

Submissions Report

Russell Vale Colliery Commencement of Long Wall 6



Submissions Report

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Client: Wollongong Coal Limited

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1.0 Introduction

1.1 Overview of the Project

1.1.1 Existing Operations

The Russell Vale Colliery operates under a project approval (MP 10_0046) (granted on 13 October 2011 and modified on 24 December 2012) for activities comprising underground longwall coal mining and operation of surface facilities (the NRE No. 1 Preliminary Works Project).

Coal is extracted by longwall mining techniques and transported to surface facilities located in the eastern most portion of the site via conveyor belt for stockpiling, prior to transport to Port Kembla Coal Terminal for export. Coal is transported from the site by road as Run of Mine (ROM) coal. Longwall mining is supported by three ventilation shafts, an explosives compound and electrical substations.

The surface facilities at the site include (but are not limited to) stockpile and storage areas, portal entries, truck load-out facilities, stormwater detention basins, and administration offices and amenities.

A modification to MP 10_0046 was approved for extraction of coal within longwalls 4 and 5 (LW4 and LW5) and the development of the main gate roads for longwalls 6, 7 and 8 (LW6, LW7 and LW8). The modified approval operates for a period of three years from the date of issue and is therefore due to expire on 13 October 2014.

1.1.2 The Proposed Project Modification

The main gate road for LW6 (Maingate 6) is currently nearing completion and as such further modification to MP 10_0046 has been sought to commence coal extraction from the first 400 metres of LW6. An extension of the existing project approval until 30 June 2015 has also been sought to allow this extraction to occur. The physical extent of works proposed as part of this modification request is shown in **Figure 1**.

No other changes to the existing project approval are proposed, and the colliery would continue to operate in accordance with the conditions of the project approval and other applicable licences and permits.

1.1.3 The Underground Expansion Project

Separately to this modification request, an application has been lodged under the then Part 3A of the *Environmental Planning and Assessment Act 1979* for an underground expansion of the Russell Vale Colliery (MP 09_0013), also referred to as the Underground Expansion Project. The application included sixteen longwall panels across the Wonga East and Wonga West areas, to extract around 31 million tonnes of ROM coal over an 18 year period.

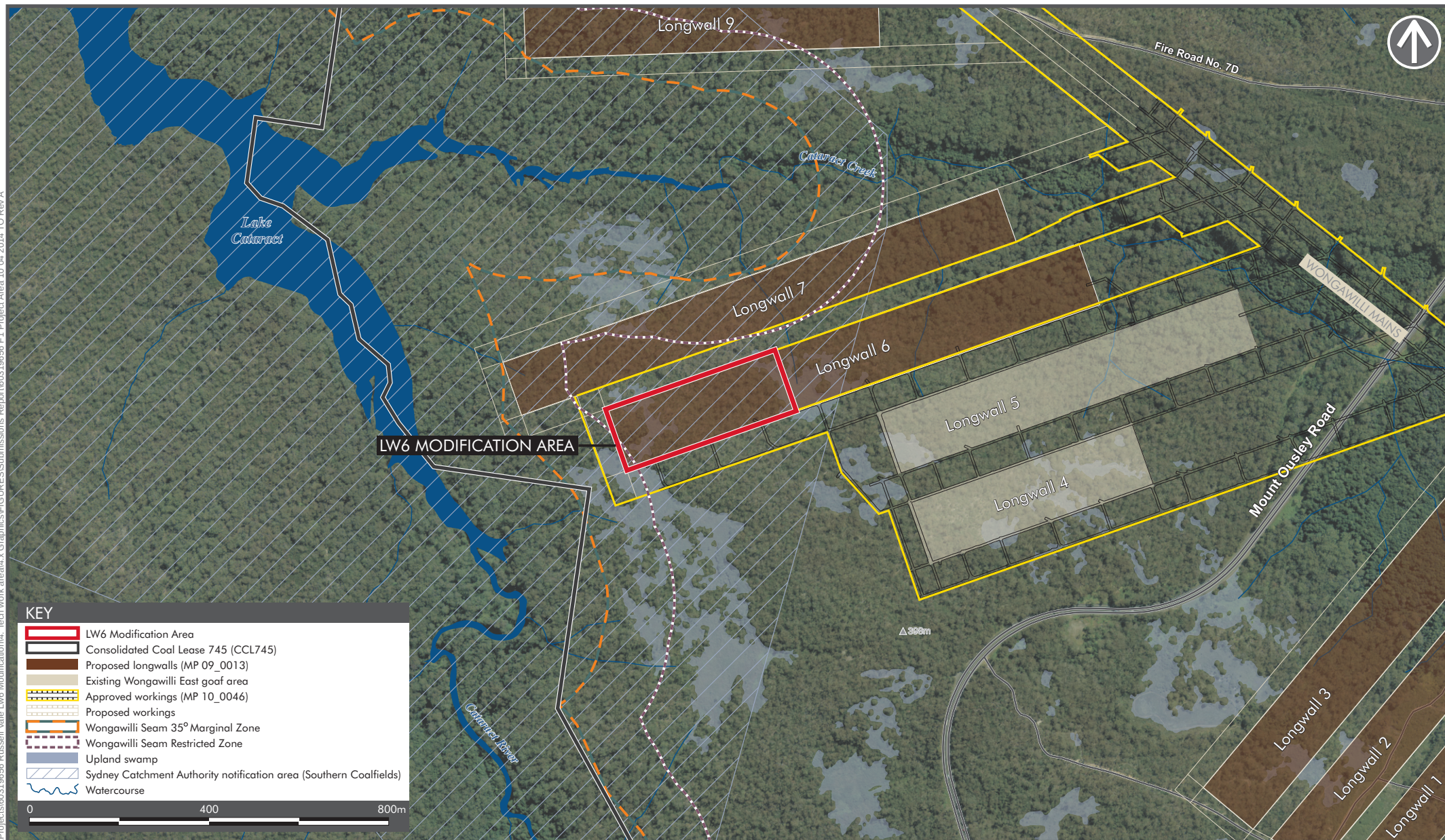
This application (MP 09_0013) was revised through a Preferred Project Report which amended the project to reduce the number of longwalls (by removing Wonga West from the proposal), ROM production and total life of the project. It also reoriented a number of the proposed longwalls. In light of the Preferred Project a number of technical specialist reports have been updated to reflect the changes to the Underground Expansion Project.

