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1. Peer review of the Aquatic Ecology and related sections of the Surface Water Impact Assessment by Dr Ian Wright from the Western Sydney University
2. Summary Council position statement over key issues addressed by the submission
3. Council resolutions of relevance to mining operations
4. Abstract of the Research Project by Dr Ian Wright titled "Subsidence Fracturing of Stream Channel from Longwall Coal Mining Causing Upwelling Saline Groundwater and Metal-Enriched Contamination of Surface Waterway".

EXECUTIVE SUMMARY

The Tahmoor South Project Application (Project Application) is entirely located within the Wollondilly Local Government Area (LGA) although the predicted maximum subsidence area extends into a small section of the adjoining Wingecarribee Local Government Area. It is recognised as having a number of economic benefits on a local and broader scale as well as being an important source of coking coal for the manufacture of steel.

The project application is viewed as being a significant development within the Wollondilly LGA and has relevance to a range of Council responsibilities in terms of asset management, protection of the environment, waste management (including the operation of the Bargo Waste Management Centre) and advocacy. It has been reviewed by Council Staff with technical knowledge and expertise in relation to these responsibilities.

It is requested that the submission be recorded as a draft that expresses the views of Council Staff. The notification of any formal endorsement of the submission and related resolutions of Council will be forwarded to the DEP shortly Council's meeting on Monday 18th March 2019. The draft submission has a broad structure comprised of Background Information (Part A) which outlines the relevance of the Project to Wollondilly LGA and key areas of concern to Council and the local community. Part B provides comments on issues common to a number of aspects of the Environment of strong relevance to the concerns of Council and the local community. Part C provides comments on specific sections of the Environmental Impact Statement (EIS) consistent with the previously expressed position of Council.

The draft submission features an independent peer review of the Aquatic Ecology and relevant aspects of the Surface Water Impact Assessment Report within the Environmental Impact Statement received from Dr Ian Wright at the University of Western Sydney. It also refers to specialist advice received on the highly technical aspects of mine subsidence induced fracturing and its interaction with surface and groundwater sources by Council Staff. The submission provides comments specifically in regard to the following aspects of the Project Application which are of particular concern to Council and the local community it represents:

- Implications of considered shortcomings in the State Significant Development Framework to the Project Application.
- The adequacy of community engagement during the preparation and public exhibition of the Environmental Impact Statement by both SIMEC Mining and the Department of Planning and Environment.
- The protection of ground and surface waters, (including the ecological health of waterways), from subsidence related impacts associated with the Project Application.
- Investigation of measures to reduce the expansion of the Reject Emplacement Area for the disposal of generated coal rejects by the Project Application.
- Potential impacts of the Project Application to the operation of the Council managed Bargo Waste Management Centre.
- Potential implications of the Project Application to the hydrology of Thirlmere Lakes.

A number of aspects of the Environmental Impact Assessment including a detailed groundwater modelling and comprehensive Social Impact Assessment are viewed as positive. However, the following shortcomings have been identified which are viewed as warranting

amendments to the Project Application prior to being forwarded to the Planning Assessment Commission for investigation and potential Determination.

- Key aspects of the EIS and associated specialist reports have not been updated to reflect scientific research and studies, in particular in regard to the impacts associated with subsidence on water sources.
- The EIS contains an analysis of impacts to Redbank Creek and Myrtle Creek experienced by existing operations associated with the Tahmoor North Project Area as a demonstration over the management of impacts to the condition of waterways by the Tahmoor South Project Application. However, this analysis does not refer to the recently concluded research study by Dr Ian Wright from the Western Sydney University which examined the impacts of mining on the condition of Redbank Creek.
- The groundwater assessment is not considered to include a detailed geological analysis and modelling that would identify the likely interaction of mining induced fracturing with both surface and groundwaters at the Application Stage (based on received specialist advice).
- The absence of a firm commitment to investigate available procedures for the disposal of generated coal rejects as a means of reducing the proposed removal of 34.2 ha of high conservation value vegetation required for its extension.

The draft submission also contains a wide variety of requested responses by the DPE to be implemented based on the structure of the revised State Significant Development that includes:

- The DPE arrange a meeting with representatives of Council, Environment Protection Authority and Subsidence Service NSW as soon as practically possible to discuss concerns over the implication of the Application to the operation of the Bargo Waste Management Centre.
- The DPE request that the current application be reconsidered due to the following identified significant shortcomings based on available information:
 - Key aspects of the EIS and associated Specialist Reports have not been updated to reflect scientific research and studies in particular in regard to the impacts associated with subsidence on water sources.
 - The EIS contains an analysis of impacts to Redbank Creek and Myrtle Creek experienced by existing operations associated with the Tahmoor North Project Area as a demonstration over the management of impacts to the condition of waterways by the Tahmoor South Project Application. However, this analysis does not refer to the recently concluded research study by Dr Ian Wright from the Western Sydney University.
- The DPE provide a response to issues raised in the report received from Council detailing the outcomes of a peer review by Dr Ian Wright from the Western Sydney University on the Aquatic Ecology and relevant parts of the Surface Water Impact Assessment components of the Environmental Assessment.
- The DPE request that the Project application be investigated in detail by the Independent Planning Assessment Commission as part of the Public Hearing Process and that it be updated to incorporate Project Advice provided by the Independent Expert Scientific Committee prior to its referral to this Commission.

Council requests that all issues raised and requested amendments to the SMP Application outlined in this draft submission be considered and addressed by the DRE prior to its forwarding to the Planning Commission. Council also requests that the DPE response to all submissions as well as any Project Advice on the Application received from the

Commonwealth Independent Expert Scientific Committee be made publicly available in a suitable format. Council staff would be available and would appreciate the opportunity to discuss key aspects of issues raised in the draft submission with senior DPE Staff.

Submission on the Tahmoor South Project Application

This submission provides comments on aspects of the Tahmoor South Project Application (Project Application) and associated Environmental Impact Statement (EIS) of particular relevance to the concerns of Council and the local community it represents. These comments are consistent with the previously adopted position of Council and the expressed concerns of local community. The comments are also consistent with issues raised in previous Council submissions on the following documents:

- Standard Secretary Assessment Requirements for the Tahmoor South Colliery Project Referral of the Tahmoor South Project to the Commonwealth Department of Environment and Energy
- The Review of the Water Trigger under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.
- NSW Integrated Mining Policy (Stages 1 and 2)
- Environmental Impact Assessment Improvement Project and subsequent Guidelines prepared by the DPE in regard to this Project.
- Subsidence Management Plan for Longwalls 31 and 37 associated with the Tahmoor North Colliery Project.
- Guidelines for the Economic Assessment Guidelines of Mining and Coal Seam Gas Proposals.
- Terms of Reference for the Independent Panel for Mining in the Drinking Catchment

This submission includes details of an independent peer review of the Aquatic Ecology and applicable sections of the Surface Water obtained from Dr Ian Wright from the Western Sydney University. The Report detailing the outcomes of this review is presented in Attachment 1 to this submission.

This submission requests the investigation of the Project Application by the Independent Planning Assessment Commission as part of the multi-agency consultation process given the identified shortcomings in the Environmental Assessment. The direction by the Minister for the holding of a Public Hearing as part of this consultation process has been welcomed. The DPE is requested to ensure that Council is involved in the consultation process and also be invited to present at the Public Hearing.

PART A: BACKGROUND INFORMATION

1. Overall features of the draft submission

(i) *Preparation process of the submission*

The EIS has been reviewed by Council Staff with technical knowledge in relation to traffic management, flood management, social impact as well as certain non-specialised components of specific environmental issues. The following consultation by Council Staff in relation to the high technical and specialised fields of subsidence and interaction with the groundwater environment has also occurred:

- A representative of the Commonwealth Independent Expert Scientific Committee (IESC) in relation to the likely nature of its Project Advice and issues associated with interaction between fracturing caused by mine subsidence and groundwater behaviour.
- Members of the Thirlmere Lakes Interagency Research Group in relation to the consideration of potential impacts of the Project Application to the hydrology of Thirlmere Lakes.
- Members of the Independent Panel for Mining in the Drinking Catchment in relation to the highly technical issue of mine subsidence induced fracturing and its interaction with surface and groundwater sources

(ii) Scope and structure of the submission

The declining of the request for an extension of the submission period by the NSW Department of Planning and Environment has been viewed with strong disappointment given Council's core responsibilities in regard to community engagement. The declining of this request has prevented the consideration and formal endorsement of the submission at a meeting of Council. It is requested that this submission be recorded as a draft and that notification of any formal endorsement of the submission and related resolutions of Council will be forwarded to the DEP shortly Council's meeting on Monday 18th March 2019.

The timing of the public exhibition period, (discussed above), and high level of detail in the Environmental Assessment has prevented a comprehensive review and comprehensive submission on the document. Provision of specific responses to the Study Requirements has been deferred to the respective State and Commonwealth Agencies. However, Council would expect the finalised EIS be fully consistent with all Standard Secretary Environmental Assessment Requirements (SSEAR's) as well as Study Requirements issued by State and Commonwealth Government Agencies.

This draft submission provides comments in regard to the aspects of the Project Application which are of concern to Council and the local community:

- Implications of considered shortcomings in the State Significant Development Framework to the Project Application.
- Protection of the condition of local waterways from subsidence related impacts associated with the Project Application.
- Issues associated with the expansion of the Reject Emplacement Area.
- Potential impacts of the Project Application to the operation of the Council managed Bargo Waste Management Centre.
- Potential implications of the Project Application to the hydrology of Thirlmere Lakes.

A summary position statement in regard to the following key issues raised in this submission of specific relevance to the Tahmoor South Project Application based on the endorsed position of Council is presented in Attachment 2 of this draft submission:

The draft submission has a broad structure comprised of Background Information (Part A) which outlines the relevance of the Project to Wollondilly LGA and key areas of concern to Council and the local community. Part B provides comments on issues common to a number of aspects of the Environment of strong relevance to the concerns of Council and the local

community. Part C provides comments on specific sections of the Environmental Impact Statement (EIS) consistent with the previously expressed position of Council.

2. Overview of Council position on mining operations

(i) Long-wall mining projects and operations

Council does not oppose underground mining provided it can occur without adverse impacts to the natural, cultural and built environment. Council also recognises the economic related benefits of mining to the local and broader economy. It further recognises the importance of mining (with the associated multiplier effect) to employment both in a local and broader context.

Council has however taken a proactive approach in advocating the concerns of the local community over impacts associated with mining operations as well as the management of these impacts by State and Commonwealth Agencies. The applicable Council resolutions that define Council's formal position in regard to mining operations is presented in Attachment 3 to this submission.

The DPE is requested to note that Council is aware of the Land and Environment Court decision (*Gloucester Resources v Minister for Planning (2019) LE 7*) relating to a Coal Mine near Gloucester. Council's Legal Counsel has reviewed the Court Findings and requested that the DPE seek independent legal advice over its implications to the Tahmoor South Project Application.

(ii) Council position regarding the Tahmoor Colliery Project

Council has not adopted a formal position in regard to existing operations associated with the Tahmoor Colliery Project. However the position outlined above in regard to mining projects and the State Significant Development framework is directly transferrable to this Project. Council has previously provided submissions on Subsidence Management Plans related to the approved Tahmoor North Project with the most recent being in 2017. This draft submission, while supporting aspects of the Plan, raised shortcomings in the assessment and management of potential impacts to the natural, cultural and built environment.

3. Level of Council support to the Project Application and related Environmental Assessment

(i) Aspects of the Project Application supported

The following aspects of the Tahmoor Application and associated Environmental Assessment documentation is supported by Council Staff given their consistency with the previously expressed position and concerns of Council:

- A detailed groundwater modelling (subject to adequacy review by authorities with related expertise).
- The integration of the subsidence impact assessment with other related components of the assessment including aquatic ecology and groundwater assessment.
- A detailed analysis of predicted level of subsidence to all built structures within the identified maximum areas of subsidence.

- The consideration and assessment of potential impacts associated with the proposal to the hydrology of Thirlmere Lakes located on the eastern edge of the Greater Blue Mountains World Heritage Area).
- The listing and quantification of greenhouse gas emissions associated with the proposal including Scope 3 (emissions associated with extracted coal).
- A Social Impact Assessment that is viewed as being largely consistent with the Guidelines prepared for such Assessment

(ii) *Identified shortcomings in the Project Application*

The EIS documentation has been identified as containing a number of significant shortcomings in terms of inconsistency with the previously expressed position of Council and received specialist advice referred to above. A number of shortcomings are also noted to have been identified by the independent Peer Review of the Aquatic Ecology Section undertaken by Dr Ian Wright from the Western Sydney University for Council. The most significant shortcomings which are viewed as requiring amendment to the Application prior to its consideration by the Planning Assessment Commission are:

- Absence of reference to research within the Main Volume and Specialist Reports for Subsidence, Groundwater, Surface Water Impact Assessment and Aquatic Ecology that has occurred since 2014 regarding potential environmental impacts associated with subsidence to the structure and ecological condition of water sources.
- The absence of reference in the description of impacts from current operations in Tahmoor North to the condition of Redbank Creek to the Research Project by Dr Ian Wright titled “*Subsidence Fracturing of Stream Channel from Longwall Coal Mining Causing Upwelling Saline Groundwater and Metal-Enriched Contamination of Surface Waterway*”, which commenced in 2014. This matter is viewed with strong concern given that the EIS has utilised local waterways within the Tahmoor North (including Redbank Creek) as the basis for its viewpoint that these impacts will be effectively managed within the Tahmoor South Project Area. The Abstract of this Research Study is presented in Attachment 4 to this draft submission.
- The absence of any firm commitment to investigate means for the disposal of coal rejects for re-use as a means of reducing the proposed removal of 34.2ha of vegetation of high conservation value that is required for its extension.

