Wyong Shire Council
CENTRAL COAST

CPA/219532, CPA/219529

20 June 2013

The Director Mining and Industry Projects
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Mr Clay Preshaw

Dear Sir

Exhibition Wallarah 2 Coal Project EIS - Application No. SSD-4974

Thank you for the opportunity to make a submission in response to the public exhibition of the abovementioned EIS. Wyong Shire Council in conjunction with Gosford City Council, has engaged Pells Sullivan Meynink Engineering Consultants (PSM) to review the EIS having regard to the implications of mining on the water catchment. In this regard, PSM has focussed their comments on the following aspects:

- Impact on groundwater
- Impact on surface water
- Impact on flooding
- Impact of subsidence
- Risk assessment and adaptive management of issues

A complete copy of PSM's report is attached with the findings summarised below. Wyong Shire Council objects to the current proposal based on the findings and recommendations contained in PSM's report.

In addition to the report by PSM, Wyong Council has engaged Earth Systems to review the EIS having regard to the potential environmental and planning issues related to the project, with the exception of those aspects reviewed by PSM. Wyong Shire Council objects to the current proposal based on the findings and recommendations contained in the Earth Systems report, a complete copy of which is attached. The findings and recommendations of Earth Systems are also summarised below and address the following aspects:

- Structure and approach of the EIS
- Stakeholder engagement
- Water quality impacts
- Air quality impacts
- Greenhouse gas emissions
- Noise and vibration impacts
- Ecological impacts
- Traffic and transport
- Visual amenity
- Archaeology and cultural heritage
- Impacts beyond the Director General's Requirements
- Management and monitoring

It should be noted that as of Wednesday 19 June, 2013, the "water trigger amendment" to the EPBC Act was passed through the Senate. The Bill is now awaiting assent by the Governor-General, with the changes under the Bill set to commence the day after assent.

The Bill's passage now means the Commonwealth is responsible for ensuring water systems are not impacted by major coal seam gas and coal mining projects. Under the Bill, a person, a constitutional corporation or the Commonwealth (or agency) commits an offence if they take an action involving coal seam gas development or large coal mining development, and the action has, will have or is likely to have a significant impact on a water resource, unless they first obtain approval for the action for the Commonwealth environment minister under the EPBC Act.

The approval trigger will apply to an action which has, or is likely to have, a significant impact on water resources whether in its own right or when considered with other developments.

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The existing EPBC Act provides definitions of "coal seam gas development" and "large coal mining development" as any activity involving coal seam gas extraction or any coal mining activity (respectively) that has, or is likely to have, a significant impact on water resources. The definition of a water resource in this amendment is the same as currently used in the Water Act 2007. A water resource relates to ground water and surface water, and includes organisms and ecosystems that contribute to the physical state and environmental value of the water resource.

According to the Department of Sustainability, Environment, Water, Population and Communities guidelines on the definition of a "significant impact", a significant impact is an impact that is important, notable or of consequence, having regard to its context or intensity. A significant impact on water resources may be caused by one development action relating to coal seam gas or large coal mine, or the cumulative impact of such actions. Under the National Partnership Agreement, factors which may directly or indirectly bring about a significant impact on water resources could include those that:

- change in the quantity, quality or availability of surface or ground water;
- alter ground water pressure and/ or water table levels;
- alter the ecological character of a wetland;
- result in rivers or creeks diverted or impounded;
- alter drainage patterns;
- reduce biological diversity or change species composition;
- alter coastal processes, including sediment movement or accretion, or water circulation patterns;
- result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the environment such that biodiversity, ecological integrity, human health or other community and economic use may be substantially adversely affected; or
- substantially increase demand for, or reduce the availability of water for the environment.

Although the Amendment post-dates the Wallarah 2 Coal Project EIS submission, it would apply to any developments (such as this Project) that are currently referred for a decision that is in the approval process, where the Independent Expert Scientific Committee has not yet given advice.

The transitional arrangements provide that if the process of having a development assessed under the EPBC Act has already commenced, the Minister has 60 days (from the commencement of the Bill) to decide whether the project requires approval in relation to the new water trigger. The Minister then has to advise and consult with the proponents affected on the proposed decision for a period of 10 days before a final decision is made.

Following is a summary of each of the issues, however, both the PSM reports and the Earth Systems report need to be read in their entirety.

1 IMPACT ON GROUNDWATER

The EIS underestimates the potential impact on groundwater. The conclusions reached in the EIS are primarily the result of the input parameters adopted for their numerical modeling. These input parameters are primarily driven by the unsuitable method by which the makeup of the rock and its defects have been sampled and are not consistent with available data or modeling within the EIS. Further, the modeling assumes recharge of the water system based on average climatic conditions.

