCO BYLONG COAL PROJECT MAY 2017**

### **CONSIDERATION OF RESPONSES TO SUBMISSIONS**

In our report S006.R1 (4 Nov 2015), Pells Consulting provided advice to EDO NSW, acting on behalf of the Bylong Valley Protection Alliance (BVPA), on matters of mine subsidence, groundwater and water resources arising from the proposed Bylong Coal Project as canvassed in the EIS. Our previous advice was in response to a brief from EDO NSW dated 26 October 2015 and informed the BVPA submission to the EIS.

KEPCO (the Proponent) has now issued Responses to Submissions and the DPE has conducted a preliminary assessment. In this present report, we provide further advice subsequent to a review of these responses, in response to a brief from EDO NSW dated 9 May 2017. Our advice is limited to review of responses made by the Proponent to our previous submissions in the following reports:

#### *Response to Submissions*

##### Main Report

- Subsidence
- Surface Water
- Water Licences
- Groundwater
- Geology
- Geotechnical Stability

Appendix H – Responses to Submissions on Groundwater

#### *Preliminary Assessment Report*

##### Main Report

##### Appendix E - Supplementary Response to Submissions

- J Response to Department of Primary Industries -Water Submission
- L Groundwater Model Audit

Appendix F – Additional Information

- F5 KEPCO response to DPI Water request for clarification groundwater issues –Sep 2016
- F8 DPI advice on Supplementary Response to Submissions, Nov 2016
- F9 KEPCO response to DPI Water, Nov 2016

#### Appendix G: Peer Review Reports and Response from KEPCO

- G1 Groundwater Review, Kalf & Associates, Nov 2015
- G2 Groundwater Review, Kalf & Associates, May 2016
- G3 Groundwater Review, Kalf & Associates, Aug 2016

#### Appendix H: IESC Advice

These issues are summarised as follows and are discussed in turn below:

1. Impacts of expected subsidence on Bylong Valley Way
2. Impacts of subsidence and cracking on regional farmland
3. Stability of cliffs
4. Impacts of cracking on Dry Creek and limitations of proposed rectification measures
5. Assessment of post-mining flow frequency within the Bylong River
6. Consideration of uncertainty in borefield yields and impacts to the alluvial aquifer
7. Incorrect storage values used in groundwater modelling
8. Inadequate consideration of uncertainty in groundwater modelling
9. Inadequate representation of groundwater in upper 200 m of strata

We have read the Expert Witness Code of Conduct (Division 2, Part 31 *Uniform Civil Procedure Rules 2005*) for the Land and Environment Court and agree to be bound by it, and have prepared this report in accordance with those rules.

## 1. SUBSIDENCE IMPACTS ON BYLONG VALLEY WAY

In our report S006.R1 (page 15), we noted that the predicted ground strains for Bylong Valley Way are expected to cause un-trafficable and unsafe driving conditions along this roadway. We noted that the predicted strains are five times greater than what was considered an unsafe condition for roadways above other mine locations.

Our submission was acknowledged on Page 264 of the Response to Submissions Main Report, and the facts of the argument are not disputed by the Proponent.

The Proponent argues that these risks can be managed with an appropriate subsidence management strategy: “Mine subsidence impacts on Bylong Valley Way will be effectively managed by KEPCO” (RtS pg 264), and “The PSMP will *likely* include the following actions” (RTS pg 275)

- Public notification
- 24 hour monitoring
- Temporary repairs
- A post-mining inspection, with possible permanent repairs.

It is noted that 24 hour monitoring of the kind required for safety of traffic (in particular, motorbikes), such as used on the Hume Highway, is particularly sophisticated and expensive. The statement in the RTS of what is “likely” to be included is insufficient in this regard. If the project is approved, it is suggested that the strategy should be formulated in specific terms, including specifications for monitoring. Response plans should not simply rely on closure of the Bylong Valley Way, but should include possible changes to the mine schedule or mining plan if damage to the road exceeds unacceptable criteria. We do not know which authority is responsible for the Bylong Valley Way, but regardless of this we consider that the Roads and Marine Services should be consulted in this matter as that organisation has expertise in regard to road safety matters and was the authority responsible for management of mine subsidence impacts on Appin Road, the Hume Highway and the Mt Ousley Road.

## **2. SUBSIDENCE IMPACTS ON FARMLAND**

In our report S006.R1, we noted the following impacts to agricultural lands:

1. That the cracking described in the EIS will have substantial degradation effects on the land. (pg 9 of S006.R1)
2. That the predicted tensile strains will cause substantial cracking of stream beds, and substantial loss of water during flow periods (pg 10 of S006.R1)
3. That the predicted tensile and compressive strains may result in cracking, heaving or stepping of the dam bases or walls, which may lead to leakage of stored water (pg 15 of S006.R1)

It is understood that each of these issues are given separate responses at various locations in the Responses to Submissions. It is our general observation that the Proponent does not dispute these predicted effects. We also note that the defence of the Proponent given in the EIS, in various matters, rested upon their ownership of the affected properties.

This argument is, to some extent, still evident in responses, eg:

- Pg 314 “All of the lands within the offset sites are privately owned by KEPCO.”
- Pg 487 “the mine plan for the Project has been developed to ensure that the predicted impacts are largely contained ... on land already owned by KEPCO”.
- Pg 494 “the predicted depressurisation and drawdown in groundwater within the coal seams and within the alluvium as a result of the Project are contained to KEPCO owned land and will have no consequences for neighbouring private groundwater users”

We question the validity of an argument establishing acceptability of impacts based on land ownership. However, we consider this to be a legal issue, which is beyond our scope of expertise.

### 3. STABILITY OF CLIFFS

In our report S006.R1, we noted that the EIS predicted that subsidence will cause collapse of parts of the cliff lines above the area of longwall extraction and that there is a potential for tension cracking to occur at upper or side slopes and for compressive ridges to form on the lower slopes. We argued that:

1. Remediation of cracking by infilling cracks or re-grading the surface is not feasible (pg 13)
2. the envisaged damage to cliff lines is not consistent with current environmental requirements in NSW (pg 15)

Responses given in Section 5.4.1 of the Response to Submissions Main Report argue that the mine plan has already been optimised “to minimise the potential for adverse impacts to these features” (pg 254).

Our opinions as summarised above in respect to crack filling were based on our experiences at Mt Sugarloaf, above the Wallsend Colliery, and reported work on crack filling above Metropolitan Colliery. In respect to ‘natural’ infilling of cracks we are aware from the history of cracking in Cataract River, that there is no evidence of substance to demonstrate that such natural infilling is effective in sealing cracks. We note that our opinions are in effect dismissed in the Responses.

In respect to the expected cliff line collapses, and the significant probability that there will be other unexpected failures, we accept that whether such collapses are acceptable under law, or as a matter of ethics, is a matter for the relevant authorities to determine.

In this matter, there is a balance to be struck between extent of coal extraction, and risks to cliff instability. Ultimately it falls upon the PAC to determine the level of risk that is accepted and what limits on coal extraction extent are to be placed for the sake of reducing risks to cliff lines.

### 4. IMPACTS TO DRY CREEK

Both the EIS and the Response to Submissions (eg Section 4.3.11) acknowledge the likelihood of cracking of Dry Creek. The Proponent does not offer to limit the extent of mining to reduce the risk or severity of cracking. Rather the Proponent offers either: “allowing natural filling to occur” (i.e. do nothing); infilling with soils, or infilling with grout.

The Response to Submissions acknowledges the limitations of these approaches, but states that “*appropriate remediation measures will be implemented in an attempt to minimise or avoid impacts to flows*” (pg 79).

We agree that there are no suitable techniques for remediation of creek bed cracking. The only guaranteed protection methodology in this instance would be to modify the mine plan.

We consider that the approach offered by the Proponent offers no guaranteed of protection for Dry Creek, and no incentive to limit damage incurred, other than good will. We question whether a ‘do nothing’ approach is acceptable. Again, ultimately it

falls to the PAC to assess whether these risks are considered to be acceptable or whether, if the mine is approved, changes to the mine plan are required to reduce risks to cracking of the streambed.

## **5. IMPACTS TO FLOW FREQUENCY IN BYLONG RIVER**

In our report S006.R1, we noted that assessments in the EIS predicted that the ‘net’ flow change to Bylong River will be significant. Impacts to streamflow in Bylong River are considered in the EIS in terms of “water availability” – and the impacts therefore appear to be addressed by management of water licencing. We argued that assessment of environmental impacts was made without establishment of appropriate environmental flow criteria for the creeks systems and without reference to flow frequency of the Bylong River. We recommend that the Proponent applies their detailed catchment and mine water management model to simulate the flow frequency, at the old the Bylong River gauge site and in the Bylong River, just upstream of the confluence with Growee River. We requested that this should be done to simulate flow frequency before, during and after mining. Assessment to impacts on river health and ecology should then be made with reference to these flow-frequency analyses.

We have been unable to find a response from the Proponent to this request.

## **6. UNCERTAINTY IN BOREFIELD YIELDS AND IMPACTS TO ALLUVIAL AQUIFER**

### **6.1 Borefield yields**

In Section 4.5 we pointed out that the production from the proposed borefield is critical to the real water supply in the first decade of operation of the project. We also noted that the computed yields from the borefield were primarily theoretical and that there was low confidence in the validity of the computations because of the absence of substantive field testing (pg 21). In the EIS (Section 23, Chapter 13.6) it was stated that:

*The proposed bore field requires high volumes of water from a relatively thin aquifer system. The groundwater model assumes a component of this water is derived from a consistent surface water influx. Sensitivity analysis of the possible climatic scenarios concluded that the proposed bore field (up to 15 bores) will not be able to meet the Project requirements if extraordinarily dry periods coincide with high water volume requirements (between Year 3 to Year 10). The modelling indicated it would be necessary to expand the bore field by a further 25 to 31 bores.*

*Therefore, it is recommended that several test wells are constructed prior to bore field reliance, to test the true sustainability of the bore field. Long-term pumping tests should be carried out at varying times of the year, to ensure that the proposed bore field will be able to sustain water during dry periods. The data derived from these long-term pumping tests could also be used to further validate the groundwater model. The proponent has purchased a large area of land and this will enable the borefield to be distributed along the alluvial aquifer, to minimise take of surface water and interference between bores.*

In Section 4.3.2 of the Response to Submissions, it is stated that “extensive work” has been undertaken “to provide further certainty in relation to the groundwater modelling predictions, including the reliability of the alluvial borefield”. It is stated that the issue is discussed in further detail in Section 4.3.6. Section 4.3.6 in turn references Appendix H of the Response to Submissions. Our review of Appendix H suggests that the claimed ‘further certainty’ is incorrect. Further works undertaken

has comprised revised modelling, but not further field work. The revised modelling has not offered the certainty required. Rather the revised modelling confirms the uncertainty in predicted yield. Appendix H appears to support our concerns, with the following statement: “The results also suggest that the information in the calibration dataset does little to reduce the uncertainty of the sustainable yield, and the value of the planned pumping tests within the alluvium” (Section 5.4).

The EIS indicates that groundwater within the alluvium is strongly related to flow frequency within the embedded Bylong River. It is noted above that impacts to flow frequency are not presented in the EIS, and the impacts to the alluvial aquifer appear to be based on direct simulation of groundwater only (this is discussed in and discussion in G2 Groundwater Review, Kalf & Associates, May 2016, pg 2).

We maintain the view that field testing is required to examine the potential yields from the proposed borefield. We request clarity be provided on how stream flows in Bylong River will be incorporated in this yield analysis.

## **6.2 Impacts to adjacent landowners**

It is argued in the EIS that impacts to the alluvial aquifer will be restricted primarily to land already owned by KEPCO (e.g. RTS pg 487).

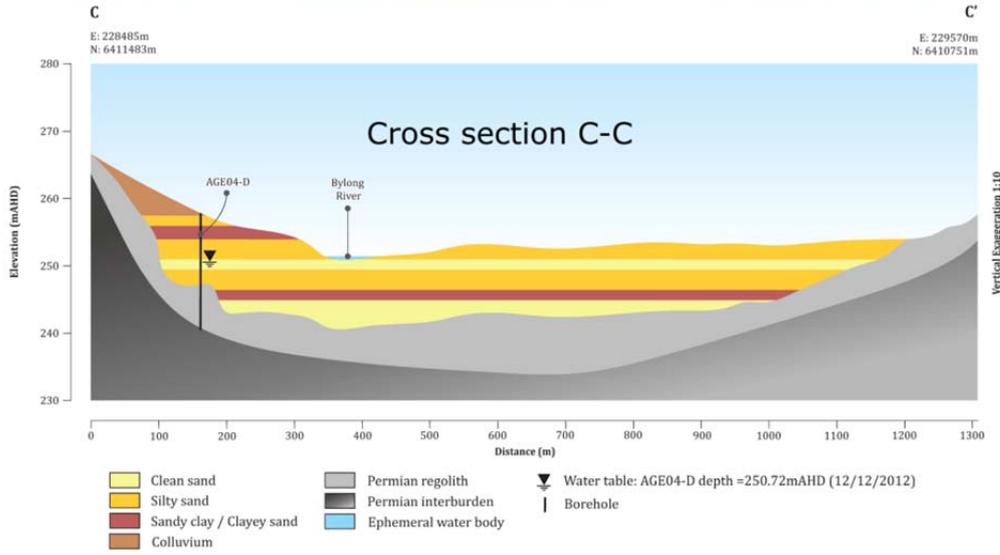
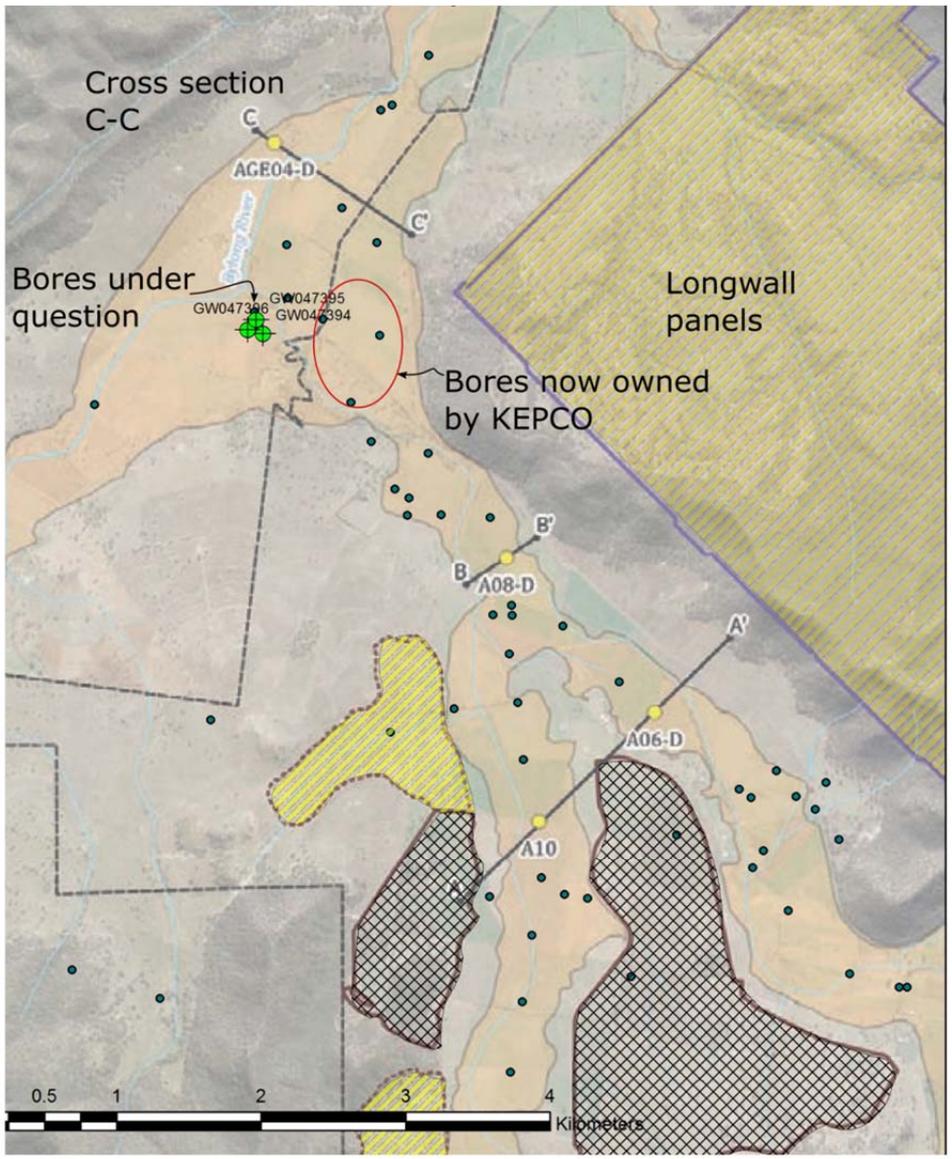
Firstly, it is considered difficult to review this claim in the light of the various predictions made in the EIS and the RTS (see inset box below entitled “*Various predicted impacts to adjacent landowners*”).

Secondly, it is considered that this statement cannot be supported without further field testing, particularly in regards to impacts to the water entitlements from bores GW047394, GW047395, GW047396 (see Figure 1), which are not owned by KEPCO.

The landowner of bores GW047394, GW047395, GW047396 has reported (to EDO NSW) that impacts predicted by modelling appear incongruent with experience at the site. Drawdown of “several meters” is reportedly observed at neighbouring bores (which are now owned by KEPCO) when these bores are operated. The landowner reports that the extent of drawdown in their own bores is unmeasured but coordination with adjacent landowners was previously required in operating the bores due to this drawdown. If this claim is accurate, it appears to be in conflict with numerical simulations that show predicted drawdown to affect only one side (the KEPCO side) of the alluvium in this region (eg Figures 44 of Appendix H Part 1 of the RTS; Figure 26 of Appendix H Part 1 of the RTS; Figure F.31 of Part 3, Appendix M of the EIS; Figure F.24 of Part 3, Appendix M of the EIS). The observations made by the landowner emphasises the requirement for further field testing.

This recommendation echoes recommendations made in the groundwater peer review (G2 Groundwater Review, Kalf & Associates, May 2016, pages 4 and 5), with particular reference to the above-cited property. In this review, the need for testing was emphasised, and specifications were provided for testing and monitoring bores at this location, as per Figure 2 below.

We support recommendations given in the groundwater review by KA Consulting that field testing is required to examine impacts on adjacent properties. It is also considered appropriate that KEPCO present clear and simplified predictions specific to landowners, and establish monitoring that will be able to demonstrate to what degree compensation will be required.



**Figure 1 - Location of landowner bores**

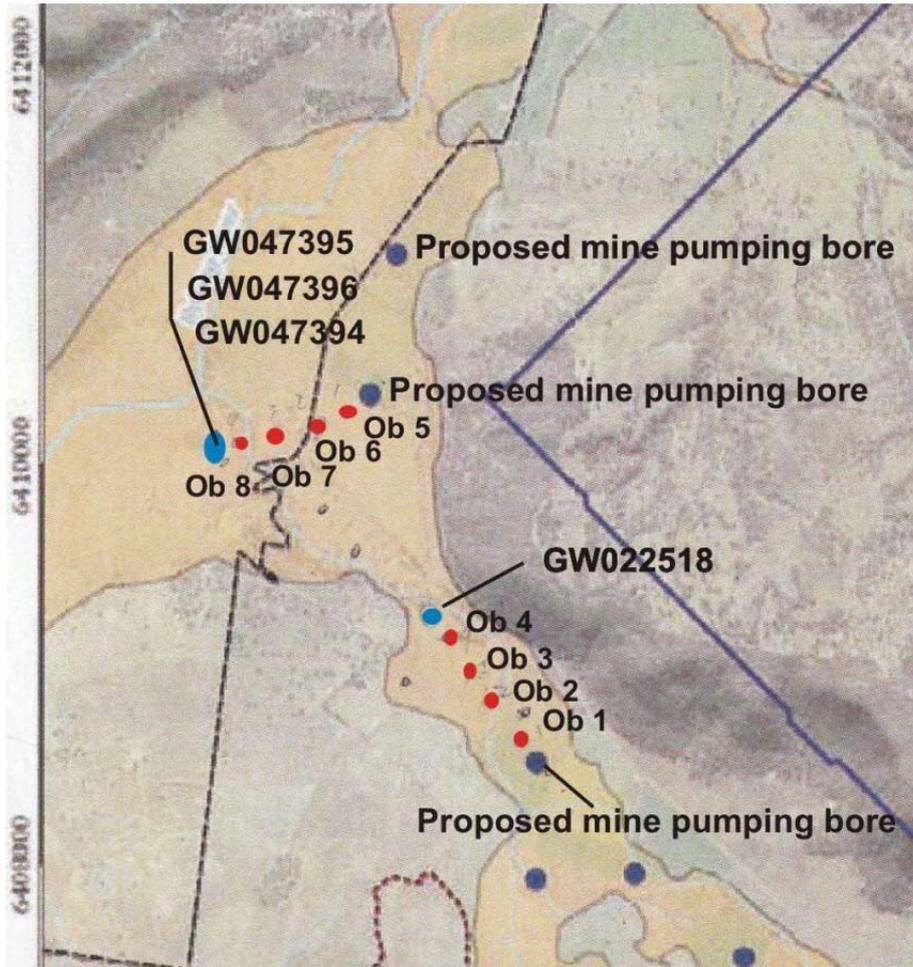


Figure 2 - Monitoring and testing recommended in the Groundwater Peer Review

### ***Various predicted impacts to adjacent landowners***

It is difficult for adjacent landowners to discern predicted impacts at his/her property based on information presented in the EIS and RTS. The following examples are made:

1. The EIS presents locations of proposed wells to be used by KEPCO – these are stated to be “sited ... to reduce potential impacts on private bores” (pg 104 Appendix M Part 1 EIS and Figure 10.2 of Appendix M Part 1 EIS). The proposed borefield layout presented in the RTS is different (Figure 38, pg 70 Appendix H Part 1 of RTS), and is also stated to be devised to reduce potential impacts on private bores. It is unclear which borefield is proposed, and hence which predictions are to be heeded.
2. Mapping of predicted drawdown in the alluvium presented in Figures 10.10, 10.11 and 10.12 in Appendix M Part 1 of the EIS is difficult to read at the scale presented.
3. The significance of the ranging predictions presented in the EIS and the RTS is unclear:
  - a. Figure F.24 of Part 3, Appendix M of the EIS indicates varying impacts.
  - b. Figure F.25 of Part 3, Appendix M of the EIS indicates drawdown of the Coggan seam underneath the alluvium if ‘cracking’ is increased (it is anticipated that drawdown within the underlying Coggan seam in this location would affect the alluvium).
  - c. Figure F.31 of Part 3, Appendix M of the EIS indicates ranging impacts for multiple alternative scenarios.
  - d. Drawdown in the alluvium is presented in Figures 43, 44 and 45 of Appendix H Part 1 of the RTS, provides different prediction based on mine water requirements.
  - e. Various scenarios of different levels of impacts are presented in Figure 26 of Appendix H Part 1 of the RTS, based on predictions from different modelling codes.

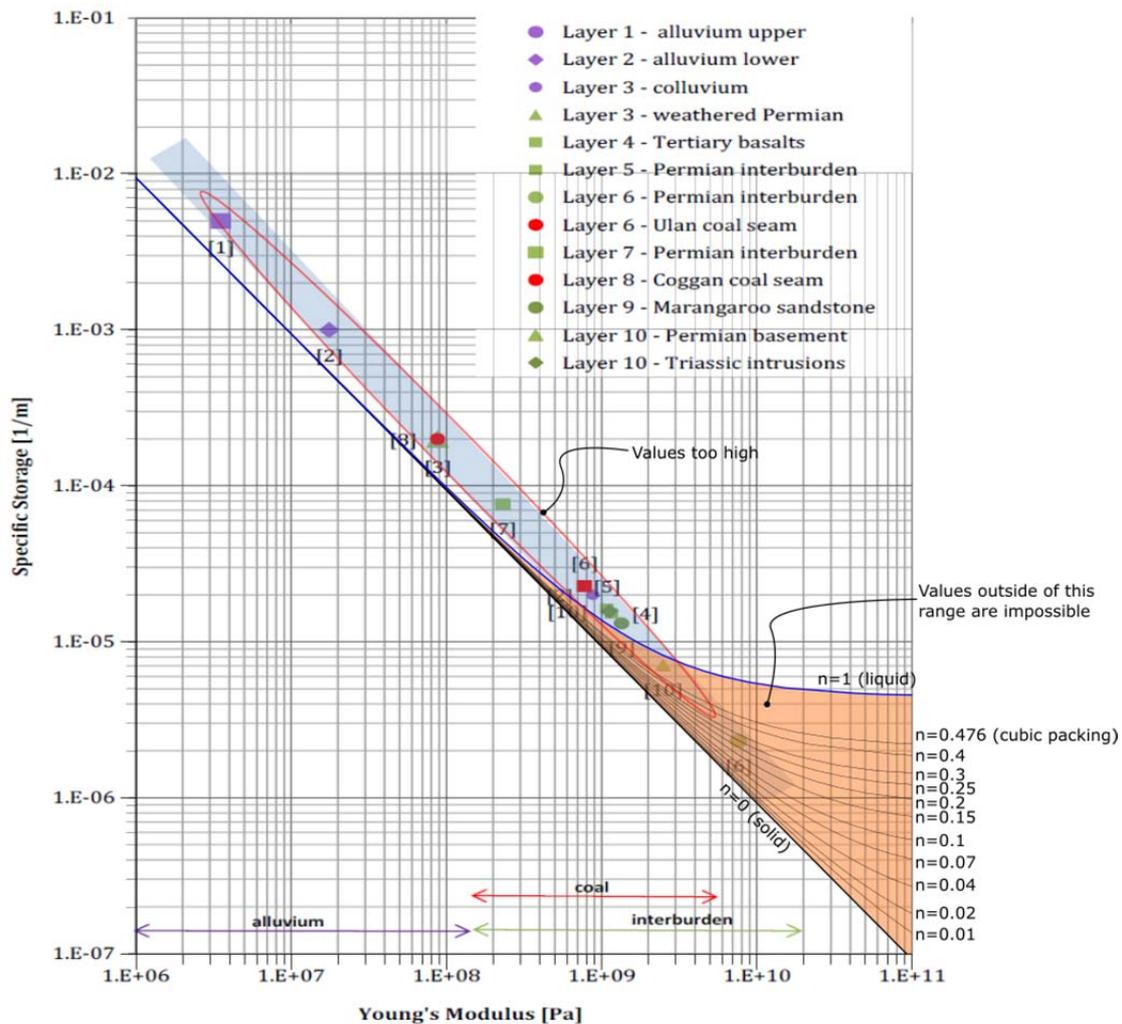
## **7. INCORRECT STORAGE VALUES**

In our report S006.R1 we argued that the extent of simulated drawdown was under predicted as the specific storage values adopted in the EIS groundwater modelling were unrealistically high. We cited the equation which defines specific storage as the basis of our argument:

The **specific storage** is defined as:

$$S_s = \text{specific storage} = \rho_w g \left[ \frac{(1+\nu)(1-2\nu)}{E(1-\nu)} + \phi\beta \right] \quad (1)$$

A response is given by the Proponent in Section 4.4.2 of Appendix H. For technical reasons, we are not convinced that the nature of our argument has been fully understood or implemented. We have plotted the solution to the equation for specific storage in Figure 3 below, and have overlaid onto the Figure 19 from the revised AGE report (Appendix H of the Response to Submissions). The values for specific storage adopted in the groundwater model remain outside of the possible range.