The 400 metre section of LW6, to which this modification request applies, is consistent with the proposed extraction of that longwall assessed as part of the Underground Expansion Project. However, given that updated assessments have become available as part of the Preferred Project for the Underground Expansion Project, these assessments have been relied on for the purpose of responding to the submissions received on the modification application to the extent that those assessments are relevant to the initial extraction of LW6.

This modification request would allow the colliery to continue to operate until a determination of the Underground Expansion Project is made.

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I:\Projects\0319556 Russell Vale LW6 Modification\4. Graphics\FIGURES\Submissions Report\60319556 F1 Project Area 10.04.2014 TO Rev A



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PROJECT AREA
Russell Vale LW6 Modification

FIGURE 1

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1.2 Overview of the Environmental Assessment Process

1.2.1 Planning Framework

The NRE No. 1 Preliminary Works Project (MP 10_0046) constitutes a 'transitional Part 3A project' within the meaning of Schedule 6A of the *Environmental Planning Assessment Act 1979*. In particular, it is a project that was approved subject to the provisions of the then Part 3A of the Act (clause 2, Schedule 6A).

Pursuant to clause 3(1), Schedule 6A of the *Environmental Planning and Assessment Act 1979*, the provisions of the now repealed Part 3A continue to apply with respect to the approved project. This includes the power to modify the project approval under section 75W.

An Environmental Assessment was prepared and submitted to the Department of Planning and Environment (DP&E) to seek approval under section 75W of the *Environmental Planning and Assessment Act 1979* for the modification of the project approval for the NRE No.1 Preliminary Works Project (as modified) (MP 10_0046).

1.2.2 Public Exhibition

The Environmental Assessment was placed on public exhibition for 21 days from 22 April 2014 until 13 May 2014. The Environmental Assessment was exhibited electronically on the DP&E major projects website. Electronic and written submissions were accepted by DP&E until 13 May 2014.

1.3 Purpose of this Report

The purpose of this Submissions Report is to respond to the submissions received during the public exhibition of the Environmental Assessment.

This Submissions Report documents and responds to submissions received by the community, stakeholders and government agencies. Submissions received on the Environmental Assessment are available on DP&E's major projects website. A register of the submissions, and a reference to where each submission has been addressed in this report, is provided in **Appendix A**.

1.4 Structure of this Report

This Submissions Report has been structured in a manner that sets out the key issues raised in the submissions.

Section 1.0 – provides an overview of the proposal, the impact assessment process and Submissions Report purpose and structure.

Section 2.0 – summarises the submissions received and identifies the key issues raised.

Section 3.0 – provides a response to the key issues raised.

Section 4.0 – provides a response to specific issues raised by government agencies.

Section 5.0 – concludes and summarises the outcomes of the Submissions Report.

Appendix A – register of submissions.

Appendix B – updated subsidence assessment (SCT Operations Pty Ltd, 2014).

Appendix C – recent geological reports (Wollongong Coal Limited, 2014).

Appendix D – updated groundwater assessments (GeoTerra Pty Ltd, 2014).

Appendix E – updated surface water assessment (WRM Water & Environment Pty Ltd, 2014).

Appendix F – updated ecology assessment (Biosis Pty Ltd, 2014).

Appendix G – Bellambi Creek Flood Study (Cardo, 2014)

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2.0 Summary of Submissions

2.1 Submissions Process

During the exhibition period, submissions regarding the modification request were accepted by DP&E from online, email, fax and post sources. Submissions were numbered as received and provided to Wollongong Coal in accordance with the requirements of the *Environmental Planning Assessment Act 1979*.

All submissions were reviewed and issues raised have been included and addressed in this Submissions Report.

2.2 Submissions Received

In total, the DP&I received 39 submissions and copies were provided to Wollongong Coal. Of these:

- Nine were from local and State Government authorities and agencies, including:
 - Office of Environment and Heritage.
 - Environment Protection Authority
 - Department of Primary Industries.
 - Department of Resources and Energy.
 - Wollongong City Council.
 - Dams Safety Committee.
 - Sydney Catchment Authority.
 - Roads and Maritime Services.
 - Heritage Council of NSW.
- Four were from community and specialist interest groups:
 - Illawarra Residents for Responsible Mining.
 - Save Our Water Catchment Areas.
 - Nature Conservation Council of NSW.
 - The Colong Foundation for Wilderness.
- 26 were from the public, including private individuals.

2.3 Issues Raised in Submissions

This section provides a summary of the key issues raised in submissions by government agencies, stakeholders, community groups and individuals.

2.3.1 Agency Submissions

Office of Environment and Heritage

- OEH considers the modification request to be a continuation of the piecemeal approach to planning and approvals for the site, which fails to consider the cumulative impacts of this activity.
- The proposed extraction of LW6 is considered to have significant impacts on upland swamps CCUS4 and CRUS1 which will not meet the performance measure of negligible environmental consequence for swamps of special significance, in line with OEH's draft *Upland Swamp Environmental Assessment Guidelines*. If amendments to the mining layout to avoid or minimise impact are not considered feasible, a biodiversity offset strategy should be prepared.
- Potential for surface to seam fracturing and aquifer drainage has not been adequately assessed. There is no discussion of how the mine would interact with CCUS4, CRUS1 and other aquifers. OEH recommends that approval not be granted until this has been undertaken.

- OEH has previously recommended, and reiterate, that a survey for the threatened Giant Dragonfly (*Petalura gigantea*) should be undertaken. OEH believes that the species may occur in other swamps and targeted surveys are appropriate to understand the spatial distribution of the species in the area.
- Consultation should be undertaken with Wollongong City Council to ensure consistency with Council's floodplain risk management studies. The proposed modification should incorporate measures to reduce potential adverse flood impacts and downstream flood risk.
- OEH concurs with the management and mitigation strategy for Aboriginal cultural heritage included in the Environmental Assessment.