SUMMARY OF COUNCIL POSITION REGARDING THE PROJECT APPLICATION

This draft submission does not provide the formal position of Council on the Project Application as a consequence of the DPE declining to grant an extension to enable its consideration at the Council meeting on 18th March 2019. It is requested that the opportunity be provided to update this section of the draft submission to provide Council’s formal position and that this amended submission be recorded and made available as its formal submission on the Application. **It is consequently further requested that the referral of the Project Application to the Planning Assessment Commission for its review not occur until notification of this Council position is provided to the DPE shortly after this meeting.**

PART B: COMMENTS ON BROAD KEY ASPECTS OF THE PROJECT APPLICATION

This part of the submission provides comments on aspects of the Application of pertinence to the concerns of Council and the local community and common to a number of individual sections of the Environmental Impact Statement.

1. Assessment and approval Pathway for State Significant Development

The assessment of large complex proposals such as the Tahmoor South Project Application at the State Government level is recognised as being appropriate. However, the following discussion outlines shortcomings experienced with the introduced State Significant Development (SSD) for these Projects by Council and the local community. It also provides requested responses by the DPE to address concerns regarding the potential adverse implications of these shortcomings to the adequacy of the review and Determination of the Tahmoor South Project Application.

(1) General adequacy of the State Significant Development framework

A range of previous relevant submissions from Council have referred to the general absence of confidence expressed by the local community regarding the transparency of the State Significant Development Framework and its adequacy in providing a sufficiently comprehensive assessment of the Project Application. These submissions have also raised a number of shortcomings in both the Determination process and adequacy of individual Determinations that deliver outcomes for individual Projects that suitable to applicable stakeholders including the community.

The Environmental Assessment Improvement Project (EAI Project) is viewed as being positive in addressing the significant shortcomings experienced by Staff in the framework for State Significant Development Projects outlined above as well as associated level of community engagement. Council has noted with disappointment however that a range of amendments to address these concerns and improve the overall transparency and level of public confidence in the SSD framework outlined in its submission were not incorporated into the finalised Guidelines for this Project.

2. Recent reforms to the planning framework

The benefits of Initiatives in the process of being introduced to enhance the SSD planning framework, (such as the EAI Project referred to above), are viewed as being counteracted by recent reforms to the overall planning framework. This viewpoint is based on the following concerns of specific relevance to SSD Project Application that were expressed in Council's submission on the overall planning reforms:

- The achievement of lower environmental outcomes as a result of restrictions placed over specialist advice provided by Government Agencies on State Significant Developments
- The opportunity for detailed and transparent investigation of complex issues associated with Project Applications has been greatly reduced as a result of the abolishing of Planning Assessment Commissions.

The introduced planning reforms are recognised as allowing for the holding of a Public Hearing that provides the opportunity of presentation and investigation of issues. The direction for the

holding of such a Hearing in relation to the Tahmoor Project Application has been welcomed in this regard. **However, this draft submission requests that the DPE issue specific requirements for a detailed investigation by the Planning Assessment in response to the above shortcomings and identified shortcomings in the Project Application.**

3. Review and Determination process for State Significant Development Mining Projects

A number of previous Council submissions have also expressed concerns over the adequacy of the response process to received specialist advice from Government Agencies and research organisations regarding SSD by the DPE. It is considered imperative that this process be fully transparent in terms of detailing the actual review process of this advice as well as the reasons for any received advice not being accepted/supported being made publicly available. **Please note, it would be the broad expectation of Council that all specialist advice not be accepted only in particular highly extenuating circumstances.**

These submissions have also raised concerns over the adequacy of the incorporation of the received specialist advice into State Significant Determinations. An example of the validity of these concerns is the high level of deficiencies identified by a Planning Assessment Commission (PAC) established to investigate the Russell Vale Colliery Expansion Project in the DPE Assessment Report (including incorporation of received specialist advice). In relation to this matter, it is requested to be noted that Council resolved at its meeting on 19th November 2018 *to seek the reasons why Project Advice provided by the Independent Expert Panel for Mining in the Catchment was only partially incorporated into the Determination issued for Longwall 14 within the Dendrobium Colliery Project by the DPE.*

Council's submission on the EIA Project welcomed the stated intent of this Project to "develop a standard approach that does not rely on management plans to guide the Project through construction and operational phases". It is noted with concern however that the proposed management of certain potential impacts by the Tahmoor South Project Application involves the preparation of a number of sub plans intended to be completed post Determination that includes a Groundwater and Biodiversity Plan.

Implications to the Tahmoor South Project Application and recommended DPE response

The shortcomings of the Environmental Assessment detailed in subsequent sections of this draft submission is viewed as being in significant part a consequence of the deficiencies in the applying SSD framework to the Project Application outlined above. There are also concerns over the adequacy of the review process and Determination as a result of these shortcomings.

The following provides a requested response by the DPE to address these shortcomings in the Project Application:

- The DPE attend a meeting with Council Staff as soon as practically possible to discuss its concerns over the framework and adverse implications for the Tahmoor South Project Application.
- The DPE undertake a review of the EIS and submissions received in accordance with its Environmental Improvement Project as well requested amendments contained in Council's submission on this Project and subsequent submission on the Project Guidelines.

- The DPE publicly exhibit and seek comments on its response to submissions received as well as specialist advice (including the Independent Expert Scientific Committee).
- The DPE require the amendment of the EIS to largely not rely on subsidiary sub-plans and that this approach be reflected in its Assessment Report to the Planning Assessment Commission.

2. Adequacy of engagement of local community and Council by the proponent and DPE

Council endeavours to undertake community engagement in line with social justice principles to ensure equitable access. The adequacy of community engagement and involvement consistent with this broad approach in relation to the Project Application is of high importance given that Council's primary related responsibilities under the SSD framework is community advocacy.

Within this context, Council would expect a strong focus on community engagement and consultation considering the level of impact to the community by the application. It would appear however based on available information that SIMEC and the DPE have not actively engaged with the community in an adequate manner. Specifically, the level of promotion of opportunities to participate in the consultation by both organisations is viewed as being limited within the community and direct key stakeholder notification was not undertaken especially to residents residing in the vicinity of the mine.

(i) Community engagement by SIMEC Mining

The proponent is acknowledged to have provided a Briefing to Council on this Application and also held a number of community information drop-in sessions (which have been welcomed). The proponent is also acknowledged to have provided briefings at Community Consultation Committee meetings on aspects of the Project Application. However, the consultation is viewed as not being sufficiently comprehensive to ensure adequate awareness of the Project and potential impacts by both the broader community and potentially affected residents. In summary, while the consultation by SIMEC has been welcomed, it is considered that community participation in this consultation occurred in an opportunistic basis.

In relation to this matter, the Environmental Assessment is a detailed document with a high level of complexity. The EIS is acknowledged to contain a number of features to simplify this complexity such as a Summary of Key Issues. A number of paid advertisements regarding the Project Application are acknowledged to have been placed in local newspapers by SIMEC. However, it is considered, and feedback has been received to this effect, that the document is overwhelming to members of the community in terms of achieving an understanding of the Project. In order to adequately engage the community Council would expect SIMEC utilise a range of robust methods to promote their community consultation. Such methods would include direct correspondence with key stakeholders, distribution of flyers and utilisation of signage, cross-promotion at other community activities and ensure that their information days were held in highly visible locations that were accessible and held at appropriate times to encourage community participation.

In relation to this matter, the preparation of an Environmental Impact Statement Overview and its overall structure and its distribution by SIMEC is welcomed as a means of addressing issues raised above. However, the DPE is requested to note that Council views the distribution of this

Overview to approximately 3,500 residents approximately four weeks into the public exhibition period as being unsatisfactory and a process that Council would not entertain for its projects. This draft submission requests that the public exhibition period be extended for 14 days to enable a review of the information by residents following receipt of the overview and potentially prepare a submission.

(i) *Community engagement by the Department of Planning and Environment*

Recently expressed views by senior DPE representatives over the need for more effective community engagement for SSD applications has been welcomed by Council Staff. The release of the DPE draft Community Participation Plan and its proposed approach is welcomed in principle in providing a suitable framework to address the significant shortcomings that have been observed in the community engagement process. It is requested to be noted however that the engagement process for the Tahmoor South Application is viewed as being inconsistent with a number of actions in this Participation Plan such as *"Ensure community engagement accurately captures the relevant views of the community"*.

The level of engagement undertaken by the DPE during the public exhibition period comprised of placement of advertisements and public availability at locations including Council buildings and facilities is also viewed as having strong deficiencies. **The organising of a widely advertised public forum in consultation with SIMEC prior to the forwarding of the Project Application is requested as a minimum in light of these deficiencies.**

Requested response by DPE regarding community engagement

It is strongly requested that Senior DPE Staff arrange for a meeting with Council Staff to discuss concerns over the public exhibition process as well identify means of addressing these concerns during subsequent stages of the Project Application.

3. Considered consistency Study requirements and current research

(i) *Consistency with SSEAR's and Project Requirements at the NSW Level*

This draft submission has deferred the provision of comments regarding the adequacy of the EIS to the relevant NSW Government Agencies and the Commonwealth Department of Environment and Energy. However, as a broad position, Council would expect that the finalised document be fully consistent with all SSEAR's prior to the forwarding of the Application to the Planning Commission for its investigation and consideration.

There is however concern over the apparent inconsistencies of the EIS with a number of SSEAR's of relevance to the key issues raised by this submission. It is requested to be noted in this regard that the EIS is considered to have a number of strong inconsistencies with supplementary DPE SSEAR's that includes *"the EIS should provide an assessment of impacts-substantial and measurable change to the water quality and quantity of the water resource"*. **The provision of a direct response by DPE to these identified prior inconsistencies as soon as practicable is requested.**

(ii) *Referrals under the Water Trigger*

Council broadly supports the 'Water Trigger' Amendment within the *Environment Biodiversity Conservation Act 1999* as a means of achieving enhanced scrutiny of the impacts of mining as well as coal seam gas on water sources than has been observed to occur under NSW

Legislation. The scientific scrutiny by the Independent Expert Scientific Committee (IESC) contained in its Project Advice for similar Projects (including the Hume Coal Project) is noted to contain a range of strong scientific based amendments to the assessment of impacts to water sources by this Application. It is therefore the strong preferred view of Council Staff that the EIS be amended to fully incorporate all aspects of the IESC Project advice prior to its forwarding to the Planning Commission. **It is requested that the DPE make publicly available its response to the Project Advice including reasons for any recommendations not being accepted.**

(iii) *Consistency with current research*

A key issue raised in Council's submission on the SSEAR's was that the "*PEA pre-dated and did not refer to the significant scientific research that has occurred or is currently occurring as a result of the 2012 date of this document.*" The EIS is viewed as only partly responding to this raised issue as it does not refer to a number of key reports particularly in regard to the understanding of surface and groundwater resources and potential impacts of mining operations on these resources. It is therefore considered imperative that the EIS be fully consistent with the most recent research and studies to ensure an adequate scientific basis as well as for transparency purposes. **The DPE is consequently strongly requested to require the revision of the draft EIS to ensure its full consistency with all applicable scientific research prior to referral to the Planning Assessment Commission for its consideration and investigation.**

PART C: COMMENTS ON SPECIFIC SECTIONS OF THE ENVIRONMENTAL ASSESSMENT

The following provides comments on the identified key aspects of the Project Application that are consistent with comments contained in previous sections of the submission regarding Council's position on these issues as well as the State Significant Development Framework.

1. Design of the Mine

(I) *Expansion of REA*

Council position regarding the EIS over this key issue: *The absence of any firm commitment to investigate means for the disposal of coal waste (name) for re-use as a means of reducing the proposed removal of 34 ha of vegetation of high conservation value for its extension.*

The expansion of the existing Rejects Emplacement Area is acknowledged as being the most appropriate option for a range of operational and economic reasons. However, the expansion of the existing Emplacement Areas is noted to involve the removal of 34ha of native vegetation that is considered to be largely of high conservation value. It is consequently considered appropriate and warranted that options for the reuse of the generated rejects be investigated in detail as a means of reducing this environmental impact, (discussed in more detail by this submission in relation to Terrestrial Biodiversity).

Section 6.2.6 of Volume 1 of the EIS is noted to provide an overview of the examination of options for the storage and disposal of the rejects based on a "Rejects Disposal Option Study" (Options Study) contained in Appendix U. The following comments on this aspect of the EIS

which reflect expressed concerns by members of the local community over both the existing and proposed expansion of the facility are provided for consideration by the DPE:

- The EIS is acknowledged to include a supplementary correspondence from the author of the Options Study dated 31st July 2017 in response to the updated SSEAR'S. However, the EIS is not considered to be based on current practices and scientific knowledge given that the Options Study is dated July 2014. It is therefore considered that there is insufficient investigations over recent advances in technology and changes as well as economic viability of alternate options for the disposal of rejects
- The Report contains a detailed investigation of options regarding underground storage and reference to the use of roadbase which are both acknowledged as having the effect of reducing the emplacement area required. However, it is considered the conclusion of the Options Study that "*the use of rejects for roadbase is unviable*" requires updating to reflect any changes in research and economic viability of this option.
- Council Staff are aware that re-use of generated rejects associated with the Dendrobium Colliery has occurred to such a significant extent in response to large incurred expenses for its disposal that only a small amount is now being deposited at the REIS for this facility.