**Figure 3 - Solution to Equation (1) overlain on Figure 19 from Appendix H of Response to Submission**

However, the response in Section 4.4.2, and other sections of Appendix H, indicate that further efforts have been made to review the uncertainty of groundwater model predictions and test sensitivity to parameters, such as specific storage (and, in particular, the ratio of conductivity to specific storage) as discussed below.

## 8. UNCERTAINTY IN GROUNDWATER MODELLING

In our report S006.R1 we argued that groundwater impacts (and drawdown mapping) asserted within the main text of the EIS was declared on a single model output alone. This is inappropriate, and does not adequately communicate the uncertainty in predicted impacts (pg 28).

We note that significant testing of model sensitivity has been included in the Response to Submissions. This includes testing of another source of uncertainty in modelling, not previously identified by us – differences arising from the use of alternative numerical modelling codes. These further studies have highlighted the uncertainty in the numerical groundwater predictions.

We consider that uncertainty in parameters appears to have been adequately considered. It is noted that mapping presented in Figures 43 to 46 communicates uncertainty in predicted drawdown for the alluvium. It is unclear if the previous Figure F25 from the EIS, showing a range of drawdowns in the Coggan Seam has been updated.

We previously noted that, although sensitivity studies were undertaken, the significance of how these ranging predictions will be incorporated in mine planning is unclear. Groundwater impacts (and drawdown mapping) asserted within the main text of the EIS were declared on a single model output alone. This is inappropriate, and we request that determination of the Project is done on the basis of the predicted range in impacts rather than a single 'mean' model run.

## **9. INADEQUATE REPRESENTATION OF GROUNDWATER IN UPPER 200m OF STRATA**

In Section 4.4 of our report we stated that we could not find in the EIS “a reasonable representation of the stratigraphic profile above the longwall panels”.

Further information in this regard is given in Appendix H; firstly in the form of a scale-quantified stratigraphic column (see extract in Figure 4 of this report, below), and secondly in cross-section (see extract in Figure 5). The cross-section of Figure 5 is located approximately as shown in Figure 6.

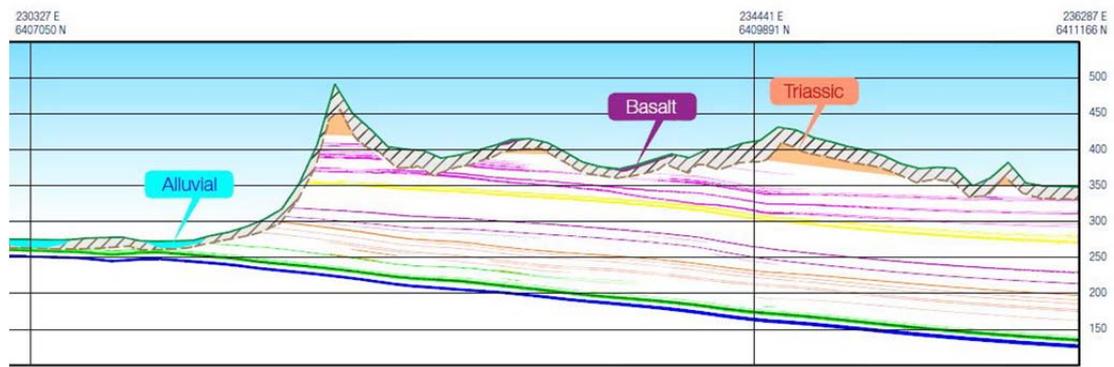
We note from the above information that this is only small thicknesses of Triassic rocks, and basalt, above the area of longwall mining and consider that these may not play major roles in recharge to Dry Creek. The substantial impacts on Dry Creek will be mostly controlled by the Wallerawang and Charbon Subgroup rocks.

In this regard we note that the response (Appendix H) includes the following statement:

“Stakeholders commented that due to uncertainty with the current hydrogeological conceptual model, future drilling and construction of a limited and reasonable number of monitoring bores into sandstones may be required should a data gap be recognised (Farmers Creek Formation, the Gap Sandstone, Watts Sandstone or other aquifers). It is agreed as raised within stakeholders submissions, that additional monitoring bores would be required to fully define the saturated and unsaturated units within the basalt area. These bores would target potentially deeper and thicker zones within the basalt where there is potential for groundwater to occur. The floor of the basalt appears to generally conform with the topography and therefore the highest potential for saturated zones is likely to be in topographically lower lying areas. “

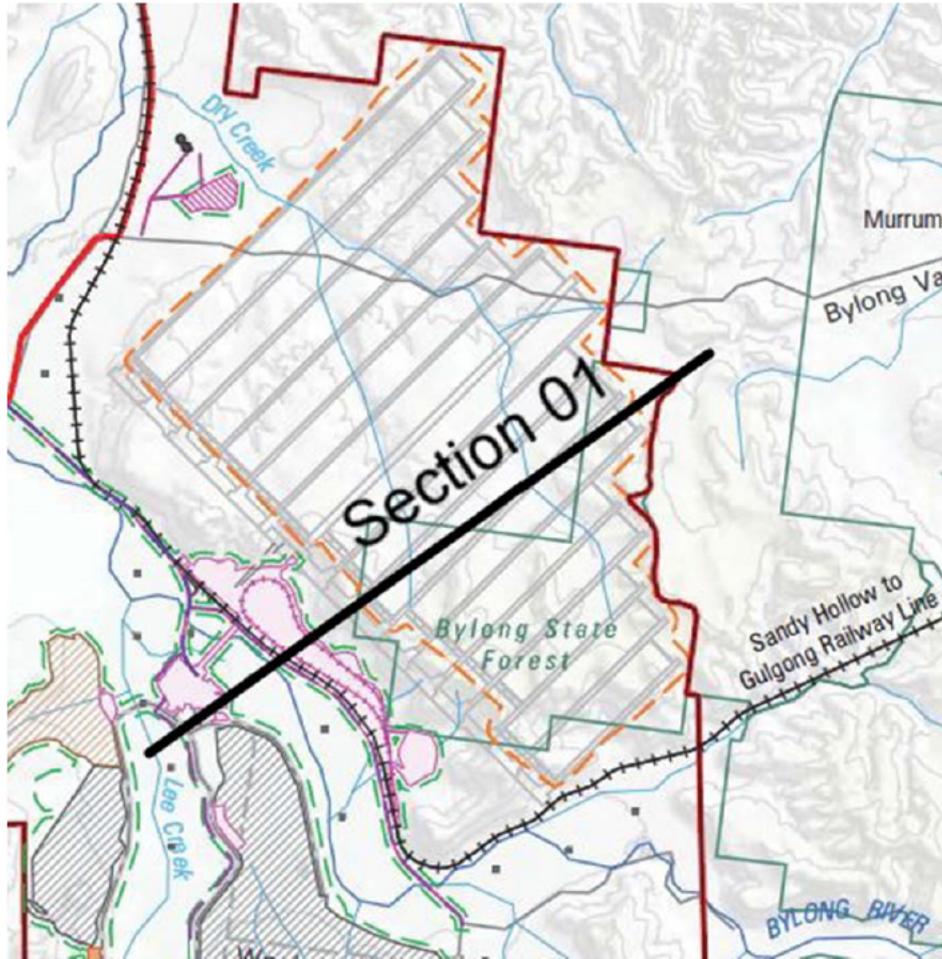
AGE	GROUP	SUBGROUP	FORMATION	LITHOLOGY	COAL SEAM PLYS	DEPOSITORIAL ENVIRONMENT	MODEL LAYER	AVERAGE THICKNESS
Quaternary			Quaternary Alluvials				1	4m
							2	6m
Tertiary			Tertiary Basalts					
Triassic	Narrabeen Group		Digby Fm				3	20m
		Wallerawang Subgroup	Farmers Creek Fm		Farmers Creek	peat/swamp/levee/splays		
					State Mine Creek		4	50m
			Gap Sandstone			alluvial fan		
			State Mine Creek Fm		GOD/E	alluvial fan/lagoon/peat swamp		
			Watts Sandstone		GOG	delta front		
	Illawarra Coal Measures		Denman Fm			interdistributary bay/restricted marine		
		Charbon Subgroup	Glen Davis Fm		GDA GDB GDC GDE GDF	peat/swamp	5	115m
			Newnes Fm		GDJ	lagoon		
			Long Swamp Fm		ULNBC	lagoon/shallow interdistributary/minor peat swamp		
			Ulan		ULNG ULNH-JULNM		6	20m
		Cullen Bullen Subgroup	Blackmans Flat Fm			fan delta/fluviol/braided channel	7	4m
			Marrangaroo Fm		COGGAN	fan delta/fluviol fan	8	3m
							9	20m

Figure 4: Stratigraphic Column



SECTION 01

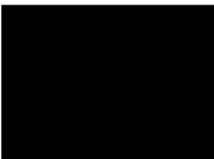
Figure 5: Cross-section through area of longwall mining in the Coggan Seam



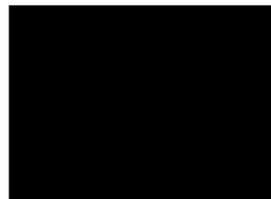
**Figure 6: Section line location**

Uncertainties of the kind described above are to be expected in groundwater modelling. However, these uncertainties could have a significant impact on the uncertainties in impacts on Dry Creek and the other smaller creeks which feed into the Bylong River. It would seem reasonable that given these uncertainties it would be appropriate to anticipate that impacts on baseflows will be worse than presently predicted. This is a matter for PAC to consider.

Yours faithfully



PHILIP PELLIS



STEVEN PELLIS

## **BYLONG COAL PROJECT – SURFACE WATER ISSUES**

### **Personal Details:**

**Name:** Andrew James MARR  
**Address:** PO Box 194  
Stratford Qld 4870

### **Qualifications:**

B Sc (Pure Mathematics and Computer Science), University of Sydney  
B Eng (Civil), University of Sydney  
M Eng Sc (Water), University of NSW  
Grad Dip Natural Resources, University of New England

Over 40 years of experience in surface water hydrology and water resources management studies for government, semi-government and consulting organisations, in over 13 countries. Relevant experience includes modelling of coal mining and power station water balances and flooding in the Hunter and Cocks River Basins, and for urban water supply for Sydney in the Hawkesbury-Nepean Basin. I have also been involved in water management studies including water availability modelling and flood modelling in major rivers basins of the world including Mekong, Blue and White Nile, Zambezi, Ganges and Murray-Darling. Many of these projects were for government agencies, with funding from major international financial institutions such as World Bank, Asian Development Bank or African Development Bank.

### **Documents Reviewed:**

- Bylong Coal Project Environmental Impact Statement (EIS) – particularly Appendix L Surface Water
- Bylong Coal Project Response to Submissions
- Bylong Coal Project Preliminary Assessment Report
- Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009 - Current version for 6 January 2017 to date (accessed 12 May 2017 at 10:04)

### **Declaration:**

I have prepared this expert report in response to a request from EDO NSW, on behalf of the Bylong Valley Protection Alliance.

I acknowledge I have read the Expert Witness Code of Conduct in the Uniform Civil Procedure Rules 2005 and I agree to be bound by it.

### **Comments:**

I have restricted my comments to the adequacy of the proposed water supply provisions to meet the predicted water requirements of the project.

A significant proportion of the water required by the project will be sourced from within the project site. This supply has been modelled and assessed in considerable detail through the groundwater modelling (that also addressed surface water-groundwater interactions) and the water balance modelling. The water balance modelling showed that there was a requirement

for additional water supply in the early years during the open cut operations. It is proposed to supply that water from two sources as summarised in Table 13 of the Department’s Preliminary Assessment Report (Assessment Report, p71) which is reproduced below:

**Table 13: Predicted Water Take**

Water	Water Sharing Plan (WSP)	Predicted Peak Annual Water Take		Water Access Licenses held by KEPCO (units)*	Total Water Entitlements in Water Source (units)
		ML	Year		
Alluvial groundwater and surface water	Hunter Unregulated WSP (Bylong Water Source)	1,835	6	2,644	5,908
Permian hard rock aquifer groundwater	North Coast WSP	4,099	23	411 + current application for 2,093 (total 2,504)	90,000

\* 1 unit equates to 1 ML in a 100% allocation year

The table notes that the Water Access Licences held by KEPCO are expressed in “units” under the Water Sharing Plan (WSP), and that 1 unit is equivalent to 1 ML in a “100% allocation year”. There is no discussion within the documents of the likelihood of the reduction in the ML/year value of each unit during periods of low flow or of extended drought, when allocation is likely to be reduced well below 100%.

The Water Sharing Plan has not been developed to the same level for the Bylong River water source as it has for more highly developed river basins within the Hunter Basin. This affects the use of the Water Access Licences to determine the quantity of water available and permitted to be taken on a daily basis.

Under the Hunter Unregulated WSP Part 10 – Division 1 – Clause 47 (Current version for 6 January 2017 to date (accessed 12 May 2017 at 10:04)), it is noted that “*Compliance with the long-term average annual extraction limit is managed through the making of available water determinations, under section 59 of the Act, for access licences in these water sources*”. Part 11 Division 3 Clause 59 addresses “*Establishment and assignment of total daily extraction limits*”. This clause notes that Total Daily Extraction Limits have not been established or assigned for various water sources, including the Bylong River. Therefore, there appears to be no basis under the current WSP for translating the Water Access Licences held by KEPCO expressed in “units” into permissible water take from the Bylong River Water Source on a daily basis. There is no certainty, therefore, that the quantity of water required in any period of time (whether that be a day, a month or a year) will be permitted to be taken under the Water Access Licences, even if the water is actually physically available.

This uncertainty is not specifically addressed in the Assessment Report. However, there are indications in various parts of the report that there is some uncertainty about the provision of water from the Water Access Licences.

On page 5 of the Assessment Report there is the following statement that implies that there are uncertainties in the reliability of water supply to the mine:

*KEPCO currently holds sufficient water licences to account for all the water required for the operation of the mine from the productive alluvial aquifers, but may require additional licences associated with the interactions of the mine with the deeper and poorer quality hard rock aquifers at some stage during the project. Both the Department and DPI-Water consider*

*there is sufficient depth in the market to accommodate the water take from the project. However, the Department has recommended that KEPCO be required to demonstrate it has adequate water supply prior to commencing both the open cut and underground operations.*

There are related statements in other parts of the Assessment Report. The report notes that quite detailed groundwater and water balance modelling was conducted by various specialists, and that these models were assessed by other specialists. On page 57 of the Assessment Report it states that “*Water resources impacts of the project has involved reviews by some of the State’s most respected water specialists. Based on these assessments the DPI-Water and Dr Kalf are satisfied that an acceptable prediction of the project’s potential water resources impacts has now been undertaken, and that the assessments include sensitivity analysis to account for the range of potential water resource impacts.*” In spite of this conclusion, it is stated in the following paragraph that DPI-Water “*considers that some uncertainty in groundwater predictions persists, and has recommended measures to address this during mining operations*”.

Statements in the Bylong Coal Project EIS that could be interpreted as confirming the availability of water under the Water Access Licences may be misleading. For example, in Paragraph 9.2.5 Mine Site Water Requirements, the following statement appears:

*The results of the water balance modelling (see Section 6) show that the existing water licence allocation from the bores of 2,535 units (currently equivalent to 2,535 ML/year) significantly exceeds the requirement for external water supply to satisfy all site demands for all years of operation, even in the driest climatic sequence experienced over the past 125 years.*

The water balance modelling computed the maximum annual requirement for external water supply for various climatic sequences based on 125 years of rainfall data, and showed that this was less than 2,535 ML. The report notes that 2,535 units are currently equivalent to 2,535 ML/year. The modelling did not consider how the 2,535 units available under the Water Access Licence might translate on a year-to-year basis into ML/year permissible water take over various climatic sequences. It is possible that in very dry periods, when the water requirement of the mine is greatest, there may be very little water physically available in the borefields, and that the water allocation may be reduced well below 100%, possibly down to 0%, so that the permissible water take is much less than the physical water available.

The Assessment Report addresses risks associated with the uncertainty in water supply as stated below (page 72 of Assessment Report):

*The Department accepts that the water take from each of the water sources is within the annual extraction limits and issued shares in each water source, and that there is sufficient depth in the market for each water source to accommodate the water take associated with the project.*

*The Department notes that, like any other significant water user in the State, access to adequate water supplies is a commercial risk for KEPCO. And like any other significant water user, if KEPCO is not able to secure enough water to meet its demands (e.g. if existing allocations are reduced due to drought), its operations may need to be curtailed, or it may need to investigate additional water efficiency measures. This is consistent with the water sharing and water efficiency principles established under the Water Management Act.*

*That said, the Department believes that KEPCO should be required to demonstrate that it has secured adequate water supplies to account for the maximum predicted water demand for mining operations in both the open cut and underground phases, prior to commencing mining operations in each phase.*

In conclusion, the documents relating to the project describe the detailed modelling and reviews that have been performed, but have failed to demonstrate that the Water Access Licences held by KEPCO will provide adequate water from the borefields to meet the water requirements of the mine, particularly during the open cut stage, during dry periods when water allocations in the Bylong River are likely to be reduced well below 100%.

# **Adequacy of the soil, land capability and rehabilitation plan of the Bylong Coal Project**

**May 2017**

## **1. EXECUTIVE SUMMARY**

It is my opinion that the complexity of the soils and their properties in the Project area are not understood and therefore the assessment of the soil impacts is inadequate. The likely soil impacts especially following excavation will be erosion, increased sediment runoff and a decline in water quality of local drainage lines. In areas of low slope it is highly likely that subsidence will create issues with drainage and consequent water logging.

Long term rehabilitation and restoration of the landscape and soil properties of the site is made more difficult by the presence of large, unconsolidated spoil heaps in which the soil is mixed and has lost the original soil structure and also in which the subsoil is sodic and possibly saline.

It is also my opinion to work with these complex issues that the Soil Consultant must be a Certified Professional Soil Scientist (CPSS).

## **2. INTRODUCTION**

The Bylong Valley is a significant rural catchment in the Upper Hunter River Catchment. The Bylong Coal Project is predicted to disturb some 2,875 ha of land (Hansen Bailey, 2015). The site lies within the Mid Western Regional Council Local Government Area approximately 55 km east-north-east from Mudgee. It lies wholly within Authorisations A287 and A342 which cover approximately 10,317 ha.

The mine life is expected to include 8 years of open cut and 22 years of underground activity. The proposed mass of coal to be removed is 121 Mt of ROM from the Illawarra Coal Measures at a maximum rate of 6 Mt/year.

The Bylong Coal Project (Project) has been the subject of an Environmental Impact Statement (EIS) which has been examined and reviewed in the preparation of this report. The following assessment examines the adequacy of the soil, land capability and rehabilitation plan of the Project.

### **2.1 Documents Examined and Reviewed**

In preparing this submission I have reviewed the relevant material in the EIS, Response to Submissions and the Department of Planning and Environment's Assessment Report, with a particular focus on:

Scott Barnett and Associates (2013). Appendix G Agricultural Impact Statement. Gateway Certification Application Supporting Document Hansen Bailey (2013).

SLR (2015). Appendix V. Bylong Coal Project EIS. Soil, Land Capability and Strategic Agricultural Land Assessment. EIS prepared by Hansen Bailey

## **2.2 Key Reference Documents**

NSW Government (2013). Interim Protocol for Site verification and mapping of biophysical strategic agricultural land.

Kovac M. and Lawrie, J.M., 1990, *Soil Landscapes of the Singleton 1:250,000 Sheet*, Soil Conservation Service of NSW, Sydney.

NSW Office of Heritage and Environment (2012). The Land and soil capability assessment scheme. Second approximation. Sydney, NSW.

McKenzie, N. J., Grundy, M. J., Webster, R., and Ringrose-Voase, A. J. (2008). *Guidelines for Surveying Soil and Land Resources*. Second Edition. CSIRO publ. Melbourne, Vic. In particular we refer to Gallant, et al, Chapter 3. Scale.

NSW Department of Planning and Infrastructure (2012). Upper Hunter Strategic Regional Landuse Plan.

[http://www.nsw.gov.au/sites/default/files/initiatives/upperhunterslup\\_sd\\_v01.pdf](http://www.nsw.gov.au/sites/default/files/initiatives/upperhunterslup_sd_v01.pdf)

NSW Department of Land and Water Conservation (2000). *Soil and Landscape Issues in Environmental Impact Assessment*. Technical Report No. 34, 2<sup>nd</sup> edition. NSW DLWC, Sydney, NSW

## **3. SOIL AND SITE ASSESSMENT**

The document provided was prepared by SLR Consulting in late 2013. A second supporting document, by SLR was prepared as Appendix V of the Project EIS (SLR, 2015) in which Section 2.2 of the submission identifies the percentile distribution of slopes in the area.

The approach taken in this soil adequacy document is to closely examine the assessment and review using the original report format. This technique allows relatively easy cross-referencing among documents.

### **3.1 Soil Survey**

The soil survey was undertaken by a Certified Professional Soil Scientist (CPSS). The methodology is per the guidelines Australian Soil and Land Survey Field Handbook (McDonald et al., 1984).

Soil Landscapes of the 1:250 000 Sheet (Kovac and Lawrie 1991) was used as the background information for the soil survey. Soil landscape boundaries were delineated on 1:100 000 base maps and published at 1:250 000. The broad scale mapping shows that the major soil landscape units in the study area include Bylong, Growee, and Lees Pinch. As a result of the variable geology and parent material the soils of these units and the minor soil landscape units are distributed throughout the entire project area. Refer Figure 1.

A significant outcome of using this small scale is that the soil landscapes are not homogeneous entities and unmapped areas of associated landscapes (<250ha) with

limitations other than those described for the dominant units may occur within the soil landscapes.

However, the survey does demonstrate the variety of soil types expected in the Project area.

### **3.1.1 Dominant Soil Landscape Units**

The Bylong Soil Landscape Unit (1,612 ha) covers alluvial flats and low terraces of the Growee Creek. It occurs on the Quaternary alluvium geological unit and the parent material is alluvium. Black Dermosol a soil with a loam to clay texture is associated with the alluvial influenced with this Bylong Soil Landscape Unit. This soil landform provides a stable landscape with little erosion except for stream bank erosion along main drainage channels.

The Growee Soil Landscape (SCge) unit covers 2,298.0 ha (22.4%) of the Project Site and is represented by 19 soil types and 4 phases. Thus the soil properties are not homogeneous. This Soil Landscape Unit (3,566 ha) covers undulating rises and low hills, with broad, widely spaced shallow valleys. It occurs on the Illawarra Coal Measures geological unit and parent rock is shale, sandstone, conglomerate, coal, tuff and clay. The slopes are generally less than 10% throughout the area.

The Lees Pinch Soil Landscape Unit (2,404 ha) on the Narrabeen Group geological unit and parent rock is lithic and quartz sandstone, conglomerate, green and red clay stone, shale and siltstone. The dominant soil type is the Rudosols which are soils that have negligible pedological organisation. This soil unit is highly siliceous and shallow. The slopes are up to 90%.

The Bald Hill Soil Landscape Unit covers low hillocks and basalt or dolerite caps and is present mainly in the northeast of the Study Area. It occurs on the Tertiary basalt geological unit and the parent rock is olivine basalt and dolerite. The major soil type with the basaltic derived Bald Hill Soil Landscape Unit is a fine textured (silt sized) Red Dermosol followed by a Red Chromosol.

Chromosols are soils with strong texture contrast between the A and B horizons that do not have strongly acidic or sodic B horizons This unit occurs throughout the Project area primarily in association with the Bylong soil landscape unit. It occurs on the Illawarra Coal Measures geological unit and parent rock is shale, sandstone, conglomerate, coal, tuff and clay.

The slopes are generally less than 10% throughout the area. The main soils are Red, Yellow and Brown Solodic soils (Sodosols) which occur on the top of a slope, midslope, and on the lower slope respectively. Non-calcic Brown Soils (Chromosols) also occur on the moderately well drained lower slopes and Yellow Solodic Soils (Sodosols) occur on lower slopes with poor drainage. The areas underlain by solodic soils can be affected by minor sheet erosion on slopes resulting in dispersed sediment being carried in runoff to drainage lines. The outcome can be the development of algal blooms and a decline in aquatic ecosystems.