The EIS implies that water inflow to the mine, of up to 2.5ML/day would largely come from water stored in the ground. However, it avoids the fact that water stored in the ground comes from somewhere, and is currently in equilibrium with natural recharge. A valid way to consider this matter is encapsulated in the following quotation from Dr Rick Evans, principal hydrogeologist of Sinclair Knight Merz, viz:

"There is no free lunch here. It's very simple – every litre of water you pump out of the ground reduces river flow by the same amount".

Australian Financial Review,
24 May 2007

Other points to note are:

- Precisely what portions of which rivers will be affected by leakage losses from the near surface alluvial lands into the deeper rock mass cannot be defined;
- The time it will take for the impact of underground extraction to reflect in surface flows cannot be determined;
- The EIS states that the mine will not fully recover groundwater pressures for over 500 years.

These points, combined with the uncertainty on the input parameters to the groundwater modeling suggest there is a high probability that leakage losses from the alluvial lands will impact the surface water. Given the high likelihood or even near certainty that climate impacts would be sufficiently severe at some point implies that it may affect visible flows for long periods.

On balance, the findings from the EIS are at the least a limited and probably unconservative view of potential impacts. This means that, at present, it is not known with an acceptable level of confidence what the likely impacts of the Wallarah 2 longwalls will be on groundwater resources, and on groundwater that feeds into the streams of the Dooralong and Yarramalong Valleys.

2 IMPACT ON SURFACE WATER

The EIS underestimates the impact on surface water. Loss of surface water from streams in either the Yarramalong and/or the Dooralong Valley will have a direct impact on the availability of water in the Wyong River downstream of the proposed mine which is used as part of the water supply to the Wyong and Gosford Local Government Areas. Further, loss of surface water will also affect businesses such as turf farming and supply of water to local bores.

The assessment of loss of surface water is entirely dependent on the inputs to groundwater modeling and the impacts on groundwater flow by the mine. The EIS concludes that there will be very little impact on leakage from the near surface alluvial lands due to the very low permeability of the rock below the alluvial lands and, that what loss does occur will be readily compensated for by surface recharge.

These statements are based on two assumptions. Firstly, that average climactic conditions prevail and secondly, a favourable view of the permeability of the rock below the alluvial lands. The latter point is discussed above under the topic of groundwater modeling, but suffice to say there is considered to be a high level of uncertainty and a lack of factual evidence to confirm the parameters used.

With regard to the first point above, for the EIS to be relevant, it must also consider the variation in inputs to the surface water supply in extended dry periods. The review in the PSM report considers the flow in Jilliby Jilliby Creek between 1972 and 2013 to illustrate the sensitivity of the stream flow to climate and to small variations in flow volumes, viz:

- The median flow rate in the creek is about 4.5 ML/day.
- Flows of less than 1ML/day occurred for 24% of the time
- Flows of less than 0.1 ML/day occurred for 10% of time.

The predicted water inflow to the mine of up to 2.5ML/day represents more than half of the average flow for Jilliby Jilliby Creek and is greater than the flows recorded for 40% of the time since 1972.

These flows are put into perspective when records of consecutive days, since 1972, where low flows are considered. The five longest periods of consecutive days when flow was less than 1 ML/day and 2 ML/day range from 112 up to 190 days. This shows that when dry periods occur, the flow in the creeks can be expected to be at a level that may be readily affected by leakage losses from the alluvial lands.

Further, a review of the climate during this period reveals that while some periods of drought did occur such as the Millennium Drought, it does not include the experience of the more intense droughts of World War 2, and the time of Federation.

3 FLOODING

The results of the flood assessment appear reasonable given the limits of the prediction of subsidence and can be considered as "best practice".

The discussion on the impacts of the W2CP on flooding are made in relation to the 1% AEP event (1 in 100 year) and would only fully come into effect after mining has been completed. It is important to note that the assessment of flooding is dependent on the expected subsidence and so any change to mine plans, or the prediction of subsidence through any validation process will result in changes to the extent and impact of flooding.

Results of the flood modeling for the 1% AEP flood event indicate that subsidence from the current W2CP mine plan is likely to result in only relatively minor increases in the depth and extent of flooding compared to current, pre-mining estimates with a total of about 35Ha of additional land becoming affected across the whole W2CP area.

The changes to flooding extents will have an adverse effect on up to 10 properties. The impact is assessed to be up to 5% of additional land area inundated for 4 of these Properties and up to 20% of additional land area for the remaining 6 properties.

In terms of impacts on residential dwellings, a total of 5 properties that were not previously impacted by the 1 in 100 year flood level are now impacted by flood water depths of between 4cm and 1.27m above floor level. These are assessed as being Major impacts in the system of '*Flood Impact Categories*' adopted by the EIS. In addition to these dwellings, a further one dwelling is Categorised as being subject to a Major Impact, in this case the expected 1 in 100 year flood level increase by up to 41cm above current, pre-mining predictions.