Environment Protection Authority

- The EPA does not support the trend for approval of modifications to allow short term works to continue given that the Underground Expansion Project is still subject to assessment and has yet to be determined.
- EPA advises that approval for this modification should only be granted if a commitment is provided by Wollongong Coal that no further modifications will be sought prior to determination of the Underground Expansion Project and that a sunset provision is attached to the amendment that expires on 30 June 2015. This would mean that continued operations at the Colliery post 30 June 2015 could only be carried out when the Underground Expansion Project is approved.
- EPA regulates existing activities under the *Protection of the Environment Operations Act 1997* and Environment Protection Licence 12040. The modification must comply with the Environment Protection Licence, *Protection of the Environment Operations Act 1997* and associated regulations, and these requirements must be considered in the development of approval conditions.

Department of Resources and Energy

- DRE supports the proposed extraction of the initial 400 metres of LW6 and the extension of the existing project approval until 30 June 2015.
- DRE's support is subject to the following recommendations:
 - Implementation of subsidence risk management strategies that were used at the mine during the extraction of LW4 and LW5 must continue.
 - Further extraction of LW6 and other longwalls or first workings are to be considered under separate applications.
 - The proponent is required to continue background flora and fauna monitoring before the commencement of mining of LW6 or satisfy OEH and DRE that sufficient background data has been collected to differentiate potential mining impacts from natural variation, particularly for CCUS4 and CRUS1 swamp vegetation.
 - Approval conditions should include a requirement for appropriate rehabilitation of impacts resulting from subsidence or as a result of the Subsidence Management Plan monitoring program.
 - Approval conditions should include a requirement to update the mine's Rehabilitation Management Plan / Mining Operations Plan.

Wollongong City Council

- Council is concerned about the current configuration, length, and orientation of the proposed LW6 given potential impacts on coastal upland swamp endangered ecological communities, specifically CCUS4, CRUS1 and CCUS5. Council considers that the proposed 400 metre extraction should be moved to the other end of LW6 to avoid undermining swamps of 'special significance'.
- Concern about the colliery's failure to complete the required Bellambi Creek realignment and channelisation works by the required deadline of 31 December 2013, to mitigate flooding impacts on downstream properties. Council requests that DP&E directs Wollongong Coal to commence the required Bellambi Creek realignment and channelisation works as soon as possible and that these works form a specific condition as part of the modification approval.
- Council requests that DP&E provide advice to Council as to when each of the works listed in the original Statement of Commitments were completed to the satisfaction of NSW P&I and /or schedule of required completion dates (if not yet completed).

Dams Safety Committee

- The proposed mining lies wholly within the notification area and as such an application to the DSC to mine within the notification area will be required.
- At the current stage of the proposal DSC requires more information, including:
 - An assessment of the dam safety risk to Cataract Reservoir and Cataract Dam Wall as a result of mining.
 - Clear demonstration that the risks associated with mining will be tolerable as defined by the DSC.
- Knowledge deficits – DSC requires the following information and that these requirements be included as conditions of approval for the project:
 - An assessment of geological structures intersecting both the reservoir and the mine workings, including a geological risk assessment to identify potential conduits for loss of reservoir water to the mine or to catchments outside that of the reservoir.
 - A ground water model that addresses the possibility of losses from the reservoir as a result of mining.
 - Contingency and closure plans need to be developed and agreed to by all parties before the commencement of extraction of LW6.
 - A detailed monitoring plan, including:
 - Water chemistry.
 - Mine water balance.
 - Groundwater monitoring borehole between the Reservoir and the mine to investigate / monitor the Bulgo Sandstone.
- DSC expresses concern regarding the presence of geological structures in the Wonga East area which may connect the reservoir to the mine, specifically the Corrimall Fault and Dyke D8. The proposed 400 metre extraction of LW6 passes through the Corrimall Fault – no assessment of the height of connective fracturing through this zone is presented.
- The absence of the Bald Hill Claystone regional aquitard in the area means that there is a permeable unit, the Bulgo Sandstone (an aquifer), connecting the reservoir to the fracture zone above the Wongawilli goaf.
- The working section height appears variable and no information is provided on the maximum working height of the longwall through the faulted zone.

Sydney Catchment Authority

Sydney Catchment Authority (SCA) expressed concern over:

- The lack of specificity of the subsidence predictions with respect to the section of LW6 (the subject of this modification application) and having regard for measurements of subsidence reported for LW5.
- Incomplete knowledge of the key geological structures known to occur in the area proposed to be mined.
- Potential loss of stored waters from Cataract Reservoir to underground mine workings at the upper arm of Cataract Reservoir as a result of mining-induced leakage.
- The impact on upland swamps due to a reduction in shallow water tables.
- The SCA recommends:
 - The DSC notification area around Cataract Reservoir be adopted as an exclusion zone where no longwall mining is permitted.
 - The proposed adaptive management approach proposed for mining activities not be used due to the lag time for mining-related impacts to manifest and changes required to be implemented.
 - The SCA's impact performance measures developed for the proposed mining area be adopted.
 - The Department seek expert advice on substantive issues raised in SCA's submission prior to making a recommendation on the proposal.

- The SCA requests the opportunity to continue to be involved in ongoing assessment of this application.

Roads and Maritime

- RMS notes that the proposed modification would not increase traffic generation.
- RMS does not object to the modification subject to technical implications regarding subsidence being referred to the Wollongong Coal RMS Longwall Mining Technical Committee.

Heritage Council of NSW

- Noted that there was no information contained in the Environmental Assessment relating to historic heritage and therefore further comment from Heritage Council is not provided.

2.3.2 Group Submissions

Illawarra Residents for Responsible Mining (IRRM)

- Objects to the proposed works as a modification.
- Raises concern over the competence of the Proponent based on the reputation of the former Gujarat NRE.
- Identified numerous outstanding obligations to the community, contractors, suppliers and suggested that financial obligations remain unpaid.
- Expressed no confidence in Gujarat NRE in terms of resources or capacity to operate the colliery.
- Suggested that the Colliery includes antiquated infrastructure, unsealed roads and out-dated truck loading facilities.
- Noted that Gujarat NRE is not compliant with the Preliminary Works Project approval with regard to the realignment of Bellambi Creek.
- Noted that the construction of noise walls or other attenuation in consultation with the Community Consultative Committee did not occur.
- Suggested that the cumulative impacts of the extraction of the first 400 metres of LW6 was not adequately considered.
- Suggested that no community consultation has been undertaken by Wollongong Coal.
- Raised concern that mining within the catchment area poses risks to water supply.
- Raised concern over the location of the mine in proximity to a residential area.
- Raised concern that the modification application would contribute to greenhouse gas emissions.