Although the most common soil types are:

- Dermosol
- Rudosols
- Chromosol.
- Sodosols

As a result of the variable geology and parent material the soils of the soil landscape units and the minor soil landscape units are distributed throughout the entire project area. However, for example, the Growee Soil Landscape (SCge), as previously mentioned, has 19 soil types within its unit. Hence the soil properties throughout the Project site are not homogeneous.

### **3.1.2 Results of the Soil Assessment**

#### Comment 1

Open cut mines typically have a high impact on soil properties of the site. From the soil survey background and field information, a large variety of soil types and hence soil properties occur throughout the entire area and cannot be treated in the same way for stockpile situations and used in the same manner for rehabilitation.

#### Comment 2

Typically the construction phase will involve complete removal of topsoil together with minor to severe compaction of the subsoil. The construction phase by removing the topsoil will expose the subsoil of soils such as G15 a Subnatric Brown Sodosol which in the north eastern area of Open Cut Mining Area, OEA and Mine Infrastructure area. G15 is sodic and dispersible as well as saline. These soil properties will have an environmental impact. Firstly sodic soils have hard set surfaces that enable an increase in the run off rate during rainfall events. The ensuing sediment will be carried in a colloidal suspension to drainage lines degrading the aquatic ecosystems, with the development of algal blooms. Ultimately the terrestrial ecosystems will also degrade and the stream banks will be easily eroded. Saline soils can result in waterlogging, poor vegetation response and erosion.

#### Comment 3

It is difficult to successfully separate topsoil from subsoil without mixing. This is especially true if the 'A' horizon is shallow, the micro-topography is rough, and drag lines are used to scalp the area

#### Comment 4

As mentioned in Soil Submission SIG1 in the Response (SLR2015) "Soils have differing compositions and structure". Soils which have been stripped and stockpiled will not retain their structure which will already have been changed by the excavation process. Once the structure is altered hydrologic characteristics such as infiltration is changed.

### Comment 5

According to Tongway and Ludwig (2011) long term rehabilitation and restoration of the landscape and soil properties of the site is made more difficult by the presence of large, unconsolidated spoil heaps containing sodic and even saline subsoil.

#### **3.1.3 Soil Stability Assessment**

An additional issue is the potential risk from exposure of sodic subsoil. Rainfall impact causes exposed sodic soil to not only disperse but also slake and easily erode. Slaking and dispersion creates a crust on the soil surface, reducing infiltration rate and therefore increasing the proportion of water that runs off the site. Once the dispersed clay is mobilised within the runoff it forms a stable floc that does not readily settle out. The sediment laden water enters local waterways reducing light penetration and smothering aquatic habitat.

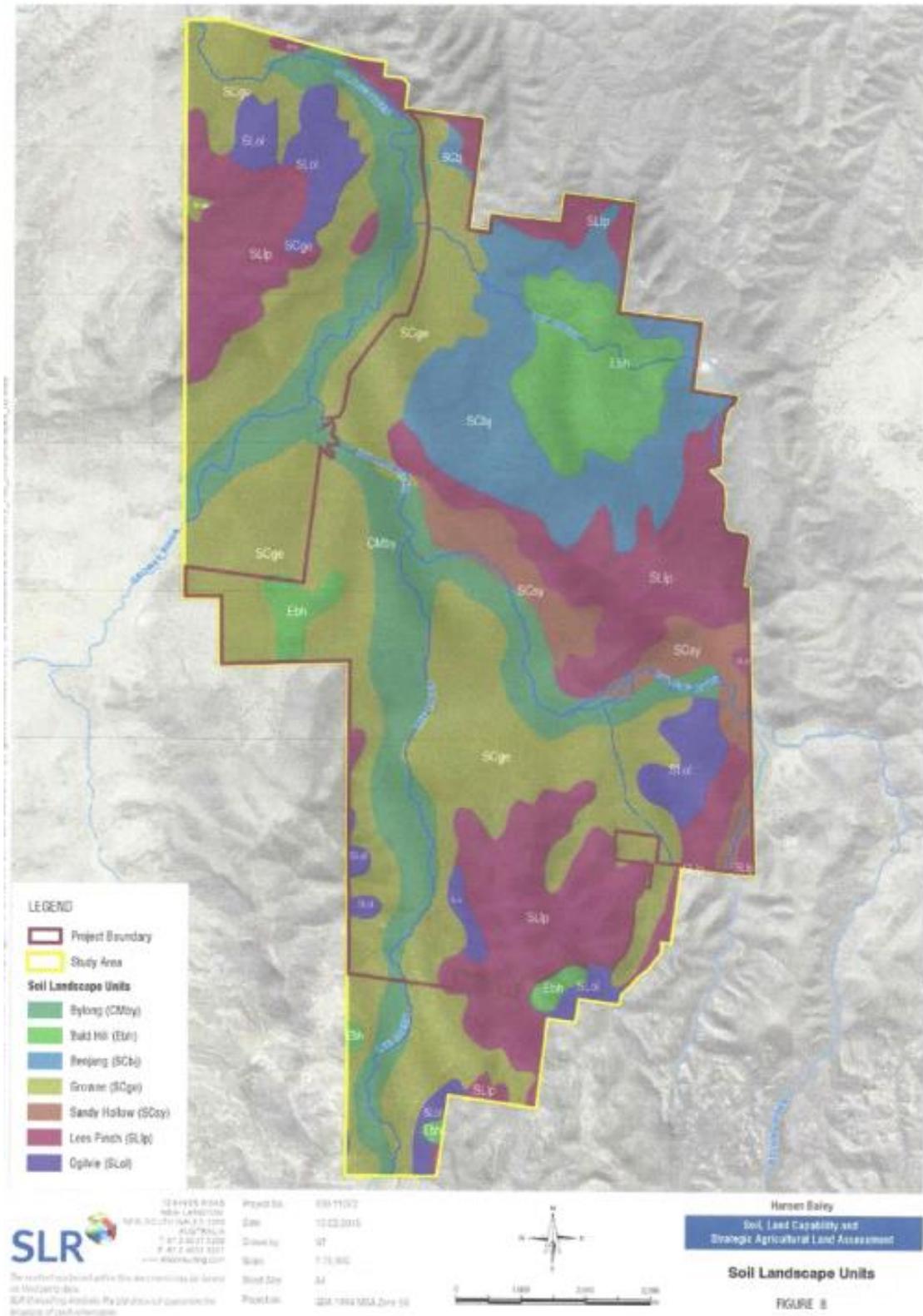


Figure 1. Soil landscapes within the project area (Source SLR, 2015)

#### **4. OPEN CUT MINING AREA, OVERBURDEN EMPLACEMENT AREA (OEA) AND MINE INFRASTRUCTURE AREA**

The soil survey at 1:25 000 was intensive in areas of Growee Soil Landscape Unit (SCge) where the risk ranked Project footprint was high. This area was the open cut mining area and the overburden placement area. The soil survey was also undertaken at 1:25 000 in SCge area high risk ranked Project foot print along the mid northern section of Wollar Rd at a slope of <10%.

The development of the Open Cut Mining Area, OEA and Mine Infrastructure area will impact upon 105.9 ha of sedimentary derived soils from the Growee Soil Landscape Unit. A total of 6 soil types within this unit are Red Chromosols, 4 soil types are Brown Chromosol with other soil types including Lithic Rudosols, Red Dermosols, Black Kandosols Stratic Rudosols, Black Dermosols, Black-Orthic Tenosols and Yellow Sodosols. The Red Chromosols are also represented by 2 shallow and 1 moderate soil depth phase; Brown Chromosols are also represented by a shallow soil phase.

##### **4.1 Stability of Soil Units in Open Cut Mining Area, OEA and Mine Infrastructure Area**

The dominant soil type of Growee Soil Landscape Unit is a Red Chromosol. Within the development of the Open Cut Mining Area, OEA and Mine Infrastructure area of 105.9 ha are Red Dermosols such as G05 (low to moderate soil erodibility), G08 (moderate to high soil erodibility, slight dispersibility), Brown Chromosols G09 (low to high soil erodibility, very high dispersibility). There are also minor soil units of the Growee Soil Landscape including Tenosols, Kandosols, Sodosols and Rudosols.

Sodosols (G15 low to moderate soil erodibility, high to moderate dispersibility) disperse and are susceptible to gully and rill erosion especially when exposed. This can result in sediment laden runoff.

Traditional erosion control measures such as straw bales and silt fences are not effective in retaining sediment if the sediment is largely dispersed clay. Flocculation within sedimentation dams is also a difficult and expensive process. Flocculation as a result of dispersed clay covers the dam surface increasing the water temperature resulting in algal blooms.

#### **5. ADDITIONAL COMMENTS**

##### **5.1 Risk Assessment and Survey Scale**

The assessment has been conducted within a framework whereby, once the risks have been identified it is then possible to commence analysis against the set of criteria for likelihood of any particular occurrence and risks can be ranked in terms of severity. Views on severity of risk this may vary depending on different stakeholder perspectives.

Using a simple matrix the likelihood of an event occurring and the consequences of the impact can be given a qualitative and quantitative value which may be easily communicated to stakeholders. The likelihood of an event or occurrence is commonly assessed on a scale from 1 to 5, where 1 represents a very low probability of the risk event actually occurring while 5 represents a very high probability of occurrence.

The Composite Index (Risk Priority Number) can take values ranging (typically) from 1 through 25, which can be arbitrarily divided into three sub-ranges. The overall risk assessment is then High, Medium or Low, depending on the sub-range containing the calculated value of the Composite Index. The three sub-ranges could be further categorised into 1 to 8 (very low to low), 9 to 16 (medium) and 17 to 25 (high to very high). Using this method enables recalculation of risk priority numbers when environmental conditions change giving a better resolution than the use of qualitative terms such as high, medium or low.

The underground mining covers some 1,717 ha of land. According to the environmental assessment there is a ‘low’ risk of adverse direct impact on the soil resources’. In view of the potential for longwall mining to cause significant subsidence, in my opinion it is difficult to see how this impact can be ‘low’. In areas of low slope it is highly likely that the subsidence will create issues with drainage and consequent water logging. Therefore the use of the terms such as “low” or “high” will often depend the view of the stakeholder. In this case, the Proponent has not defined these terms so it is not possible to independently verify these views.

The submission concludes that mine infrastructure and haul roads have only ‘**medium risk**’ of adversely directly impacting on the soil resources. In my opinion, it is difficult to see how major infrastructure such as coal plants and haul roads have only ‘medium’ risk. Typically the construction phase will involve complete removal of topsoil together with minor to severe compaction of the subsoil with the potential for accelerated runoff and erosion.

## **5.2 Further Comments**

The following comments are based on the assessment of the soil and landscape report:

- Some of the soils in the area of high risk have unstable subsoils. These subsoils will be exposed during disturbance required to excavate, process and transport coal. This issue has not been addressed.
- In response to SLR 5.8.5 concerning communication to stakeholders it is essential that the results of all inspections of the site and the subsequent written reports by the so must be easily accessible through various media for public scrutiny.

Dr Pam Hazelton BSc (USyd), Dip Ed (UNE), PhD (UNSW) CPSS

**Review of Bylong Coal Project in relation to Soils:  
A Submission to the NSW Planning Assessment Committee.**

**Michael Eddie**

**19 May 2017**

**Aim**

This report addresses whether the concerns in relation to soils, soil survey and verified Biophysical Strategic Agricultural Lands (BSAL) attribution raised by the Gateway Panel assessment process, in relation to the EIS including the Response to Submissions and Preliminary Assessment Report and associated material have been adequately addressed. Other issues such as agronomic, equine, hydrology, ecology, cultural, economic, infrastructure, geotechnical or mining issues are not addressed directly.

**Outcomes**

Gateway assessment

I conducted a review of the Gateway Panel's determination of impacts on BSAL and their assessment of the Proponent's BSAL verification. I identified that the following issues require further consideration.

The Gateway Panel determination of impacts on BSAL is presented in Appendix 1. The significant impacts that requiring further consideration are—

- (i) Impacts on the land through surface area disturbance and subsidence.  
The verified BSAL located within the predicted subsidence study area will be used as part of the Project's Biodiversity Offset Strategy and will therefore be unavailable for agricultural production into the future. However, the proponent has not addressed the issues of—
  - Ponding (which will affect the chemical and physical fertility of affected soils, thereby impacting the agricultural productivity of verified BSAL);
  - Geotechnical stability risks of mine waste emplacements; and
  - Relocation and re-creation of BSAL soils.
- (ii) Impacts on soil fertility, effective rooting depth or soil drainage.  
Not addressed. Soil handling techniques and profile mixing have the potential to affect soil fertility, effective rooting depth and soil drainage.
- (iii) Increases in land surface micro-relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to soil pH. Not significant.
- (iv) Impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy).  
Significant, but not applicable to BSAL.
- (v) Fragmentation of agricultural land uses.  
Not addressed. No reference found to fragmentation of agricultural land uses in EIS or the Response to Submissions.
- (vi) Reduction in the area of biophysical strategic agricultural land.

The Gateway Panel finds the Applicant's methodology for verification of BSAL within the Project Boundary area is generally acceptable for a Gateway Application, with four exceptions to method and reporting, as presented in Appendix 2. Issues 1, 2 and 4 are adequately addressed in Section 5.17.2 of the Response to Submissions.

## Responses to Submissions.

A review of the responses to submissions in the Bylong Coal Project Response to Submissions on behalf of the proponent KEPCO (Hansen Bailey, March 2016) is presented in Appendix 3. This outlines whether concerns raised by the NSW Department of Primary Industries (Agriculture) and other stakeholders have been addressed. Responses to submissions were generally justified, with the following exceptions—

- Presentation of soil data in the EIS is somewhat confusing and difficult to interpret.
- A soil sample was not lab-tested despite being classified as BSAL
- There is an assumption that previously verified BSAL will be returned to its original condition post-disturbance, especially in the subsidence area. The proponent has not addressed the following issues—
  - Ponding (which will affect the chemical and physical fertility of affected soils, thereby impacting the agricultural productivity of verified BSAL);
  - Geotechnical stability risks of mine waste emplacements; and
  - Relocation and re-creation of BSAL soils.
- DPI's recommendation to assess the proponent's Mining Operations Plan to determine the availability of soil volumes available for rehabilitation before the project activities commence should be adopted.

## Issues relating to the Soil Units.

Soil units are defined by soil type (ASC soil classification) within a soil landscape but their occurrence and spatial distribution is not described. The basis on which certain soil units are defined and differentiated is unclear, and the soil units cannot be understood in terms of landform element or other surface feature. It is not explained how the soil unit boundaries were mapped.

For example, the Bylong soil landscape is described as “alluvial flats and low terraces of the Bylong River and the Growee Creek ... landform consists of low (<10m) alluvial terraces with swampy hollows and abandoned channels” (Hansen Bailey, 2015, Appendix V). Within this soil landscape there are 12 soil units and 1 phase mentioned but these are not associated in the text to mappable landform elements; I would expect that in an alluvial soil landscape, deep Black Dermosols might occur on swampy hollows, and Stratic Rudosols might occur in channel beds and abandoned channels.

Bylong soil units B02 and B03 (both Eutrophic Black Dermosol, both BSAL) and B09 (Black Dermosol), are defined with the same soil type but are not differentiated. I question the difference between B06 (Eutrophic Black Dermosol overlying Stratic Rudosol) and B08 (Eutrophic Grey Dermosol overlying Stratic Rudosol), both BSAL (Hansen Bailey, 2015, Appendix V, Table 12).

There seems to be no discernible difference between Bald Hill BH1 and BH2 (both deep Eutrophic Red Dermosol, both BSAL).

Given the short time available I have concentrated on two soil landscapes and their soil units because of their importance to BSAL, in which I found some significant issues regarding soil unit definitions and mapping. There may be further issues in other soil units but I have not had the time to fully explore the text.

I question whether the sampling density may be sufficient to delineate the soil units accurately; for example the soil units of the Bylong soil landscape where soil units based on soil classification might have no surface expression (Hansen Bailey, 2015, Appendix V, Figure 11, Figure12). There are many soil map units that have only one or two sites e.g. BH2, B04, B06, B09, B10, B11, all of which are verified BSAL.

The map unit tags are very difficult to read in Figure 12.

### Verified BSAL and Land & Soil Capability Classes.

There seem to be discrepancies over the distinction between BSAL and Land and Soil Capability (LSC) Class. Land with slope greater than 10% is excluded from BSAL regardless of the soil profile attributes. This is portrayed in the maps in Hansen Bailey (2015), Appendix V, Figure 13 (Land and Soil Capability) and Figure 14 (verified BSAL).

### **Conclusions**

The concerns raised by the Gateway Panel of the effects of the Project in relation to soils, soil survey and verified BSAL were justified. The Gateway Panel determination of impacts on BSAL is summarised in Appendix 1. There are a number of significant issues that need to be addressed.

Responses to submissions (Appendix 3) were generally justified, with some significant exceptions.

The definition and spatial occurrence of the soil units are not explicit. This, and the questionable sampling density of site data, make it difficult to assess the veracity of BSAL verification.

The apparent discrepancies over the distinction between BSAL and LSC Classes should be clarified.

### **Recommendations**

Having reviewed the EIS, the Gateway Panel determination, the responses to submissions and other observations, I recommend the following actions—

1. Address the issues regarding the impact on BSAL, especially in the subsidence area. This includes ponding and inundation, geotechnical stability risks of mine waste emplacements and the relocation and re-creation of BSAL soils.
2. Address the issues of soil handling techniques and profile mixing.
3. Address the potential fragmentation of agricultural land uses.
4. DPI's recommendation to assess the proponent's Mining Operations Plan to determine the availability of soil volumes available for rehabilitation before the project activities commence should be adopted.
5. Clarify the definition and spatial occurrence of the soil units and validate the site data sampling density.

I have read the Expert Witness Code of Conduct under the Uniform Civil Procedure Rules 2005 and that I agree to be bound by it.

Michael Eddie



Senior Soil Scientist (retired), formerly of the Science Division, NSW Office of Environment and Heritage.  
Member, Australian Soil Science Society.

19 May 2017

# Potential impacts and risks from the proposed Bylong Coal Mine development - Goulburn River catchment<sup>1</sup>

**Julia Mullins Imrie**

**18 May 2017**

Please find below my report, as requested by EDO NSW on behalf of the Bylong Valley Protection Alliance, addressing the following issues:

- 1) In my opinion has the environmental impact assessment adequately considered the potential impact on surrounding and downstream catchment areas and users, particularly in relation to changes to water quality and quantity?
- 2) Provide any further observations or opinions which you consider to be relevant.

*Acknowledgment – I have read the Expert Witness Code of Conduct in Schedule 7 of the Uniform Civil Procedure Rules 2005 and agree to be bound by it.*

In 2012 I commenced a PhD research project on the Goulburn River catchment through Australian National University, with the assistance of the NSW Office Water, “*Changing land use in an uncertain climate: Impacts on surface and groundwater, Goulburn River, Upper Hunter Valley, NSW*”.(Imrie-Mullins, 2017). I have lived on the Goulburn River since 1975 downstream from the Ulan Coal & Moolarben Coal mines and have observed the impact of mining on the river system following major mine expansions in the 1980s and since 2005. The comments in this report are based on my professional opinion.

Two fundamental areas of risk from the proposed Bylong Coal Mine development (KEPCO) affecting the downstream catchment are:

- Degradation of water quality from the export of salts and other contaminants into the river system – with the risk of this increasing during and/or post mining
- Reduction in water quantity during droughts – with the risk that mining will permanently intercept or damage alluvial, porous and fractured rock groundwater systems affecting downstream base flows and water security to other users (including GDEs)

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<sup>1</sup> Copyright: The material and figures contained in this report include current work leading to a PhD. It is provided here solely to assist the PAC in its determination in relation to the KEPCO Bylong Project. No permission for use for any other purpose or by any other person is granted.

## ***Our Limited Understanding of the Goulburn catchment***

The Goulburn is one of the least studied and understood catchments in NSW despite salinity being recognised as a critical issue in the catchment. Salt export from the Goulburn has a significant impact on water quality affecting downstream riparian vegetation, water users, irrigators and the Hunter River. Monitoring of stream salinity (EC) commenced post mining - major land use change (1992 @ Sandy Hollow GS210031, 2012 @ Coggan GS210006). Groundwater resources and groundwater dependent ecosystems (GDEs) are largely unmapped due to insufficient survey data, with limited spatial layers shown in Geoscience Atlas of GDEs.

A general lack of long term, good quality water records has been a recurrent challenge in all assessments concerning the Goulburn catchment (Krogh et al., 2013; Biswas, 2010; Beale et al., 2000). Goulburn stream gauge (GS) records contain significant spatial and temporal data gaps in stream flow and water quality records caused by non-continuous and interrupted monitoring; terminated programs, and systemic technical difficulties related to stream and sand bed controls. These difficulties make the assessment of catchment yield and changes in electrical conductivity over time problematic, limiting the robustness of predictions.

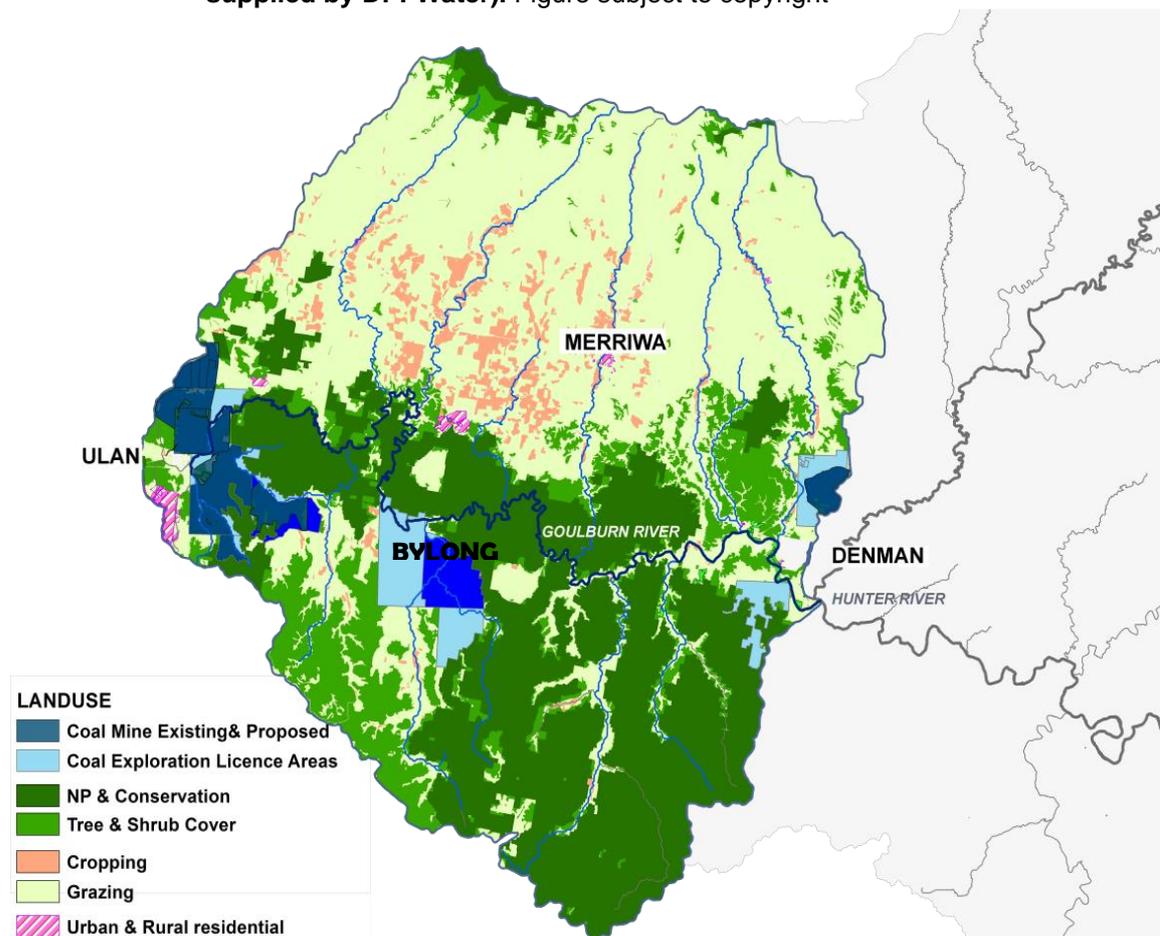
### ***Context***

The Bylong Valley is located at a mid-point in the Goulburn catchment, entering the Goulburn River immediately above the Coggan gauging station (GS210006). The Goulburn River is the largest tributary of the Hunter River, covering 36% of the valley and contributing 23% of the flows to the Hunter River. It has a significant influence on Hunter downstream water quality and on occasions contributes a greater salt load than the Hunter River at Denman. For example the annual salt load in the lower Goulburn (Sandy Hollow) in 2010-2011 was 93,200 tonnes opposed to 71,000 tonnes in the Hunter (Krogh *et al.*, 2013). The export of salts from the Goulburn can have a significant influence on the operation and functioning of the Hunter River Salinity Trading Scheme (HRSTS<sup>2</sup>) as well as other downstream users including the Goulburn River National Park and irrigation in the lower Goulburn.