In the moderate flood impact category, a total of 8 dwellings will see a rise in the currently predicted inundation levels due to the 1%AEP event by between 3cm and 17cm. A further 3 dwellings will have the level of clearance, or freeboard between the predicted flood level and dwelling floor level reduced to values of between 4cm and 28cm.

Minor impacts are expected to occur to a total of 10 dwellings and comprise increased levels of flooding above floor level by between 1cm and 4cm and reduced levels of freeboard above flood levels.

Further to the dwellings described above, a total of 14 dwellings are expected to have no significant change in flood impacts while a total of 49 properties will see a slight reduction in flood impacts.

Other impacts of the subsidence on flooding are flood peak flows are anticipated to be slightly reduced with a minor increase in the duration of the peak, although the EIS notes these as being insignificant.

Flooding will impact a total of 30 primary and secondary access roads in the project area. Of these 6 primary access route low points will be adversely impacted by the mine. Adverse impacts comprise increased duration of flooding of between 1hour and up to 27 hours. The latter time pertains to the crossing (D50) located toward the southern end of Jilliby Road just north of the intersection with Watagan Forest Drive.

Mitigation of the impacts of flooding can readily be undertaken by the WACJV. Detailed plans for each location and/or dwelling are not provided at this stage of the process and are only required after approval has been given.

At this time, the only indication of the extent of potential mitigation is in relation to the Major and Moderate Impact Categories.

Preliminary descriptions of possible mitigation works presented in the EIS comprise:

- Raising or relocating dwellings;
- Raising Sandra Street to increase the upstream flood retarding storage;
- Construction of grassed earthen levees around dwellings to provide a minimum freeboard of 0.3m; and
- Construction of new replacement dwellings.

The purchase of dwellings is mentioned as an option, but is not linked to any dwellings in the EIS, nor is any mechanism or process for such an option canvassed.

In terms of primary access points, the six adversely affected locations can be raised after subsidence has occurred to mitigate the adverse effect. In some instances, the works may require new culvert works to facilitate passage of flood waters past the obstacles.

Council is concerned regarding the longer term maintenance requirements of any mitigation measures.

The discussion on potential flood mitigation measures remain at a feasibility level but are considered appropriate and to constitute "best practice" for this level of appraisal. Detailed assessment will be required if planning approval is given and this must ensure all the Director General's requirements are met.

4 IMPACT OF SUBSIDENCE

Subsidence is the prime and most readily notable impact of underground longwall mining. The extent and magnitude of subsidence has a controlling influence on potential damage to property and the extent and nature of flooding and movement of surface water.

The prime result of mining are the expected number and severity of impacts across the 245 properties within the area affected by the predicted subsidence, viz:

- 83% of properties being unaffected;
- 12% requiring very minor to minor repair;
- 5% requiring substantial to extensive repair; and
- <0.5% requiring a complete rebuild (ie. about 1 property).

These impacts are based on predictions of subsidence comprising:

- Vertical subsidence up to 2.6m with less subsidence predicted in residential areas to the east and more subsidence within forested areas to the west.
- Tilts up to 15mm/m concentrated above the edges of the panels and over forested areas.
- Tensile strains up to 4mm/m concentrated near the edge of panels. About 99% of these strains are expected to be less than 2.5 mm/m.
- Compressive strains up to 5.5 m/m concentrated about 50m inside the panel edges. About 99% expected to be less than 3.3 mm/m.
- Far field movements up to ~60 mm horizontally at a distance of around 1km from mining diminishing to less than 25 mm at a distance of 2 km.

The subsidence prediction used for W2CP was developed using three key components:

1. The predictive model developed using the empirical Incremental Profile Method (IPM) by the specialist subsidence consultant MSEC;

2. The method used to calibrate the empirical predictive model by the consultant Strata Control Technology (SCT); and

3. Chain pillar performance.

Firstly, the situation at the proposed W2CP is unique in as much as it would be a deep underground coal mine in Newcastle Coal Measures, which have traditionally been mined at relatively shallow depths. It is from these experiences that the IPM has had to draw empirical data from. That is, the experience from shallow underground coal mining in similar geology to the W2CP from the Newcastle Coal fields along with the experience from mining at similar depths to the W2CP from the Southern Coal Fields, which are in a different geological environment.

As a result, the predictions of subsidence by MSEC, based on the empirical IPM approach was calibrated against computer based modeling by SCT and it is the result of this combination of empirical mining experience and computer modeling calibration that forms the prime aspect of the review herein.