Save Our Water Catchment Areas (SOWCA)

The appendix attached to this submission was not specific to modification application for the extraction of the first 400 metres of LW6, and is applicable to the current Underground Expansion Project proposal. A response to the issues raised in this appendix has been provided in the Response to Submissions for the Underground Expansion Project Preferred Project Report (NRE, 2014) and Residual Matters Report (Hansen Bailey, 2014).

- Raised the issue of vertical block collapse from failure of the bridging capacity of the overburden with regard to previous mining in the Bulli and Balgownie seams.
- Suggested that the use of pre and post mining data for LW4 and LW5 is inadequate and not accurate.
- Questions validity of subsidence assessment and "peer reviews".
- Mining will increase the risk of strata permeability / hydraulic conductivity.
- Suggested the groundwater assessment misplaces confidence in Bald Hill Claystone.
- Upland swamps meet the requirements for being of Special Significance which the Planning Assessment Commission and OEH requiring negligible impact.
- Modification Environmental Assessment failed to adequately consider cumulative impacts.
- The piecemeal approach to approvals erodes confidence in the NSW assessment and regulatory system.

Nature Conservation Council of NSW

Concern was raised with regard to:

- Damage to Sydney Water Catchment Special Area and upland swamps.
- Loss of surface and groundwater.
- Threats to local aquifers and local supply.
- Piecemeal planning approvals.
- Air quality and community health.
- Unsuitability of the proponent.

The Colong Foundation for Wilderness

Concern was raised with regard to:

- Multi seam mining which sets a bad precedent for impacts on valley closure.
- Subsidence cracking and damage to upland swamps.
- Mining in the drinking water supply catchment.
- Consideration of past damage to swamps (as an indicator of low impacts from mining) is unfounded as no pre-mining data exists.

2.3.3 Public / Individual Submissions (26 in total, including duplicated submissions)

Concern was raised with regard to:

- Location of longwall mining within the drinking water catchment area.
- Access to the catchment area for mining but not for public use.
- Impacts to upland swamps.
- Surface water impacts.
- Mining under previously mined seams.
- The Environmental Assessment does not consider cumulative impacts.
- Community health.
- Proximity to residential areas.
- The project does not consider the principles of ecological sustainable development..

Some support was raised for:

- Adaptive mining and monitoring of valley closure.
- Creation or continuation of employment.

2.4 Summary of Key Issues

A review of the submissions received on the project has identified the following key issues:

- Concerns regarding the planning approvals process and approach.
- Justification for the need for the project, including consideration of alternatives.
- Subsidence related impacts and management strategies. These relate to a number of subsequent impacts raised for groundwater, surface water and ecology.
- Groundwater, including issues relating to groundwater modelling, groundwater pathways, fracturing and aquifer drainage, potential drawdown impacts on water storages, historical impacts, groundwater monitoring and management and water licensing.
- Surface Water issues including impacts to and set-backs from Cataract Reservoir, impacts to upland swamps, flooding impacts, surface water management, surface water take and licensing requirements.

- Ecological impacts including the validity of the assessment, potential impacts on upland swamps, and need for detailed monitoring requirements and proactive management.
- Outstanding environmental management commitments, such as the realignment of Bellambi Creek and implementation of noise walls.

A number of issues raised were not specific to the LW6 modification and were more broadly applicable to the current Underground Expansion Project proposal. Where possible those issues have been responded to in this Submissions Report as it relates to the first 400 metres of LW6. However, it should be noted that these issues may have also been responded to in the Response to Submissions for the Underground Expansion Project Preferred Project Report (NRE, 2014) and Residual Matters Report (Hansen Bailey, 2014).

2.5 Other Issues Raised in Submissions

A number of other issues were also raised in the submissions, including:

- Air quality and health issues relating to airborne particulates and exhaust fans.
- Noise issues.
- Concerns regarding community consultation, including the timing of the exhibition period, the flow of information to the community and outstanding requests for information.
- Socio-economic issues including employment.
- Issues relating to sustainability and greenhouse gas emissions.
- Information regarding Aboriginal heritage.
- Traffic issues.
- Cumulative impacts of the LW6 Modification with the wider Underground Expansion Project and consideration of cumulative environmental impacts.

3.0 Response to Key Issues Raised

3.1 Planning Approvals

3.1.1 Piecemeal Approval Process

A number of submissions expressed concern regarding the approval process for the LW6 modification request, suggesting it forms a piecemeal approach to planning and approval of the mine that aims to incrementally expand without due consideration of cumulative impacts.

Wollongong Coal is currently seeking approval to implement its Underground Expansion Project (UEP) (MP 09_0013) which, if approved, would permit the continued operation of the site for five years and would allow extraction of 4.7 million tonnes of ROM coal. As part of the assessment process and in response to issues raised in public submissions, Wollongong Coal has recently submitted a Preferred Project Report and Submissions Report for the project. It is expected that the project application will shortly proceed to consideration by the Planning and Assessment Commission (PAC). Based on statutory environmental assessment and administrative timeframes, it is unlikely that the PAC will be in a position to determine the application until later in 2014.

In the interim, Wollongong Coal has continued to operate under its existing project approval for the NRE No. 1 Preliminary Works Project (MP 10_0046) (as modified to include extraction of LW4 and LW5, and establishment of the main gate roads for LW6). Wollongong Coal is currently in the latter stages of establishing the main gate roads for LW6, after which the spatial extent of its existing approval will be exhausted (although the approval itself currently operates until 13 October 2014). Once the LW6 main gate roads are completed, which is expected by the end of April 2014, no further coal extraction or underground development will be permitted with the exception of the Wonga Mains extension, without further approval. At that time, the site will need to be placed on significantly reduced operation or into care and maintenance until such time as approval is secured to continue mining operations on the site.

To avoid significant impacts on colliery employees, and to mitigate potential risks associated with a prolonged care and maintenance period, Wollongong Coal considers it imperative to secure an interim approval for a small-scale continuation of operations pending a final decision on the Underground Expansion Project. To this end, approval is being sought to allow coal extraction from an initial short section of LW6 (up to 400 metres), which Wollongong Coal expects will be sufficient to support continued operation of the site and employment of existing staff until such time as the application for the Underground Expansion Project is determined.