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<sup>2</sup> HRSTS is designed to minimise the impact of saline water discharges by the mining and energy industry on other Hunter River water users and the environment by using tradeable credits for discharging saline water, while limiting river salinity to <900 µS/cm. **The Goulburn River is not part of HRSTS**

**Figure 1: Goulburn Catchment – land use (Land-sat classification shape-files supplied by DPI-Water). Figure subject to copyright**



## **Coal Mining**

Large scale open cut mining commenced at the top of the catchment in 1983 with the diversion of 5.2 kms of the Goulburn River near Ulan. There are currently three large coal mines operating in the upper Goulburn catchment– Ulan Coal Mine (UCML), Wilpinjong Coal Mine (WCM) and Moolarben Coal Operations (MCO). Since 2007 all three mines have been granted major extensions and numerous modifications increasing the total approved coal production to over 52.5 million tonnes per annum. The current approved underground mining footprint in the Ulan Wollar area is approximately 144 square kilometres with an approved total open cut area of over 68 square kilometres. The licensed extraction of water by the coal mines, including incidental take (interception) of groundwater, as predicted in mine reports, will exceed 42 ML/day over the next decade. In 2015 the combined water usage by Ulan, Moolarben and Wilpinjong coal mines was estimated at 8,650 million litres (UCML, 2015b; MCO, 2015; WilpinjongCoal, 2015).

All three mines were initially approved with a ‘nil discharge’ Environmental Protection Licence (EPL) condition. This did not extend past the first substantial wet period due to excessive onsite water and the risk of an uncontrolled spill. In early 2010, following heavy rain, the Environmental Protection License (EPL) conditions were suspended for coal mines in the upper

Goulburn to allow unlimited disposal of excess mine water offsite (up to 3 months). Now UCML, WCM and MCO all have EPL licenses<sup>3</sup> that permit regulated offsite discharge of treated mine water and spillage from sediment dams. The EPA response to BCP states that should approval be granted they will not licence any discharges from mine water storages during the period of mining, although, in its Response to Submissions (RTS), KEPCO maintains that “*the EPL may be modified to include the discharge of water from the site as required*”. (RTS.AppG-p.22-23). Practical experience over the last six years in the upper catchment tends to suggest licenced discharges for the BCP will be a practical necessity, despite the EPA’s current position. (Either that, or KEPCO’s plans seem to require significant revision.)

During 2016 UCML discharged around 8,000 million litres of treated mine water offsite, carrying an estimated 4,287 tonnes of salt (UCML, 2016). UCML water discharge is predicted to peak at around 10,000 ML/year by 2023 with a salt load of approximately 5,000 tonnes of salt (EC ~750  $\mu$ S/cm). The gross salt output from the Wilpinjong catchment is estimated to reach 5,076 tonnes/year in 2018, and 7,918 tonnes/year by 2031 at the completion of mining (WEP, 2017). No similar estimated gross salt output for the Moolarben catchment is provided. The MCO EPL license, however, permits 10ML/day of mine water discharge (<900 $\mu$ S/cm EC) and spillage from sediment dams when there is > 44 mm rain over 5 day period.

Most assessments of water quality focus on salinity levels (EC), however the chemical composition of saline mine discharge water can differ significantly to what naturally occurs in surface waters. Mine de-watering, seepage and the discharge of excess mine water in the upper Goulburn is not only increasing downstream salt loads and altering the natural flow regime, but is also changing surface and groundwater chemistry. The relative proportion of ions in saline waters as well as other co-occurring environmental stressors (e.g. turbidity) can have a combined greater effect on ecosystem health than total salinity (Kefford *et al.*, 2013; Krogh *et al.*, 2013; Imrie-Mullins, 2017). The impact of mine water discharge on macroinvertebrates and groundwater stygofauna requires further research.

## ***Climatic Extremes***

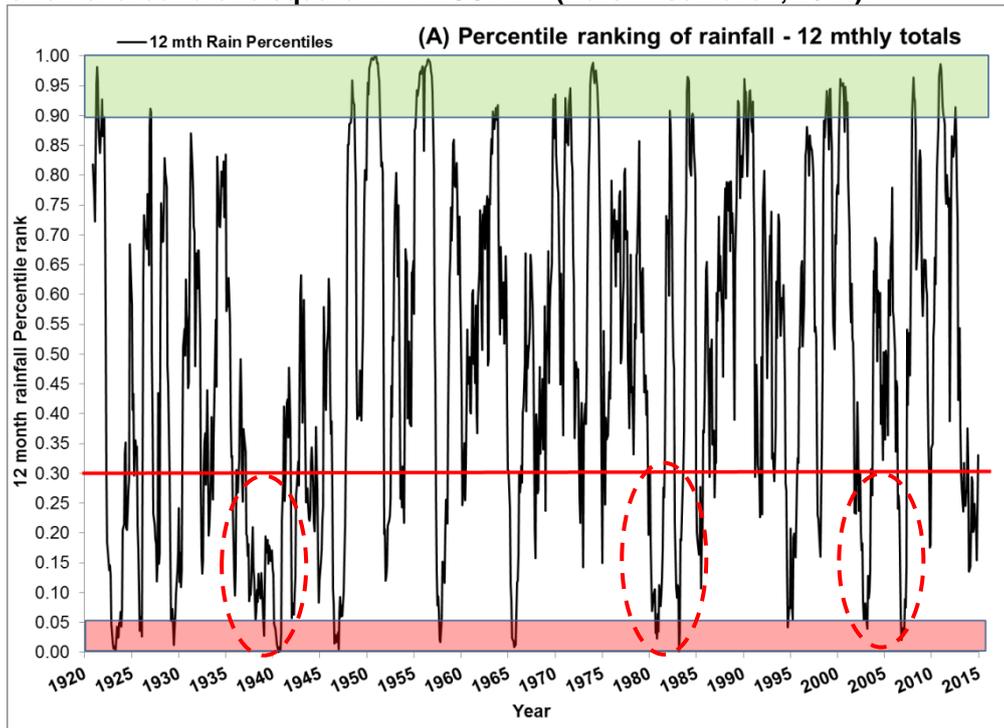
The Goulburn River has a highly variable rainfall and can experience extended periods of droughts, intense heavy storms and rain events. Drought conditions are considered extreme when the previous 12 monthly cumulative rainfall falls below the 5<sup>th</sup> percentile (CSIRO, 2015). **Figure 2** shows 12 monthly percentile ranking of rainfall for the Goulburn catchment – severe drought conditions occurred during the 1940s, 1960s, 1980s and 2000s. The green zone in **Figure 2** (90<sup>th</sup> percentile) is indicative of the wettest period when significant recharge of groundwater systems is most likely to occur. Climate indicators show a rising trend in rainfall since the 1950s

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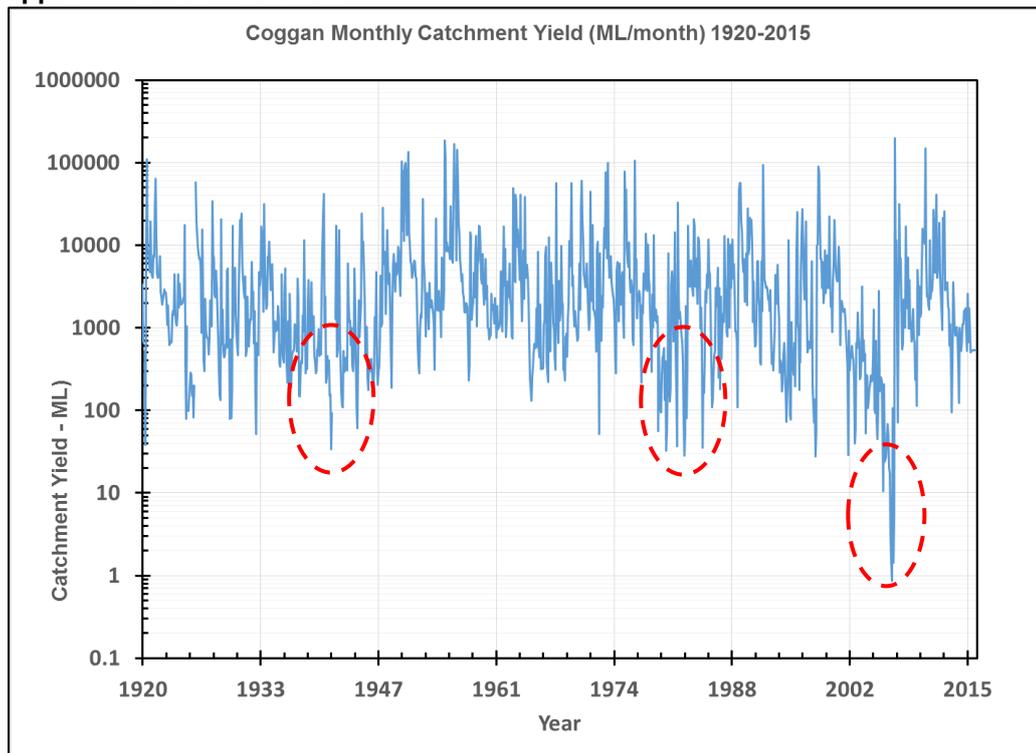
<sup>3</sup> UCML EPL394, MCO EPL12932, WCM EPL12425

particularly during the warmer season (October to March). However analysis of stream discharge data shows a *decline* in catchment yield (monthly stream flow) most noticeable since the 1980s. Catchment yield measured from stream discharge records was significantly less during the millennium drought than during the 1940s and 1980s droughts – despite these earlier periods having statistically lower precipitation (Figure 3).

**Figure 2: Percentile ranking 12 monthly precipitation – based on spatially interpolated rainfall statistics for the period 1920-2014 compiled for the upper Goulburn catchment using monthly precipitation (BOM) tied to a grid digital elevation model (DEM) - resolution of around one square km ANUSPLIN (Hutchinson et al., 2014).**



**Figure 3: Hydrograph of monthly stream discharge (ML) at Coggan 1920 - 2015 upper Goulburn catchment**

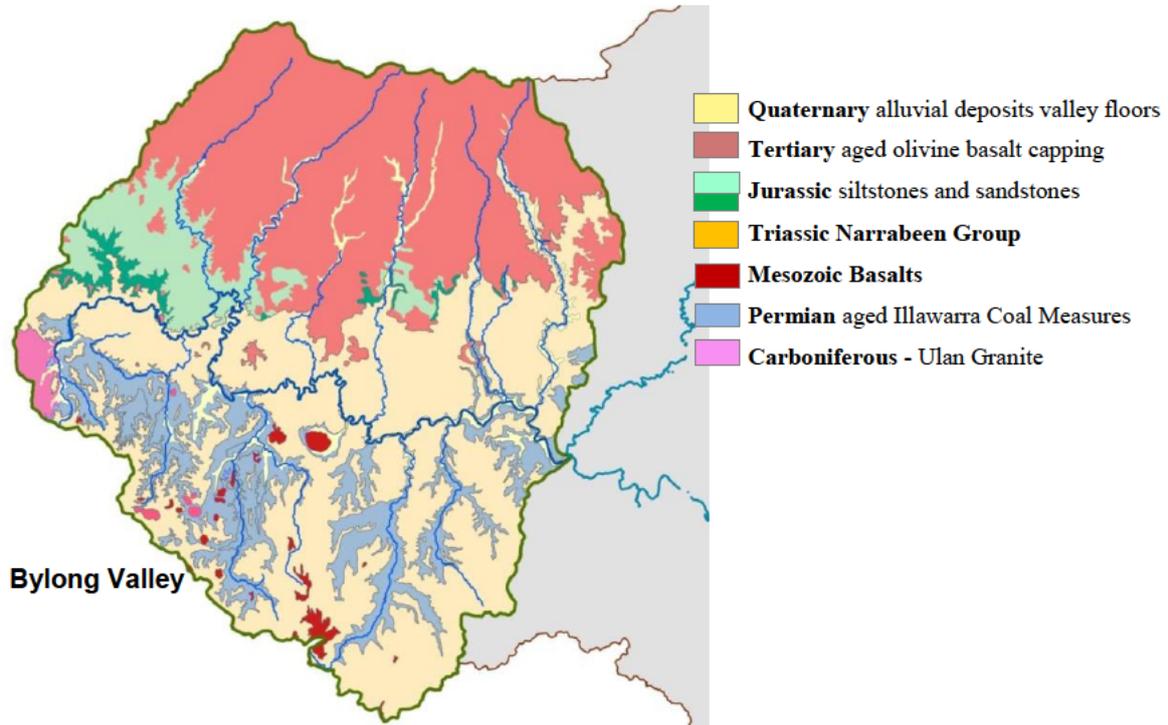


The proposed Bylong Coal project is likely to experience climatic conditions outside the range of the historical climate record. The stated 1% chance is a significant risk when impacts of the project on surface and groundwater interaction and water quality extend well into the next century. A declining trend in catchment yield generates substantial uncertainties when estimating water balances and an identifiable environmental risk for water planners assessing sustainable water limits. Climate uncertainties and limited monitoring data combined with the complexity of the hydrogeological system make environmental assessment and use of modelling to confidently predict future impacts quite problematic.

## ***Hydrogeology***

The Goulburn catchment has a complex geology; the western and southern catchments are dominated by the Narrabeen Group of Triassic sandstones and conglomerates underlain by Permian Coal Measures and shale. The geology in the north is dominated by Tertiary basalts underlain by Jurassic shales, siltstones and sandstones that outcrop as a halo, around the elevated basalt plateau. Volcanic activity in the Mesozoic period is thought to have also contributed volcanogenic material to the Permian and Triassic sedimentary sequences.

**Figure 3.4 Geological Map of Goulburn Catchment (copyright)**



The Goulburn is regarded as a highly connected surface-groundwater system with groundwater inputs *providing crucial low flows (or base flows) during droughts*. The Goulburn River and its tributaries act as regional sinks whereby groundwater mounding reflecting the elevated sandstone topography and basalt hills drains towards topographical lows discharging as base flows to rivers and streams. Secondary permeability through connected bedding planes, fractures and joints, augmented by igneous intrusions, form conduits for horizontal and vertical groundwater flow paths. The Narrabeen Triassic sandstones have been found to be porous and highly conductive strata supporting a regional and localised groundwater system *contributing good quality, low salinity groundwater that supports base flows in streams and groundwater dependent ecosystems* (McVicar TR *et al.*, 2015; Kellett *et al.*, 1989; Imrie-Mullins, 2017).

Bylong River alluvium contains an extensive and productive groundwater store, dependent on rainfall recharge and augmented by fresh and saline flows from Permian groundwater and the surrounding Triassic porous/fractured rock system. Subsurface groundwater flows that slowly discharge into the Goulburn River system are a characteristic feature of this tributary.

The main contributor to high salinity levels in streams is the export of salts in surface runoff and groundwater from disturbed Permian coal measures within the incised valleys of the southern catchment. The activation and mobilisation of salts is accelerated by land clearing and in recent years the large scale disturbance of the landscape from the expansion of coal mining that directly targets coal reserves in the valley floor.

Diffuse seepage from mined areas is very difficult to measure and is inevitably modelled based on numerous assumptions. Saline deposits, once activated, concentrate with evaporation during dry times and consequently mobilised during wetter periods accumulating downstream within the sand and sediments of the river alluvium or exported into the Hunter River at high flows. The risk of cumulative saline leakage from buried mine tailings, disturbed interburden and reject material, contaminated groundwater in underground goafs and buried brine waste from desalination plants represent a potential long term hazard to water quality in the Goulburn. This risk will continue for 100s of years post mining, when management effectively ceases.

Rigorous management regulations and approval conditions requirements have reduced (but far from eliminated) offsite discharge and seepage of contaminated water from current mining operations within predicted range of climatic conditions. However, weather extremes and post mining uncertainties extending decades, introduce a high level of uncertainty and unacceptable risk to downstream environments, leaving a potentially costly legacy for society and future generations. In my opinion KEPCO's Bylong Coal proposal has not adequately considered or modelled the potential risk to the Goulburn catchment from extreme climatic events during or post mining.

## ***Water Security***

Stream flow hydrographs supplied by KEPCO for the Bylong and Goulburn River (AGE RTS p.35 Figure 5-12) show a significant difference between the modelled flows for the Bylong River and measured stream discharge in the Goulburn at downstream Coggan gauge (GS210006). One explanation for this discrepancy is the predicted groundwater recharge rate for the Bylong catchment is significantly higher than assumed in the modelling. Recharge rates are a critical parameter in surface and groundwater modelling predictions.

KEPCO groundwater modelling also assumes a very low recharge rate for fractured/ porous rock groundwater. The estimated recharge rate 0.7% rainfall for sources other than the alluvium (6.3.2 Part 2 RTS) is significantly lower (~ x 10) than generally accepted 5-7 % recharge level for Triassic Narrabeen group geology (Pearse – Hawkins *et al.*, 2015; Ross and Webb, 2015). This potentially underestimates the contribution of fresh, slow release groundwater from the fractured and porous rock hydrogeological units.

In my opinion the KEPCO groundwater assessment does not adequately consider the potential interference and contamination of fresh (low salinity) groundwater from the upper Bylong River and Lee Creek and emanating from the surrounding fractured rock system (Triassic/Upper Permian) that sustain groundwater storage and help dilute more brackish water in the alluvium. Potential connectivity between the coal seams, alluvium and Permian/Triassic weathered zone was initially overlooked and appears to still be underestimated. The report

assumes the extent of coal seam depressurisation will not be significant. This is a substantial claim that is yet to be tested.

*“...available data does indicate in some areas there is a direct or direct hydraulic connection between the alluvium and the coal seams proposed to be mined....*

*The unit (Triassic Permian) underlies the alluvium and will act as a pathway for flow from the alluvium to the proposed open cut mining areas in some parts....*

*...bores installed within the weathered zone (Triassic/Permian) show a response in groundwater levels to climatic events and confirm the unit is well connected to the surficial alluvium ...” AGE RTS p.41-45*

Monitoring from the longest operating coal mine at Ulan has shown conclusively that mining has resulted in the depressurisation of the coal seam for many kilometres outside the mine footprint affecting both the Permian coal measures and Triassic strata (MER, 2015; MER, 2011; UCML, 2015a).

KEPCO repeatedly consigns potential unresolved issues and remedial measures to a future, yet-to-be-prepared Water Management Plan. These include monitoring seepage from overburden placement, resolving groundwater trigger levels, gaps in the groundwater monitoring network and borefield production; validation of water models and risks with site water management, including delaying rehabilitation of open cut voids and post closure monitoring (RTS S4.3, SRTS Vol 2. App.J. pp.3, 7, 15-24, AGE RTS, pp.41.84)

The experience from other mining operations in the area has shown that once mining commences, many (if not most) of these impacts *cannot* be reversed or adequately mitigated. The loss of water security to the Bylong Valley will destroy its agricultural potential and reduce base flows in the Goulburn, most critical during extended dry periods and droughts. This threatens the resilience of the riparian ecosystem in the Goulburn River National Park which provides invaluable ecosystem services, improving surface water quality, reducing turbidity and algae blooms. Such outstanding issues and risks need to be fully tested and plans scrutinised before any true assessment of the impact of this green-field project and its costs (broadly defined) can be made.

## **Conclusion**

The existing three mines in the upper Goulburn catchment have initially claimed there will be no mine discharge but all have subsequently required modifications to allow discharge of excess mine affected water. Each mine has also been granted approval for significant expansion of their mining footprint that has placed further pressure on water resources.

It has proved very difficult to accurately measure and quantify the potential combined contributions from coal mining operations resulting from point and diffuse seepage of saline

water or loss of fresh groundwater inflows from regional Triassic-Permian groundwater system. . The cumulative impact of opening another coal mine in a green field, highly vulnerable landscape has the potential to significantly increase the total salt load in the Goulburn River over coming years, considering point and diffuse discharge of mine affected groundwater and mobilisation of geologically sequestered salts from disturbed mined areas.

The lack of adequate monitoring in both the upper and lower sections of the Goulburn River catchment demands further strategic real-time monitoring of flow and salinity; the regional groundwater system and surveying of GDEs. The assessment of the long term impacts of the Bylong Coal Project on water security requires further scientifically robust investigation and consideration of climatic extremes. The proponent's claim that the proposed Bylong Coal mine will achieve *nil discharge* (direct and diffuse) over the life of the mine and post closure requires particular scrutiny and interrogation by the PAC.

The Goulburn is a vulnerable catchment at risk from climatic extremes and rising salinity that requires very careful and sensitive land and water management to maintain resilience and avoid escalating degradation and loss of valuable ecosystem services and sustainable agricultural production.

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**SUBMISSION TO THE PLANNING ASSESSMENT COMMISSION –  
BYLONG COAL PROJECT – SSD6367  
Dr Hedda Askland  
May 2017**

I provide the following expert witness report in relation to the social impacts of the Bylong Coal Project (Project) currently being assessed by the Planning Assessment Commission (PAC). I, Dr Hedda Haugen Askland (Cand.Mag, MSocSc, PhD), have read the Expert Witness Code of Conduct in Schedule 7 of the Uniform Procedure Rules 2005 and I agree to be bound by it.

I am a qualified social researcher and have been working with local communities in the area over the past two years. I am employed as a Senior Lecturer at The University of Newcastle, where I am conducting a long-term ethnographic research project with mining-affected communities in the Upper Hunter and Mid-Western Region of New South Wales. Bylong is one of the case study area for this project, which explores issues of migration, resettlement and displacement in the context of mining.

I have reviewed the Social Impact Assessment dated July 2015 developed by Hansen Bailey for the Proponent (being Appendix AC of the EIS), as well as the Peer Review commissioned by the NSW Department of Planning and Environment (DPE) and developed by Elton Consulting and KEPSCO's response. In addition, I have reviewed the Response to Submissions (RTS), the Social Impact Assessment (SIA) No workforce accommodation facility (WAF) Accommodation Scenario, the Workforce Accommodation Stud, Supplementary Responses to Submissions, and the DPE Preliminary Assessment Report.

This report should be used as evidence of my professional opinion and contains information that I believe the PAC must be aware of in order to make an informed decision about the Project. It raises what I believe, in my professional opinion, are problematic elements of the SIA of the Project Environmental Impact Statement (EIS), the Peer Review on which the Department's recommendation to approve the project is founded, and the RTS, and outlines additional concerns and observations that I believe are relevant.

## **EXECUTIVE SUMMARY**

In this submission, I forward a review of the various documents related to the social impact assessment for the Bylong Coal Project: the Social Impact Assessment (SIA), the Response to Submissions (RTS), the Peer Review and the DPE Preliminary Assessment Report. In light of the evidence presented in these documents, I argue that the social impacts of the proposed projects have not been adequately assessed and that the mitigation and management strategies proposed are insufficient. I argue that a project of this kind presents unique moral issues that must be considered by the PAC. These relate to the weighting of social, economic and environmental impacts, which requires valuation of social, economic and environmental costs and benefits as they manifest within different locations. There is a distinct inequity embedded in the development. It exposes a particular part of the population—rural landholders in Bylong who are in direct competition with the Proponent in relation to key resources (particularly water)—to the vast majority of negative impacts whilst receiving very few, if any, benefits. This inequity is not considered in the SIA or any of the other documents for this project, yet it is a key concern when scaling benefits and costs. Moreover, there is a distinct lack of attention paid to the transnational nature of the project and the fact that this is a greenfield mine. Further consideration is required in terms of the greater social impacts that a project of this kind will have and the broader community costs of a greenfield mine.

### **1.0 Social Impact Assessment (SIA)**

The SIA of the Project, identifies a number of negative social and economic impacts and benefits for the Regional Study Area and the Project Area. The assessment of these impacts and benefits is, however, incomplete and inadequate. There are a number of methodological and analytical shortcomings in the SIA, and the entire impact analysis section lacks evidence of social research and is devoid of actual, structured assessment. There is limited cross-analysis of the data, restricted reference to the environmental assessments, and a significant lack of consideration of cumulative, long-term impacts. The assessment does not include a 'no development' scenario, which is standard for any impact assessment and important for understanding change.

#### **1.1 SIA requirements**

- The DPE Secretary's Environmental Assessment Requirements (SEARs) (23 June 2014) specified that the EIS for the development should include 'an assessment of the likely social impacts of the development (including perceived impacts), paying particular attention to any impacts on Bylong village'. I would argue that the social impacts are not explored or illustrated in the detail required as part of typical and adequate SIA practice. The SIA are inconsistent with the Secretary's Requirement given that there is:
  - no rating or assessment of the social impacts according to a defined assessment matrix (indeed, the SIA contains **no actual assessment of impact**, just reference to potential impacts);
  - refutation and consistent undermining of perceived impacts through lack of social research and analysis. The analysis remains descriptive and, as such, does not provide adequate detail for a decision to be made. It does not look at 'what does this mean' in terms of human wellbeing. The analysis only identifies impacts as 'positive and/or negative' and it is left to the reader to identify the severity, extent and temporality of the impacts.
  - a consistent focus on the regional benefits without adequate reflection on the local impacts. The local impacts identified in the SIA are significant, yet the substantial impact that the project will have on the village is not adequately dealt with and the proposed mitigation strategies are inadequate; and,
  - limited feedback from stakeholder engagement.