It is requested that the DPE in its advice to the Planning Commitment require a commitment in any Project Determination for the proponent to investigate all measures based on available measures that would reduce the volume of waste required to be placed at the REA.

(ii) Location of Vents

The proposed location of the additional two vent sites is not opposed in recognition of related operational and land tenure constraints for SIMEC Mining. It is requested to be noted however that significant community opposition was expressed over a proposed installation of a similarly located vent shaft associated with the Tahmoor North Colliery Project. The basis of this opposition received from residential properties within the vicinity of this vent potential health issues associated with flaring.

The modelling of likely Pm 2.5 emissions and the intended monitoring of these emissions during the operation of the vents is welcomed given their high health risk. However, the experience of Council Staff with mining operations and other types of development involving air emissions is that there is a general level of community ambivalence to modelling undertaken and consistency with guidelines.

It is recommended that the DPE include in any Determination appropriate conditions that would require specific and targeted consultation prior to the commencement of any work and on-going public display of the monitoring of emissions undertaken.

2. Prediction of subsidence levels and approach in identifying impacts

(i) Overview of Council position

The provision of detailed comments regarding the adequacy of this component of the EIS and associated Specialist Report in Appendix F is outside the scope of this submission and responsibilities and technical knowledge of Council Staff. However, the adequacy of this

assessment and its consistency with the most recent scientific research is viewed as being highly important by Council Staff for the following reasons:

- The identified extent and likely levels of predicted subsidence inform the assessment and management of a wide variety of other components of the Environmental Impact Statement.
- The observed difficulties observed in achieving full rehabilitation of natural features identified as being impacted from subsidence associated with existing mining operations as part of the Tahmoor North Colliery Project.

Council has provided comments over this issue in a wide variety of relevant submissions that includes the Tahmoor South SSER's and a Subsidence Management Plan associated with the Tahmoor North Project. The broad position of Council expressed in these submissions as well as received specialist advice by Council Staff is summarised as follows:

- The highest possible detailed assessment of likely subsidence levels should occur prior to the issuing of the Determination instead of being largely reliant on the Extraction Plan and the Prediction/Monitor/Response approach.
- The need for a form of Trigger Response Plans is recognised as being necessary given the difficulty in identifying likely subsidence levels. However, it is considered that these levels should be identified to the greatest extent possible at the Application Stage and not largely be the responsibility of Extraction Plans subsequent to Determination.

(ii) *Approach in identifying and managing the risk of subsidence*

(a) Adoption of the recommendations of the Southern Coalfields Inquiry

The EIS is noted to have utilised the recommendations of the 2008 Southern Coalfields Inquiry in identifying maximum subsidence risk areas then defining Risk Management Zones for such risk areas based on third order watercourses and identified high sensitivity areas. This approach is recognised as having a level of suitability in providing a scientifically based management framework for the prediction of subsidence levels at the Application Stage following a discussion with a member of this Inquiry (Dr Jim Galvin). Council Staff however maintain concerns over the adequacy of the approach in accurately identifying then managing impacts associated with subsidence in a catchment context as discussed above.

In relation to this matter, the second Term of Reference for the Independent Panel for Mining in the Catchment requires "*A review and update of the findings of the 2008 Southern Coalfields Inquiry, including recommending measures to improve the way mining effects, impacts and consequences are assessed and managed*". Members of the Panel advised during a meeting with Council Staff on 12th February 2019 that the report on Stage 2 of the investigation (which includes this review) is anticipated to be provided to the NSW Government in approximately May 2019. **It is the strong preferred view of Council Staff that the referral of the Tahmoor South Application to the Planning Assessment Commission not occur until after this report is released to allow updating of the EIS.** The provision of specific Project Advice from the Panel in accordance with its Terms of Reference would be acceptable if this is not possible.

Subsidence modelling

The adoption of the Tammetta model by the EIS to “*predict the height of connected fracturing within the overburden to the coal seam*” is not being questioned by this draft submission. However, the Project Advice by the IESC for the Russel Vale Colliery Expansion is noted to not express disagreement over the application of this Model by the Project Application in stating “*it, (the Tammetta Model), is not supported by evidence and may under predict fracturing and increases in hydraulic conductivities*”. **The DPE is consequently strongly requested to seek specialist advice over the suitability of the use of the Tammetta Model by the EIS. It is further requested that this advice be sought prior to the referral of the Project Application to the Planning Commission given that the predicted levels of subsidence informs a number of other environmentally related components of the EIS.**

(iii) *Identified broad adequacy and concerns of the Groundwater Assessment*

Identified concerns over this component of the EIS based on the position of Council outlined above and outcomes of consultation of specialist advice received over particular technical aspects of the document have been identified and are listed below.

General concerns over the approach

- There is a considered absence of a specific response to the additional Study Requirements provided by applicable NSW Government Agencies as well as the IESC
- The Risk Management Zones depicted on maps within the EIS have not been applied to all watercourses and consequently have strong shortcomings in identifying and managing impacts associated with subsidence to both the structure and ecological health of waterways in a catchment context.
- The Study Requirement issued by the IESC is noted to state the EIS must provide adequate information to allow the Project to be reviewed (by the IESC) as outlined in the Information Guidelines for Independent Expert Scientific Advice on Coal Seam Gas and Large Coal Mining Development Proposals. However, the reference to this document within the EIS has been identified as being restricted to a general statement “*that the assessment has been carried out considering these Guidelines*”.
- The intended approach for monitoring and managing subsidence related impacts is considered heavily dependent on detailed sub-plans prepared after Determination such as Extraction Plans as well as Trigger Action Response Plans. This is viewed as being illustrated by the statement on Page 11-36 that (such Sub-Plans) “*would be developed to manage the impacts of longwall mining on specific features which could potentially be impacted by subsidence*”.

The provision of a response directly to Council over these concerns prior to referral of the Application to the Planning Commission be appreciated.

Consistency with recent scientific research and studies

A particular concern is a general absence of reference to a range of relevant scientific research and studies since 2014 which viewed as inferring shortcomings in the scientific basis of this component of the EIS. There is in particular, a noted absence of reference to Studies released since 2012 known to Council Staff including the Height of Fracturing Study which is viewed as having strong relevance to the Project Application.

A key noted component of the Height of Fracturing Study is an analysis of the adequacy of models in identifying the groundwater response to mining induced fracturing at various levels including near the surface. The impacts of such fracturing on groundwater is a particular concern of Council and the local community (discussed by this draft submission in regard to groundwaters). The amendment of the EIS to incorporate applicable findings of this Study prior to its forwarding to the Planning Commission is viewed as being essential by Council Staff to ensure the assessment subsidence related impacts at the application stage is based on current scientific studies.

Summary of requested response by the DPE in regard to the Subsidence Impact Assessment

- Require updating of the EIS to be consistent with research and advice provided by Government Agencies and response of the DPE be made publicly available.
- Defer referral of the Project Application to the Planning Commission until the Independent Panel for Mining in the Catchment its Report on Stage 2 of its Investigation given this Report is required to include *"A review and update of the findings of the 2008 Southern Coalfields Inquiry, including recommending measures to improve the way mining effects, impacts and consequences in relation to water quantity are assessed and managed"*.
- Provide a response over the consistency of the Project Application with the findings and recommendations of its *Height of Fracturing Study* to Council and make this response publicly available.
- Require that the Planning Commission specifically investigate the adequacy of this component of the EIS given that it informs a number of other components of the Environmental Assessment as well as concerns identified by this draft submission.

3. Potential impacts to surface and groundwaters

The provision of comments regarding the technical aspects of the Surface Water Impact Assessment and Groundwater component of the EIS is a matter for relevant Government Agencies and the IESC. However, the following provides comments on aspects of these components consistent with the previously expressed position of Council and DPE response. Comments are provided concurrently by this draft submission in recognition of the interrelationship between impacts associated with the Project Application to surface and groundwater sources.

(i) Overview of Council position

Issues associated with the assessment and management of impacts associated with mining operations on the condition of groundwaters and surface waters is of strong concern to Council and the local community it represents. An overview of Council's position regarding these impacts based on Council resolutions and issues raised in applicable Council submissions is provided below:

- Applications should contain a description of the properties and behavior of the groundwater environment in a lateral and vertical direction based on modeling that is informed by extensive groundwater monitoring and consistent with scientific research.

- All potentially affected watercourses should be subject to detailed assessment of likely subsidence induced impacts within a catchment context.
- Applications should contain scientific rigorous assessments of likely identified impacts to water sources and Trigger Response Plans and any such Plans should be based on strong scientific knowledge and extensive baseline data.
- There should be full rehabilitation of any watercourse identified as being impacted by mining operations to its former condition including ecological health.

The DPE is requested to consider the above position when reviewing received submissions and finalising the EIS prior to its forwarding to the Planning Commission

(ii) Identified concerns over specific aspects of the Groundwater Assessment

This draft submission does not provide comments on technical aspects of the modelling and its consistency with guidelines which is a matter for applicable Government Agencies and the IESC. However, a review by a Council Officer with a good working knowledge in groundwater related issues identified potential concerns over the consistency of the Groundwater Assessment with aspects of Council's position listed above.

Specialist advice was obtained by Council Staff during a discussion with a representative of the Independent Expert Scientific Committee (Dr Wendy Timms). The primary concern discussed with this representative was the adequacy of groundwater modelling in accurately identifying impacts to surface waters attributable to mine subsidence which is of particular concern to both Council and the local community. The following provides the specialist advice received and associated Council Staff comment for the information of the DPE:

Specialist advice:

The previous Project advice provided by the Committee should be used as a guide to the review process and nature of likely Project Advice to be provided by this Committee on the Tahmoor South Project Application.

Council Staff comment

The advice provided by the IESC for the Hume Coal Project is noted to provide comments with a high level of synergy to the concerns of Council regarding impacts of mining to the condition of water sources. It is considered imperative that the EIS reflect the Project Advice received from the IESC for the Tahmoor South Project Application prior to its forwarding to the Planning Commission. It is further considered imperative that the Project Advice be fully incorporated into the Determination.

Specialist advice: Groundwater modelling is not sufficient to accurately identify the interaction of fractures created in geological strata above coal seams with groundwater in terms of both condition and behavior. This interaction requires a detailed investigation of the geological strata in association with collection of extensive baseline data. The groundwater specialist referred to a current project she is currently involved with as part of the Thirlmere Lakes Research Program "the Thirlmere Lakes Geology and Geophysics Project" as an example of the required investigation.

Council Staff comment

A structural geologist involved with the Thirlmere Lakes research project referred to above has advised the next stage of this Project will involve the development of a geological model that identifies the interaction between faults and groundwaters in a broad context. Council Staff consider that the development of a similar model, (or equivalent) for the Tahmoor South Project Application is warranted based on this received specialist advice.

It is requested that the EIS be required to be amended by the DPE prior to its referral to the Planning Commission to provide a detailed geological model that identifies the likely interaction of subsidence induced fractures and groundwater in the response to the specialist advice received by Council.

(iii) Interconnectivity of ground and surface waters

The EIS is acknowledged to contain a number of references to the impacts of subsidence induced fracturing of relevance to the connectivity between groundwater and surface waters. The identified most relevant statement to the concerns of Council and the community is:

"It is expected that upsidence-induced fracturing may lead to releases of aluminium, iron and manganese. It is likely that there may be transient, localised spikes in metal concentrations at Tea Tree Hollow, Dog Trap Creek and downstream watercourses, while subsidence is active".

The provision of detailed comments over the adequacy of the Tahmoor South Project Application in assessing the interaction of mine induced fracturing with groundwater and surface waters is a matter for research organisations and applicable Government Agencies. However, the following particular concerns to Council and the local community of relevance to interconnectivity of surface and groundwaters issues associated with the Project Application are provided for the information of the DPE:

- The accurate calculation of water drawdowns as a result of the removal from established longwalls and any potential effect of this activity on nearby aquifers. Council has been informed a project by the Australian Nuclear Science and Technology Organisation (ANSTO) within the overall Thirlmere Lakes Research Program will undertake a radioisotope analysis comparing under groundwater within the mine to collected water from the lakes. The understood cooperation of SIMEC in this analysis is welcomed. It is considered appropriate however that researchers involved with this project be consulted by the DPE during the finalisation and implementation of the EIS by the DPE given its relevance to the Project Application.
- The re-emergence downstream of water drained from watercourses as a result of mined induced fracturing. The Research Study by Dr Ian Wright on Redbank Creek involved the analysis of water considered to be such re-emergence. The high level of pollutant readings at this locality detailed in the research study attached to this submission highlight the potential for significant impacts to waterway health.

(iv) Assessment of potential impacts to surface waters of relevance to mine subsidence quality issues

The following provides comments on the adequacy of the EIS in assessing potential impacts related to mine subsidence on water quality of surface waters based on received specialist advice and requested DPE response.

(a) Overview of received specialist advice

Peer Review received from Dr Ian Wright at the Western Sydney University

Council engaged the services of Dr Ian Wright to review the Aquatic Ecology as well as related sections of the Surface Water Impact Assessment component of the EIS in recognition of his expertise and involvement with relevant research studies. The received report (presented in Attachment 1) to this draft submission agrees with aspects of the Specialist Report however has also identified a number of shortcomings of relevance to the assessment of potential impacts related to mine subsidence to surface water quality.