The NRE No. 1 Preliminary Works Project (MP 10_0046) constitutes a 'transitional Part 3A project' within the meaning of Schedule 6A of the *Environmental Planning Assessment Act 1979*. In particular, it is a project that was approved subject to the provisions of the then Part 3A of the Act (clause 2, Schedule 6A).

Pursuant to clause 3(1), Schedule 6A of the *Environmental Planning Assessment Act 1979*, the provisions of the now repealed Part 3A continue to apply with respect to the approved project. This includes the power to modify the project approval under section 75W.

The extraction of coal from LW6 and extension of the life of the Russell Vale Colliery beyond 13 October 2014 is not consistent with existing project approval MP 10_0046. Under (the now repealed) section 75W of the *Environmental Planning Assessment Act 1979*, the approval of the Minister for Planning is therefore required to modify the existing project approval to allow these additional works.

This approvals approach is not the preferred approach by Wollongong Coal. However, it is a currently unavoidable requirement from a company commercial perspective to ensure continuity of operations. A delay in longwall operations will have a significant commercial impact on Wollongong Coal's operations. A significant delay may have implications for suppliers, contractors and employees. None of these outcomes is desired by Wollongong Coal.

Extraction of coal from the first 400 metre section of LW6 is consistent with the proposed extraction of that longwall as it forms part of the Underground Expansion Project. As such, assessments undertaken for the Underground Expansion Project have been relied on for the purpose of this modification application to the extent that those assessments are relevant to the initial extraction of LW6. The information contained in these assessments provides a cumulative assessment of the extraction of LW6 in relation to the broader project and mining of other longwalls. The Environmental Assessment therefore presents a conservative assessment, as it is based on the impact assessment and findings of the technical specialist studies prepared for the Underground Expansion Project Preferred Project Report project as a whole. The proposed modification is not an additional

development component over and above the scope of the Underground Expansion Project – it is an initial part of that larger development.

The current modification application applies to the first 400 metres of LW6 only. Further extraction of LW6 is subject to the current application MP09_0013 as part of the Underground Expansion Project. Other than workings within LW6, it is not anticipated that Wollongong Coal would need to seek further modifications or approval for other longwall extraction prior to the determination of the Underground Expansion Project.

3.1.2 Consideration and Compliance with Relevant Legislation

It was suggested that the Environmental Assessment makes no reference to the Sydney Drinking Water SEPP or its embodied Neutral or Beneficial Effect (NorBE) on water test. It was also raised that if the modification is approved it must comply with the Environment Protection Licence, Protection of the Environment Operations Act 1997 and associated regulations.

Application of the *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* (Sydney Drinking Water Catchment SEPP) is discussed in Section 3.1.4.2 of the Environmental Assessment (page 18).

Clause 10 of the Sydney Drinking Water Catchment SEPP requires a consent authority, when determining a development application under Part 4 of the *Environmental Planning and Assessment Act 1979*, to consider whether the development would have a neutral or beneficial effect on water quality. The proposed modification, not being an application for development consent under Part 4, is not bound by this requirement.

Wollongong Coal will comply with all conditions of approval that may be applied to the modification request and relevant licences under the *Protection of the Environment Operations Act 1997*, including the current Environment Protection Licence. Russell Vale Colliery currently operates under Environment Protection Licence No. 12040, which is not proposed to alter as a consequence of the proposed modification.

The Russell Vale Colliery currently operates under groundwater licence 10BL602992 with an annual groundwater extraction limit of 365 ML. An additional groundwater allocation may need to be sought to ensure all extracted groundwater is appropriately accounted for under the *Water Management Act 2000*.

3.1.3 Supporting Documentation

Concern was raised regarding the currency of supporting documentation to the modification Environmental Assessment, including specialist assessments.

The modification Environmental Assessment relied on specialist reports available at the time. Updated specialist assessments have since been prepared and have been relied on for this Submissions Report. These reports have been updated as part of the Preferred Project Report for the Underground Expansion Project. In addition, an Addendum Groundwater Assessment for LW6 has been prepared and is appended to this Submissions Report (refer **Appendix D**).

Further, all of Wollongong Coal's environmental management plans are now available for public viewing and download on the website (www.wollongongcoal.com.au). This website would be updated with revised management plans specific to the 400 metre extraction of LW6, in accordance with future approval conditions, subject to approval of the modification.

3.2 Project Need and Justification

A number of submissions raised issues around the need for the project and justification for the proposed extraction of the first 400 metres of LW6.

Section 2.5 of the Modification Environmental Assessment provides a discussion of the need and justification for the proposed extraction of the first 400 metres of LW6. To avoid significant impacts on colliery employees, and to mitigate potential risks associated with a prolonged care and maintenance period, Wollongong Coal considers it imperative to secure an interim approval for a small-scale continuation of operations pending a final decision on its larger Underground Expansion Project. To this end, the extraction of coal from an initial short section of LW6 (up to 400 metres), is expected to be sufficient to support continued operation of the site and employment of existing staff until such time as the application for the Underground Expansion Project is determined.

Mine Design

The current LW6 alignment was chosen as part of the re-design of the Wonga East area for the Underground Expansion Project Preferred Project Report. Significant changes to the mine plan were made for the Preferred Project Report to minimise the impacts on significant surface features whilst still recovering a commercially viable percentage of the available coal resource.

The extraction of coal from the first 400 metres of LW6 is proposed based on avoidance of key sensitive environmental features identified through the assessment of the current Underground Expansion Project. The first 400 metres of LW6 has been identified to avoid mining under the majority of upland swamps CRUS1 and CCUS4. The proposed extraction of the LW6 Modification Area below these areas of CRUS1 and CCUS4 provides the opportunity to monitor ground movements, groundwater impacts and ecological changes in response to longwall extraction to provide evidence to guide the management of longwall mining in proximity to these upland swamps (refer to **Section 3.4.3**). Potential impacts on CCUS4 have been assessed and would continue to be monitored as part of the larger Underground Expansion Project.

The revised mine design is focused on balancing the predicted environmental impacts on natural and manmade surface features against the legacy of the existing underground workings and the economics of the reserve within current mining operations.

Alternatives

A number of submissions suggested the consideration of alternative options to the proposed extraction of the first 400 metres of LW6. The existing approval for the extraction of the V-Mains Panel was also suggested as an alternative.