In summary PSM concludes that:

- Based on their discussions with W2CP, PSM understands that something like 4 to 5 panels would need to be extracted before a full model calibration exercise could be undertaken to assess the validity of the subsidence prediction and modeling undertaken.
- The reliability and accuracy of the SCT method is unknown as:
  - There is a reliance on extrapolated inputs to which the method has been shown to be sensitive.
  - The model is calibrated to site-specific data, and not to a small number of measurements from other sites.
  - The sensitivity to most input parameters is not presented.
- Due to the empirical nature of the method the Incremental Profile Method (IPM) is only as reliable as the data to which is it calibrated, in this case the SCT model results. Therefore the reliability and accuracy of the IPM is in doubt.

This is to some extent recognised by MSEC who in the EIS state:

"A thorough calibrotion...will only be achieved after subsidence monitoring data is obtained and analysed".

- The use of one predictive model to calibrate another is generally unwise and not widely regarded as best practice.

- The IPM is stated as being conservative and likely to over predict impacts. The evidence for this conservatism and the expected magnitude with respect to W2CP are not provided. Indeed all indications are that the model development is centred around matching expected conditions and not exceeding or over-predicting them.

- There is a reliance on pillar compression after extraction resulting in a smoother subsidence profile. However, the basis for this assumption appears to conflict the Geological Report (Appendix G), where significant variation in both roof and floor conditions is expected across the site.

- The EIS acknowledges that pillar compression may not occur but does not quantify the impacts or changes in impact should this not occur.
- First longwall will prove that this pillar compression assumption is valid.
- No less than 3 longwalls (L1N to L3N) and more likely 4 to 5 longwalls are required before the pillar compression theory can be verified.

PSM accepts that these predicted impacts are in agreement with expectations based on measured subsidence impacts elsewhere, and the Newcastle and Southern Coalfields in particular.

PSM is in general agreement that should the predicted level of subsidence occur, the type distribution and severity of impacts on houses, buildings and infrastructure is likely to be similar to that stated in the EIS.

PSM does not agree that the prediction represents a conservative estimate of subsidence impacts as all the evidence presented in the EIS suggests the prediction represents the most likely impacts.

P S M considers that the model, calibration and application of the prediction does not provide sufficient guidance as to the sensitivity and reliability of the method and may, therefore, fail the Director General's "reasonable level of confidence" test.

In general PSM did not find any omissions or evidence to suggest that subsidence due to W2CP is likely to be significantly different to that predicted by the EIS. PSM's main concern is the lack of certainty around the predictive method and the likely variation in prediction based on observed variations that are already known and potentially those unknown.

5 RISK ASSESSMENT AND ADAPTIVE MANAGEMENT

In terms of groundwater impacts and to a lesser extent surface subsidence, the EIS presents an abridged assessment of the potential impacts and hazards posed by the W2CP. This situation arises as the EIS only considers risks that have been modeled by the specialist consultants and is thereby limited by the specialist assumptions and either lack of or limited sensitivity assessments. This is not considered appropriate at this stage of the assessment where transparency as to the entire gamut of potential impacts should be canvassed.

Further, the consequence rankings at the high end of assessment have been combined and limit the risk assessment process by requiring that severe, long term and/or potentially irreversible impacts must also be wide spread to warrant a high ranking.

In order to begin to allow the impacts of the project to be managed via adaptive management, the understanding of the impacts and risks must be robust and comprehensive, and quantitative in nature, not qualitative as is the case here.

The risk assessment should consider the level of risk associated with all aspects of the W2CP, and in particular those that:

- Are associated with a high level of severity in terms of consequence,
- Have a high degree of uncertainty surrounding the assessment/modeling,
- Have consequences that either may not/cannot be able to be remediated, mitigated or managed once they are observed, or
- Represent a significant degree of community concern.

The results of a rigorous, qualitative risk assessment could then be considered with respect to acceptable levels of risk, and/or a cost/benefit assessment. The latter of which may, of course result in high consequence impacts with a low risk and/or cost impact being disregarded in the final assessment of the project. However, as stated above, they all need to be considered and presented so an informed judgement/decision can be made.

In terms of the aspects of the project covered in this report, PSM recommend the following be subject to a detailed risk assessment process.

1. Ground Water Impacts – test the sensitivity of the baseflow water losses with respect to hydraulic conductivity, level of subsidence induced by mining and environmental factors such as drought.

2. Subsidence Impacts – test the magnitude and location of subsidence effects with respect to items such as variability of the roof conditions of the mine and strength of pillars.

If the impacts of the mine are to be managed via adaptive management then a risk assessment is essential in order for the process to be:

- Correctly focused; and
- Establish realistic and measurable targets.

Following this, and possibly with the assistance of a cost/benefit assessment, for an adaptive management plan to be effective it must be based on targets for monitoring and assessment that are:

- specific;
- measurable; and
- agreed between all parties.

Further, the targets must be accompanied by agreed responses otherwise the management system would be reduced to an impotent and disingenuous process.