The DPE is requested to provide a response to Council all findings of this Peer Review prior to the forwarding of the Application to the Planning Assessment Commission as well as make this response publicly available.

Discussions with a representative of OEH

A representative of the Scientific Division of OEH expressed a broad view to Council Staff that third order streams should not be directly undermined due to concerns over the potential for draining of pools within such order streams with resulting significant hydrological as well as ecological downstream impacts that are potentially significant. It is consequently considered warranted that the proponent be requested to engage in discussions to adjust the proposed longwall layout to avoid any direct undermining of third order streams in consultation with applicable government agencies and research organisations prior to the forwarding of the Application to the Planning Commission.

(b) Comments on the management approach of potential impacts to surface waters

The following provides comments on aspects of the management approach of the EIS by Council Staff consistent with the previously expressed position of Council and the local community.

Management of reductions in water flows

The reference to reductions in waterflow as a consequence of mine induced fracturing as an activity requiring a licence under the Aquifer Interference Policy was welcomed by Council. The detailed discussion over the relevance of this Policy to the Project Application and stated intent within the EIS to obtain an aquifer interference licence is consequently welcomed. It would be expected that such a licence would be required to be obtained prior to the commencement of any subsurface works as a condition of consent

Response mechanisms to potential impacts

The EIS is noted to state that "*Trigger Response Plans (TARPS) would be prepared for the development focusing on water quality exceedances, unexpected flow loss, and unexpected loss of pool water holding capacity*". Previous sections of this submission have recognised the need for such Plans but expressed the view that response mechanisms largely need to be based on detailed assessment, modelling and data collection as part of the preparation of the EIS. **It is requested that the DPE require that the TARPS have a scientific basis to the satisfaction of applicable government agencies and potentially the IESC prior to the forwarding of the Project Application to the Planning Commission.**

The description of both the existing water quality monitoring and intended monitoring within the EIS is considered broadly adequate. However, current triggers for the implementation of TARPS for the Tahmoor North Colliery Project are viewed as not sufficiently rigorous and have been observed to be commonly exceeded. **It is consequently requested that the DPE in its Assessment Report request that any future Determination for the Project include a condition which requires the monitoring be based on updated Triggers values that have a strong scientific basis.**

Framework for the rehabilitation of waterways impacted by mining operations

Shortcomings have been observed in the adequacy of the current framework involving TARP's Creek Restoration Plans required by the Division of Resources and Geoscience in achieving full restoration of the ecological health of waterways. Council's submission on the review of the *Mine Subsidence Compensation Act 1961* in this regard referred to expressed community views that its provisions extend to impacts associated with mine subsidence to the condition of waterways. In addition, Council's recently lodged submission on draft Guidelines for Mine Rehabilitation requested the extension of these guidelines to the rehabilitation of waterways from impacts attributable to mining operations. **It is requested that the DPE require that the Planning Commission carry out an investigation into a suitable framework that would achieve full restoration of creeklines impacted by mining to their formal ecological condition.** Note, a copy of the submissions from Council referred to above can be provided to the DPE upon request.

(v) Issues associated discharges licenced by the EPA

The regulation and management of treated mine water discharged into Tea Tree Creek the Bargo River is a matter for OEH and EPA. However, potential impacts from this discharge on the ecological condition of these waterways is of strong concern to Council and the local community. The DPE is requested to note that the Bargo River Gorge, whose northern extremity is located close to the confluence of Tea Tree Creek and Bargo River, is viewed as a highly significant natural, cultural and visual landscape.

Dr Ian Wright was requested to also carry out a peer review of the adequacy of the EIS in assessing and managing impacts resulting from the discharge of treated mine water. Key findings associated with this aspect of the Project Application is detailed in the report received by Council presented in Attachment 1 to this draft submission.

The DPE is requested to provide a response to Council all findings of this Peer Review prior to the forwarding of the Application to the Planning Assessment Commission as well as make this response publicly available

Requested response by the Department of Planning and Environment

- Provide a response to all identified areas of concern and position of Council outlined in the submission prior to the referral of the Project application to the Planning Commission that includes:
 - All potentially affected watercourses should be subject to detailed assessment within a catchment context.
 - There should be full rehabilitation of any watercourse that is identified as being impacted by mining operations to its former condition that includes ecological health.

- Require the amendment of the EA to include a detailed investigation regarding impacts associated with mining induced fracturing on groundwaters in light of the advice received by a representative of the Independent Expert Committee that groundwater modelling does not adequately identify such impacts.
- Require the amendment and updating of the EIS to demonstrate that impacts associated with the Project application to local waterways will be adequately managed to prevent similar impacts to their ecological health identified by Dr Ian Wright in his research study on Redbank Creek.

4. Prediction of subsidence levels to the built environment and facilities

(i) Impacts to residential dwellings

It is recognised that there is a well-established process for monitoring and repairing damage to buildings caused by mine subsidence. Council typically is however the first point of contact when residents and community representatives become concerned about potential impacts to their properties that they or may not be aware are potentially attributable to mine subsidence.

In relation to this matter, the EIS is noted to state *“Tahmoor Mine has been successfully managing subsidence impacts to houses and buildings from longwall mining at Tahmoor North for many years in accordance with an approved Subsidence Management Plan and would continue to do for Tahmoor South with an Extraction Plan for the proposed development”*. The DPE is requested to note however that Staff are aware of issues over the adequacy of this process raised by members of the community including the standard of repairs to dwellings impacted by subsidence. **The DPE is requested to require the proponent to address these issues in consultation with Subsidence Service NSW and amend the EIS if considered appropriate.**

(ii) Impacts of the development to on proposed and future development

Specialist advice was received from Council's Strategic Services Section regarding the consistency of this component of this EIS with Council planning instruments and strategic documents. This Section advised that the EIS had correctly reflected the identification of potential additional 2000 dwellings in the Bargo area to 2036 by Council's Growth Management Strategy. The Section further advised the EIS had adequately reflected the identification by this Strategy of the area to the immediate east of the existing Bargo Village as the desired location for such residential growth. However, this Section also identified the following issues for consideration and response by the DPE:

- The EIS should acknowledge and provide specific assessment on two proposals at No. 95 Great Southern Road and No. 1A Kader Street as both of these proposals have been subject to public exhibition. The DPE is requested to note that Council is in receipt of a sub-division application for 95 Great Southern Road.
- Council is in the process of identifying appropriate local growth targets for each town and village in the areas through its current strategic planning work within the overall framework of the Western Sydney District Plan. However, the EIS should include a discussion of the impact and extend to which the project would affect local growth and whether it would affect the villages ability to respond to any particular growth needs going forward.

(iii) Impacts to Council owned community facilities

The detailed description of public facilities within the Project Application Area and identified likely level of subsidence to be experienced by these facilities within the EIS is welcomed. Council's Facilities Section has requested that the accurate extent of likely damage be identified as soon as practically possible to prevent any disruption to the on-going community service purposes of these facilities as well as absence of alternate land for such facilities. **The DPE is consequently requested to recommend in its Assessment Report to the Planning Commission that there be a condition of consent in any Determination that requires the proponent hold discussions with relevant Council Staff over this matter as soon as practically possible.**

(iv) *Issues associated with the Bargo Waste Management Centre*

The Bargo Waste Management Centre (BWMC) is a Council-owned facility that has serviced the waste management needs of local residents and businesses since the 1960s. The Centre is open seven days a week and operates as both a landfill and resource recovery centre. The Centre is viewed as a critical piece of infrastructure for the community by Council with few other affordable waste disposal and resource recovery facilities available elsewhere in the Shire or within easy reach of residents and business operators.

The following is advice received from Council's Waste Services Section regarding potential impacts from subsidence associated with the Project Application to the facility:

The document states that 'the BWMC is expected to experience the full range of predicted subsidence movements...(and)...the landfill areas may experience greater subsidence due to additional settlement of the fill'. This is of grave concern for the future operation of the facility and for the future rehabilitation of the site, as subsidence may damage critical infrastructure such as leachate collection systems, stormwater diversion systems, batters, final capping, environmental monitoring wells, weighbridge and buildings. Damage to leachate collection systems and batters (especially the Eastern batter) is of particular concern as the site is adjacent to Dog Trap Creek, which flows into the Bargo River and ultimately into the Nepean River. Escape of leachate or landfill gas from the site due to damage caused by mine subsidence may have a significant environmental impact on the river network, prompting the NSW Environment Protection Authority to contemplate revocation of the site's Environmental Protection Licence, and requiring extremely expensive mitigation infrastructure.

The NSW Environment Protection Authority requires installation of a weighbridge at the Bargo Waste Management Centre as a condition of its ongoing operation. Readings from the facility's weighbridge will be used to calculate:

- 1. charges to customers, and*
- 2. Council's payment to the EPA in landfill levy.*

To enable Council to lawfully apply charges to customers and to calculate the Centre's landfill levy payments to the NSW Government, the weighbridge must be calibrated regularly in accordance with the National Measurement Institute's requirements. Destabilisation of the weighbridge due to mine subsidence is likely to corrupt weighbridge data, in which case Council will not be legally entitled to charge customers based on the weighbridge data, nor calculate landfill levy payments to the NSW Government. This may

prompt the EPA to revoke Council's Environmental Protection, in effect shutting down the facility.

Requested response by the Department of Planning and Environment

The DPE is requested to arrange a meeting as a high priority to discuss the concerns of Council regarding its impacts to the Bargo Waste Management Centre. It is requested that such a meeting be also attended by representatives of Subsidence Service NSW and the Environment Protection Authority.

5. Potential impacts of the Project Application to the hydrology of Thirlmere Lakes

(i) *Background to Council's involvement with Thirlmere Lakes*

Thirlmere Lakes is located on the eastern edge of the Greater Blue Mountains World Heritage Area. The National Park is viewed by Council as being an important asset for the community both in a local and regional context. Council has shared the concerns of members of the local community over recent significant reductions in the levels of the five lakes and potential influences on the level of these lakes from internal and external influences. The resolutions of Council which detail its formal position regarding this matter is included in the list of resolutions is included within the broad list of resolutions relevant to mining (Attachment 3).

The announcement of the Thirlmere Lakes Research Program in December 2017 has been welcomed in achieving as a means of achieving a scientific investigation into potential causes of reductions in their levels (including mining) as well as an understanding of the complex hydrology of the lakes. The DPE is requested to note that a successful Stakeholder Forum organised in response to a resolution of Council identified influences to the hydrology of the lakes as the major priority issue.

(ii) *Comments on the management of the issue by the EIS*

(a) Related project advice from the Department of Environment and Energy

Council's submission on the referral of the Project to the DEE recognised that there was a low likelihood of impacts occurring to the hydrology of the lakes based on available information. However, it also referred to a statement in the World Heritage properties section of the DEE Guidelines *"that an action is likely to have a significant impact on the World Heritage values of a declared World Heritage property if there is a real chance or possibility that it will cause (amongst others) one or more of the World Heritage values to be degraded or damaged"*. The provision of a specific item in the Requirements from the DEE requesting on-going monitoring of any potential impacts associated with the Project Application on the hydrology of Thirlmere Lakes was consequently welcomed.

(b) *Interaction of the EIS with the Thirlmere Lakes Research Program*

The inclusion of a detailed modelling of potential impacts associated with the Project Application on the hydrology of Thirlmere Lakes is welcomed in principle. The reasons over this modelling apparently not having any linkage with studies within the OEH Research Program is however uncertain particularly given the intended purpose of this Program is *"to investigate the sensitivity of these wetland systems to external influences, including the potential effects of mining activity and groundwater extraction"*.

The DPE is requested to note that researchers associated with the Program advised at an Information Day held on 12th February 2019 that potential effects of previous mining operations on hydrogeological features of the lakes would be examined by a number of number of individual studies in subsequent stages of the Program. Council Staff subsequently sought advice from a representative of the Thirlmere Lakes Inter Agency Research Group who expressed a level of comfortability to the approach of the EIS. However, this representative also expressed the view that the on-going management of groundwater impacts by the Project Application should consider and be consistent with the applicable parts of the Thirlmere Lakes Research Program.

Requested DPE response regarding this matter

The DPE is request to recommend in its Assessment Report to the Planning Commission that:

- Undertake a detailed investigation over potential impacts of the Project to the hydrology of Thirlmere Lakes which considers both the groundwater assessment within the EIS as well as available findings of the Thirlmere Lakes Research Program.
- Any Determination includes a condition that requires full compliance with the Study Requirement provided the Department of Environment and Energy regarding the hydrology of Thirlmere Lakes.
- Any Sub Plans within any Determination be required to consider all relevant available information associated with the Thirlmere Lakes Research Program and that the Thirlmere Lakes Interagency Research Group be consulted as part of this consideration process.

6. Assessment and management of aquatic ecology

The potential impacts of mining to the ecological condition of waterways has been a common key issue raised in a range of previous Council submissions of direct or indirect relevance to the Project Application. These submissions have expressed a broad expectation that any watercourses impacted should be rehabilitated to their full ecological condition prior to mining occurring.