## 1.2 General concerns with the SIA

- It should also be noted that a number of negative social impacts have already manifested within the local community (Bylong Valley). This obscures the baseline, yet it is an issue that remains veiled throughout the SIA, as well as other documents underpinning the Department's recommendation.
- The SIA is central to the assessment and decision making of the proposed development. As with any development of this kind, all project related assessment and decision making are connected to a moral economy, where the environmental-economic bind is negotiated. The role of the EIS, of which the SIA is part, is to enable determination of assessing costs and benefits within this nexus, and social, economic and environmental variables—such as noise, dust, water, traffic and 'the social'—get treated as objects for inquiry. What easily happens in this process—and what has happened in relation to the SIA for the Bylong Coal Project—is that individuals become treated as objects. The human element disappears from the assessment and it becomes a calculation of costs and benefits in which the essence of a social impact assessment gets ignored. This essence is **human wellbeing**. Ultimately, a social impact assessment is about reviewing how a project will influence human wellbeing and how individual's wellbeing can be maintained, if not, enhanced. The SIA prepared by Hanson Bailey fails to adopt a holistic, system analytical perspective that facilitates insight into the integrated variables underpinning wellbeing. It reduces social impact to singular, linear change rather than an integrated and cumulative process.
- As is stated in the various documents, social impact can be both negative and positive, and it is those who are living most closely to the coal resource that will be most exposed to negative impacts. There is a particular logic to social impacts in relation to costs and benefits: those who are closest to the Project (that is, in this instance, the local residents of the Bylong Valley and the immediate villages surrounding Bylong, such as Wollar) will endure the most negative impacts and the least positive impacts. Vice versa, those who are further away will be screened from the direct negative impacts but will be able to enjoy positive impacts. There is, thus, a distinct creation of winners and losers in this project. Whilst the SEARs identify the need to consider geographical location as a distinct variable for assessment of social impacts, there is no consideration of how this is to guide assessment. Thus, we end up with a scenario in which there is a descriptive analysis of social impacts as they manifest within different locations (Bylong versus the broader local government area (LGA)/Mudgee) but they appear to be treated as qualitatively similar when assessing project costs and benefits. This is problematic and it essentially means that the Government is willing to sacrifice the lives and wellbeing of some to the benefit of others. There are **distinct equity** issues embedded herein that are not addressed or acknowledged in the SIA for the project. Note that the first principle specific to SIA practice, as outlined by Frank Vanclay (2003: 9) in his discussion of the International Principles for Social Impact Assessment is equity considerations, which 'should be a fundamental element of impact assessment and of development planning.'<sup>i</sup>

### **1.3 Shallow analysis and insufficient assessment of cumulative impacts**

- The analysis in the SIA as well as other documents is extremely shallow when it comes to negative and cumulative impacts. When, for example, it is stated in the SIA that people articulate 'sadness' about the changes to the place, that local residents experience a 'sense of loss of place', increased community tensions, liminality and ambiguity, concerns about the future, what do these really mean? In the SIA these statements and observations are treated without consideration of what these mean in terms of people's current and future wellbeing.
- Whilst the word 'cumulative' is included on a number of occasions and the Proponent claims to assess cumulative impacts, this is not the case. As with direct social impacts, there is no real assessment of the impacts that are projected. There is some consideration of cumulative impacts in terms of a temporal scale but there is no systematic analysis of how the different components of the project will add up, nor is there adequate consideration of how the proposed project will 'speak to' the multiple mining activities in the region. Whilst there is some nod to cumulative impacts in terms of employment numbers and traffic, when it comes to the core issues of social impact as it is experienced within the local area this is not the case.

### **1.4 Failure to account for rural economies and social structure**

- Whereas the SIA distinguishes in locality between Bylong and the Mid-Western Regional Council LGA, it does not acknowledge the significant link that exists between Bylong and Wollar as remote, regional town that are historically connected. As both these villages are now under threat due to mining, I would argue that it is essential that a more thorough analysis of the cumulative impacts as they present in the intersection between the Bylong Coal Project and Wilpinjong, as well as Ulan and Moolarben, is considered.

### **1.5 Shortcomings in terms of SIA process**

There are a number of shortcomings in the SIA in terms of process. These include:

- Lack of evidence of social research and actual, structured assessment of impact: the entire impact analysis section lacks evidence of social research and is devoid of actual, structured assessment of impacts, a requirement not only of the SEARs but also typical of common SIA practice for major projects. There is neither in-depth thematic quantitative analysis of identified social impacts nor qualitative analysis (with a lack of stakeholder quotations to illustrate research findings).
- Social impacts have only been assessed as positive or negative: in any standard risk or impact assessment framework risks and impacts (see: Queensland Guidelines, Terminal 4 SIA, also lots of standard risk assessment tools) need to be assessed for key characteristics such as duration, significance (perceived and technical), likelihood etc. Just assessing an impact as positive or negative is meaningless (e.g. a positive impact could be temporary, a negative impact could be permanent and critical in impact) and this detail is completely lost in the assessment.
- No ranking and prioritisation of social impacts based on risk/significance of impact: due to the lack of assessment described above, the impacts have not been ranked and prioritised for management. This means that the impacts and their management strategies are portrayed as equal in importance, duration etc. It is considered common practice of any impact assessment to include ratings of impacts and opportunities, and there are many available and widely used standard rating scales (see: QLD Government SIA Guidelines 2013). At no point is an assessment matrix provided to assess the relative extent of each impact or opportunity.
- No sense of an overall assessment of impacts and opportunities: how many stakeholders identified positive versus negative impacts? Where do these stakeholders reside? What are their experiential accounts of these impacts and opportunities?
- No sense of stakeholder feedback: there is no information about if and how stakeholders were provided with opportunity to comment and provide feedback on impacts/opportunities and their ratings.

- Lack of benchmarks, standards, best practice evidence: there is no sense of whether an impact is significant based on evidence/benchmarks. Burdge (2004) states that a population change of greater than 5% will have significant social impacts; this has not been taken into consideration.<sup>ii</sup>
- Insufficient description of the proponent: the proponent has not been described in any detail and this is important for understanding social impacts of the proposed operation - what are its operational policies? financial statements/plans? history of mining operations/developments? ownership of existing land not mapped or described? OHS/workplace policies?
- Insufficient consideration and presentation of visual impacts: considering the importance of amenity impacts and the scale of open-cut operations, there is a lack of any maps or visual presentation of the evidence - i.e. maps of the project area do not give a sense of residential locations, numbers of residences, ownership of residences etc and are only included in the appendices; and no photos of the area. It is important to include maps and photos in the SIA and also provide project maps that show the 'social context' - i.e. residential locations, topography of area, adjoining industries etc.
- The 'no development' scenario is not assessed. The 'no development' scenario is a standard part of any impact assessment and important for understanding social change.
- Management and mitigation strategies are vague and do not align with significance of impact: although it is proposed that the proponent would consider undertaking a Social Impact Management Plan (SIMP), the details of management strategies provided in the SIA are insufficient and do not consider the significance of the impacts as part of the design of the management strategies. Terms such as 'support', 'encourage' and 'assist' do not provide a sense of 'how' these actions will happen, when etc.
- The consideration of specific impacts lacks social research and analysis, i.e. there is limited quantitative and hardly any qualitative data and analysis provided, very few stakeholder quotations, and no supporting literature or research.
- Limited stakeholder engagement program: the stakeholder engagement program appears very limited. More information is required regarding the methodology and sampling underpinning the research for the SIA. The interview schedule and survey used for the SIA are not included, subsequently restricting transparency about how the conclusions presented in the SIA have been reached. There is little evidence provided in the SIA for comprehensive stakeholder engagement and very little detail on the participants.
- Health impact assessment is required: due to the nature of the project (open-cut, greenfield), extent of existing operations, and emerging evidence on coal mining and health impacts, there is an urgency for conducting a health impact assessment.

### **1.6 Shortcomings in terms of SIA analysis**

- My main concern with the SIA in relation to its analysis of the data relates to the SEARs first Social and Economic Requirement, namely: 'the assessment of the likely social impacts of the development (including perceived impacts), paying particular attention to any impacts on the Bylong village' (2014: 3). The methodological shortcomings identified above impart significant limitations on the analysis of the data and the assessment of identified (perceived) social impacts. Whereas the SIA gives particular attention to the social impacts on the Project Area (the Bylong Valley), the analysis of these impacts is shallow and lacks references to the primary data and existing research. The impacts are not adequately analysed in relation to one another; each identified impact (positive and negative) is treated in isolation, though these are intertwined and together they create a much more complex picture than what the SIA presents.
- For example, on p.42 it is stated that the consultation identified the concerns of 'changes in natural landscape...and the perceived corresponding change in rural character'. It is also emphasised on p.40 that one of the key assets of the area is its 'remoteness and peacefulness'. On p.42, it is stated that one of the opportunities associated with the project is population growth. The assessment identifies potential increase in social capital and increased population in the Project Area (temporary). The opportunity identified is, however, not analysed in relation to how it will impact on the key assets of the area. Only some off-handed comments are made about how the workforce will be working long shifts and, as such, have limited opportunity to contribute to the area. Moreover, no consideration is made as to whether this

in fact will be in the interest of the workers. No analysis is made about how the remoteness and peacefulness may be impacted by the presence of the WAF and the increased traffic of workers coming along the new (proposed) Wollar road from Mudgee. Moreover, in the subsequent SIA No WAF Accommodation Scenario, the social impact of increased traffic on the surrounding area, such as that between Wollar and Bylong, and the impacts on Wollar Road through the Munghorn Gap Nature reserve are not adequately addressed.

### 1.5.1 Introduction

- This section provides an introduction to the SIA and the Project. It describes the background and context of the Project. This section is meant to introduce the proponent, however there is only one sentence included about KEPCO. The insufficient description of the proponent is a significant shortcoming of the SIA and has implications for the subsequent assessment. More information about the proponent's operational policies, financial statements and plans, history and past experience of mining operations and developments, ownership of land and workplace policies is required.
- The background to the project describes the parallel/dual construction phase. This is not dealt with adequately in later sections of the SIA. The social impact of dual construction and operation of mining activity needs to be properly assessed; both in terms of their independent impacts and their cumulative impacts. The SIA does not address existing literature on cumulative impact.
- Considering the emphasis in the data on 'diverse economies' the lack of understanding, analysis and management strategies of cumulative impacts is a significant shortcoming of the SIA. Indeed, as argued in the recent CSRSM report on cumulative impacts, '[t]he impacts of individually minor, but collectively significant activities taking place over time, when considered together, than compound or increase their effect. These cumulative impacts present greater management challenges than individual activity impacts' (CSRSM 2015: 5).

### 1.5.2 Project setting

- In section 2.2.1, it is noted that whilst coal mining is new to the Bylong Valley, coal exploration has been occurring for more than 15 years. **The pre-existing impact of mining activities in the Project Area is not adequately addressed in the SIA.** The SIA presents the Project as a novel activity within the area and does not analyse if/how the proponent and its predecessors' activities in the area have had social impacts such as depopulation, closing of the school, and loss of services. Whereas these issues are noted in the later chapters of the SIA, it is not sufficiently analysed in the context of the proponent's past and current activities in the area.
- When presenting the Central West Regional Action Plan's planning priorities for the region (p.13), these are listed as if they are in hierarchical order. More information is required here. Moreover, the discussion of the Plan only considers how the mining sector positively contributes to the planning priorities and no information is included about how the Plan considers expanding mining sectors in relation to competing land uses and diverse economic strategies.

### 1.5.3 Project Socio-economic characteristics

- Section four outlines a number of important issues, including the question of workforce recruitment and workforce roster assumptions. Key issues in this section are the lack of attention to the cumulative impacts of construction and operation, and the implications of dual construction and operation. This section outlines operational factors that have significant implications for social impacts discussed later in the SIA; however, these are treated in isolation and there is no in-depth analysis of the relationship between the project's socio-economic characteristics and other social impacts. For example, in relation to the workforce roster assumption; the seven day rotating roster for the duration of the construction phase suggest that there will be an influx of people to the area who will have limited, if any, engagement with the local community. It will increase traffic and noise, which will deter the quality of life for local residents. It states that the roster will 'be sensitive to Mudgee community values' (p.33), but it does not adequately explain what 'Mudgee community values' are, nor does it explain how it will be 'sensitive' to these values. Moreover, it does not consider how this will be aligned with 'Bylong community values'.

- In the discussion about the WAF it is stated that ‘the WAF has been designed to address social amenity considerations and blend in with the Bylong village’. No information is provided as to how this is facilitated, and it is unclear how the WAF, which can hold 650 people, will ‘blend in’ with the local community. This is a typical example of the limitations of the analysis of the SIA.

*No-WAF Accommodation scenario* – this concern is addressed through the no-WAF accommodation scenario. Should, however, it at any time be deemed necessary to build a workforce accommodation facility, the questions of integration of the workforce with local community will be required.

- Assumptions of Workforce Residential Locations – the SIA suggests that the Operation Phase will encourage NLHs to reside permanently within the Local Area. How will this be done? What does ‘permanent’ mean? It is significant that the SIA speaks about residence as ‘permanent’ when it is referring to a temporary project that will endure a gradual reduction in workforce.

#### 1.5.4 Community issues, values and aspirations

- A key issue with this section is how each of the values identified are treated in isolation. The themes (variables) identified are interconnected and it requires a holistic perspective to fully understand the impact (positive and negative) of the Project. The data that is presented in this section is open for misinterpretation; a fact that is further increased due to the lack of transparency about the questions that have been asked. The discussion about the values and the ‘existing issues’ and ‘issues and opportunities’ is treated separate but should be cross-analysed.
- This section does not consider the health impacts that may arise from the project related issues identified (e.g. changes to natural landscape, loss of rural character, air quality changes etc.).
- The SIA suggests that with population growth, the Project will attract new residents to the Bylong Valley, and that this may secure long-term viability of the local school. This is unsubstantiated. No analysis about the location of the school within the Project Boundary Area and how this may impact on the viability of the local school is made. This lack of information is misleading.
- The SIA presents an unsupported and unrealistic assumption about relocation of families to the Bylong Valley. In what other areas adjacent to major coal operations have families relocated? The SIA fails to justify this claim that approximately 20 employees with families could move to the area. This therefore appears to be pure speculation that is used to disguise significant population impacts.

#### 1.5.5 Population and demographics

- The SIA identifies a significant loss of population from the Project. The SIA notes 14% population loss from Bylong Valley due to the Project. It does, however, not include additional loss of population due to the social impacts of the Project. The figure presented is nonetheless significant; as mentioned above, Burdge (2004) states that a population change of greater than 5% will have significant social impacts. Considering the small scale of Bylong Valley, a 14% population loss further enhances its significance. If this was loss was equated to loss to the broader Mudgee area, it would result in the loss of approximately 1400+ people.
- Population changes associated with property acquisition (p.67). This section of the SIA considers the ‘perceived’ cumulative impact on population decline due to property acquisition associated with coal exploration in the Bylong Valley. This section is a typical example of how the SIA uses ‘perceived’ to describe negative impacts of the Project or associated with the activities of the Proponent. The population changes in the Valley as a consequence of coal activity are not ‘perceived’; these can be analysed and tested as they are backward looking. The discussion in this section and the calculation of changes in population are also typical of the limitations to the analysis and the lack of cross-analysis of data and holistic exploration of the issues at stake. In this section, the net calculation of population loss is calculated to ten people (10% of 2014 population). There is no discussion of the significance of this number and the social impacts that this significant change pose on the area; as stated above, any change greater than 5% is believed to have significant social impact. Why is there no further discussion of the social impacts? Why is there not assessment of how this change has impacted the local community and its members? Why is there no modeling based on these experiences in relation to the forecasting of property acquisition?

- In relation to future property acquisition, the SIA states that '[w]hilst the percentage change in population from Project related property acquisition appears significant, it must be considered in the context of the gradual decline in Bylong Valley population' (p.68). This statement is not supported by any analysis of how the existing population decline relates to the presence of coal mining activity and the Proponent's acquisition of property in the area.
- In the same paragraph it is stated that '[i]t is realistic to plan for the return of land affected by open cut mining to productive non mining land uses and for the associated arrival of new landholders to manage land' (p.68). This statement is not supported and it is unclear how this will happen. Moreover, it is a complex argument to suggest that future population can 'replace' existing populations with long-term history. It also does not account for the stress and uprooting that the current population will go through as a consequence of the mining activity. The analysis presented in the SIA suggests that you can simply pause a community for a period of time; there is a significant body of work that shows that this is not the case. The lack of acknowledgement of social research in this area is problematic.
- The use of the term 'permanent resident population predicted for the Bylong Valley' (e.g. pg. 73) is problematic as there is no qualification or discussion of what 'permanent' means, nor the potential long-term social impacts (negative and positive) of such population change.

#### *1.5.6 Labour market dynamics*

- This section does not adequately address what will happen in Bylong.
- Local employment benefits are assumed to automatically flow to local residents but there is no evidence of a local recruitment/procurement strategy associated with the project. The SIA also assumes the 'generation of employment opportunities for existing residents of the Bylong Valley', again without any commitment to local recruitment or training. It should also be noted that the analysis of local employment benefits does not consider how the employment opportunities that may potentially arise from the project are aligned with people's motivations and aspirations. Whereas the local employment benefits – if sufficiently addressed through procurement and recruitment opportunities – may present opportunities for local residents, it may also be a negative impact as the new employment may replace traditional work (e.g. move from employment in agriculture to extractive industry).

#### *1.5.7 Housing and accommodation*

- Property market analysis: the impact on the property market is based on unsubstantiated assumptions that do not draw on precedents at other sites. The figure of 9% relocation of NLHs is included without support or justification, and relocation projections are based on peak workforce. Any modelling of population and property market impacts must be modelled on average annual workforce.

#### *1.5.8 Community liveability*

- This section describes the SIA study area in terms of community liveability and presents the potential impacts of the project on community liveability, and a description of the management of these impacts.
- This section is a key section in exploring, analysing and assessing the intangible aspects that will be affected by the Project, as well as the interconnections of the various changes identified in the social composition of the local community, the environmental (physical) changes, and the changes to livelihood, economy and social cohesion. It is, however, treated largely in isolation from the other sections. It is not possible to adequately assess liveability without considering it in relation to the economic, social and environmental factors that have been identified in the previous sections of the SIA.
- There is no explanation of what is meant by or definition of 'community liveability'.
- There is a gap in understanding and knowledge about the meaning and role of 'place'.
- An extensive body of research exist about the connections between people's home, identity, community and belonging, yet there is no references made to this research or to other areas that have endured similar changes as to what Bylong is exposed to.

- The SIA points to the character and amenity of the Bylong Valley (p.152), to the concept of community cohesion (p.153), and to the question of residency stability (p.153). Yet, no analysis is presented by which these values are assessed against the social impacts identified in the earlier sections (e.g. housing, employment, population change).
- Section 10.2.5 (pg.157) outlines issues related community health and wellbeing. The lack of analysis and assessment of health impacts and their relationship to both environmental and social changes is one of the most significant shortcomings of the SIA. The SIA only mentions stress and tension, noise and air quality (one paragraph) despite this being an identified as an 'evident finding' in the material. Considering the extensive research that exist in relation to the health impacts due to environmental and social change in relation to large scale mining activities, it is highly problematic that there is no real analysis and assessment of community health and wellbeing.
- Section 10.3.3 (pg.167) looks at 'loss of connection to land'; this is another issue that has been identified in existing research as a significant health and wellbeing issue. The analysis that is presented here is problematic, not least because of ambiguous use of quotes and unclear reference to stakeholders as 'participants' – who is it that is represented here? Whose voices is it that is quoted? What does it mean when someone says that the can 'move to any place where there was similar land' – where does the person who said this live? Who are 'the participants in SIA consultation' that are cited in this section? The lack of evidence of social research displayed in this section is not unique and is characteristic for the whole SIA; this section can be used as an example of the shortcoming in evidence of social research.

*1.5.9 Conclusion*

- The summary of the 'positive impacts of the Project on the Bylong Valley' (p.228) is highly contentious and exemplifies the problems with the SIA. It uncritically forwards population growth as a benefit for community capital, infrastructure and availability of volunteer work; it uncritically forwards the potential for improved local social capital, skills and capabilities, it suggest improved local infrastructure and services, and an opportunity for strategic approach to land management and land improvement due to a significant proportion of the land being held by a single entity.
- These benefits are contradicted by the negative impacts, summarised on p.229, which includes loss of rural character, adverse changes in rural amenity, changes in local and regional perceptions of community identity etc.
- The conclusion is a clear illustration of the shortcomings of the SIA and its limited analysis. It presents contradictory data and insufficient analysis. For example, on the one hand it says that the Project holds the potential to improve local social capital; on the other hand, it says that the loss of long-term landholders will result in negative impacts on social capital. These two findings needs to be assessed in relation to the baseline; it is insufficient and meaningless simply to classify these as positive and negative. A much more thorough analysis that looks at the range of data, adopting a system analytical approach is required not only to understand the social impacts of the Project but also to develop mitigation and management strategies that are in the interest of those affected.

**2.0 The Response to Submissions (RTS, March 2016): shortcomings of SIA, response and adequacy<sup>iii</sup>**

Shortcomings of SIA addressed in the RTS	Response to Submissions	Adequacy of response
Inadequate analysis of social and cumulative impacts (5.25.1)	Cumulative impacts discussed in Section 4.2.7 and Sections 5-9 of the SIA. Loss of rural population discussed in Section 5.25.15.	The RIS refers back to Section 4.2.7. This is a misleading presentation of material, as section 4.2.7 does <b>no</b> address the issues of cumulative impacts but instead refers back to the SIA, which is inadequate in terms of assessing cumulative impact. Thus, whilst claiming to address this significant concern and shortcoming, no effort is made to present a thorough analysis of cumulative impacts (both temporal and spatial). In

		<p>order for cumulative impacts to be addressed, a system analytical framework should be established in which the interlinking and interactions between the various spatial and temporal variables, as well as economic, environmental and social impacts, are investigated.</p> <p><b>The response in the RIS is misleading, and one of the key Secretary’s Environmental Assessment Requirements is, thus, not addressed.</b></p>
<p>Methodology and compliance with SEARs (5.25.2)</p>	<p>The proponent emphasises in their response to the methodological criticism that:</p> <ul style="list-style-type: none"> <li>i. There are not specific NSW Government guidelines for the preparation of SIA in NSW. It is stated that the SIA was guided by the SEARs and the regulatory framework in other states, such as Queensland.</li> <li>ii. The SIA is not an academic research document but designed to address specific approval requirements of NSW government.</li> <li>iii. The SIA has been prepared by a specialist in the SIA field, Bronwyn Pressland, with more than 20 years experience.</li> <li>iv. The SIA considers the interlinked aspects of economic, social and environmental change.</li> <li>v. Assertions on lack of analysis of quantitative and qualitative data are not valid.</li> </ul>	<p>The proponent’s address of the methodological concerns are inadequate:</p> <ul style="list-style-type: none"> <li>i. It is correct that at the time of the SIA, there were not specific guidelines for the preparation of SIA in NSW. The proponent successfully points out how the SIA is guided by the SEARs and in which section the various requirements are addressed. It should be noted that, whilst the SEARs are addressed, the concern about lack of rigorous analysis and methodological insufficiencies remains. The reference of the regulatory frameworks that are underpinning the SIA is problematic as there is no evidence of this in the original SIA and, subsequently, it implies that this has been retrofitted.</li> <li>ii. Whilst not an academic document, a minimum expectation of analysis of impact through the use of risk analysis and matrixes is required in order for this SIA to comply with best practice (see, for example, Table 4 – Worksheet for summarising the results of preliminary significance assessment, page 16 of the NSW DPE Draft Guidelines for State Significant Mining, Petroleum Production and Extractive Industry Development).</li> <li>iii. It is a welcomed addition to the SIA to be provided with the information about the lead researcher and the SIA team. Whilst it is recognised that Ms Pressland has significant experience in the field, it does not take away the failures of the SIA to comply with minimum expectations of an SIA.</li> <li>iv. In the RTS, the proponent makes reference to Frank (2012) and his argument about how a number of common changes included in mining can lead to social impacts, including social and cultural change, economic change and socio-environmental change. It is stated in the response that the SIA considers all of these common changes and many more are identified. This is correct, and the SIA does go a long way in identifying social, economic and environmental change and offers some analysis of how these are linked. This analysis is, however, inadequate and is primarily a social and economic profile of the</li> </ul>