Longwall mining is always undertaken in the direction of the main drivage, which in the case of LW6 would involve coal extraction from the south west towards the north east. Avoiding CCUS4 by commencing mining on the mains side (east) of CCUS4 would render extraction of coal from LW6 commercially unviable.

Further reductions to the mine plan, such as the removal of LW6, would result in the loss of economic viability of the proposed operations and subsequent sterilisation of the coal resource within the proposed longwall. Removal of LW6 from the current mine plan would cause significant and expensive discontinuity issues as there would be significant time required to drive the LW7 gateroad while no longwall coal would be available from LW6 to generate revenue during that period.

All mining leases contain a resource recovery clause that allows the Department of Resources and Energy to consider a colliery's reasoning for not extracting a coal resource that is currently considered to be commercially viable. Wollongong Coal has approval to remove remnant coal from the V-Mains Panel, an extraction area in the Bulli seam between earlier longwalls to the south of Wonga West. However, the extraction of this resource is not viable due to geological and economic constraints.

The V-Mains Panel is limited in recoverable resource and was originally designed to serve as a transitional mining area until further longwall mining areas were developed. The V-Mains Panel is also considered unsuitable for longwall mining due to geological constraints, which would require the extraction of coal using only first workings and pillar extraction methods. Given the current context for medium and long-term coal pricing, extraction of a limited recoverable resource using these methods is not commercially viable.

3.3 Subsidence

3.3.1 Subsidence Modelling

An issue was raised regarding the specific subsidence modelling for the extraction of the first 400 metres of LW6. Some submissions also expressed concern over the ability of modelling methods to correctly predict subsidence in a multi-seam environment.

Since the exhibition of the Modification Environmental Assessment for LW6, an update of the subsidence assessment has been undertaken in response to regulatory submissions on the Preferred Project Report for the Underground Expansion Project (MP 09_0013). The *Updated Subsidence Assessment for Wollongong Coal Preferred Project Report Russell Vale No.1 Colliery* prepared by SCT Operations Pty Ltd and dated 18 June 2014 (**Appendix B**) includes:

- Subsidence monitoring data for the completion of extraction of LW5.
- Revision of the estimates for valley closure.
- Results of additional field studies undertaken.
- Identification of a sandstone formation which forms a waterfall downstream of CCUS4.
- Changes and clarifications recommended as part of a peer review of the subsidence assessment.

The proposed 400 metre section of LW6 is consistent with the proposed extraction of that longwall as part of the Preferred Project Report for the Underground Expansion Project (MP 09_0013). As such, the updated subsidence assessment, which predicts the cumulative subsidence above each longwall panel proposed to be mined in the Wongawilli seam, as well as previous mine subsidence from mining of the Bulli and Balgownie seams, is considered to provide a conservative assessment for the extraction of the first 400 metres of LW6. As noted previously in relation to cumulative impacts, this subsidence assessment also takes into account the potential cumulative subsidence impacts of extraction of the first 400 metres of LW6, along with the remainder of the longwall and adjacent longwall panels proposed as part of the Underground Expansion Project.

Measured subsidence for the first 400 metres of LW6 is anticipated to be within or below the cumulative subsidence predicted for the full extraction of LW6 as assessed in the Preferred Project Report. **Table 1**, in the following section, summarises the subsidence predictions for the full extraction of LW6 and takes into account the cumulative subsidence of adjacent longwall panels.

In addition, in response to submissions raised, an updated subsidence contour has been prepared to show the vertical subsidence footprint predicted for the extraction of the first 400 metres of LW6 proposed for the Modification Environmental Assessment. **Figure 2** presents the contours for predicted subsidence over the first 400 metres of LW6 and the cumulative impact associated with the predicted subsidence for the previously extracted longwalls, LW4 and LW5, within the Wongawilli Seam. **Figure 2** shows a subsidence area primarily contained within the 400 metre panel footprint, in line with the predicted subsidence profiles for the recently extracted LW4 and LW5. The predicted effects of subsidence, including subsidence impacts at the goaf edge, are discussed in **Section 3.3.2**.

Multi-seam Mining Environment

The modelling approach that has been adopted to predict subsidence movements for the Preferred Project Report, including the LW6 Modification Area, is appropriate for a relatively complex multi-seam mining environment.