The detailed analysis of the aquatic ecological features within the Project Area and open acknowledgement of impacts associated with different components of the Project by the EIS is therefore welcomed. However, a review of the Aquatic Ecology Specialist Report by Council Staff identified the following concerns:

- Description of potential impacts to the aquatic ecology are viewed as generic and without sufficient scientific basis. For example, the EIS states on Page 60 "*where the longwalls mine directly beneath the streams, it is considered likely that fracturing resulting in surface flow diversion will occur*".
- The recommendations of the Specialist Report for the management of impacts associated with the Project Application to aquatic ecology is noted to be restricted to "*that appropriate stream rehabilitation measures be applied to areas that undergo significant impacts due to subsidence*". The Specialist Report is consequently considered by Staff to have shortcomings in providing a strong scientific based framework for the management of these impacts.

In light of the above concerns, Dr Ian Wright from the Western Sydney University was requested to provide a peer review of the Aquatic Ecological Report given his recognised high level of technical expertise in this field. The key findings of this Peer Review of direct relevance to the Aquatic Ecology Specialist Report are detailed in the report received by Council presented in Attachment 1 of this draft submission.

The DPE is requested to provide a response to Council all findings of this Peer Review prior to the forwarding of the Application to the Planning Assessment Commission as well as make this response publicly available
Potential impacts to terrestrial biodiversity

7. Impacts to Terrestrial Biodiversity

Position of Council regarding issue from Part A of this submission

There must be Identification of biodiversity values and adequate offsetting of biodiversity removal that is consistent with the current policy and legislative framework at the State and Commonwealth level.

The provision of a detailed response to the adequacy of this component is viewed as being a matter for the Office of Environment and Heritage (OEH) in accordance with their statutory responsibilities for the protection and management of biodiversity. The following provides comments regarding the adequacy of the assessment based on issues raised by Council in submissions on the SSEISR's for the Project and referral to the DEE as well as requested DPE response.

(i) Adequacy of the mapping and surveys

The mapping of vegetation communities on site and surveys carried out by the Specialist Terrestrial Ecology Report is viewed as being consistent with applicable guidelines. These aspects of the Report are also consistent with information available to Council Environmental Staff through mechanisms including surveys as part of received Development and Planning Proposals and from Council on-ground works. **It is however requested that the DPE recommend in its Assessment Report that any Determination include a requirement for targeted fauna surveys given the timeframe between the surveys by the EIS and commencement of vegetation clearance.**

(l) Adequacy of assessment of potential impacts

The EIS is noted to state that 34 hectares of the Critically Endangered Ecological Community Shale/Sandstone Transition Forest (SSTF) will be cleared for the expansion of the REA and 9.4ha of this vegetation community will be cleared for the two proposed additional ventilation shafts. It is further noted to state the provision of surface infrastructure would result in the removal of approximately 100 individuals of the threatened plant *Persoonia bargoensis* and an estimated 2,324 individuals of the threatened plant *Grevillia parviflora subsp. Parviflora*.

The methodology of the impact assessment is acknowledged as being broadly consistent with the applicable State and Commonwealth framework. However, the following comments over the adequacy of this approach and intended area of vegetation clearance are provided for consideration and response by the DPE:

- The proponent is acknowledged to have implemented measures to reduce impacts associated with the expansion of the REA. However, it is considered there are potential inconsistencies with avoidance and minimising measures contained in the *Framework for Biodiversity Assessment*. The securing of advice from OEH regarding this matter is considered warranted.
- The previous section of this submission regarding the expansion of the REA requested that the DPE require the proponent to undertake a detailed investigation regarding the reuse of coal rejects as a means of reducing the level of vegetation clearance required.
- The level of impact to threatened species and ecological communities listed above is agreed as being likely not significant. However, the number of credits required for their removal, (e.g. 32,536 for *Grevillia parviflora*) is viewed by Council Environmental Staff as greatly in excess in comparisons to applications received by Council where credits less than 500 is viewed as high.
- The above extent of direct impacts predominately for the purposes of storage of generated waste associated with the Project is viewed with strong concern by Council. It is envisaged this would also be viewed with concern by sections of the community that are aware of this purpose.

The DPE is requested to provide Council with its view over each of the above concerns as soon as practically possible. The DPE is further requested to arrange for the provision of a response to Council regarding technical aspects of these concerns.

(iii) Approach for the assessment of impacts to fauna and habitat

(a) Identification of potential impacts to fauna species in general

It is noted with concern that the assessment of impacts associated with the Project to fauna and associated habitat appears to be restricted to impacts that are directly attributable to subsidence and not consider impacts associated with vegetation clearance. It is considered this approach is inconsistent with a number of Study Requirement including the following in the Supplementary SSEAR's dated 14 February 2018 issued by the DPE:

"The EIS must include (amongst other matters), a description of the relevant impacts of the action on threatened species and ecological communities that includes, (amongst other matters), the nature and extent of the likely direct, indirect and consequential impacts, including short-term and long-term relevant impacts".

Council Staff consider potential impacts from vegetation clearance at both the REA and vent shaft sites as a major impact within the overall context of the Project Application. **The DPE is consequently requested to require the amendment of the EIS to contain a detailed and explicit description of these potential impacts prior to its forwarding to the Planning Assessment Commission.**

(b) Identification of potential impacts specifically relating to koalas

Council's submission on the SSEAR's contained a range of requested issues for the EIS to consider in regard to the potential impacts of the Project Application to koalas given the identification of a koala near the south East corner of the Project Application Area. The extent of surveys and methods specifically for koalas detailed in the Specialist Terrestrial Ecological Report, (including the targeting of spotlighting with areas proposed for disturbance), is viewed

as being broadly adequate for the purposes of the EIS. **However, it is recommended that the DPE request in its Assessment Report to the Panel that any Project Determination include a condition that specifically requires an up-to-date analysis of the movement of any koalas as well as presence of any species.**

(c) Management of potential impacts

Section 9.2.2 of the EIS "Vegetation Clearance" is noted to list a range of matters that are intended to be addressed by a Vegetation Clearance Protocol within a Biodiversity Management Plan. The intended preparation of a Plan to manage impacts associated with vegetation clearance is agreed with in principle. However, Council would request that all impacts be adequately addressed by prior to Determination as occurs for applications where it is the consent authority. **It is consequently requested that the DPE require the amendment of the EIS to contain a detailed description of potential impacts to terrestrial biodiversity associated with all components of the Project Application.**

(iv) *Offsetting of impacts to biodiversity*

The utilisation of SIMEC owned land as offsetting sites is agreed with in principle subject to demonstration that the intended offsetting is in accordance with the applicable framework and based on strong ecological grounds. The views expressed within the EIS that the offsetting scheme is in accordance with transition arrangements associated with the introduction of the *Biodiversity Conservation Act 2016* is agreed with in principle. However, the reference to Biodiversity Stewardship Agreements would indicate that the management of the actual offsetting sites has been prepared in accordance with Part 5 (Division 2) of this Act. **It is consequently requested that the DPE arrange for clarification to be provided to Council over the framework for the assessment and management of offsetting sites utilised by the EIS.**

Council has previously raised doubts over the ability of the biobanking framework to deliver suitable sound ecological outcomes in offsetting the removal of existing populations of a particular threatened species given this offsetting occurs for a separate population at an alternate locality. This submission consequently raises questions over the ability of the Project Application to adequately offset the intended removal of 2,234 specimens of the threatened plant *Grevillia Parviflora* and 100 species of *Persoonia bargoensis* on ecological grounds. **The DPE is consequently requested to arrange for the provision of demonstration to Council Staff that suitable ecological outcomes will be achieved in regard to the removal of these species.**

8. Traffic Impact Assessment

The following provides comments received from Council's Traffic Engineer over the considered adequacy of his Section of the EIS in relation to the potential impacts of the Project Application to local roads and traffic management.

(i) *Intersection upgrade of Tahmoor Mine's access with Remembrance Driveway*

There is concern over the degradation of the current Level of Service during PM Peak regarding east moving traffic on Avon Dam Rd in 2028. There is also equal concern about west movement traffic at on this road as well. The basis of Council's concerns regarding the

impact of addition traffic at this intersection as a result of the Project Application is that upgrade work is difficult due to site restrictions as well as the cost involved for such work.

There also needs to be consideration by the Traffic Impact Assessment over potential impacts at this locality from southbound traffic on Remembrance Drive turning right into the Wollondilly Anglican College entrance during school AM peak and PM peak. The DPE is requested to note incidents of significant queueing associated with this traffic movement has been observed. There is further concern regarding the intended reduction in the Level of Service for the access road to the existing Colliery in 2020 as part of the implementation of the Project and during the construction phase. The use of concrete medians Instead of painted medians (where possible) is recommended to minimise the cost of continuous maintenance of painted medians.

- (v) *Degradation of the Level of Service at the intersections of the rail overpass with Remembrance Driveway and Avon Dam Road -*

It is considered that the limited infrastructure capacity at the above junctions warrants special attention due to the short link between Remembrance Driveway and Avon Dam Road. The Australian Rail Track Corporation and John Holland as the owner of the railway over bridge needs to be consulted on the increase of heavy vehicles and types of heavy vehicles due to concerns over impacts to its resulting from collision by trucks.

It is requested that the DPE arrange for a response to be provided to Council regarding the above issues raised by Council's Traffic Engineer during the finalisation of the EIS.

9. Greenhouse gas emissions associated with the Project

The provision of detailed comments regarding the adequacy of this section including consistency with applicable guidelines is outside the scope of Council's responsibilities. The detailed listing and calculation of Scope 1, 2 and 3 greenhouse gas emissions associated with the project application is however welcomed.

Council has noted a recent Land and Environment Court decision (*Gloucester Resources v Minister for Planning (2019) LE 7*) relating to a Coal Mine near Gloucester that involves the production of coking coal as with the Tahmoor South Project Application. The full findings has been referred to Council's General Counsel who has the Court Decision has implications to the Tahmoor South Project Application that are yet to be legally tested.

It is recommended that the DPE seek independent legal advice over its implication to the determination of the Project application prior to its referral to the Planning Assessment Commission for consideration and investigation. **It is further recommended that this advice (redacted as necessary), be made available to the public given the noted high profile the Court Decision has achieved at a national and international level.**

10. Social Impact Assessment

The introduction of requirements for State Significant Developments to include Social Impact Assessments and Guidelines introduced for such Assessments by the DPE has been supported. The inclusion of a Social Impact Assessment (SIA) within the EIS based on these Guidelines is consequently strongly welcomed.

The Social Impact Assessment has been reviewed by a Council Staff member with relevant experience who has advised that it is thorough, comprehensive and uses established SIA methodology. The Staff Member has further advised that the range of social impacts identified and the proposed responses and mitigations is considered appropriate. This Officer did however raise the following issue in relation to Section 3.3.3 of the SIA which refers to community partnerships through SIMEC's current Corporate Social Involvement (CSI) program:

There are comments in the documents indicating that an updated CSI program will continue and there is some reference to a VPA being negotiated with Council. But there is no clear information whether the program is to be extended or increased. It would therefore be beneficial for Council to have some input into the updated CSI Program to help ensure that their program focuses on agreed community priorities.

The DPE is requested to include a recommendation in its Assessment Report that an item be contained in the Determination that requires SIMEC to consult with Council as part of the on-going development and implementation of the Corporate Social Involvement Program.

The issue of amenity and noise impacts associated with proposed increased truck movements as a result of the Project Application is noted to have been raised at meetings of the Tahmoor Colliery Community Consultation Committee. The SIA is considered to have broadly addressed this issue satisfactorily and consistent with the Guidelines. **It is however recommended that the DPE in its Assessment Report request the inclusion of a condition in any Determination for the Project that requires results of the on-going monitoring of noise impacts to be made publicly available including in any SIMEC publications.**

PART D: CONCLUDING STATEMENT

This draft submission recognises the economic contribution of the Tahmoor South Project Application as well as a number of supported aspects including detailed groundwater modelling and a Social Impact Assessment. However, a number of shortcomings have been identified from a review by Council Staff as well as specialist advice received on the highly technical aspects of subsidence and its interaction with surface and groundwater sources. This received specialist advice includes a Peer Review of the Aquatic Ecology and related sections of the Surface Water Impact Assessment.

The draft submission identified significant areas of concern that are viewed as warranting the reconsidering of the Project by the proponent. These areas of concern includes the absence of reference to research that has occurred specifically in regard to potential impacts on water sources and the absence of reference to the most recent research study on the impacts of mining on the condition of Redbank Creek by Dr Ian Wright from Western Sydney University. The draft submission also contains a range of requested responses by the DPE to address areas of concern associated with the Project Application. This includes arranging a meeting as a high priority to discuss concerns over impacts associated with the Project to the council managed Bargo Waste Centre. The draft submission requests that a response to all raised issues be provided to Council and that this response also be made publicly available.

ATTACHMENT 1

DRAFT: Review of the Tahmoor South EIS: focus on potential impacts on stream and river water quality and ecology

Investigator: Dr Ian Wright, School of Science and Health, Western Sydney University.

25 Feb 2019

Peer review of EIS documentation prepared for the Tahmoor South EIS (SSD 17_8445) which is currently exhibited for public comment.

My review focuses on the current and the potential impacts of the proposed extension of the Tahmoor Colliery on river and stream surface water quality and freshwater ecosystems.

In particular, I have examined three of the EIS documents:

1. Tahmoor South Coal-EIS-App J Surface Water
2. Tahmoor South Coal-EIS-App K Ecology
3. Tahmoor South Coal-EIS-App A SEARS and Requirements

App J Surface Water: Stream Flow Water Quality

In my opinion the EIS fails to satisfy the SEARS requirements in regards to assessing current and / or future impacts on surface water quality and aquatic ecology.