		<p>impacted communities.</p> <p>v. The SIA does contain analysis of both qualitative and quantitative data but it is primarily descriptive.</p> <p>One of the key problems with the SIA and the RIS is that the negative impacts identified are forwarded as matters that can be mitigated. There is no discussion of alternative scenarios; management and mitigation responses are not the same as assessing the likelihood and the severity of the impact. The latter is an essential part of the SIA process and remains unaddressed in the SIA and the RIS for the project.</p>
Scope and implementation of the SIA (2.25.3)	The methodology adopted for the consultation process is described in Section 3 of the SIA and consultation for the EIS is described in Section 5.	The response from the proponent on this matter is adequate and missing information is provided. It should, however, be noted that I have been informed that this particular issue refers to the sense of bias that emerged through the consultation process with local people, in particular, which was generated by the fact that interviews were held on KEPCO owned land.
<p>Scope of assessment, including (2.25.4):</p> <ul style="list-style-type: none"> <li>• lack of social research and assessment against benchmarks, standards and best practice;</li> <li>• no temporal understanding of impacts, only assessed as negative and/or positive;</li> <li>• no prioritisation or ranking of social impacts;</li> <li>• no sense of stakeholder feedback;</li> <li>• limited assessment of WAF;</li> <li>• insufficient description of proponent;</li> <li>• insufficient consideration of visual impacts;</li> <li>• lack of 'no development' scenario;</li> <li>• relevance of managerial impacts;</li> <li>• no health impacts.</li> </ul>	The proponent refers back to section 2.25.2, and states in relation to the critique of a lack of health impact that this was not a specific requirements and therefore not included.	<p>The details of this critique are not adequately addressed through 2.25.2, which presents a framework that appears to be retrofitted. Moreover, whilst it is stated that it is 'best practice', these methodological concerns point to distinct issues in the analysis that remains unaddressed. There is a need for the SIA to include an analysis of how changes may change (from negative to positive; from positive to negative) over time, and how change may be multifaceted in terms of impact. Moreover, to include benchmarks and reference to other scenarios within the analysis would enable the development of more thorough and advanced mitigation strategies. There remains no ranking or prioritisation of the social impacts and stakeholder feedback remains limited. All of this should be expanded on in the RIS, if data is available, or an expansion on the SIA should be expected.</p> <p>It should also be noted that whilst assessing health impacts was not noted as a specific requirement in the SEARs, health is intimately intertwined with social and environmental impact and I would argue that the proponent's claim that there was no need to assess health because of the lack of a specific requirement undermines the SIA. A good SIA requires, as stated by Esteves, Franks and Vanclay (2012), an integration of social and economic variables with environmental, health and cultural heritage issues. A SIA has, as Vanclay (2003), argues, strong links with health and mental health impacts and a limited view of the SIA, such as that presented in the RIS, creates demarcation problems about what the social impacts are. Health, in this instance, relates to wellbeing and a state 'of complete physical,</p>

		mental, social and spiritual wellbeing and not merely absence of disease or infirmity (Vanclay 2003: 6) and an SIA should strive to provide the analysis to ensure that people ‘get to live in an environment which is conducive to good health and to a good quality of life’ (ibid: 9). The social dimensions of the environment—including, but not limited to, peace, quality of social relationships, belongingness, and freedom from fear—are central aspects of people’s health (ibid: 9) <sup>iv</sup> The refusal to adequately consider ‘health’ as a variable of the social is, thus, a significant problem with the SIA and points to the critique of the limitations in analysis and scope.
Cumulative impacts and impact on community (5.25.5).	Proponents points to Section 5-9 of the SIA in response to this concern, arguing that the cumulative impacts are discussed herein.	The analysis of cumulative impacts in the SIA is inadequate and referring back to the SIA as the point of reference is misleading.
No consideration of solastalgia (5.25.7)	Argues that solastalgia is considered in the SIA and that the potential impacts on the community liveability are considered in section 10.3.1 of the SIA.	Whilst the SIA discusses how the existing Bylong Valley community will be required to cope with change, this is not an adequate analysis of solastalgia. Solastalgia refers to the sense of <i>solace</i> (comfort, consolation, relief) that people get through their connection to sense of place. Identifying potential and unfolding changes to place is not enough to be considered an analysis of solastalgia, and this points to what I have argued elsewhere in this submission as a shortcoming of the SIA and the RTS. Solastalgia is linked to experiences of displacement in place or homelessness when still at home; it points to how physical changes lead to a sense of disconnection between self and place, as it is linked in with past history, present reality and future opportunities and aspirations. None of this is included in the SIA or the RTS yet it is a key social impact of a development of the kind proposed by this project.
Suitability of shift based operations in rural environments (5.25.8)	It is economically unviable to restrict the project to daylight hours, and the shift workforce is essential for a 24 hour mine operation.	The proponent's response poses is valid but it does not assess the concern about shift based operations and the impact this will have on rural environments etc. adequately through a ranking of social impacts – positive and negative – as they relate to the environmental and economic impacts associated with continuous operations.
Community health and wellbeing, particularly the farming sector, as a result of changing landscapes (5.25.9)	KEPCO emphasises its commitment to mitigation of social impacts through the SIMP.  Voluntary groups such as Men’s Shed and Beyond Blue provide established offer of support for	Part of the problem with the RTS is that it states a commitment by the proponent to address issues through plans that will be developed and approved, such as the SIMP. Whilst a number of the actions outlined in the response are welcome initiatives to address issues with community health and wellbeing, exactly what these are, who they will be targeted at, the implementation and likely success at addressing the negative impacts

	<p>communities.</p> <p>A number of actions aimed to achieve positive outcomes for the Bylong Valley community and Sub-Regional Area are listed, and ongoing consultation with stakeholders will take place.</p>	<p>and enhancing positive impacts are unclear.</p> <p>A key issue here is that the response does <b>not</b> distinguish between existing residents in the Bylong Valley, who will be more exposed to negative impacts, and those of the Local Government Area, which includes residents in Mudgee and Rhylestone (one hour commute from the Project boundary). The impacts in terms of community health and wellbeing on these communities are <b>significantly different</b>. This is a major issue as the mitigation strategies proposed are likely not to be effective, let alone possible, within the Project Area which is the community that endures the most severe negative impacts.</p>
Loss of employment in farming and equine industries	<p>The main negative impact of the project on jobs relates to displacement of agricultural land uses on the land occupied by mining operations. This is addressed in the EIA. The job losses in the agricultural sector only represent 2.7% of the jobs to be generated from the project within the region.</p>	<p>It is unclear how the relative figure of employment generated by the project versus job losses in agricultural sector is generated and, moreover, how longevity of agricultural employment versus the temporality of project-related employment is taken into consideration.</p> <p>It is also important to note that the loss of jobs in farming and equine industries is not only a matter of employment and economic but something that matters in terms of thinking about a place and a region. As a traditionally agricultural area with a proud history of horse breeding, losing the equine industry and reducing farming will change the meaning of the place. This may have social impacts that should be investigated further. Farming is not just a matter of employment; for many, it is a lifestyle associated with a distinct type of environment. This environment will change with this project and this could be something that can impact people's sense of place and wellbeing.</p>
Impact on tourism attributes of the Bylong Valley	<p>The mine plans, operational methods and infrastructure design has been established to minimise impacts on tourism. Viability of the mine from the road will be minimal and, thus, will not affect the travelling experience along the Bylong Valley Way.</p>	<p>The response to the concern about impacts on tourism is essentialist and it reduces the notion of tourism to driving on Bylong Valley Road. The Valley has already lost some of the accommodation used by tourists to the project, and it is problematic to assume that people will not sense the presence of a coal mine and that this will not affect people's decision to visit the area (rather than just driving through).</p>
Community Investment Fund (CIF) – more information needed.	<p>A list of supported local community groups is provided and it is stated that information regarding the investment progressed through the CIF will be available on project's website.</p>	<p>The information requested is required. It would be beneficial to see a greater analysis of how the CIF can/will be used to mitigate negative impacts in the Bylong Valley and provide new opportunities for and enhance livelihoods for those who live there, if these can be argued exist.</p>
Displacement of rural	<p>Refers back to section 4.2.7, which addresses the</p>	<p>The section that is referred to does not refer to the question of displacement of the rural population.</p>

population	failure of the SIA to address cumulative impacts.	Instead it refers back to section 5-9 of the SIA, in which community issues, values and aspirations, population and demographics, population change and management commitments, economic vitality and labour markets are discussed. Neither of these sections deal adequately with displacement as a phenomenon (see 5.4).
Rural amenity must be ensured and no noise or air quality impacts should go beyond the project boundary.	The project is not predicted to contribute to air exceedances of the relevant air quality criteria for private residents; residents within the impact zone will be entitled to voluntary at-property mitigation and acquisition rights.	The notion of mitigating noise impact by offering voluntary acquisition rights is problematic. Whilst the residents that are affected should get acquisition rights, it is important to note that purchasing more properties will further reduce the social cohesion of Bylong Village and it may have a distinct social and health impact on those who are required to move in its own right. The mitigation strategy assumes that people wish to leave and, moreover, that leaving is in this instance a matter of choice. This is problematic and the scholarship on migration and resettlement (e.g. Koser and Martin 2011; Muggah Vullnetari 2012; Muggah 2015) show that the issue of choice and force overlap and that in many instances, particularly in relation to development projects, the notion of 'voluntary acquisition', 'resettlement' and 'choice' conceals experiences of force (see 5.4). <sup>v</sup>
Property impacts (5.25.18-21)	The four submissions that raises concern the impact on specific properties are addressed with cross-referencing to various sections if the RTS and the EIS.	In relation to the proponent's response to the concerns about specific property impacts, it is worth noting how these all present examples and evidence of the insecurity and ambiguity that landholders in the Bylong area endure. The insecurities of how the development will affect their livelihoods, land and community are in themselves a social impact that affect social cohesion and individual's wellbeing. This is not problematised or addressed in the SIA or the RIS.

### 3.0 Peer-review and Response to Peer-review

- The peer review of the SIA, conducted by Elton Consulting, identifies the following key concerns in relation to adequacy, gaps and areas for additional research. These include:
  - The need for a more fine-grained evaluation of community feedback and documentation of local stakeholders to better present the qualitative information and community voices, and ensure views expressed in consultations are reflected in mitigation and management measures.
  - Lack of evidence base drawn from documented social impacts and benefits of other mining projects, including experience of WAFs.
  - No information on community health.
  - Little discussion of or appreciation of the social impacts arising from bio-physical factors and reliance on cross-referencing to original technical documents, which underplays the social significance of these matters.

- Little weight given to the significance of the community views articulated by residents in the Project Area and no weighting or scaling of impacts according to proximity to the development and subsequent severity of impact.
  - Little information about the depth and intensity of concerns and the sensitivity of the cumulative changes already underway and expected to continue.
  - Exclusion of key social impacts in the analysis, including significant effects of historical property acquisition on community structure and the effects of the community engagement process itself.
  - Community engagement process for SIA has fallen short of professionally accepted standards for accuracy and completeness of information provided and transparency of process, evidenced in local residents' inability to contribute to an informed discussion about project's likely impacts on daily lives and activities.
- The peer review concludes that the reader is left with a poor understanding of the process and the significance of the cumulative change, social significance of bio-physical impacts on the lives of local residents. The reader is also left with limited insight into the effects of the development and associated land acquisition, environmental and social processes on stress and change within existing population, and the potential for future community revitalisation.
  - As an experienced social researcher, I agree with Elton's conclusions about the shortcomings of the SIA (details above). Whereas the Response to Peer Review of Social Impact Assessment developed by Hansen Bailey emphasises shortcomings of the Peer Review, it should be noted that much of this critique is based on the idea that Elton conducted an alternative SIA. This was not the case; conversely, as articulated in the peer review report and during consultations (which I sat in on), the purpose of the peer review was to assess an independent peer review of the SIA and the RTS, not conduct an alternative SIA. The major weakness in the SIA and the RTS is how it treats the Project Area. It is important to note that the Project Area is not the same as the Local Area, which is often referenced in the Proponent's SIA documents. In contrast to the Local Area, which includes residents and communities an hour commute from the Project boundary, the Project Area refers to the Bylong Valley—that is, the community and residents who are within the vicinity of the proposed mine and directly affected by the project and that are in direct competition of resources.
  - In relation to the above point, it is important to note that most of the key issues raised by the Proponent in their response, including that of the scope and methodology; geographical scope; and social baseline considerations, is misplaced. It should also be noted that the findings of Elton through consultation with the Bylong Community reflect similar issues to those identified by Hanson and Bailey and the critique points not to the use of methods (which Elton argues are adequate) but rather to the superficiality of the analysis and lack of consideration of cumulative impacts and the depth of the locally felt and feared negative impacts.
  - A key problem is that much of the criticism raised by Elton's peer review and other submissions is that there is a call for greater emphasis of the negative impacts on the community most closely to the project boundary (Bylong) and consideration of cumulative impacts. The nature of the proposed development, being a green field mine in a historically agricultural area and, to date, relatively protected from the surrounding coal mining activity, requires a better conceptualisation of 'community' and 'area'. A key problem, which is identified in the peer review, is that the negative impacts on the Project Area (Bylong) are placed on a balance sheet with the positive impacts of the Local Area (1 hour commute from the Project Area, including Rhylstone and Mudgee). It is imperative to identify, weight and rate the impacts—negative and positive—within each of these areas independently before a comparative analysis of the greater region can be conducted.

#### **4.0 DPE Assessment Report**

- In this report, the NSW Department of Planning and Environment presents its final assessment of the development application, EIS, submissions, RTS, and a range of additional information. The Department acknowledges how social dynamics and community cohesion has substantially changed due to land acquisition required for the project and how there are significant ongoing concerns over future social impacts (p.8, 118). Whilst recognising the impact the project has had and is projected to have on local

sociality, rural landscapes, connectivity, relationships, and sense of place, it is stated that this reduction is not solely project related. This is problematic: whilst there is a trend for rural decline in NSW, Bylong is a place that has been attracting new landholders in the last ten years—despite the potential of a mine—and the closure of the school and loss of social services cannot be seen as unrelated to the mining interests in the area. None of the social studies related to the Bylong Coal Project presents an informed analysis of projected rural mobility—in and out—in a no-mine scenario. The proximity to Mudgee, which is used as an argument for why the mine should go ahead, can be used as a counter argument for thinking about possible rural revitalisation of this particular area, which is one of a kind of the region. The basis of the Department’s assessment on this regard is, thus, hypothetical and further analysis and study would have to substantiate the idea that Bylong would be facing depopulation if there was no mine.

- The condition about future land acquisition to mitigate noise and air impacts (e.g. p.118) is problematic as this will have a social impact in its own right. The proposal to mitigate noise impacts at significantly affected properties will further reduce the number of local landholders and potentially remove local knowledge of the area. The implications of this is not considered in the social impact assessment, yet it is a significant measure. It requires further consideration about how the potential hollowing of the community will be addressed, mitigated and managed. The failure to adequately address this is evident in the neighbouring village, Wollar, where Peabody’s proactive purchasing strategy, supported by the Department, has left the community unviable. It is essential to better investigate the cumulative impacts of resettlement and how to mitigate and manage the social impact that comes from relocation of local residents. This strategy points to physical resettlement planning, which is concerned with how to ensure the preservation of the existing social fabric in both new and old locations (Reddy, Smyth and Steyn 2015).<sup>vi</sup>
- To be able to adequately assess the social impacts and to review the projected success of mitigation strategies, the SIMP should be developed prior to approval. The lack of a SIMP prior to approval will expose the local residents, particularly those within the vicinity of the mine, to unnecessary risk and increased stress. After two years of working with the community and seeing the impact that the planning process is having on the community, I feel confident in arguing that the physical, mental and economic health of remaining residents will be jeopardised if no real and binding requirements for mitigation are established prior to approval
- The discussion about agriculture and the impacts that the Project will have on land use and, more specifically, Tarwyn Park property refrains from dealing with the role that agriculture plays in terms of the meaning of place and the identify of the region. Conversations with local residents that I have had as part of my research subsequent to the sale of Tarwyn Park suggest that KEPCO does not have the required expertise to continue the natural sequence farming practice of the Andrews family. Whilst it is a stated commitment of KEPC to maintain and monitor the natural sequence farming techniques and providing access to external groups for ongoing research, the details of this is vague. Further information is required how KEPCO will protect Tarwyn Park, give access for researchers and groups, and maintain the unique farming practice.
- Heritage impacts are not considered from a social impact perspective. The proposal to establish a recording and salvage program for Aboriginal sites should not be the first option for mitigation. The exhumation of burials have potential impacts on local residents and families living elsewhere. The social impacts that this may have on local residents and families are mentioned but greater weight to how this relates to heritage and construction of place should be forwarded in the assessment.
- The presentation of workforce numbers on p.17 is misleading.
- There is no assessment of long and short term factors in the discussion of agricultural impacts (6.4).
- The discussion of traffic impacts (p.107) should further identify the social impacts that changes to traffic volumes will have on local residents on Bylong Road and Wollar Road, as well as residents in Wollar and Bylong. The increased traffic (461%) is significant and will change the nature of and increase risks in the villages that the traffic will go through. The Wollar Road through the Munghorn Gap Nature Reserve would require improvement. It should be noted that whilst the population that will be impacted by the increased traffic is small, this represent a demographic that has already endured significant stress and disadvantage due to mining activity in the region.

## **5.0 Other observations**

### **5.1 Gag clauses**

- It should be noted that because of the gag clauses put on landholders that have sold, there is a lack of voices in the public domain from people who have been and are negatively impacted by the proposed development. During the course of my research in Bylong, I have met a number of former residents who have been forced to sell. Many of these have expressed a desire to voice their concerns about the significant impact that they are enduring to the PAC, yet are not able to do so because of contractual agreements in relation to the sale of their property.
- In regards to this, it is also important to note that whilst the former residents have reached an agreement with KEPCO and sold their properties, this is generally not a voluntary process characterised by choice. The landholders that I have spoken with over the past two years have expressed significant distress about the situation and the continued ambiguity surrounding the future of the place, as well as pressure placed on them to sell, have forced them out. People describe this experience as being 'refugees in our own homes' and the stress the decision to sell is the result of their mental, physical and financial health being affected to the extent they no longer feel they have a choice.

### **5.2 Social as a secondary concern**

- Whilst significant efforts have been put in place by the Proponent and the DPE in relation to assessing social impacts, the social appears to remain at a discursive level where the different sides of the project engage in a 'war of words'. A good example of this is the RTS for the Bylong Coal Project, where the Proponent responds to the criticism and concerns articulated in submissions by referring back to the SIA; which is the document that the submissions are criticising for lacking in respect to assessment. When, for example, the SIA is criticised for an inadequate analysis of cumulative impacts, the Proponent refers back to sections 5-9 of the SIA and states that cumulative impacts are assessed within these. This is not the case; there is no meaningful assessment of cumulative impacts, as evidenced by the lack of a risk matrix, if nothing else. The multiple documents developed in relation to the social engages with the core question of 'how will this project impact individual's wellbeing' but it omits a distinct assessment of the data that are presented in response to this. Ultimately, this must be seen in relation to the vexed nature of the question in the first place and the implicit comparative element of a SIA.

### **5.3 Co-existence and local identity: loss of equine industry and risk to heritage of Tarwyn Park**

- Negative social impacts of the project must be seen in context of the localised land use conflict and competition triggered by the proposal. Approval of the project is, essentially, to prioritise this area—historically known for its agricultural production—for extractive industry.
- Whilst co-existence is flagged as an opportunity, the reality of this is slim. For example, as is stated in the DPE Preliminary Assessment Report, the equine industry has already fallen victim to the extractive interests in the area, with an accelerated decline due to land acquisition for the Bylong Coal Projects. As identified by the DPE, the Bylong Valley area is part of an Equine Critical Industry Cluster (CIC), which points to its role in contributing to the identity of the region and providing significant employment opportunities.
- The loss of the equine industry and the threat that the project poses on Tarwyn Park—which has been developed as a unique landscape for distinct agricultural methods (natural sequence farming), holds heritage value as a stud farm and is the burial home of one of the region's great champion horses—is as such not just an economic matter but also one of significant symbolic importance. The loss of this industry within the valley, as well as the future reduction of agricultural production, transforms this landscape and reduces its value as a place that contributes to regional identity and sense of place. The implications of this are not considered in the social impact assessments for the project.

### **5.4 Depopulation, resettlement and displacement**

- The fact that the project area has no former history of coal mining is an essential fact that is not problematised in terms of its social impact. The mine will introduce a new land use in a predominantly

agricultural setting. A previously vibrant rural community has become depopulated, with local people being bought out. It is deeply concerning that the DPE appears to be celebrating the acquisition strategy of KEPCO, which has led to the majority of freehold land now being in the hands of a coal company.

- Considering the lessons from the neighbouring village, Wollar, the DPE should be aware of the distinct social impacts that are embedded within this strategy and a proactive response to the implications this is having and will have on the local community should be forwarded. As local residents have been bought up, the community has not just lost numbers but also key individuals who have been central to the sociality of the community. Those who remain have not just lost neighbours, but also friends and relatives who made the place what it is.
- There is a distinct social impact embedded in the resettlement of the local community that is not addressed in the SIA and that will not be mitigated by the strategies proposed. This must be considered seriously before any decision can be made; the hollowing of the community is making people exposed to new vulnerabilities and risks that must be adequately considered and assessed. It should also be noted that the ambiguity that the local people in Bylong has been living with for an extended period of time has significant impact on people's wellbeing and ability to get on with both their professional and private lives. This is not acknowledged in the SIA or by the DPE but is an important impact that should be addressed.
- Displacement does not feature as an issue in any of the documents outlining and discussing social impact of the Project. This may be a reflection of a restricted understanding of the phenomenon of displacement, which is approached as an unproblematic movement of people or artefacts in space. Displacement is, however, not simply about movement of people from one place to another. Conversely, as scholarship on migration, displacement and resettlement show (e.g. Malkki 1992; Albrecht 2005; Bakewell 2011; Muggah 2015), displacement can happen when people are still in place and may manifest as a lived experience, conditioned through the spatial, temporal, cultural, and social specificities in which individuals experience their everyday life.<sup>vii</sup> Displacement is, thus, not something that is simply a matter of movement in space; conversely, the condition of displacement—characterised by distress and disruption associated with a sense of lost home, powerlessness, hopelessness and lack of autonomy to decide own future—is a state of being that can happen to people in response to significant changes in natural, cultural and social milieus. There is no recognition of displacement as a condition in any of the social impact assessments conducted for the project.
- The social impact assessment for the Project is characterised by a lack of attention paid to resettlement and displacement. The word 'displacement' barely makes it into the reports and, when it does, it is kept at a technical level and the embodied, lived experience of changes to place is underplayed. The word 'displace\*ment/\*ed' features on only a few occasions in the SIA. On the occasions it is mentioned, it refers to:
  - future property acquisition (p.68);
  - mine closure impacts (p.85);
  - increased demand of social housing for lower socio-economic groups pushed out of public housing market during peak operations (p.149; 214);
  - community sustainability and cohesion (p.162); and
  - property acquisition (p.162-3).

Whilst the SIA problematises and describes existing and future displacement of people, this refers only to processes of physical movement and resettlement, and the sense of displacement that can happen when still in place remains under-explored.

- A sense of lost place and displacement saturates the stories of the people whom I have spoken with in my academic research, and people express that ambiguity and limbo is affecting their mental health. This is intimately tied to the slow and gradual depopulation of the community. It should be noted that the sense of displacement and limbo was particularly prevalent in the Upper Bylong area, where most of the residents by now have been bought out. The distress placed upon these people and the subsequent impact the depopulation of the area will have on those who remain is not considered adequately in the SIA.
- Since the late 2000s, mining-related resettlement and displacement of the population living within the vicinity of the project area have taken place. The onus has, in this process, been placed on the individual

land holder and the Proponent. Through the voluntary acquisition policy, the responsibility (and success) of negotiation has been placed on the individual landholders. This process has reduced transparency and exposed the community to distress; it has not supported a fair and equal process. Moreover, gag-clauses (see 5.1) have disempowered the local community in their efforts to deal with the proponent.

- The lack of an a priori resettlement plan is central to the sense of limbo and distress that residents have been exposed to. What is happening within the community today and the vulnerability that the community is facing in relation to the proposed development relate to negligence of resettlement as a distinct feature of the Project. I would argue that this failure in the planning process bestows a distinct responsibility on the NSW Government to ensure the wellbeing of the remaining people in Bylong and the immediate villages (in particular Wollar, which will be left even more stranded subsequent to the depopulation of Bylong) and a decision should not be made until an adequate mitigation plan has been established.
- Whereas it is suggested that existing social impacts in Bylong are tied to a general trend of rural small town decline, the sense of displacement endured by local residents and the future decline of the Bylong community cannot be seen as independent KEPCO's purchasing strategy and the fears people have about having a mine as next-door neighbour. Weaknesses in the safeguards in mining have exposed the people of Bylong to unprecedented harm, with the depopulation and resettlement of a significant portion of the community happening without any proper planning or protection established for the people who are outside the acquisition zone or without strategic relevance to the proponent.

### 5.5 Greenfield mine in 2017

- The proposed mine is a greenfield mine that will radically transform a rich agricultural landscape with distinct heritage and significance. This very fact is hardly mentioned in the documents, let alone problematised. NSW Government and the PAC are bestowed with a moral responsibility in this instance. Approval of a greenfield mine in 2017, when the world is moving to alternative energy sources and the impacts of climate change is felt across the globe, will have impacts beyond what is considered in the social impact assessments for this project. This is yet another issue that is not dealt with in the assessments of the project, yet one that could have significant political impacts through the distinct signal that it will send to the public about the Government's commitment to a sustainable future.

### 6.0 Conclusion

In light of the evidence provided in this submission, it is in my professional view that the social impacts of this project remains poorly understood and assessed. The impacts on the local community—Bylong Valley—is significant and the project will jeopardise the future of this community as an agricultural farming community. I argue that the SIA for the project does not adequately consider and has not actually assessed the significance of the social impacts of the project.

Kind regards,

#### **Dr Hedda Haugen Askland**

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<sup>i</sup> Vanclay F. 2003. International principles for social impact assessment. *Impact Assessment and Project Appraisal* 21:1, 5-12.

<sup>ii</sup> Burge, R. 2004. *The concepts, process and methods of social impact assessment*. Wisconsin, USA: Social Ecology Press

<sup>iii</sup> These points were made in the Bylong Valley Progress Association's initial submission but are restated here as I would argue they have not been adequately addressed in the Response to Submissions.

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<sup>iv</sup> Esteves AM, Franks D, Vanclay F. 2012. Social impact assessment: the state of the art. *Impact Assessment and Project Appraisal* 30(1): 34-42; Vanclay F. 2003. International principles for social impact assessment. *Impact Assessment and Project Appraisal* 21:1, 5-12.

<sup>v</sup> Koser K, Martin S. (Eds.) 2011. *The Migration-Displacement Nexus. Patterns, Processes, and Policies*. Volume 32, Forced Migration; Vullnetari J. 2012. Beyond 'choice or force': roma mobility in Albania and the mixed migration paradigm. *Journal of Ethnic and Migration Studies* 38(8): 1305-1325; Muggah R. 2015. The invisible displaced: a unified conceptualization of population displacement in Brazil. *Journal of Refugee Studies* 28(2): 222-237.

<sup>vi</sup> Reddy G, Smyth E, Steyn M. 2015. *Land access and resettlement. A guide to best practice*. Sheffield: Greenleaf Publishing

<sup>vii</sup> Malkki L. 1992. National geographic: the rooting of peoples and the territorialisation of national identity among scholars and refugees. *Cultural Anthropology* 7(1): 24-44; Albrecht G. 2005. 'Solastalgia'. A new concept in health and identity. *PAN: Philosophy Activism Nature* 3: 41-55; Bakewell O. 2011. Conceptualising displacement and migration: processes, conditions, and categories. In K Koser and S Martin (Eds.) *The Migration-Displacement Nexus: Patterns, Processes, and Policies*. New York, Oxford: Berghahn; Muggah R. 2015. The invisible displaced: a unified conceptualization of population displacement in Brazil. *Journal of Refugee Studies* 28(8): 222-237.