Agreed responses may be as minor as "continue to monitor / watch" to potentially quarantining coal below the alluvial areas or even as strong as "cease mining".

6 STRUCTURE AND APPROACH OF THE EIS

The EIS should fully consider and assess the different phases of the mine. The EIS does not adequately assess construction impacts, focusing primarily on operations. Impacts and issues associated with air quality, water quality and transport are likely to be significantly different during construction. The EIS does not adequately consider closure planning and no assessment of potential closure impacts has been undertaken. The EIS does not demonstrate that the Project would be closed in a manner that safeguards the environment and community assets.

The Proponent's risk assessment and cost benefit analysis is based on the results of the EIS. The risks, benefits and costs associated with the Project need to be re-rated based on the knowledge gaps and uncertainties that remain and the findings of further recommended studies.

An Environmental Management System has not been developed for the Project, nor is there a commitment to develop such a system.

The project proponent has not committed to regular independent environmental audits throughout the project life cycle. However, the project proponent has committed to developing an Annual Review Report to systematically assess performance and identify areas for improvement.

7 STAKEHOLDER ENGAGEMENT

The Proponent has still failed to adequately engage with the community during the environmental assessment process and consequently limited consultation has been conducted. The EIS does not provide sufficient information on the concerns raised by the community during consultation.

8 WATER QUALITY

The EIS does not assess impacts on surface water quality associated with the construction phase of the Project, nor does it provide management and mitigation measures for any potential impacts. There is no contingency for the Project if development does impact on water quality or hydrology.
The mined materials and wallrock of the deposit have not been assessed in terms of their ability to leach acid and metalliferous drainage (AMD). This is a significant oversight as AMD / saline drainage can be one of the most long-lived environmental impacts from coal mining.

The surface water monitoring program does not include a sampling point immediately downstream of the proposed Wallarah Creek tributary discharge site

The EIS does not provide contingency for overflow of untreated mine water from the Mine Operations Dam (MOD) in the event that overflow may occur.

The baseline assessment for groundwater quality appears to have included measurement of only pH and TDS, neglecting other key analytical parameters and therefore not providing a suitable baseline.

Mitigation measures for groundwater impacts are limited to repairing damaged bores from subsidence and replacing water supply if groundwater drawdown exceeds expectations. Mitigation for groundwater quality is not directly articulated.

9 AIR QUALITY

The methodology for air quality impact assessment does not appear to have been undertaken in a manner consistent with applicable legislation (DECC, 2005). Some modeling appears to include only Project emissions rather than Project emissions with baseline conditions. This provides a misleading assessment of likely dust levels that will be experienced by surrounding communities. Construction impacts and impacts associated with certain climatic conditions are not clearly outlined.

Predicted Project-related emission concentrations from dispersion modeling assume Project implementation of best practices. These estimates are only relevant provided these controls are implemented. It is unclear whether the EIS commits the Project to these management and mitigation measures.

10 GREENHOUSE GAS

Greenhouse gas emission mitigation strategies are very brief and do not demonstrate a sufficient level of commitment by the Proponent to reduce emissions. As such the Greenhouse Assessment does not adequately address the terms listed in the Director-General's Environmental Assessment Requirements and the Supplementary Director-General's Requirements.

11 NOISE AND VIBRATION

It is unclear whether the control measures identified in the Noise and Vibration specialist study are Project commitments or recommended best practices. The results of noise modeling are only valid if the recommended attenuation measures are committed to and implemented.

While noise modeling indicates that construction and operational noise will not be a major issue for the Project, modeling predicted that there may be some exceedences of Project Specific Noise Criteria (PSNC). Additional mitigation measures are not identified to prevent these exceedences.

12 ECOLOGY

In general, an adequate ecological baseline (terrestrial and aquatic) has been provided, however, it lacks detail in regard to threatened species population distribution and abundance estimates.

Ecological surveys should have been conducted over a broader survey area to reflect impacts associated with all project components.

Offsets required under the EPBC Act threatened species identified within the Project Boundary were not calculated using the new EPBC Act Policy Guidelines of 2012.

13 TRAFFIC AND TRANSPORT

A Rail Study has been conducted as part of the 2013 EIS to address the gaps in information regarding transport impacts identified in the 2010 EIS. This is a more comprehensive assessment of the transport route of the coal.

14 VISUAL AMENITY

The visual assessment conducted for the Project provides a good site analysis and identification of key viewpoints, assessment of potential visual impacts and recommendations for mitigation measures to minimise impacts of the Project.

15 ARCHAEOLOGY AND CULTURAL HERITAGE

In general, a comprehensive survey and report of the Aboriginal cultural and historic heritage of the areas surveyed within the Project Boundary has been prepared apart from some areas with accessibility restrictions.