1. Failure of the EIS to provide detailed information on Tahmoor Colliery mine wastes

The EIS does not fully describe the chemical contaminants in the Tahmoor Colliery treated mine waste that is currently released into Tea Tree Creek which flows for a short distance before flowing into the Bargo River. The Surface Water chapter of the EIS presents a summary of water quality information that was collected from Tea Tree Hollow (see Table 28). It is based on samples collected many years ago (2012-2015) downstream of the mine discharge. No detailed information is provided in the EIS on recent water quality conditions in tea Tree Hollow (ie 2016, 2017 or 2018) or is provided on predicted future mine waste water quality.

In addition, it is not possible to interpret the extent to which the mine's wastewater is responsible for degraded water quality in Tea Tree Creek and Bargo River. I understand that the majority of the flow in Tea Tree Hollow is due to the Tahmoor Colliery waste discharge. But I cannot find information in the EIS that explains exactly what proportion of the flow is due to the mine's discharge. This is puzzling as the mines EPA licence (Environment Protection Licence (EPL) 1389) requires the collection of daily discharge volumes from the mine.

I consider the dated and incomplete information on the water quality of Tahmoor Colliery's waste water discharge to Tea Tree Hollow and Bargo River to be a major flaw in the EIS. It is also possibly misleading as the EIS should have presented water quality data for the mine's licenced discharge point into Tea Tree Creek that is routinely collected and reported in accordance with the EPA's licence EPL 1389. This includes monthly results for (1) nickel; (2) oil & grease; (3) chemical oxygen demand, (4) total suspended solids in the mine waste discharge. These four pollutants are not mentioned in the EIS and this diminishes the ability to provide a detailed overview of the pollutants in the colliery wastewater.

The lack of information in the EIS on the discharge of the pollutant nickel is particularly important and the significance of this is explained further in the next section.

2. Nickel contamination in Tahmoor mine wastes

The EIS ignores nickel pollution of Tea Tree Hollow and Bargo River due to the Tahmoor Colliery waste discharge. The failure to report any results for nickel in Tahmoor Colliery waste water, and in Tea Tree Hollow and the Bargo River in this EIS is a very serious issue. It could also be a misleading omission. This is an important aquatic toxicant that is regularly detected in the Tahmoor Colliery waste discharges, and in downstream waterways at environmentally hazardous concentrations (Wright et al. 2015).

Nickel data in the Tahmoor Colliery wastewater is reported on the Tahmoor Colliery website. This is based on data that is collected and reported monthly, as part of the mine's EPA licence. The data is made available on the Tahmoor Colliery website (<http://www.simec.com/mining/tahmoor-coking-coal-operations/publications/epl1389-monitoring-reports/>)

Recently this data reveals that nickel in the Tahmoor mine waste discharge was at concentrations in the last six months ranging from 43 µg/l (December 2018) to 82 µg/l (September 2018).

A published peer-reviewed study (Wright et al. 2015) of Bargo River (conducted 2013-2014) reported that nickel concentrations in the river increased by more than 20 times, from a mean of 1.65 µg/l (upstream of Tea Tree Creek) to 35.6 82 µg/l (2.8 km downstream of Tea Tree Creek). Consistently elevated nickel concentrations have been reported in accordance with the EPA licence (EPL 1389) provide confirmation that the Tahmoor Colliery wastes are a point source of the nickel contamination in the Bargo River.

Tahmoor Colliery is aware that ecologically elevated levels of nickel in the mine's wastewater is a major issue, and the EPA notices to the mine state this very clearly. Nickel is regarded by the EPA as one of the three key pollutants (along with arsenic and zinc) that the mine's new wastewater treatment facility is required to treat to a much lower concentration (target 11 µS/cm).

For example, the EPA issued a notice to Tahmoor Colliery on 13 August 2018 requiring the effectiveness of the mine's treatment plant to be improved. Part of that notice stated:

'The licensee must submit a report confirming the re-commissioning of the water treatment plant by the due date. The report must contain a summary of water quality achieved by the treatment plant and demonstrate that ANZECC 2000 trigger values for arsenic, nickel and zinc are being achieved in the Bargo River as specified in Stage 1. Due Date: 30 November 2018'

Tahmoor Colliery have failed to satisfy this level of treatment (nickel 11 µg/l), as required by the mine's EPA licence (EPL 1389; PRP 22 Stage 2). The most recent nickel concentration in Tahmoor waste (collected in January 2019 and reported February 2019) was 51 µg/l, more than four times higher than the concentration required by the EPA. This is also more than four times higher than the ANZECC (2000) guideline for ecosystem protection.

The EIS frequently mentions that the upgraded Tahmoor Colliery waste treatment plant will reduce water pollution from the discharge of mine waste water in future discharges. For example, one of the concluding comments from the Aquatic Ecology chapter stated:

'The implementation of a heavy metal treatment plant is likely to reduce heavy metal from mine water discharge and reduce barium precipitation'...

The failure to achieve this target (11 µg/l) for nickel after the EPA deadline of 30 November 2018 erodes the credibility of Tahmoor Colliery to achieve the predicted wastewater treatment performance. The EIS claims that the Tahmoor Colliery Waste Water treatment plant will achieve very low concentrations of nickel. This claim is in doubt given the inability to achieve this performance, as required by the EPA.

3. Salinity contamination in Bargo River from Tahmoor mine wastes

The Tahmoor Colliery currently causes substantial salinity contamination of the Bargo River. The existing salinity impact due to saline colliery wastes is downplayed in the EIS documents. The EIS document indicates that the future colliery development will have similar salinity to the current mine discharge. This indicates that the extended mine operation could cause a larger salinity impact given the larger flows of waste water that are likely to be generated.

The most detailed source of information on the impact of saline Tahmoor Colliery waste discharges is provided in Table 28 'Water Quality Summary for Tea Tree Hollow'. Tea Tree Hollow is the small waterway that receives the Tahmoor Colliery waste, and it is unclear how much of the flow in this creek is due to the mine discharge. This lack of this information deprives the ability to interpret the exact extent to which the mine's wastewater is responsible for the elevated salinity in Tea Tree Hollow and Bargo River.

Water quality data, including salinity, is available as the mine's EPA licence requires monthly reporting of EC in the mine waste discharge. Tahmoor Colliery possess and reports this data which is updated monthly. It should have been presented in the EIS, over many years, to allow a precise description of the impact of salinity from the current operational discharge of mine wastes to receiving water ways.

The salinity guideline used in the EIS is provided in Table 18. Salinity is presented as 'electrical conductivity' with the EC figure of 350 uS/cm, based on ANZECC (2000) guidelines for south eastern Australian upland streams. Yet although the guideline is provided in Table 18, it is never used in any of the following sections of the EIS. The mine releases a highly saline effluent into Tea Tree Hollow. This is clearly apparent from data reported in accordance with the EPA licence. The failure to present detailed data on the salinity of mine wastewater discharged in this EIS is a serious omission. It also diminishes the ability to predict the water salinity impact of the future mine operation (ie waste discharge to Tea Tree Hollow).

Salinity in Tea Tree Hollow (according to table 28) had a median salinity of 1875 uS/cm, yet this is not shaded as being in exceedance of the water quality guideline (350 uS/cm). This is inconsistent with the comparison of other water quality results with ANZECC (2000) guidelines.

The Tahmoor Colliery wastes cause an increase in the salinity of Bargo River from a median of 187 uS/cm upstream (Table 21) to a median of 867 uS/cm downstream (Table 22). This is indicative of a very large salinity plume caused by the mine in Bargo River, which is likely to extend downstream for many km. It is also well above the ANZECC (2000) guideline of 350 uS/cm.

The EIS fails to fully describe the contribution that the mine wastewater makes to salinity pollution of the Bargo River. However, it does provide an argument that the salinity is not of major concern. For example, a concluding comment in the aquatic ecology was:

'Studies of salinity from mine water discharge in the Southern Coalfield have not shown a direct linkage between salinity and effects on macroinvertebrates'.

I reject this statement for justifying why the current level of elevated salinity in Bargo River from the mine is an acceptable impact. I reject this based on the knowledge that macroinvertebrates may not change abundance or taxonomic richness under higher salinity. Metzeling (1993) published an Australian study that showed that common macroinvertebrate taxa may be tolerant of elevated salinity, but rare taxa are not. The macroinvertebrate data presented in the EIS was coarse. It was based on family-level identification and if it was at the species level, which may have detected the response of rare and common species to salinity, and thus provided a more thorough assessment of any ecological impact. In addition, it is impossible to apportion which chemical constituents were most responsible for the mild ecological impact reported in the EIS in the Bargo River because multiple pollutants are present (salt, zinc, nickel, arsenic, barium etc) and the impacts may overlap in a cumulative impact.

Additionally, macroinvertebrates may not be the most appropriate indicator for detecting the effect of salinity on freshwater rivers and streams. Nielsen et al. (2003) investigated increased salinity on freshwater ecosystems and suggested that algae, plants and microinvertebrates could be more sensitive to salinity than are macroinvertebrates. This supports my opinion that using only macroinvertebrates to assess the ecological risks associated with releasing saline mine wastes provides inadequate evidence to justify why disposing such highly saline mine waste water (c. 1800 - 2600 uS/cm) into Tea Tree Hollow and Bargo River is considered to be acceptable.

In my opinion the information presented in the EIS on salinity in the mine waste, and in Tea Tree Hollow and Bargo River was inadequate for all the reasons mentioned above. I regard salinity as a hazardous pollutant at current elevated levels. The EIS predicts that the mine is likely to continue to release waste water of similar salinity. I believe that this will contribute to continued impairment of aquatic biota in receiving waterways. Given that the EIS prediction that larger volumes of mine waste will be discharged if the mine extension eventuates, I accept that it is likely that the impact of the salinity could cause a larger negative ecological impact on Tea Tree Hollow and on Bargo River.

The EIS recommends that the EPA licence limit (EPL 1389) for salinity (2600 uS/cm) be retained for Tahmoor Colliery waste discharges:

'EC discharge limits for LDP1 currently listed in the Tahmoor Environment Protection licence remain unchanged and that an aquatic ecology monitoring program be established aimed at identifying any future changes in aquatic health due to the discharge from LDP1'.

I reject the suggestion that the future mine operation retains a maximum salinity target of 2600 uS/cm. I suggest that a salinity limit based on the 80th percentile of an unaffected reference site, such as Bargo River upstream (eg Table 21: 243 uS/cm) would provide a salinity discharge limit that would provide effective protection of the Bargo River aquatic biota from unnatural elevated levels of salinity.

In my opinion, the future performance of the extended Tahmoor Colliery, as described by the EIS, indicates that salinity contamination is likely to continue and will continue to adversely impact the biota of Tea Tree Creek and Bargo River.

Zinc and other pollutants in the coal mine waste

The EIS provided poor-quality data on pollutants discharged in wastewater from existing operations at Tahmoor Colliery. It failed to give a detailed break-down in its chemical constituents, and even failed to describe several of the pollutants that are required by the EPA to be monitored in its licence (EPL 1389). However, summary data for Tea Tree Hollow (from samples collected 2012-2015) acknowledges that Tahmoor Colliery wastes contribute to elevated concentrations of a range of pollutants that exceed the ANZECC (2000) Aquatic Ecosystem guidelines. According to Table 28 summary for Tea Tree Hollow, these pollutants include aluminium, arsenic, copper, selenium and zinc.

Zinc is probably the most environmentally dangerous pollutant in the Tahmoor Colliery mine waste. It was frequently recorded at very hazardous concentrations that are likely to damage freshwater ecosystems. It was reported that Tea Tree Hollow (Table 28) had zinc at a median concentration of 776 ug/l, nearly 100 times higher than the ANZECC (2000) guideline for protection of aquatic ecosystems of 8 ug/l. In the Bargo River zinc increased more than 4 times from 15 ug/l (upstream) to 66.5 ug/l (downstream). My own research has also measured zinc at ecologically dangerous concentrations in Bargo River (Wright et al. 2015). According to the EIS at the Bargo River site downstream of Tea Tree Hollow (Rochford Bridge) the median elevated zinc concentration was 8 times higher than the ANZECC (2000) guidelines and the maximum reported concentration of 754 ug/l was more than 90 times higher than the guidelines.

The water quality data presented in the EIS was collected several years ago and failed to describe water quality of colliery wastes, although these concentrations for pollutants including zinc are available (<http://www.simec.com/mining/tahmoor-coking-coal-operations/publications/epl1389-monitoring-reports/>).

The EIS results for Tea Tree Hollow and Bargo River reveal that the plume of zinc contamination from the Tahmoor Colliery frequently extends down the Bargo River for many km downstream of Tea Tree Hollow. The Tahmoor Colliery is currently required by the EPA to provide much more effective waste treatment to reduce concentrations of zinc in the effluent, to 8 ug/l.

Recent EPL 1389 data for Tahmoor Colliery report that zinc concentrations have ranged from 38 ug/l in December 2018 to 239 ug/l in August 2018. In January 2019, the most recent report, revealed that zinc was 54 ug/L.

Based on the failure of Tahmoor Colliery to achieve the EPA PRP 22 target (less than 8 µg/l) for zinc after the EPA deadline of 30 November 2018 erodes the credibility of Tahmoor Colliery to achieve the predicted future environmental performance expected for the extended mine operation that is discussed in the various EIS chapters.