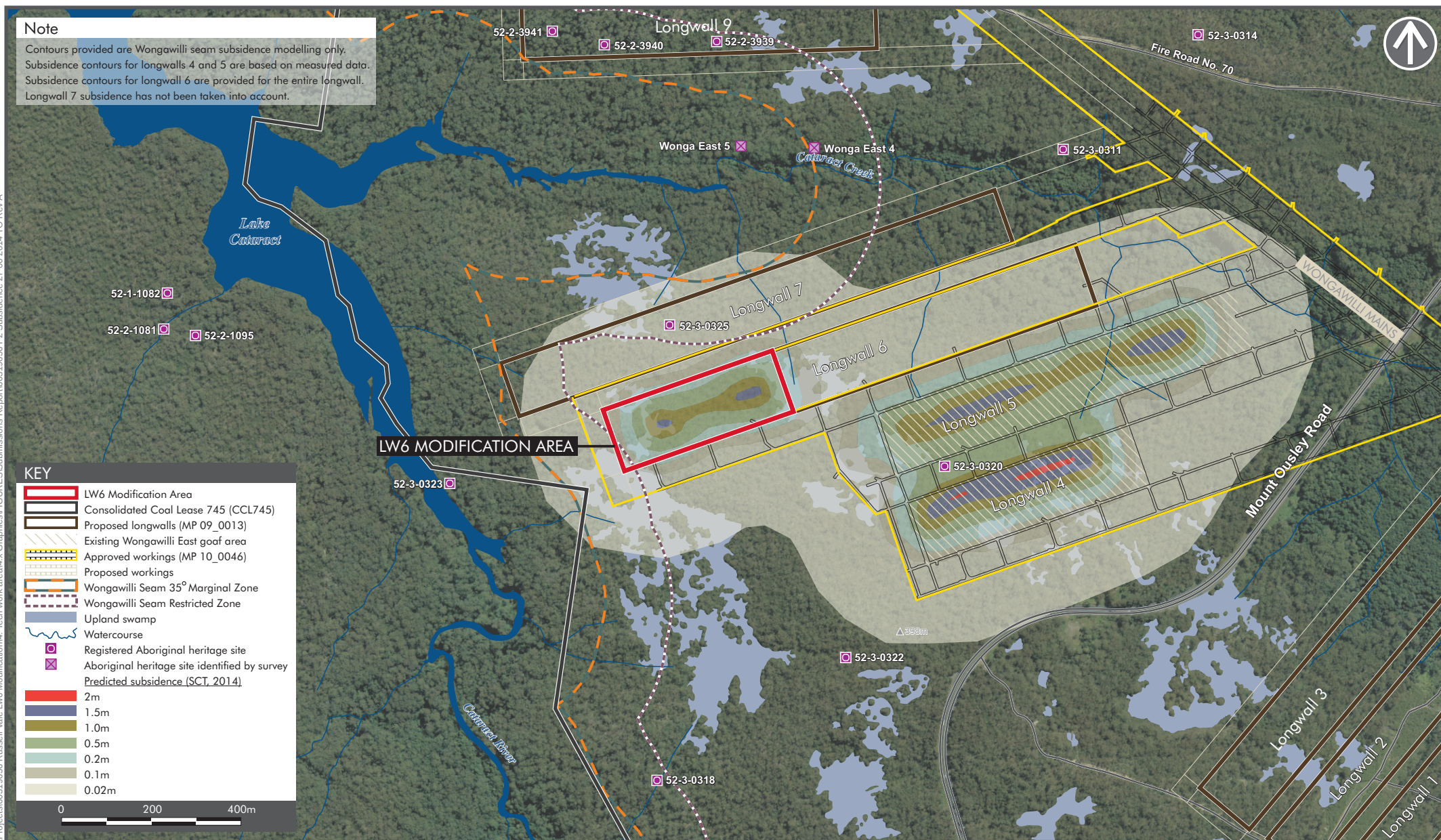
The subsidence prediction methodology used in the subsidence assessment is based on previous subsidence monitoring experience at the Russell Vale Colliery site, including data available from mining in the Bulli seam, Balgownie seam, and more recently, LW4 and LW5 in the Wongawilli seam. The experience available from mining LW4 and LW5 indicates that the subsidence behaviour is predictable and largely in line with movements expected for single-seam mining. The main difference for mining within a multi-seam environment is that the overburden strata are more flexible as a result of disturbance caused by previous mining. The bridging capacity across individual panels is reduced and sag subsidence in the middle of individual panels is therefore greater than would be expected above single seam operations. This data and observations of historical subsidence effects indicate that the impacts of future mining are likely to be similar in nature to the impacts that have already occurred.

There is some potential for pillar instability to result in vertical block collapse of the overlying Bulli seam workings during extraction of the Wongawilli seam. However, the area affected by pillar instability, as mapped by SCT (2014) is not located in proximity to the proposed LW6. In addition, SCT notes that although the potential for pillar instability in the Bulli Seam is possible, the significance of surface subsidence that may result is considered to be low, especially in terms of impacts to major surface infrastructure such as Mt Ousley Road. The risk of pillar instability and vertical block collapse, and the subsequent potential for increased mine inflows, is addressed in the Preferred Project Report for the Underground Expansion Project.

As discussed in the updated subsidence report (**Appendix B**), uncertainties that remain for predicted subsidence behaviour in a multi-seam environment are offset somewhat by the benefits of having previous subsidence monitoring experience and the opportunity to review the longer term recovery of surface impacts associated with earlier mining activity. The ability to inspect all three levels of underground mining also improves confidence in the understanding of the mechanics involved at the site, and this knowledge has been applied in the modelling and subsidence predictions for the proposed modification.

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3.3.2 Predicted Subsidence Effects

An issue was raised with regard to the comparison of predicted and measured subsidence, as presented in the recent End of Panel Report for LW5 (WCL, May 2014).

Table 1 provides an updated summary of the predicted subsidence parameters, including actual subsidence measurements taken for LW4 and LW5, based on results of the *Russell Vale Colliery Longwall 5 - End of Panel Report* (Wollongong Coal, May 2014) and the updated subsidence report prepared by SCT in June 2014 (**Appendix B**).

The predicted subsidence outcomes assume full extraction of LW6 and the adjacent LW7, and are therefore likely to overestimate the subsidence impacts of extracting only the first 400 metres of LW6. Notwithstanding, these results have been used to provide a conservative assessment of predicted subsidence for the first 400 metres of LW6.

Actual subsidence measurements taken for LW4 and LW5, based on the most recent measured subsidence data, have been included in parentheses for comparison against modelling predictions.

Table 1 – Predicted Subsidence for the Russell Vale Colliery Underground Expansion Project (LW4, LW5 and LW6) (SCT, June 2014)

Subsidence Parameter	Long Wall Panel		
	LW4	LW5	LW6
Overburden depth to Wongawilli Seam (m)	300	265	285
Previous Bulli and Balgownie Seam subsidence (m)	1.9	0.9	1.5
Predicted subsidence for Wongawilli Seam (measured data) (m)	2.1 (1.8)	1.9 (1.8)	2.1
Predicted tilt for Wongawilli Seam and (measured data) (mm/m)	35 (30)	36 (16)	38
Predicted tensile strain for Wongawilli Seam and (measured data) (mm/m)	10.5 (7.5)	10.8 (6)	11
Predicted compressive strain for Wongawilli Seam and (measured data) (mm/m)	21 (14)	22 (12)	23
Predicted maximum closure on Cataract Creek (Southern Tributary) (mm)	N/A	300 (49)	290

The upper limit of valley closure across Cataract Creek was estimated using the ACARP Method, and is predicted to be in the range of up to 290 millimetres adjacent to the end of LW6 and up to 300 millimetres for LW5. These closure estimates are recognised as being conservative upper limit values, as they are estimated based on experience of closure in deep gorges at high stress levels. Recent monitoring undertaken for the completion of LW5 indicates that measured closure values are much lower than the maximum upper limit values estimated using the ACARP Method (refer to actual data presented in parentheses in **Table 1**). Given the topography, significant valley closure along the section of Cataract River adjacent to LW6 is considered unlikely.