# REPORT on TARWYN PARK BYLONG VALLEY, Heritage Assessment

## Part 1. Was the heritage impact assessment adequate?

The heritage impact assessment provided as part of the Bylong Coal Project environmental assessment document is inadequate. In particular, insufficient attention and forward planning is given to heritage impacts of mining on the Tarwyn Park complex. Tarwyn Park is potentially an item of State significance.

In the Department's Preliminary Assessment Report (PAR), page 6-7 states:

*The project would directly impact a part of the Tarwyn Park property, which is partially located within the footprint of the open cut. This property is known for the development of natural sequence farming principles, has operated as a horse stud, and is also the burial site of dual Melbourne Cup winner, Rain Lover. However, direct impacts from mining on the Tarwyn Park homestead and natural sequence farming area, which is located within the floodplain, would be avoided* [my emphasis]

In my opinion, the statement that direct impacts will be 'avoided' is not justified. Tarwyn Park homestead and its stables are sandstone buildings in poor repair. The site will be subject to blasting, dust and vibrations from the mining operations which will directly affect the mortar in the stone walls and will cause damage. It was recommended that a Conservation Management Plan (CMP)<sup>1</sup> be drawn up that could address these issues with actions. In my opinion, if the Project is approved a CMP and any urgent works must occur before mining operations commence, not after.

### Blasting Impacts

The EIS notes that ground vibrations and overpressure associated with blasting have the potential to indirectly impact the structural integrity of the identified historic heritage sites. Most of the older buildings and in particular masonry buildings will be impacted. Cracks and deterioration through dust and water penetration are likely consequences.

The blasting impacts are noted as follows:

'Tarwyn Park Homestead (31.7 mm/s); and its Stables (79.5 mm/s)'.

<sup>1</sup> Bylong Coal Environmental Impact Statement Page 41 by Hansen Bailey states: *the implementation of a Historic Heritage Management Plan. Conservation Management Plans will also be developed to guide the conservation of Tarwyn Park Farm Complex...*

On page 48 of the PAR it states:

*KEPCO's assessment indicates that project-related blasting has the potential to impact some heritage sites and sensitive features in the vicinity of the project site, and that further measures are required to minimise and/or mitigate these impacts. Importantly, KEPCO is able to reduce the size of blasts so that Tarwyn Park and other sensitive features are protected and operational flexibility is achieved.*

And the conclusion on page 49 states:

*Blasting is also unlikely to significantly affect the heritage values of the locality, but has the potential to impact some heritage items in the vicinity of the mine, including on the Tarwyn Park property.*

It is possible that maintenance work such as pointing–up of stone work using a traditional lime based mortar mix, and some form of suitable underpinning to the main walls may minimise the effects of vibration, but these are fragile building materials and would need ongoing regular inspections and repairs.

Permanent occupation of Tarwyn Park homestead should be a recommendation of any CMP so that the building can be maintained, and damages noticed and managed on an ongoing basis.

In notes from my site visit in 2015 the condition of the building fabric was in very poor condition. To my knowledge KEPCO has not carried out any maintenance since that time.

Below is an extract from my report in 2015:

<b>Description:</b>	The two principal buildings on Tarwyn Park are the Homestead and the associated stables building, both designed by early Rylstone and Mudgee architect Harold Hardwick and constructed in locally hewn sandstone. They date from the early Federation period and their style reflects that with wide dual pitched roof and generous verandahs, decorative gables and exposed rafters. This residence is an excellent example of Hardwick's work.
<b>Condition of fabric and/or archaeological potential:</b>	The residence building is now in poor condition. Fretting stonework and rising damp need urgent attention.
<b>Integrity / intactness:</b>	The buildings have a high level of integrity.
<b>Modifications Dates:</b>	Constructed c.1910
<b>Date you inspected the place for this description:</b>	2015



View of Tarwyn Park – the Verandah stone pillars are failing due to significant rising damp, spalling of the surface and loss of mortar. Detail below. (Images BJ Hickson)



A detailed assessment of the fabric of the buildings should be an urgent consideration and would be a recommendation in any heritage Impact statement for a building of this type.

In response to this issue, DPE on page 49 has recommended the following conditions:

- *provide for structural property inspections and investigations **on request**; [my emphasis]*
- *repair any structural damage to buildings or infrastructure caused by the project;*

The stated conditions are '**on request**', but it is unclear on whose request if there is no occupant and no access. Any Heritage Management Plan needs to address this matter.

## Visual Impacts

The general destruction of the environment will modify all of the existing visual environment and potentially the visual aesthetics of the surrounding heritage sites.

The EIS contains a 'Visual Impact Assessment' undertaken by JVP Visual Planning and Design that describes the likely visual impacts associated with the Project on sensitive receivers in the surrounding area. A list of visually impacted or potentially visually impacted heritage items and landscape areas is provided in the Table 69.

While a landscape of 'high visual diversity' is promised as a long term outcome it is very difficult to appreciate that this will resemble the existing cultural landscape. As some historic built items will be removed or altered, and the farming practices that created the environment will be gone, the diverse landscape will be denuded. Views to and from retained heritage items will be largely modified. In my opinion, the valley's heritage environmental curtilage or setting will no longer exist. One of the questions usually addressed by a SOHI is - '*are views to and from the item affected?*' In my opinion, these question has not been appropriately addressed in relation to the Project and views are likely to be significantly affected.

## Dust impacts

The Main Report did not address dust impacts except in a social context.

There will be visual effects on the built environment as elevated levels of fine particle dust cause short-term reduction in visibility.

There would also be the low end annoyance of coal dust, which may cause discolouration on windows and the more damaging long term effects of coal dust being ingrained on buildings where those buildings consist of light sandstone structures such as Tarwyn Park and its stables. The dust contains sulphur compounds, which can corrode structures and combined with rain, falling or rising damp, and do further damage. These effects are not easily managed. Wall blasting with water, powder or sand blasting will cause loss of building fabric. Coal dust should be constantly monitored and removed regularly to avoid long term staining.

## Water Impacts

On page 33 of the PAR, the Department notes '*that natural sequence farming features on Tarwyn Park would not be affected by the project.*'

The consequences of vibration and later underground mining will need careful attention if it can be said, as above, that that the natural sequence farming will not be affected. This farming system is based on careful reticulation of water around the property and maximum advantage

taken of such stormwater to improve ground fertility. It requires day to day management – at least in the times where rainfall is exceptionally high or low. This can only be really managed by a live-in expert. This system is an intrinsic part of what makes Tarwyn Park significant.

Peter Andrews' 'Natural Sequence Farming' is a landscape system. Its functioning relies heavily on working flood plains and high water table. Based on the current proposal for the mine's open cut pits and the ensuing modelled drawdown across the Tarwyn Park and Iron Tank properties, the operation of this system is at significant risk, even though there are no plans to mine directly on, or under the areas where Peter and his son have done most of their world-renowned work.

## Part 2. Is TARWYN PARK worthy of State significance listing?

**My assessment of Tarwyn Park as an item of heritage significance is as follows:**

**Criterion (a) – a place is important in the course, or pattern, of NSW's cultural or natural history.**

The Bylong Valley and Tarwyn Park within it, are historically significant for its role in early settlement in this area as it provided good water and promised fertile soils for crops. The first sighting by a European was explorer William Lawson during a survey of the Upper Goulburn River in 1822. Early settlers followed including John Tindale and William Lee.

**Criterion (b) - an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history.**

The Bylong Valley and especially Tarwyn Park and Iron Tank are associated with Peter Andrews (OAM), author and exceptional farmer, who has significantly contributed to our knowledge of appropriate farming practices through natural sequence methods in a global warming environment.

**Criterion (c) - an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).**

The Bylong Valley is part of the Capertee Valley Way and has great aesthetic scenic values as an encapsulated and peaceful farming valley. The spectacular drive from Rylstone through the Valley is included in special tourist drives and includes the drive down into the valley through 300 m of sandstone rock layers, a drive never forgotten.

The Technical achievements of the practices of Peter Andrews and his son Stuart Andrews are of great significance and their work and contribution to farming practices has been recognised through the granting of an OAM to Peter.

Tarwyn Park homestead and associated buildings are an excellent example of the Federation design work of architect Harold Hardwick,<sup>2</sup> who was Rylstone born and practiced in the region most of his life.

**Criterion (d) - an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons.**

The Bylong Valley is of particular social and cultural significance to the farming community and their heirs and descendants, including the William Lee family descendants, whilst also being a place of significance to the towns that have serviced them such as Rylstone and Mudgee.

The valley has aboriginal heritage sites likely to be of cultural significance to aboriginal groups.

**Criterion (e) - an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history.**

The valley has the potential to reveal more about early farmer settlement in the context of a pristine valley with opportunity for agricultural and pastoral production. As a confined or smaller valley there are qualities that attract farmers that may be missing from other locales. For example, the Bylong valley offers winter grazing on the higher lands around it. Stock was moved according to seasonal changes and cooperation between property owners would have been vital. In the late Victorian and Federation periods, Bylong was intensively farmed by the dairy industry and cattle summer grazed on the nearby Nullo Mountain.<sup>3</sup>

**Criterion (f) - an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history.**

The Tarwyn Park Natural Sequence Farming practices are an example of specialist experimental farming that is rare, and endangered by present pressure for mining, especially pit mining that can easily change the whole nature of the water systems and the fertile fields that have been developed through the practice.

**Criterion (g) - an item is important in demonstrating the principal characteristics of a class of a NSW Themes.**

Consideration of heritage items includes thematic analysis at an Australian and NSW level. Of most relevance to Tarwyn Park, its catchment and the wider curtilage of Bylong Valley is the NSW historic theme 'Environment - cultural landscape - Activities associated with the interactions between humans, human societies and the shaping of their physical

<sup>2</sup> Harold Robert Hardwick (A.I.A.) was born 6 November 1866 at Rylstone, sixth child and fifth son of John William Hardwick and Rebecca, nee White. Little is known of Harold Hardwick's early life. After qualifying as an architect, he practised in Sydney until 1898, when he moved to Mudgee and established his successful architectural practice in Davidson's chambers in Market Street East. In 1898 he married Adele Florence Wells. Many of Harold Hardwick's architectural briefs in the district are well-known.

<sup>3</sup> CMP Sandy NPWS 2001 Camp

surroundings'. In my view the Bylong Valley is an important cultural landscape in particular because of its history of dairy farming and farmer cooperation confined within a physically small valley that enhances cultural connections. Tarwyn Park is an important component of this cultural landscape. There are few listings in the cultural heritage theme in the Heritage Data Base but Tarwyn Park farming lands and its environs demonstrate the principal characteristics of the Theme and provide an excellent example of the theme.

### Statement of Significance

The Bylong Valley is historically significant for its role in early settlements of the land by William Lee, John Tindale and their descendants. The area offered settlers clean water and fertile soils and was first sighted by William Lawson c. 1822. The Bylong Valley is a place of great agricultural value accommodating many farming and pastoral pursuits including cattle and sheep, dairy and horse breeding.

Tarwyn Park Homestead and associated stables building were designed by architect Harold Hardwick in 1920. It is an excellent example of the Federation design work of Harold Hardwick, who was Rylstone born and practiced in the region most of his life.

Tarwyn Park has historical and cultural significance. This property and the associated Iron Tank property are important pastoral properties within the Bylong Valley, demonstrating a cultural landscape that illustrates significant interactions and technical achievements of Peter Andrews OAM and his family. His work on the farming environment at this place significantly contributes to our knowledge of appropriate farming practices through natural sequence methods in a global warming environment. Tarwyn Park buildings and the natural sequence farming practice area, are both rare and endangered by present pressure for mining, especially open cut coal mining that can easily change the whole nature of the water reticulation systems, the fertile fields that have been developed and the wider environmental curtilage.

Based on this and similar assessments the Heritage Branch received a State Heritage Register nomination for Tarwyn Park and Iron Tank, and the Heritage Council states that it supports the further investigation of the heritage significance of the properties. On page 90 of the PAR it states:

*To this end, the Heritage Council has resolved to request the Planning Assessment Commission to obtain an independent assessment of the heritage significance of the properties, and the impacts of the project on these values, to inform its consideration of the state heritage register nomination.*

*Notwithstanding the state heritage status, the Department notes that KEPCO proposes to avoid and/or minimise the potential impacts on the heritage values of the properties, particularly through:*

- *avoiding direct disturbance of the natural sequence farming areas;*
- *maintaining the natural sequence farming during mining operations, including managing adequate water supply to the areas;*
- *managing the horse burials in accordance with a detailed management plan;*
- *minimising blast-related impacts on Tarwyn Park infrastructure (see Section 6.1);*
- and*
- *preparing a detailed Conservation Management Plan for the farm complex.*

If the Project is approved, the recommended independent assessment should proceed before any work places the fabric of the buildings at risk.

### Tarwyn Park listing

The Tarwyn property should, in my opinion, be **locally heritage listed** for its exceptional stone Federation homestead by local **architect Harold Hardwick**. It is an excellent example of his local Federation style and in face stonework, with generous verandahs, decorative gables and asymmetrical balance, with its outbuildings, some of which are also in stone, forming a complete setting for listing as a group.

Tarwyn Park as a complex should, in my opinion, be listed as an item of local and **State significance** for its association with Peter Andrew and his experimental farming practices. The place became known nationally as the place where the ground breaking work on water systems for farming fertility was developed, known as *Natural Sequence Farming*. Through this development the whole area of Tarwyn Park and the associated property Iron Tank deserves listing as an item of State Significance.

Tarwyn Park and the associated stone stables are noted as an item of local significance in the Bylong Valley EIS report by Hansen Bailey. In their description it states: *'The complex consists of the homestead constructed in 1926, stables, various farm buildings, rubbish mound containing antique bottles and racehorse burial sites (Rain Lover and Eloisa). The area is also the location where the Natural Sequence Farming (NSF) was first developed and practiced.'*

This document does not go far enough. For example:

- The document does not cite the provenance of the architect Harold Hardwick, or his work elsewhere.
- It makes no attempt to define the curtilage of the place, nor to recommend an appropriate setting – which would probably encompass the whole of Tarwyn Park including the property Iron Tank, and their water catchment. It does not explore the significance to the nation of this work at a time when climate change is occurring.

I have read the Expert Witness Code of Conduct under the Uniform Civil Procedure Rules 2005 and I agree to be bound by it.

**Report prepared by Barbara Hickson**

**Heritage adviser and architect**

**15 May 2017**



Barbara Hickson

Brief CURRICULUM VITAE

## EDUCATION

Bach. of Architecture (1st class hon.) Sydney University 1973

Architects Board Registration exam. 1974

Masters of Materials Conservation with Honours: (UWS) 1999.

## PROFESSIONAL DEVELOPMENT

- Chartered & Registered Architect (3845).
- Licensed Builder (for 10 years to 2000).
- Heritage Planning in Practice, Heritage Short Course 1997
- Member: NSW Heritage Advisor's Network
- Convener of the Central West Heritage Network 2005-7
- Member of the Heritage Branch of the Dept. of Planning- Technical Advisory Group (TAG) 2012-13

## AREAS OF SPECIALISATION

- Architecture
- Heritage Advice
- Project administration
- Community consultation

## AWARDS

- 2007 Energy Australia NSW National Trust Cathy Donnelly Memorial Award granted to an architect for contribution to heritage management.
- 2007 Energy Australia NSW National Trust for cultural heritage study: Tracking the dragon through the central west.
- 2003 Energy Australia National Trust of Australia Award for Cultural Heritage – '100 lives of Bourke: A cemetery interpretation book'.
- 2002 NSW Government Heritage Volunteers' Award.
- 2001 Sydney Harbour Foreshore Authority 2001 Heritage Award: Highly Commended - 'Conservation and Repair of Victoria and Colonial Brickwork'.Architecture

## **Outstanding biodiversity issues with the Bylong Coal Project**

### **Submission to the Planning Assessment Commission**

18 May 2017

David Paull M.Res.Sc

Accredited Biobanking Assessor #0019

I have prepared this expert report in response to a request from EDO NSW, on behalf of the Bylong Valley Protection Alliance.

I acknowledge I have read the Expert Witness Code of Conduct in the Uniform Civil Procedure Rules 2005 and I agree to be bound by it.

### **Summary**

This submission has been prepared as a response to biodiversity matters outlined in the Dept of Planning and Environment's (DPE) Secretary's Assessment Report (SAR) including the relevant appendices.

Following the submissions to the Environmental Impact Statement (EIS) for the Bylong Coal Project (Project) a Biodiversity Assessment Report (BAR) was submitted to by the proponent. It outlines three of 'matters for further consideration' pursuant to the Framework for Biodiversity Assessment (FBA). These are:

- Impacts to Bylong River, a fourth order stream;
- Impacts to Box Gum Woodland and Derived Native Grassland; and
- Impacts to the Regent Honeyeater.

The Secretary is informed by the Office of Environment and Heritage (OEH) as to whether conditions for assessment on these matters have been adequately followed according to the FBA. In this case, OEH found that they were:

*"...satisfied that the small area of encroachment on the riparian buffer of the Bylong River is adequately dealt with in the offset package and that the project would not cause Box Gum Woodland, the Regent Honeyeater or the Brush-tailed Rock Wallaby to become extinct or have its viability significantly reduced in the region."*

Evidence presented here will show that the impacts on these matters have not been adequately assessed due to a lack of consideration of key factors, particularly for the Bylong River landscape linkage and the Regent Honeyeater.

OEH also mentions impacts on the Bush-tailed Rock-wallaby, which is not regarded in the assessment as a 'matter for further consideration' though for which impacts will involve loss of irreplaceable breeding/shelter habitat.

In accordance with the FBA, the assessment of impacts presented within the BAR deals only with direct impacts associated with vegetation clearing as impacts such as subsidence cannot be

quantified at present. This has hampered due consideration for these types of impacts, in this Project they should be regarded as significant.

In addition, offsetting arrangements for the Project agreed to by the agencies should have been rejected by the Secretary as being inconsistent with types of land-use normally acceptable for conservation measures in perpetuity. It is my opinion that the agreed offsetting arrangements mean the residual impacts on the Regent Honeyeater have not been offset.

### **Bylong River**

The Project has been assessed as impacting a regionally significant biodiversity link (20 m riparian buffer of a fourth order stream). This is the result of a buffer applied to the proposed upgrade of Upper Bylong Road.

The Response to Submissions report (RtS) states that, *"...approximately 3.26 ha of the riparian buffer occurs within the Project Disturbance Boundary. Of this extent, native vegetation occupies approximately 0.86 ha (0.41 ha woodland and 0.45 ha grassland) with the remaining 2.40 ha comprising cleared land. Approximately 0.58 ha of the native vegetation comprises vegetation zones with a site value score  $\geq 17$  which have been assessed as impacted."*

*"The total length along which the potential impact may occur is 375m. The widest point of impact is 38m over an 8m length. Although some limited (2m) connectivity will remain, the Project is likely to create a gap of approximately 50m."*

In my opinion, a 20m buffer should not be hard to avoid as per the offset hierarchy of avoid, mitigate, offset. The FBA in fact does not allow for such landscape features to be offset and so avoidance should be required. Some flexibility is flagged within the RtS:

*"The final design of the road upgrade will consider the significance of the riparian buffer and endeavour to achieve further avoidance of the sensitive biodiversity within this area. General construction, operation and water management mitigation measures will be implemented over the life of the Project."*

### **Regent Honeyeater**

The EIS and the RtS reports both under-estimate the significance of the Bylong Valley for the critically endangered Regent Honeyeater from two key perspectives - as a dispersal route and as a potential breeding site.

*"This species has been recorded within the Study Area and is assumed to utilise the habitat within the Project Disturbance Boundary on occasion as part of a movement corridor"*.

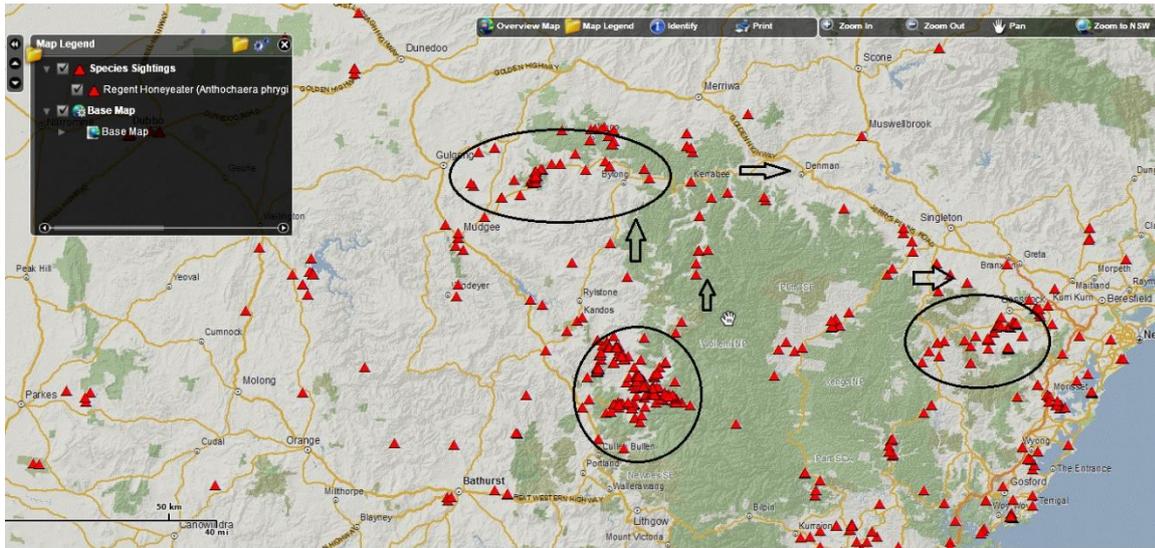


Figure 1. Sydney Basin Regent Honeyeater population from BioNet database (accessed 18/05/17) showing likely dispersal routes and destinations

There are three recognised areas in the Sydney Basin that are known to support Regent Honeyeater breeding and dispersal destinations (CoA 2016) - Capertee Valley, Munghorn Gap and the central Hunter area around Cessnock. While it is recognised that from a genetic standpoint, this species forms one genetic meta-population, it is thought that sub-populations exist (CoA 2016). The Sydney Basin cluster is likely to be one such sub-population and contains concentrations (possible breeding areas) and likely dispersal routes (shown as arrows) in Figure 1.

This figure shows the significance of major creeks and rivers that assist the dispersal of this species in this area, including the major Goulburn and Hunter Rivers, but north-south dispersal within and adjacent to Wollemi National Park is also associated with major streams.

This position is supported by the assessment in the BAR, except that no mention is made of the breeding status within the Goulburn River area. The BAR states *“The individuals assumed to occur within the Project Disturbance Boundary are considered to form part of the population of individuals breeding within the Capertee Valley. This breeding population disperses to a number of areas including Munghorn Gap Nature Reserve, Goulburn River National Park, Wollemi National Park and the Hunter Valley.”*

This lack of acknowledgement about the breeding status is re-enforced throughout the BAR, *“As the Study Area occurs outside of the known breeding areas of the Regent Honeyeater within NSW, the Project is not anticipated to impact breeding habitat for this species.”*

As well as being a linkage for this species, the Project study area actually lies in close proximity to the cluster of records around Munghorn Gap/Goulburn River National Park. While not discussed within the BAR, there is a recent breeding record in the Mt Penny Valley from 2010, this is shown as a yellow star in Figure 2. The current Recovery Plan also identifies Munghorn Gap as a likely breeding area, making the Goulburn Valley area potentially a critical area for species recovery. This is acknowledged in the Recovery Plan as requiring further investigation. One key point is that the current Recovery Plan is not acknowledged in the RtS or the EIS, one therefore has to assume it was not referred to.

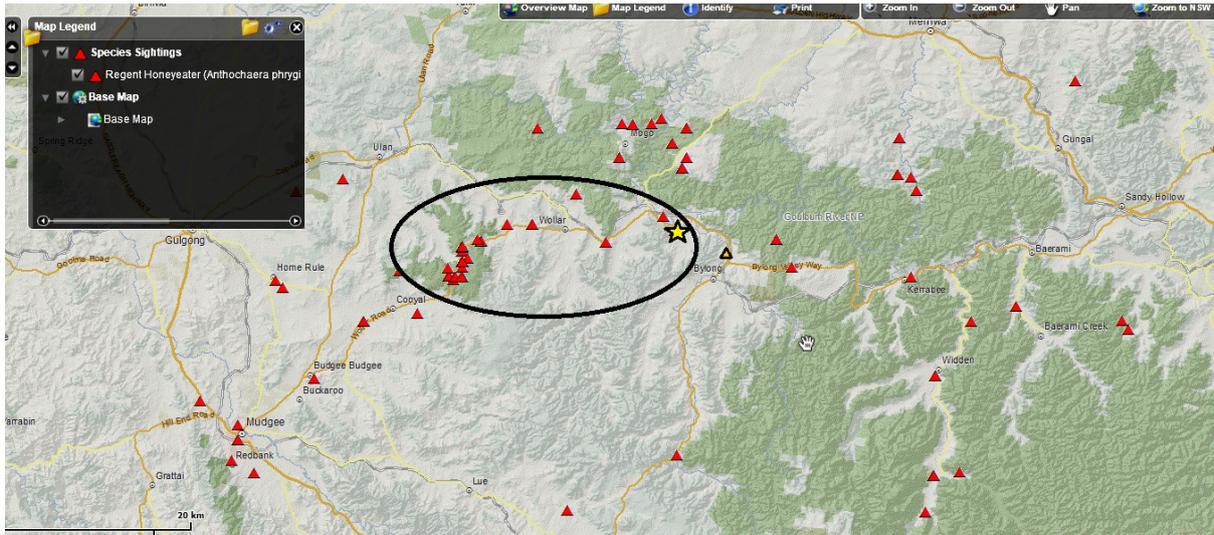


Figure 2. The Goulburn River records from BioNet database (accessed 18/05/17) showing known incidence of breeding (yellow star) and record from EIS (orange triangle)

Any assessment of the breeding potential in the locality should have required an inspection of the Birdlife Australia databases on this species, or indeed discussions with the Regent Honeyeater Recovery Team, given its status and the fact that it was a matter for further consideration. Review of this component of the assessment undertaken in the BAR shows it is data deficient and did not take into account all available information, such as local breeding status.