Subsidence

Section 6 (page 19) of the Surface Water Impact Assessment chapter of the EIS explains that longwall mining has been conducted at Tahmoor mine since 1987. It rightly points out that certain longwall panels (22 to 27) has resulted in subsidence of sections of Myrtle and Redbank Creek. This information is very incomplete and is very dated as panels 28, 29 and 30 have also caused major subsidence damage to Redbank Creek. My investigation of Redbank Creek over the period 2012 to the present has revealed that the subsidence damage was much worse during and following panels 28-30 (Wright et al. 2015; Morrison et al. 2019). The lack of recent information relating to damage from Tahmoor Colliery to surface waterways is a very serious omission and it contributes to the EIS failing to fully describe regional and historic subsidence impacts to surface waterways (according to the EIS SEARs).

In my opinion the EIS seeks to downplay the seriousness of subsidence damage. Many statements I regard as incorrect. For example the EIS on Page 20 (of the Surface Water Impact Assessment) makes the statement:

'Geoterra (2013) reported that overall, there had been no adverse effect on stream bed stability, stream bank stability or water quality in Redbank Creek during the monitoring period'.

I challenge this statement. It is my professional opinion that this is an incorrect and inaccurate statement, and I support that through published research on Redbank Creek water quality (Wright et al. 2015; Morrison et al. 2018; Morrison et al. 2019) that there have been widespread and dramatic damage to the Redbank streambed and to Redbank water quality. In addition, an ABC media report in September 2018 (<https://www.abc.net.au/news/2018-09-17/sydney-coal-mine-ordered-to-repair-cracked-creek/10253148>) reported that:

The NSW Government has ordered the owners of the Tahmoor Mine to come up with a way to fix the problem before the end of the year, the ABC can reveal.

"Environmental impacts have exceeded performance measures identified in the mine's approved Environmental Management Plan, which has triggered the requirement for a remediation plan," a NSW Government spokesman said in a statement.

"The Resources Regulator has directed that the titleholder develop that plan no later than 31 December 2018," it said.

In my opinion the EIS provides inconsistent and confusing statements about the changes to water quality in Redbank Creek, relating to mine longwall subsidence. On page 22 (Surface Water Impact Assessment) is a statement that suggests that the elevated salinity in Redbank Creek is not related to mining:

'These higher salinity levels appear to be unrelated to mining and possibly relate to pre-existing groundwater inflows (ferruginous springs) reported in Redbank Creek (GeoTerra 2013)'.

Yet an examination of the supporting graphs of salinity (Measured as electrical conductivity in Figure 6) contradict this text, as the data appears to show a steadily rising salinity level in Redbank Creek over time, particularly at the most downstream site (RC5).

However, I do agree with the sentence *'EC values at RC2 and RC5 have trended somewhat lower following mining of longwall 28'*.

I broadly agree with the text on page 24 that iron concentrations in Redbank Creek rose during longwall activity, but were relatively localised. My own published research data (Morrison et al. 2019) reported higher iron levels in 2017 and 2018 than the graphs indicate. I am puzzled why the graphs on water quality in Redbank Creek stop at Feb 2017. My own research found very highly degraded water quality in Redbank Creek after February 2017. Much of the data in the EIS is very dated.

I disagree with the statement (p24) that elevated manganese in Redbank Creek may be unrelated to mining of longwalls 25 to 29 and possibly relate to pre-existing groundwater inflows (ferruginous springs) reported in Redbank Creek which may also be responsible for the periodic elevated EC and zinc.

My own research recorded highly elevated manganese and zinc (and EC) in water emerging through freshly fractured sections of Redbank Creek stream bed in 'upwelling' water (Morrison et al. 2019). In my opinion, the longwall triggered subsidence causing the fractures which provided the pathway for the upwelling groundwater. Without the fractures from subsidence the groundwater would probably have remained in the ground.

The EIS text is inconsistent. On page 26 the EIS does acknowledge that elevated zinc concentrations in Redbank Creek near the longwall activity is due to subsidence cracking of bedrock.

Many sections of the EIS are incomplete and often out-of-date. For example several pages are devoted to 'Redbank Creek Flow Analysis' (p27-p34). Yet the flow data is very out of date (it was based on data collected from 2009-2012). In my experience studying Redbank Creek 2012-2019 the largest impacts of subsidence on flow occurred after 2012. In my opinion this old data avoids providing a detailed analysis of major flow disruptions (and water quality and stream ecology impacts) that I found occurred during the period 2013-2019 in the most subsidence fractured sections of Redbank Creek.

A curious statement on p35 discusses water quality data collected from Waratah Rivulet that :

...'showed water quality both within and downstream of reaches affected by subsidence was generally good with most water quality indicators being low relative to the default triggers for protection of aquatic ecosystems published by ANZECC (2000)'.

It is frustrating that no details of the water quality concentrations in Waratah Rivulet are provided – and yet the previous section that discussed water quality in Redbank Creek failed to mention such a comparison with ANZECC (2000) aquatic ecosystem guidelines.

Aquatic Ecology

The EIS acknowledges that the future mine operation of the Tahmoor South project is likely to have adverse impacts on aquatic biota in small surface waterways in the project area due to longwall subsidence, but this does not include the larger waterways, Bargo River or Nepean River:

The ground movements induced by longwall mining can potentially have indirect impacts on aquatic biota through the diversion of surface water flows to the dilated substrata, increased levels of ponding and changes in water quality. Based on mine subsidence predictions (MSEC 2018), there will be little to no impact on aquatic habitat and biota in the Nepean and Bargo Rivers, however streams within the Project Area that occur directly over the proposed longwalls will experience fracturing, resulting in surface water flow diversion and potential changes in water chemistry.

But the EIS predicts that the predicted impacts of subsidence on the ecology of small streams is likely to lessen over time:

All creeks discussed above have substrate consisting of sand, mud and cobbles upstream of the areas of impact and as such, there may be some natural infilling during subsequent flow events that will return some aquatic habitat over time. There is expected to be some recovery of stream fauna once pool holding capacity and habitat is re-established.

Given the many years of subsidence and damage to Myrtle and Redbank Creek - there is not data presented to add support to the 'expected recovery'.

The Aquatic Ecology EIS document explains how surface water streams that are likely to be impacted by longwall subsidence will be monitored for changes in stream biota. This is planned to include macroinvertebrate monitoring for 2 years prior to longwall extraction. The EIS also explains that the sampling will enable a 'before versus after, control versus impact' design. In my opinion this is appropriate and will enable detection and measurement of any ecological impacts.

The EIS also states that :

'It is also recommended that appropriate stream rehabilitation measures be applied to areas that undergo significant impacts due to subsidence'.

I could not locate any detailed information in the EIS on what appropriate rehabilitation measures would be applied. I expected to see information on recent subsidence impacts from Tahmoor Operation on Redbank and Myrtle Creek.

Public health risk of potential disease vectors (mosquitos)

There is one very important issue that was missing from the Aquatic Ecology section of the EIS. That is, where was the issue of mosquitos in subsidence damage surface waterways? My study (Wright et al. 2015) found that two sampling sites on Redbank Creek, affected by long wall subsidence, had a domination of aquatic macroinvertebrates by mosquitos. I consider this to be potentially a very serious public health issue. I am

not surprised that the EIS did not bring this up, as their sampling presented in the EIS was from 2012-2013. I found the worst mosquito problem in 2013-2014.

The mine subsidence modified the stream channel and water quality of Redbank Creek that enabled mosquito larvae and pupae to proliferate. In particular, the fractured promoted not flowing pooled sections, with high salinity, metals and low dissolved oxygen. As air breathing invertebrates, these conditions are perfect for mosquitos. I consider this to be a serious public health risk associated with long-wall subsidence.

The aquatic ecology chapter of the EIS collected samples in 2012 – 2013. Again – very dated sampling. It also avoided the most extreme subsidence damage over the period 2014-2018.

The aquatic ecology chapter in the EIS explained that Tahmoor Colliery commissioned an investigation on salinity at the request of the EPA. They report that the investigation in 2016 concluded that there was no need to reduce the salinity in the Tahmoor Colliery waste discharge:

‘4.4.2 PRP 23 - Aquatic ecology investigation

PRP 23 states: “The Licensee must conduct an aquatic health monitoring investigation in Tea Tree Hollow and the Bargo River. The main objective of the investigation will be to define site specific trigger values for electrical conductivity in the Bargo River, and recommend suitable discharge concentration limits for electrical conductivity at Licensed Discharge Point.”

The results from the PRP 23 investigation (Cardno 2016) found that there is an apparent effect of the discharge on aquatic ecology in Tea Tree Hollow and Bargo River with a reduction in pollution sensitive invertebrates and an increase in pollution tolerant invertebrates downstream of the Discharge Point. However, the report found that the impairment was not excessive, in the context of a system modified by other anthropogenic land uses. The results of the field study suggest that the effect of the discharge on aquatic ecology appears localised to within a few kilometres downstream of the Discharge Point that includes Tea Tree Hollow and the Bargo River.

Based on conclusions for CEL (2016), there is no strong justification for the need to improve ecological health by further reductions in EC levels. While there was evidence of an effect of the discharge on the aquatic ecology of Tea Tree Hollow and at locations on the Bargo River, these effects appear to be localised to areas immediately downstream of the Discharge Point in the Bargo River and elevated levels are not likely in the Nepean River.’

Further information is provided in the EIS that the mine discharge to Teas Tree Creek and Bargo River provides an environmental benefit, and a reduction in the mine discharge could have adverse environmental consequences:

‘Measures to reduce EC at LDP1 would likely result in reduced flow in Tea Tree Hollow and the Bargo, as discharge water would likely be re-used on site. Discharge from LDP1 constitutes a substantial proportion of flow in the Bargo, and any reduction in flow would likely have consequences on aquatic ecology, such as reductions in habitat area and connectivity. Thus, there may be no net benefit of reducing EC to aquatic ecology given if it resulted in reduced flow (and habitat connectivity) in Tea Tree Hollow and the Bargo River’.

I reject this completely. See my comments in the previous salinity section.

The EIS reports (Ecology Chapter; section 2.1.9) that the future operation of the Tahmoor Colliery mine is forecast to dewater 6.8 ML/day of mine drainage in the late 2030s – approximately 1.8 ML/day more than it currently does.

6.6.7 This section is 'Mine water discharge impacts'.

This section provides a sketchy justification for statements such as **'therefore future impacts from the development to aquatic ecology from heavy-metals are unlikely'**

6.7.1 Cumulative water quality impacts

'It was concluded in section 6.4.3 that mine water discharge is unlikely to cause further adverse effects to the environment as there will be no negative change in discharge management. With the implementation of the heavy metals water treatment plant (under PRP 22) future cumulative impacts mine water discharge is considered neutral. However mine water discharge currently contributes to poor water quality in Bargo River and there is an interaction with past (water infrastructure developments), that is Picton Weir. This potentially has a cumulative effect to water quality as discharge is less diluted from upstream flow. This cumulative impact however is existing, and is partially offset by the potential habitat, and connectivity provided by mine water discharge from Tea Tree Hollow to Bargo River'.

In a previous part of this document I highlight that the mine's waste water treatment plant is currently demonstrating its inability to achieve the much lower pollutant concentrations that the EPA currently demands. The EPA instructed the mine to achieve much lower concentration of arsenic, nickel and zinc by the end of 2018. Data from Tahmoor Colliery reports that these pollutant concentrations in the mine waste are much higher than EPA requires. This suggests that the future Tahmoor South operation, as described in the EIS may continue to release ecologically hazardous levels of metals.

The aquatic ecology chapter of the Tahmoor South EIS presented detailed information on biota (macroinvertebrates, macrophytes and fish) but provided very little interpretation of the significance of the results. The following section of text provides a summary interpretation:

'8.2 Mine water discharge Impacts

The following conclusions were made from the assessment of mine water discharge impact:

- *There was significant difference between impact and control groups however this difference could not be directly related to mine water discharge impacts.*
- *These differences were reductions in Leptophlebiidae, Oligochaeta, Elmidae and increases in Chironominae and Caenidae in affected sites.*
- *Although no direct relationship could be established between faunal differences and mine water discharge, these taxa could be potentially useful indicators in a quantitative benthic monitoring program.*
- *A barium precipitate was identified as having a potential impact to benthic substrate and is thought to be impacting benthic processes and fauna.*
- *The implementation of a heavy metal treatment plant is likely to reduce heavy metal from mine water discharge and reduce barium precipitation.*
- *Studies of salinity from mine water discharge in the Southern Coalfield have not shown a direct linkage between salinity and effects on macroinvertebrates.*

- *Tea Tree hollow has an affected hydrology with the constant flow of water making it geomorphically different from other streams downstream of the discharge point LDP1'.*

This concluding section of the Aquatic Ecology chapter of the EIS attempts to describe the aquatic ecology impacts (current and future with the project approval) of the discharge of the Tahmoor Colliery waste to the Bargo River via Tea Tree Creek. It fails to fully describe either the existing impact of the waste discharge, or the future predicted impact of the discharge. It makes multiple failures of adequately addressing the SEARs. It is my professional opinion that the Tahmoor Colliery discharge to the Bargo River, via Tea Tree Creek currently is a major point source of water pollution (salt, nickel, and zinc in particular) that causes adverse impacts to aquatic biota. The nature and magnitude of the impact is not fully acknowledged or described in the EIS documents.

I do expect that the impact of the future Tahmoor South project, if it continues to discharge waste of a similar standard to the current operation, will continue to have a negative impact on the ecology of Tea Tree Creek and also Bargo River.