16 COMMUNITY HEALTH AND SAFETY

Uncertainties and knowledge gaps identified in this report including air and water quality impacts indicate that the assessment of community health and safety impacts and risks and their necessary management and mitigation measures are unlikely to be sufficiently comprehensive.

17 IMPACTS BEYOND DIRECTOR GENERAL'S REQUIREMENTS

Contingency plans for potential disasters, whether naturally occurring or human induced, have not been included in the EIS. This is an oversight.

The Buttonderry Waste Management Facility is mentioned in the EIS in respect to visual amenity, however, the potential environmental risks (gas and leachate leakage) associated with the proximity of this facility to the project are not discussed.

18 MANAGEMENT AND MONITORING

The EIS is not accompanied by management and monitoring plans. It is understood that these have not yet been prepared. Good industry international practice and / or best practice requires an Environmental Management and Monitoring Plan to be prepared as part of the EIS process. Ideally this should be accompanied by a budget indicating that the Project is sufficiently resourced to undertake this work. It is not possible to fully assess the impacts of the Project without an adequately articulated management and monitoring plan.

Notwithstanding the above it is understood that the latest guidelines provide for Management Plans to be prepared much later in the process.

In recent years a trend has developed for adopting, so-called, Adaptive Management to deal with uncertainties in respect to future impacts on groundwater and surface water systems from mining operations. This developed to the point that adaptive management involved changing the targets that were established in environmental impact statements in response to what actually occurred in the field. This was done in conjunction with the establishment of groundwater monitoring systems and the visual and flow monitoring in creeks and rivers.

The fallacy of this approach was determined by the Land and Environment Court in a recent case (2013) in regard to the proposed expansion of Berrima Colliery. The judges found as follows with respect to Adaptive Management:

> Adaptive management regime
>
> The intention of the Water Management Plan is to provide an adaptive management regime, under which management actions would be modified in response to the results of the monitoring program. Preston CJ held that,
>
> > "in adaptive management, the goal to be achieved is set, so there is no uncertainty as to the outcome and conditions requiring adaptive management do not lack certainty, but rather they establish a regime which would permit changes, within defined parameters, to the way the outcome is achieved."
>
> It follows that it is necessary for there to be precise limits imposed on the cumulative operations of the colliery.

The judges went on to quote Judge Preston in a previous case in relation to the need for implementation of the precautionary principle when there is uncertainty in respect to future environmental impacts. They stated:

> Preston CJ held in *Telstra* at [150], the following, in regard to the precautionary principle and the shifting of the evidentiary burden of proof:
>
> > 'If each of the two conditions precedent or thresholds are satisfied – that is, there is a threat of serious or irreversible environmental damage and there is the requisite degree of scientific uncertainty – the precautionary principle will be activated. At this point, there is a shifting of an evidentiary burden of proof. A decision-maker must assume that the threat of serious or irreversible environmental damage is no longer uncertain but is a reality. The burden of showing that this threat does not in fact exist or is negligible effectively reverts to the proponent of the economic or other development plan, programme or project.'
>
> We are satisfied that the precautionary principle is activated as the risk of significant environmental harm currently remains uncertain,.....

The judges determined that the proposed expansion of Berrima Colliery should not proceed on the basis of Adaptive Management as was proposed by the colliery owners.

Council considers that the legal findings summarised above should be taken into account in respect to the proposed Wallarah 2 project, because future impacts on groundwater and surface waters are likely to be substantial to both town water supplies in drought periods, and to agriculture and flora and fauna under even average climatic conditions. Furthermore, there are substantial uncertainties in respect to a number of these impacts, making it possible, and even probable that the impacts will be greater than assessed by the EIS.

CONCLUSION

It is considered that the proposal should not be approved for the reasons outlined above, in particular based on the precautionary principle.

In the event, however, that it is intended to progress the application, the matters set out in the attached table need to be addressed.

Further, the following conditions pertaining to Council's water and sewer services should be imposed:

- No disposal of brine or mine water to the sewer
- Connection of potable water to Buttonderry and Tooheys Road sites
- Sewage connection to Buttonderry and Tooheys Road sites
- Connections to be in accordance with Council's requirements.