*“The Project is not considered to significantly fragment foraging habitat for this species as it predominantly requires clearing at the edge of treed habitat rather than creating fragmented habitat patches.”*

The Bylong Valley is already highly fragmented from past agricultural use which has dramatically reduced habitat for this species in this region. The only remaining habitat for this species lies in some small valley fragments, and along the lower slopes of the mountainous country which forms more or less continuous habitat for this species. Even the riparian zones are heavily fragmented, with little riparian vegetation left intact along Lee and Bylong streams. This is however the typical pattern for Regent Honeyeater habitat loss across its range as it favours higher nutrient valleys and lower slopes, areas also favoured by agriculture. This is why this species is critically endangered.

The contention that the BCP will not fragment any more habitat for this species cannot be supported by the evidence. In fact, it will sever an important corridor – a likely dispersal corridor for this species by the removal of all valley and lower slope woodlands in the project area and even the removal of what little stands of Red Gum/Apple and Yellow Box that are left in the valley (Figure 3). These drainages will also be subject to haul road crossings and changes to Bylong Valley Road.

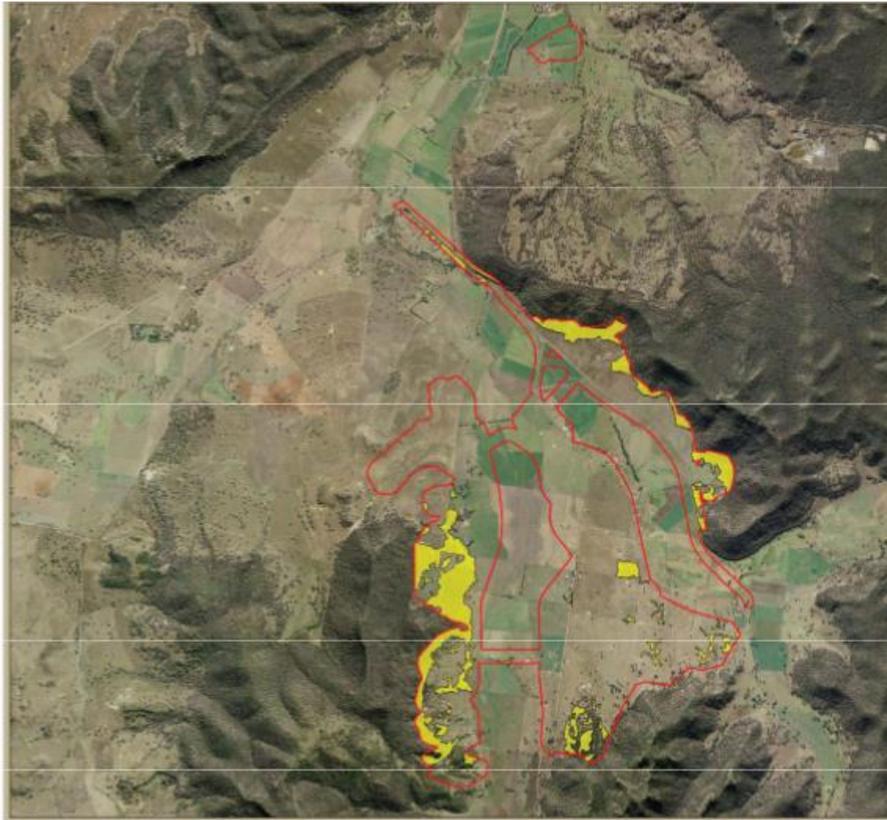


Figure 4.2. Species polygon for the Regent Honeyeater

Figure 3. Extent of proposed removal of Regent Honeyeater habitat in the Bylong Valley

There will also be a conveyor belt linking the open cut with the coal processing area on either side of Bylong River. All these constitute flight path hazards, important for birds such as the Regent Honeyeater. Impacts from noise, dust and light will also be greatest in this area, reducing linkage quality (Figure 4). These matters have been poorly considered in the EIS and the RtS.

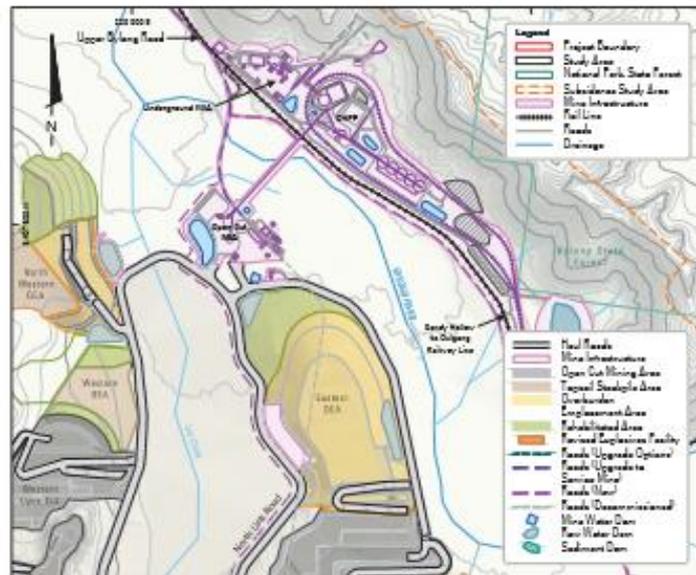


Figure 4. Level of proposed infrastructure encroachment upon the Bylong River linkage

This species has a *“Limited ability to tolerate loss of up to 10% of foraging habitat, provided it is adjacent to alternative foraging habitat”*, according to the NSW threatened species database. If we leave bioregional-scale comparisons aside, this project will remove the majority of vegetation for this species within the study area, outside of the Offset 5 subsidence zone. This includes approximately 171 ha of suitable habitat comprising woody vegetation that is dominated or co-dominated by nectar producing trees identified within the National Recovery Plan. In addition, as the BAR notes, the removal of paddock trees would also pose a threat to this species.

In terms of mitigation for this species, the Bylong Offset Strategy includes, *“conservation of vegetation within the offset sites, habitat management and improving connectivity of woodland vegetation within the locality.”* No specific comment is made in the BAR to improve riparian corridors and any specific measure for the Regent Honeyeater.

The threats to this critically endangered species from the Project should have been regarded as much more significant than the evidence provided in the BAR. The failure to not properly consider the relevant evidence is a failure of due diligence and a failure to adequately comply with the necessary steps that should be undertaken for an assessment of matters for further consideration.

#### **Cliffs and the Brush-tailed Rock-wallaby**

*“The Brush-tailed Rock-wallaby has been recorded within the Study Area and is assumed to utilise the habitat within the Project Disturbance Boundary.”*

Despite this statement, Cumberland Ecology go on to say, *“... due to lack of records within close proximity that could provide a source population for this area, as well as the presence of foxes and wild dogs, the habitat within this area is not considered to support a population of the Brush-tailed Rock-wallaby.”*

Both of the above statements cannot be true. The RtS states that the study area does not support a population of Brush-tailed Rock-wallaby, even though one was sighted and several other locations are known close by at Mt Penny. These records may represent an undocumented population as rock-wallabies have a high site-fidelity (Hazlitt et al. 2004).

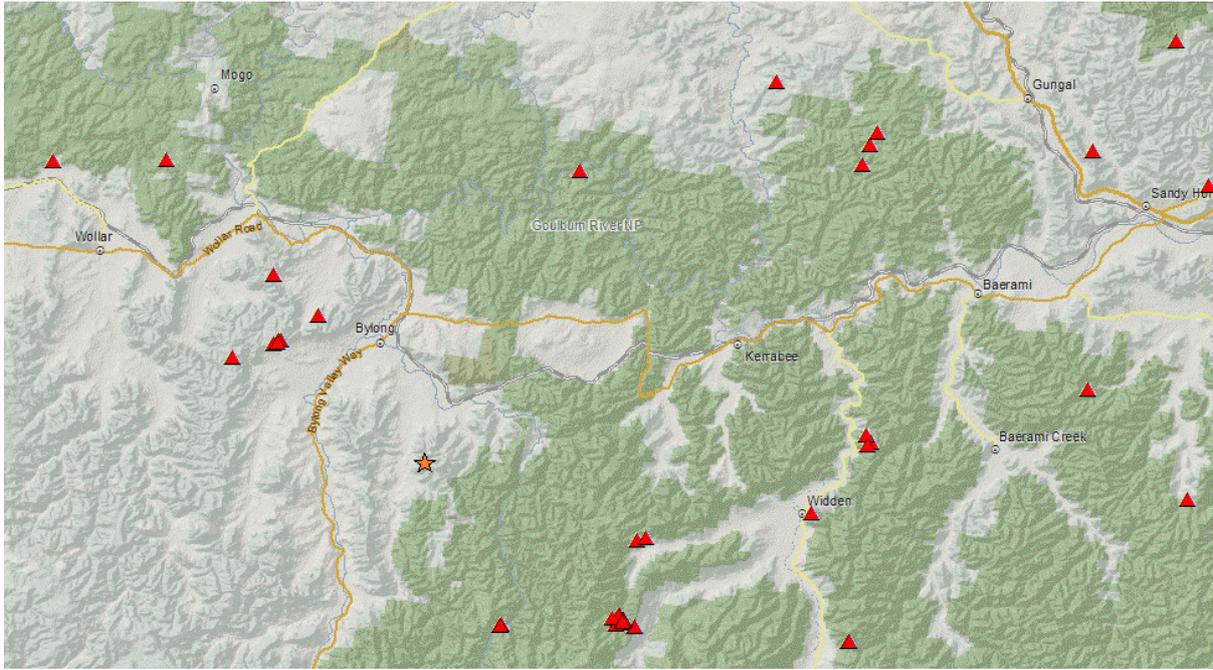


Figure 5. Brush-tailed Rock-wallaby records from BioNet database (accessed 18/5/17) (red triangles) and record from EIS (orange star)

A 20m buffer has been applied to the extent of the cliff lines identified in the EIS. The total cliff habitat, including the buffer, within the Subsidence Study Area is 16.23 ha. But a predicted rate of cliff collapse of 20% as noted by OEH is conservative given cliff heights and levels of predicted subsidence. In addition, a total of 26.45 ha of habitat for the Brush-tailed Rock-wallaby has also been identified within the Project Disturbance Boundary for which there will be 100% loss.

In the SAR, the Department has also recommended conditions requiring KEPCO to:

- avoid all impacts on Cliffs C1 to C4;
- manage the project to minimise impacts on Cliff C5 (and 24312); and
- ensure that the impacts on other cliffs are no greater than those predicted in the EIS.

Much of the area is relatively hilly, containing a number of steep slopes and approximately 41 cliffs, including 30 cliffs directly above the proposed longwall panels.

However, critical breeding habitat for this species will still be affected by the proposal. Under the NSW threatened species database, there should be no loss of breeding or shelter habitat for the Brush-tailed Rock-wallaby as cliff-line habitats are considered irreplaceable.

The same is true for the Large-eared Pied bat, which cannot tolerate further loss of breeding or shelter habitat. According to the BAR, this project has a total of 56 ha of habitat for the Large-eared Pied Bat (breeding habitat) within the Project Disturbance Boundary.

Any irreplaceable cliff line habitat should be protected from harm and, if approved the BCP should be amended to protect these areas.

## **Groundwater Dependent Ecosystems (GDEs)**

With respect to a number of vegetation communities within the subsidence area, the proponent states in the RtS:

*“Grey Myrtle Dry Rainforest (Unit 2) and Blakely’s Red Gum/Paperbark Forest (Unit 5) occur in areas where depth to groundwater is 50 m or greater. Grey Myrtle Dry Rainforest (Unit 2) occurs in sheltered gullies and Blakely’s Red Gum/Paperbark Forest (Unit 5) occurs in minor drainage lines. As these communities occur within areas that the canopy species are unlikely to access groundwater, the species composition is likely a result of other factors. For Grey Myrtle Dry Rainforest (Unit 2), it occurs at sheltered locations which give rise to shade-tolerant species. For Blakely’s Red Gum/Paperbark Forest (Unit 5), the species composition may be the result of increased retention of water in the soil along minor drainage lines. Therefore, these two communities have not been assessed as GDEs.”*

However, following comments for further information from Department of Primary Industries – Water (DPI Water), the proponent admitted to *“... a minor perched system associated with Tertiary basalt above the underground mining area.”*

Therefore, the gully vegetation in the basaltic uplands within the subsidence area are shallower than 50m above the water table, but the proponent has still not linked these communities with the high likelihood of them being GDEs and assessment on the impacts on these GDEs has not been undertaken. This is despite DPI Water GDE mapping elsewhere in the state identifies similar upland gully communities as being surface GDEs.

Subsidence-related impacts on the groundwater in the Dry Creek system is described as:

*“... inflow from the Dry Creek alluvium to groundwater via cracks would be up to about 0.15ML/day (55ML/year), and that the loss of surface water to groundwater via cracking would be negligible given the ephemeral nature of the creek. ”*

While the second statement may be partially true, it does not acknowledge the local effects that perched aquifer may have in areas of water retention at the surface, particularly in areas of uneven topography.

Though impacts on the physical nature of the creek as a result of subsidence is admitted, *“In practice, subsidence-related impacts on Dry Creek (including cracking, ponding, bed shear/stress) would be remediated as necessary using standard best practice techniques (such as sealing cracks, draining ponds, scour protection, etc.).”*

However, there is no good evidence that cracked rock creek beds can be repaired, decreasing level of water retention for these GDEs.

## **Offsets shortfalls**

*“It is important to note that the full application of the FBA was not required as the environmental assessment requirements for the project pre-dated the finalisation of NSW Offsets Policy. In this regard, the Bylong Coal Project is considered a transitional project.”*

Whatever the implications of this statement, a number of questions remain unresolved with regard to the offset strategy for the Project.

OEH state that offset arrangements satisfy impacts on the Bylong Creek linkage. However, there are no riparian offsets provided in the package and the FBA does not allow for landscape matters to be offset. Impacts on these links should be avoided at all costs.

The Assessment Report states that, “... the proposed biodiversity offsets for the Project will generate a surplus of ecosystem credits for all except one of the PCTs impacted. A shortfall of 143 credits exists for HU547, which is proposed to be offset with additional HU690 credits. The biodiversity offsets will also generate a surplus of species credits for all except one of the species credit species impacted within the Project Disturbance Boundary. A shortfall of 81 credits exists for the Regent Honeyeater, of which an outcome is proposed to be negotiated with OEH.”

The issue of a shortfall of ecosystem credits for the Fuzzy Box Woodland vegetation community, KEPCO and OEH are examine further options for addressing this.

For the Regent Honeyeater, the EIS initially contained a shortfall of species credits (5,106) to retire the impacts on this critically endangered species, DoPE has proposed that this shortfall be met by the use of Offset Area 5 (70% subsidence affected) to retire those credits, but as Cumberland Ecology notes,

*“The Regent Honeyeater is classified as a species credit species in the Threatened Species Profile Database for the Hunter Central Rivers major catchment. Species credit species identified within the OEH Threatened Species Profile Database are those that cannot reliably be predicted to occur based on PCT, distribution and habitat criteria. As such, the occurrence of a particular PCT linked to the Regent Honeyeater does not necessarily imply that habitat is present within the PCT.”*

As a species credit species, impacts on Regent Honeyeater cannot be predicted by use of habitat surrogates, therefore, any use of predicted habitat in an offset package is fraught with being in vain. To ensure best possible outcomes, it should be a requirement that habitat used as an offset for this species should be of the best quality possible. In this project the total area of Regent Honeyeater habitat assessed as impacted is 171.09 ha, which equates to 13,174 credits. However there are still 81 species credits that have not been retired, with a commitment by OEH to explore this issue further.

In relation to the retirement of the Regent Honeyeater credits:

*“It has been suggested that during the transitional period for the NSW Offsets Policy and associated FBA, the land within Offset Area 5 could be managed under a conservation agreement (or similar mechanism) during the life of the Project. Following completion of the Project, it has been suggested that Offset Area 5 will be secured through a BioBanking Agreement (or other appropriate mechanism at the time). Further consultation with OEH and DP&E will be undertaken to determine the details of the conservation agreement.”*

DPE state that the use of the subsidence impacted Offset 5 will retire outstanding credits. Despite claims by the proponent that a conservation agreement can be established, as OEH points out in their submission to the EIS, it is not within current practice to include mine-affected lands for in perpetuity arrangements including Biobanking Sites or Conservation Agreements.

‘Improvements’ in biodiversity cannot be achieved when there are uncertain levels of subsidence to manage. A 10% discount on the credits generated in this area is based on any reliable information, as stated in the RtS:

*“The application of this methodology to the Project is a “proof of concept” only. This assessment utilises the credit liability for the Project Disturbance Boundary as presented within the BAR prepared for the Response to Submissions Report. The credit liability for the Subsidence Study Area is indicative only and draws upon available information collected for the purposes of the EIA and BOR.”*

This credit discount does not resolve the issue of ongoing biodiversity loss from unknown levels of subsidence-related impact.

Given the uncertainty associated with the use of habitat surrogates to offset impacts on this species and the uncertainties outlined above regarding the levels and types of subsidence impacts, the use of Offset Area 5 to retire Regent Honeyeater credits is not likely to assist the conservation of this species.

## **Conclusion**

The SAR fails to take into consideration:

1. **Irreversible impacts that can be avoided**, the Bylong River Link and the loss of breeding habitat for the Bush-tailed Rock-wallaby and the Large-eared Pied Bat.
2. **The significance of the study area for the Regent Honeyeater both for breeding and dispersal**. Consideration under s. 9.2.2 of the FBA has not been followed adequately.
3. **The subsidence impacts within Offset 5 are unlikely to result in improved biodiversity values**. Providing a 10% discount to the credits generated is very ad hoc and does not resolve this issue due to the high level of uncertainty on extent and nature of impacts, presence of Regent Honeyeater and considering impacts on perched aquifer GDEs have not been taken into account.
4. **Outstanding credits for the Regent Honeyeater and Fuzzy Box Woodland suggest available offset opportunities cannot mitigate the impact of the proposed mine**.
5. **Based on these serious constraints, it is my opinion that the BCP should not proceed in its current form**.

## **References.**

Commonwealth of Australia (2016). ‘National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*).

Hazlitt, S. L., Eldridge, M. D. B. and Goldizen, A. W. (2004). Fine-scale spatial genetic correlation analyses reveal strong female philopatry within a brush-tailed rock-wallaby colony in southeast Queensland. *Molecular Ecology* Volume 13, Issue 12, pp. 3621–3632



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Our ref: 5824-2.1L

**Bylong Coal Project**  
**Acoustic Review of Noise and Blasting Impact Assessment**  
**Planning Assessment Commission Submission**

18 May 2017

This written submission expands on a presentation to the Bylong Coal Project Planning Assessment Commission Review by Stephen Gauld on Thursday 11 May 2017 in Mudgee, NSW.

The proposed Bylong Coal Mine will create significant noise impacts for the Bylong community, primarily due to the low existing noise level in the area.

The original Noise and Blasting Impact Assessment in Appendix Q of the Bylong Coal EIS was prepared by Pacific Environment Limited dated 10 July 2015 (the "**Report**") and the subsequent Response to Submissions, Appendix F was prepared on 22 March 2016 (the "**Response**").

The NSW Department of Planning and Environment prepared an Assessment Report dated March 2017 (the "**Assessment**").

Several issues relating to noise impact are discussed herein and are a major cause for concern.



• AIRCRAFT, ROAD TRAFFIC AND TRAIN NOISE CONTROL  
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## Low Frequency Noise

It is generally agreed that the **Report** has been carried out in accordance with the NSW Industrial Noise Policy (INP). The low frequency noise assessment is the only major exception. Initially, in Section 5.6 of the **Report**, it was found that *“the difference between the A and C weighted noise levels were found to be greater than 15 dB”*. However, it was claimed that as the Broner method was not triggered, the predicted impacts are considered acceptable.

The Department, in their **Assessment** (p46), notes that the EPA has discounted the Broner method and therefore should not be relied upon, preferring to rely on the modified UK Department for Environment, Food and Rural Affairs (DEFRA) method. In my opinion, the DEFRA method provides a reasonable approach by applying an internal threshold criteria based on audibility of low frequency noise. This is then modified to result in the external threshold criteria used in the draft Industrial Noise Guideline (dING). This approach seeks to not penalise low frequency noise from industrial sources when it is below the threshold of hearing, which is reasonable.

In the applicant’s **Response** (Section 6.0) however, their assessment of the low frequency noise in accordance with the dING found that the threshold was exceeded in the 63 Hz and 125 Hz octave bands, which is within the range of human hearing. It doesn’t appear that the analysis was carried out in third octave bands as required and as noted by the Department in the **Assessment**. Further, the **Response** claims that *“the difference between C-A noise levels is less than 15 dB, therefore the low frequency thresholds are not applicable”*. This appears to be convenient, since the **Report** found that the difference was greater than 15 dB.

I recommend that the Department require a full and complete assessment of the low frequency noise impacts be carried out in accordance with both the INP and dING prior to determination of the Project.

## Background Noise Levels

There is no dispute that the Rating Background Level (RBL) in Bylong is extremely low, in the order of less than 25 dBA and more likely less than 20 dBA (see **Report**, Appendix B<sup>1</sup>). The INP requires the minimum RBL for assessment purposes to be 30 dBA. The effect this has is to falsely increase the actual background noise level and skew all the following results.

Normally, an emergence of 5 dB above the background noise level is considered acceptable and is the basis for the INP and dING intrusiveness criterion. In the case of the proposed Bylong Coal Mine case, the predicted noise levels are 15-20 dB above the background noise levels. This will have significant impacts on the Bylong community.

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<sup>1</sup> As an example, Appendix B1 shows the background noise monitoring for five locations BG01 –BG05 in Autumn 2012. The median RBL at every location is 24 dBA or less, however the RBL graphs show the noise floor of every logger was engaged (appears as a flattened line around 20-23 dBA) and therefore the actual background noise level is most certainly less than 20 dBA as depicted by Figures B1 and B5.



One of the conclusions in the **Response** (Section 9.0), states “*With regard to privately owned land subject to land acquisition in accordance with DP&E VLAM Policy the outcomes of the NBIA<sup>2</sup> will be unchanged.*” Table 5-6 in the **Report** shows a summary of the residually affected receivers. Three receivers (60, 63 & 69) are identified as being significantly affected. A further six receivers are identified as being either negligible or moderate in their affection.

The **Assessment** provides an update of the properties affected in Table 6. One receiver (60) is identified as being significantly affected. A further eight receivers are identified as being either marginal or moderate in their affection.

The decibel difference between a ‘negligibly’ affected receiver (RBL +5-7dB) and a ‘significantly’ affected receiver (RBL +11dB) is no less than 6 dB.

The effect of the false increase in the RBL of at least 5 dB and up to 10 dB or more, is to ‘upgrade’ all of the nine affected receivers identified in Table 5-6 to significant as the noise impact from the mine will be more than 10 dB above the background noise level and will significantly affect residents comfort and repose.

A review of the complete Operational Noise Modelling Results for Year 3 in Appendix D.1 of the **Report** shows a further 17 properties<sup>3</sup> that are predicted to receive 30-35 dBA noise levels from the operation of the proposed Bylong Coal Mine. While these noise impacts are considered acceptable in accordance with the INP, the impacts will be significant as the predicted noise level is more than 10 dB above the background noise level.

For very quiet rural communities, the noise impacts on people should be considered and not hidden beneath the regulatory framework.

In my opinion, the predicted level of noise from the operation of the proposed Bylong Coal Mine would be considered offensive as defined by the POEO Act 1997. That is, “it would interfere unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted”.

### **Reasonable and Feasible Mitigation**

In Table 5-3 of the **Report**, the proponent has rejected all bund walls considered, as they are ‘Not reasonable’ due to limited noise reduction benefit. The bund walls are reported to achieve up to 4 dB attenuation. Typically five receivers are ‘significantly’ affected in Year 3. Due to the large volume of earth being moved to create the proposal, the creation of earth berms would appear to be a reasonable method of noise control.

Given that there are many more receivers who will be significantly affected than calculated through the INP assessment, it is reasonable to implement bund walls as considered in Table 5-3 of the **Report**.

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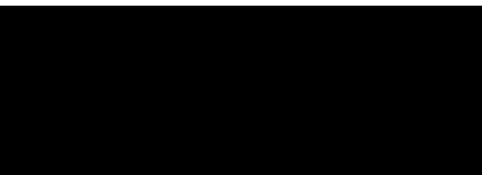
<sup>2</sup> Noise and Blasting Impact Assessment

<sup>3</sup> Properties 56, 57A, 57B, 57C, 61A, 61B, 146, 161, 162, 165, 168, 181A, 181B, 181C, 181D, 225, 292.



In my opinion, all receivers that are affected should be considered, not just those +5dB above the PSNL.<sup>4</sup> In my opinion, due to the low background noise level in the area, as discussed above, all 'Affected Receivers' will be significantly affected.

Due to the low background noise levels in Bylong, the noise impacts from normal operation of the proposed Bylong Coal Mine and the added impact of low frequency noise multiply the unacceptable acoustic impacts further than those residences 'significantly' affected in accordance with the INP. I would implore the Planning Assessment Commission to consider the amenity of the rural residences that will never be the same again while the Bylong Coal Mine is in operation.



**Stephen Gauld**, BE(Mech), MEngSc (Noise & Vibration), MIEAust, MAAS

Principal Acoustical Engineer

For and on behalf of Day Design

#### **AAAC MEMBERSHIP**

Day Design Pty Ltd is a member company of the Association of Australian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

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<sup>4</sup> Project Specific Noise Level