Since inadequate information is provided in the EIS, I am unable to make any informed comment about the magnitude of the negative impact on the downstream waterways (Bargo River and Nepean River).

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ATTACHMENT 2: SUMMARY OF COUNCIL POSITION REGARDING KEY ISSUES

Potential issue	Broad related Council position
Assessment and approval process for State Significant Developments	
The assessment process for mining proposals	Assessment of all potential impacts associated with the proposal occur at the same level as applications where Council is the Determining authority
The review and approval process for mining proposals	Assessment and development of mitigation measures should occur at the highest level possible prior to Approval and there should not be a reliance on post-approval subsidence plans
Potential impacts to the natural, cultural and built environment	
Impacts to the condition of watersources (surface and groundwaters) as well as ecological health.	All impacts be accurately identified within a catchment context based on current research and commensurate baseline data
Monitoring and rehabilitation of identified impacts to natural and cultural features from subsidence attributable to mining operations.	There be a comprehensive assessment of impacts to surface and groundwaters within a catchment context utilising modelling based on extensive baseline data and current scientific research.
Protection of biodiversity values and accurate offsetting of those values	All biodiversity values be adequately identified
Impacts of subsidence to structures	This matter is outside the responsibilities of Council. However as a broad position, Council would expect comprehensive consultation and adequate repairs of any damage
Impacts of subsidence to roads and public utilities	While supporting the process, measures need to be implemented to address delays experienced in obtaining reimbursement for expenditure incurred to repair impacted roads.
Community engagement	
Community engagement and consultation	Comprehensive consultation occur at all stages of the process as part of a detailed engagement strategy.

ATTACHMENT 3

RESOLUTIONS OF COUNCIL RELATED TO MINING

Resolutions of Council at its meeting of 16th July 2007

1. *That Council make a formal submission and oral presentation to the Inquiry into Coal Mining in the Southern Coalfields.*
2. *That Council's submission stresses Council's opposition to any mining that affects our river systems.*
3. *That Council's submission emphasises the Mine Subsidence Board's responsibility to restore structures damaged as a result of mining activity.*
4. *That the Inquiry increase the pressure on the mining companies and the mining equipment suppliers to develop a method of disposing of the excess material back into the cavity as the mining is taking place.*
5. *That Council calls for the completion of the Maldon Dombarton rail link to transport coal.*
6. *That Council write to the Minister and express our disappointment that the panel hearing is being held in Camden.*
7. *That Council offer its facilities at Wollondilly.*

Resolutions of Council at its meeting of 16 March 2009

1. That Council write to the Minister and Shadow Minister for Mining requesting that Councils be compensated through mining royalties and the Mine Subsidence Board for the additional cost of infrastructure projects.
2. That Council support the Association of Mining Related Councils in their endeavour to get a percentage of the mining royalties for such instances.

Resolution of Council at its meeting of 14 August 2009

1. That Wollondilly Shire Council write to the Minister for Primary Industries and Shadow Minister for Climate Change and Environmental Sustainability expressing its concerns over the recent cracking of Myrtle Creek.

Resolution of Council at its meeting of 19 October 2009

1. That Wollondilly Shire Council write to the Minister for Planning and Shadow Minister for Planning calling for third-party appeals to be allowed for Part 3A processes or that Part 3A be removed from NSW Government Policy.

Resolution of Council at its meeting of 15 November 2010

1. That Council send correspondence to the Minister for Planning requesting that a new Part 3A application be lodged for the Bulli Seam Project, given the significant changes to the original application by the proponent and the flaws in the original exhibition process.

Resolution of Council at its meeting of March 2013

1. That Wollondilly Council write to the Minister of Regional Infrastructure and Services requesting a review of the methodology used to classify the 'tiers' of Mining Affected Communities and expressing its concern at the relegation of Wollondilly's Community to Tier 3, excluding it from any support from the Resources for Regions Programs.

Resolution of Council at its meeting of 11 December 2014

1. That Council write to the Minister for Primary Industries and the Minister for Planning requesting that the impacts on communities and infrastructure from coal mine gas drainage be included in the criteria for Local Government assistance through the Resources to Regions Program.

Resolution of Council at its meeting of 16 March 2015

1. Council convene a meeting with invited community members of Douglas Park and representatives of Illawarra Coal to facilitate a consultation between the parties regarding Illawarra Coal's proposed gas extraction and power plant development in the Douglas Park area.

Resolution of Council at its meeting of 20 July 2015

1. That Council write to the Federal Minister for Environment, the Federal Minister for Agriculture, the NSW Minister for Planning, the NSW Minister for Primary Industries and the NSW Minister for Industry Resources and Energy in regard to the approval of the Shenhua Watermark mine on the Liverpool Plains to:
 - Express dismay regarding the approval of the mine on the Liverpool Plains by the Federal Government given the region's major role in Australia's food production balanced with a vulnerable environment and the unacceptable risk to this balance that the mine may cause.
 - Express its concerns that in a local context, the productive peri-urban areas of Sydney are also being threatened by unsympathetic land uses.

Resolutions of Council at its meeting of 20 July 2015

1. That Council endorse the submission on exhibited components of the draft Integrated Mining Policy.
2. That Council send correspondence to the NSW Minister for Planning tat:
 - (a) Acknowledges the benefits in introducing the Integrated Mining Policy.
 - (b) Expresses disappointment that the exhibited Policy has not addressed issues raised in previous Council submissions.
 - (c) Advises that Council is not able to finalise its position until all documents associated with the Policy have been publicly exhibited and submissions received.
 - (d) Stresses the importance of the inclusion of all stakeholders in the notification process.

Resolutions of Council at its meeting of 21 September 2015

1. That Council continue to monitor the Douglas Park Mine Gas Drainage and Power Plant Proposal by South 32 and that Council continue to engage with residents of Douglas Park regarding their concerns about the proposal.

2. That Council throughout the process, advocate on behalf of the community, communicating their concerns to the consent authority, our state member, mining authority, and any other applicable minister/authority.

Resolutions of Council at its meeting of 15 February 2016

- That Council take a proactive role in advocating for the protection of the natural environment from impacts of mining under Redbank Creek.
- That Council write to the State Minister for Planning, the Minister for Environment and the Minister for Resources and Energy expressing its concern that compensation mechanisms for damage to the natural environment from mining impacts is not considered in the function of the Mine Subsidence Board and Council calls for this situation to be reviewed and remedied.
- That Council consider the allocation of resources in the third Quarterly Review to undertake advocacy regarding this issue.

Resolutions of Council at its meeting of 15 February 2016

- That Council take a proactive role in advocating for the protection of the natural environment from impacts of mining under Redbank Creek.
- That Council write to the State Minister for Planning, the Minister for Environment and the Minister for Resources and Energy expressing its concern that compensation mechanisms for damage to the natural environment from mining impacts is not considered in the function of the Mine Subsidence Board and Council calls for this situation to be reviewed and remedied.
- That Council consider the allocation of resources in the third Quarterly Review to undertake advocacy regarding this issue.

Resolutions of Council at its meeting of 21 March 2016

- That Council write to the NSW Minister for Environment and NSW Minister for Resources and Energy requesting:
 - The establishment of on-going funding for investigations and monitoring of the condition of watercourses that are identified as being impacted by subsidence associated with underlying operations.
 - Ongoing funding be made available to local governments, research organisations and community groups upon the lodgement of suitably detailed applications.

Resolutions of Council at its meeting of 16 May 2016

- That Council requests a copy of the report investigating possible non-compliance regarding the conditions of consent for the Bulli Seam Operation Project and the Extraction Plan for long-walls 901-904 from the Department of Planning and Environment Compliance Team and EPA.

- That Council also request information from South 32 as to what their approved setback from the Nepean River is.
- That copies of these requests be forwarded to the Local Member for Wollondilly, Jai Rowell and that a report come back to Council on the responses received.

Resolutions of Council at its meeting of 20 June 2016:

- Write to the relevant Federal and State Ministers, the Federal and State local members, the Greater Blue Mountains World Heritage Area Advisory Committee and UNESCO demanding that action be taken to further investigate the causes of continued water loss from the World Heritage listed Thirlmere Lakes. That this action includes the funding and support of rigorous and detailed research into:
 - The water loss patterns and trends in the past and over current times.
 - Predictive modelling of the consequences to the Lakes's biology and hydrology of continued or prolonged water loss.
 - Targeted investigation into the suggested cause of the water loss in relation to the Tahmoor Mine's operations in the past and future.
 - The potential of engineered options to reinstate and maintain water levels to protect the biodiversity and hydrology of the Lakes.
- That Council, through the oversight of the Minerals and Energy Resource Committee, undertake a facilitated solutions focused forum to investigate and identify solutions to the continued observed water loss from the World Heritage listed Thirlmere Lakes and that Glencore and other key stakeholders associated with the three tiers of government be invited to participate in this forum.

Resolution of Council at its meeting of 18 June 2018

- That Council write to the NSW Department of Planning and Environment to:
 - I. Welcome the establishment of the Independent Expert Panel for Mining in the Catchment and its composition.
 - II. Requests that no Determinations be used for any mining related application within the Catchment Area until such time that it has received and reviewed the Final Report produced by the Panel.

Resolutions of Council at its meeting of 18th July 2016

- The Executive include the following recommendations in the Business Paper of the next available meeting of the Association with a view to advocate the position of Council and the local community defined by the supplied resolutions:
 - i. The Association provide support to the resolutions of Wollondilly Shire Council regarding concerns over the continued observed water loss from the World Heritage listed Thirlmere Lakes and the conclusions of recent scientific studies regarding this matter.
 - ii. Pursuant to i), Correspondence be sent to the NSW Minister for Resources and Energy (the Hon Anthony Roberts) and the NSW Minister for Primary Industries (the Hon Niall Blair) advising of the support to the resolutions and requesting a prompt response.

Resolutions of Council at its meeting of 17th September 2018

- That Council write to the Minister to request further investigation into the impacts of fracturing and modified flow of Redbank Creek. As identified in Dr Ian Wright's Research Study for Western Sydney University, it is reported that Redbank Creek has the worst pollution from Mine Subsidence in the world. This study identified the rehabilitation of the creek channel and recovery of the creek water quality / ecology is very challenging.
- That Council request that the Minister investigate how the mining company could contribute to the rehabilitation of Redbank Creek.
- That Council workshop how we can advocate to assist Dr Wrights research findings and that we add it to the State Issues Paper.

Resolution of Council at its meeting of 15 October 2018

- That letters be sent to relevant Commonwealth MP's asking the Australian Government to use their Constitutional power and duty to protect water sources within the Drinking Catchment Areas of Avon, Nepean, Cordeaux and Cataract Dams from South 32's Dendrobium coal mining activities.

Resolution of Council at its meeting of 19 November 2018

- That Council send correspondence to the NSW Department of Planning and Environment seeking the reasons for all of the recommendations provided by the Independent Expert Committee for Mining in the Drinking Catchment not being incorporated into the Approval for Longwall 16 dated 30th May 2018.

Subsidence Fracturing of Stream Channel from Longwall Coal Mining Causing Upwelling Saline Groundwater and Metal-Enriched Contamination of Surface Waterway

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Abstract This study investigated a small waterway that had been impacted by upwelling groundwater due to recent geological strata fracturing caused by subsidence activity from longwall coal mining. Documents from the coal mine report that subsidence has undermined and fractured the stream channel for more than 10 years prior to this study. Mine documents also report many years of variably degraded water quality (salinity, elevated metals) in the reaches affected by fracturing. In this study, water quality of the stream was monitored over an 11-month period with water flow dominated by ground water upwelling through fractures in the creek channel. The upwelling water caused extensive modifications to the creek's surface water quality relative to unmined reference sites. The mean electrical conductivity increased by seven times from 230 $\mu\text{S}/\text{cm}$ at reference sites to 1833 $\mu\text{S}/\text{cm}$ below the upwelling. Dissolved oxygen in the upwelling groundwater was extremely low (2.7% saturation) and was mildly acidic (5.8 pH). Alterations to the ionic composition included sevenfold increases in magnesium, sodium, and chloride concentrations. Heavy metals iron and manganese increased by more than ten times, with nickel by more than 60 times compared to the reference sites. The alteration to ionic composition was inferred to be saline groundwater intrusion. The ecological impacts of such large modifications to surface stream water quality

would be hazardous for integrity of downstream aquatic ecosystems.

Keywords Underground longwall coal mining · Freshwater pollution · Heavy metals · Zinc and nickel · Salinity · pH · Ionic composition

1 Introduction

Coal mining operations can cause significant environmental disturbance of ground and surface waters (Banks et al. 1997; Brake et al. 2001; Johnson 2003; Younger 2004). Many published studies on this topic examined the discharge of contaminated water from coal mine operations, whether accidental or deliberate, to surface waterways. Underground longwall mining is a popular method for coal extraction in Australia (Mudd 2009) and is associated with surface subsidence due to the movement and fracturing of geological strata following the removal of the coal seam (Krogh 2007). Subsidence can cause changes to surface and groundwater chemistry as water can be exposed to fresh rock fractures which often causes rapid chemical reactions resulting in the mobilisation of elements (Jankowski 2007).

Key water chemistry changes to ground and surface waters resulting from coal-mine subsidence include depletion of dissolved oxygen (DO), alteration of pH, increased salinity, and increased concentrations of metals such as iron, manganese, aluminium, zinc and nickel (Pigati and López 1999; Jankowski 2007; Wright et al. 2015; Ali et al. 2017). Longwall coal mining and

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