Yours faithfully

Lin Armstrong
Director
DEVELOPMENT & BUILDING

TABLE 1
GUIDANCE FOR FURTHER ASSESSMENT / VALIDATION AND MONITORING

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Subsidence	High	Accurate measurement of surface subsidence is expected to be undertaken by the mine if and when mining occurs. This must be calibrated against an accurate map of conditions prior to mining. The record must also include detailed survey of all properties, infrastructure and structures that may be affected by subsidence along with comprehensive dilapidation assessments. Agreement with all stakeholders and landowners must be gained as to the extent and infrastructure to be assessed for impact due to subsidence.
Subsidence Model	High	A hold point after an agreed number (possibly 5) of longwalls have been extracted and the SCT and MSEC models validated and recalibrated as necessary.
Subsidence – potential variability in modeling results.	Medium	The influence of UCS – Sonic correlation UCS – modulus correlation and stress regime on the prediction of subsidence must be validated – as is proposed by the EIS.
Subsidence – impact of pillar yielding on subsidence and the ability to validate predictions	Medium	A comparison of impacts with and without the influence of pillar yielding. A program of pillar performance measurement including convergence measurements and extensometer readings.
Mine Plan	Medium	It is likely, or even inevitable that the Mine Plan and layout of longwall panels will change during the life of the mine. This is particularly so after the process of validation of the subsidence modeling has been completed following initial mining of the first longwall panels (minimum of 4). Modification to the Mine Plan and longwall panel layout will alter the extent and location of subsidence and the location of impacts on flooding, access routes and stream flows. A clear process must be setout for the assessment and approval of revised mine plans and must include Council. Assessments of the impacts of Mine Plan change include subsidence magnitude and extent, potential impact on groundwater modeling, impact on flooding and stream flows/ponding.

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Sampling of rock mass – impacts on groundwater modeling	High	In order to confirm the EIS assumption and reduce uncertainty on the extent and connectivity (tortuous) of the defect system within the "aquatard" which is relied upon in the modeling factual data should be provided. If this data is not available then within the existing mine database, or other sources additional exploration cored boreholes drilled at an angle to the horizontal plane of say 60° should be implemented. Drilling would need to be undertaken in the Dooralong Valley and in the lower reaches of the Yarramalong Valley to target rocks below the alluvial soils. Drill holes to extend to at least the base of the "constrained zone" from subsidence modeling. The location and number of such holes is not recommended here, but should be of sufficient number to provide confidence in the result when used in conjunction with other available data. These angled holes could also be used to undertake further in-situ permeability testing by means such as Packer or Constant Head testing.
Permeability of Patonga Claystone – impacts on groundwater modeling	High	Specific testing of the permeability of the rock mass below the alluvial soils in the valleys be undertaken to confirm EIS assumptions, or otherwise. The assumptions, and hence impacts of the EIS groundwater modeling must be confirmed prior to mining below any alluvial areas. Testing to be in inclined, cored boreholes. Holes must be logged to allow permeability testing to be carefully targeted to allow assessment of vertical and horizontal defects. Possible methods to test the rock mass permeability comprise; • Packer testing. • In-situ Constant Head testing. • Full scale in-situ pump testing targeting the impacts of dewatering below the Patonga Claystone formation. We acknowledged that these tests are expensive and time consuming and alternate methods may be appropriate. We recommend the former two methods be employed as a first phase of testing. Testing should comprise a suitable number of locations and successful tests to be meaningful. The final number is likely to be subject to the results of the works at the time. A minimum of 6 test holes is suggested.

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Impact on Groundwater Levels	High	Should the mine be approved a comprehensive system and regime of groundwater level monitoring must be implemented. This will require a robust system of new and existing monitoring wells and/or piezometers that are able to survive the predicted subsidence impacts. Monitoring points must be read on a frequent basis and compiled into a central database which is not only open for access by Council, but the data must be reviewed and assessed for its 'meaning' on a regular basis. This system should be augmented by measurement of levels and yields from water bores in the valleys.
Impact on Stream Flows	High	Monitoring of streamflow and inputs that influence alluvial lands water table recharge must be ascertained to allow assessment of the impact of groundwater leakage/loss. Aspects that must be monitored include: • Rainfall and runoff across the catchment area for Wyong River and Jilliby Jilliby Creek, • Stream Flows – measured at multiple points along the various streams. As a minimum this must comprise o Jilliby Jilliby Creek upstream of the mine area, upstream and downstream of the confluence with Little Jilliby Jilliby Creek and just upstream of the confluence with Wyong River. o Wyong River upstream of the mine area - say at Duffy's Point, just upstream and downstream of the volcanic intrusion along the southern edge of the mine – say about 500m upstream of Chandlers Creek and about 700/800m upstream of Kidmans Lane, just upstream and downstream of the confluence with Jilliby Jilliby Ck. o Little Jilliby Jilliby Creek just upstream of the confluence with Jilliby Jilliby Creek and say just as the creek enters the upper forested area. These points could also be used to monitor water quality as necessary.

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Flood Remediation to Access Roads	Medium	The impact of potential remedial works to access roadways must be understood prior to undertaking such works with regard to the impacts on future flood levels. Models for the 1%AEP and 20% AEP must be developed, assessed and agreed. Further, the method and design of remedial works and the maintenance implications for the future must be understood and agreed with Council.
Stream Stability (and ecology)	Medium	Specific and measurable/quantifiable targets must be agreed and established concerning stream stability and the impacts on erosion (as well as flora and fauna) so all parties understand where they stand if the mine is approved. This is particularly so given the very difficult nature of assessment of what is adverse and what is not as a result of the mine.
Risk Assessment	High	A detailed and comprehensive risk assessment must be undertaken to provide a framework against which reasonable adaptive management programmes can be developed, and assessed.
Adaptive Management	High	Specific, measurable and agreed targets or levels from monitoring **MUST** be established prior to any underground works to allow all stakeholders certainty about what the aims of any adaptive management programme are. These should be based on the results of a comprehensive quantitative risk assessment and possibly cost/benefit assessment. Targets may include loss of stream flows, lowering of water levels/pressures in monitoring bores and levels of subsidence. Further, the targets must be accompanied by agreed responses otherwise the management system would be reduced to an impotent and disingenuous process. Agreed responses may be as minor as "continue to monitor / watch" to as strong as "cease mining" or to quarantine sensitive areas from mining. It may be considered that it is not possible to sufficiently confirm through monitoring the level of streamflow loss. In that case it may be that a proportion of the mine inflow water is deemed to be from streams and an agreed method and distribution of this proportion of mine water is treated and repatriated to streams, users/residents and areas of significant flora.

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Independent Impact Monitoring Authority	Medium	An independent body be established to install, monitor and maintain all the groundwater, surface water and surface level impacts of the mine both during and after operation – this is particularly so given the EIS stated length of impact on groundwater and uncertainty on the speed with which pillar yield may impact subsidence. This body must be guaranteed funding to not only establish the monitoring system, but to maintain it as the impacts of subsidence and the long mine life will require significant repairs and timely replacement of equipment and monitoring points/instruments. Indeed, replacement of instrument/monitoring points should not take longer than say 2 months to maintain continuity of measurements. It is also recommend the monitoring authority be given either a direct, or at the least oversight role in the assessment of impacts and on the assessment of compensation for damage/loss or the development of remedial works/measures to control/limit the impacts of the mine – judged against the specific targets of the Adaptive Management Plan – and as such must be able to undertake, or direct the mine to undertake additional investigations and/or assessments with regard to subsidence, groundwater and surface water. The records and recommendations of the authority should be available on the public record.

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Air Quality	High	Air quality impacts are assessed utilising relevant methodologies to ensure that detailed impact assessments of project phases are conducted effectively.
Greenhouse Gas	Medium	A more realistic assessment of greenhouse gas (GHG) impacts is provided by including Scope 2 and 3 emissions sources in the analysis of the GHG impacts and updating impacts of the Project on anthropogenic global warming.
Water Quality	High	Surface water quality is investigated further to ensure that all sources of contaminants are identified and that water sources are effectively monitored for changes associated with the Project. A geochemical assessment for potential AMD / salinity is conducted, including development of contingency plans for the management and treatment of the Mine Operations Dam.
EPBC Water Amendment	High	The EPBC Act Water Trigger Amendment (2013) is considered by the Proponent.
Ecology	Medium	Further detailed surveys for biodiversity are conducted, including extended flora survey to establish a robust flora baseline for the Subsidence Impact Limit. The Biodiversity Offset Strategy for threatened species is revised to ensure it addresses the current Policy and that currently proposed offsets for fauna habitats are reviewed for suitability.
Mine Design and Layout	Medium	Internal haulage routes are confirmed to allow assessment of potential impacts of heavy vehicle movement.
Stakeholder Engagement	High	A robust Stakeholder Engagement Plan is developed that is inclusive of commitments to ongoing consultation and a structured grievance procedure.
Rehabilitation and Closure	High	A comprehensive Rehabilitation and Closure Plan is prepared.
Risk Assessment and Cost Benefit Analysis	Medium	The Risk Assessment and Cost Benefit Analysis are reviewed and revised based on detailed findings of further recommended work.
Disaster Risk Management	High	A Disaster Risk Management Plan is developed to cover natural and human-induced emergencies associated with the Project. This Plan should be inclusive of specific Contingency Plans to manage particular events, including the management / treatment of the Mine Operations Dam (MOD) and spontaneous combustion.

ITEM / AREA OF UNCERTAINTY	IMPORTANCE (Low, Medium and High)	MEASURES
Community Health and Safety	Medium	The Community Health and Safety assessment is reviewed and revised based on the findings of the further work recommended. Potential impacts upon the Buttonderry Waste Management Facility associated with the development of the Project are fully considered.
Management, Monitoring and Reporting	High	Management and Monitoring Plans are prepared for each aspect of assessment prior to commencement of the Construction phase to clearly outline how impacts will be mitigated and managed. An independent expert is commissioned by the Proponent to conduct Environmental Audits of the project on a regular basis throughout the project life cycle. An Environmental Management System based on ISO14001:2004 'Environmental management systems -- Requirements with guidance for use' is developed and implemented for the Project.