Subsidence beyond the goaf edge (i.e. the edge of each longwall panel) is expected to be similar to the movements observed beyond the goaf edges of LW4 and LW5. Vertical movements greater than 20 millimetres are expected to be limited to within a distance of about 0.7 times the overburden depth from the nearest goaf edge (approximately 200 metres). This results in a subsidence profile which falls predominantly within the footprint of the panel being mined.

In areas where there is either solid coal or substantial coal pillars within the Bulli or Balgownie seam workings directly above the goaf edge, goaf edge subsidence is expected to be of the order of 100-200 millimetres. In areas where there has been previous mining in both the overlying seams, vertical subsidence at the goaf edge is expected to increase to up to 300-500 millimetres and the goaf edge subsidence profile is expected to be more gradual outside the goaf edge and steeper directly over the panel.

Far field horizontal movements are expected to be of low magnitude but may still be perceptible at up to 1.5 to 3 times the overburden depth from the nearest goaf edge.

Working Section Height

Concern was raised regarding the working section thickness for the extraction of coal through the fault zone, which will impact on the level of subsidence.

As discussed in the *Geological Report on the Wonga East Area* (Wollongong Coal Limited, May 2014) (**Appendix B**), the proposed height of extraction for longwalls within the Wongawilli seam is 2.8 metres. During extraction, the longwall shearer will cut through the fault zone, with the cutting angle adjusted to gradually move from the current to new level of the coal seam. This will increase the amount of rock cut but there will be no change in height of extraction or subsidence at the surface.

3.3.3 Subsidence Monitoring and Management

A number of submissions raised concern over subsidence monitoring and management strategies, including the monitoring of far field effects and options for a Trigger Action Response Plan (TARP).

Subsidence Monitoring Network

The subsidence monitoring systems being used by Wollongong Coal have recently been upgraded from two dimensional surveying techniques used during the initial stages of mining LW4 through to full three dimensional monitoring with an improved GPS survey control network. The upgrade of the subsidence monitoring systems allows regional “far-field” three dimensional monitoring at 12 stations surrounding the longwall panel, up to a current distance of 3.5 kilometres from LW5. Additional monitoring and further upgrade of the monitoring systems is proposed as part of the Preferred Project Report for the Underground Expansion Project (MP 09_0013).

Subsidence Management Plans

Measures to manage impacts of subsidence would be outlined in the Subsidence Monitoring and Management Plans, to be prepared for LW6. These plans would be prepared in line with the existing subsidence monitoring and management plans for LW4 and LW5, and would include further approval conditions for the extraction of the first 400 metres of LW6. For example, the Rehabilitation Management Plan would be updated to include the new LW6 area and potential impacts requiring rehabilitation as a result of mining of LW6.

Trigger Action Response Plans (TARPs) would be prepared for incorporation into the relevant management plans for LW6 (e.g. Subsidence Monitoring and Management Plans, Water Management Plan), and would include trigger levels for monitoring to assess performance and triggers for the implementation of contingency measures. The TARPs would be prepared in line with those previously prepared for LW4 and LW5, incorporated into the relevant management plans, as available on Wollongong Coal’s website (<http://wollongongcoal.com.au/management-compliance-r/>).

Further discussion regarding the management of specific impacts of subsidence, as raised in submissions, is provided in the following sections.

3.4 Groundwater

3.4.1 Groundwater Modelling

A number of submissions raised concern regarding the absence of a numerical model to assess potential impacts of mining on groundwater.

Since the exhibition of the Modification Environmental Assessment for LW6, groundwater assessments have been updated in response to regulatory submissions on the Preferred Project Report for the Underground Expansion Project (MP 09_0013).

GeoTerra Pty Ltd (GeoTerra) and Groundwater Exploration Services Pty Ltd (GES) were commissioned by Wollongong Coal to address potential groundwater impacts relating to the proposed extraction and associated subsidence of the Wongawilli Seam as proposed in the Preferred Project Report for the Underground Expansion Project. The following groundwater assessment reports have since been prepared and are provided in

Appendix C:

- *Groundwater Assessment* (GeoTerra, 2014a).
- *Groundwater Assessment Addendum – Longwall 6 (400m Extraction)* (GeoTerra, 2014b).
- *Groundwater & Surface Water – Response to Submissions* (GeoTerra, 2014c).

Assessment of the current and potential mining related impacts due to extraction of the proposed Wonga East Wongawilli Seam longwalls on groundwater systems involved a revised conceptualisation of the local groundwater flow processes, measurement of hydraulic parameters in the field, revised simulation using computer based mathematical modelling with MODFLOW SURFACT, imposition of changes brought about by the proposed extraction and assessment of the resulting impacts (GeoTerra, 2014a).

In addition, the *Groundwater Assessment Addendum – Longwall 6 (400m Extraction)* (GeoTerra, 2014b) has been prepared to assess the potential changes to the groundwater and connected surface water systems specific to the proposed extraction of the first 400 metres of LW6.

Information on the model structure, modelling approach and simulations generated by GES in association with GeoTerra and SCT is provided in the *Groundwater Assessment* (GeoTerra, 2014a) in **Appendix C**.

NSW Aquifer Interference Policy

Submissions expressed concern that the assessment of groundwater did not meet the requirements of the NSW Aquifer Interference Policy.

The *NSW Aquifer Interference Policy* provides the framework for the assessment of impacts of a proposed development on aquifers in NSW. The *Groundwater Assessment Addendum – Longwall 6 (400m Extraction)* (GeoTerra, 2014b) includes responses to the minimal impact considerations for “less productive porous rock water sources” and “perched ephemeral aquifer water sources” specific to the proposed extraction of the first 400 metres of LW6 (refer to **Appendix C**).

The groundwater assessment concluded that criteria for the minimal impact considerations for “less productive porous rock water sources” and “perched ephemeral aquifer water sources” were not exceeded as:

- There are no:
 - High priority groundwater dependent ecosystems.
 - High priority culturally significant sites.

Listed under Schedule 4 of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011.

- There are no water supply works (i.e. groundwater bores) within the proposed Wonga East area of the Russell Vale Colliery that will undergo more than a 2 metre decline.
- There are no water supply works (i.e. groundwater bores) in the proposed Wonga East area that will undergo a greater than 40 percent post water sharing plan pressure head decline above the base of the water source.
- The beneficial use category of the groundwater source will not be changed beyond 40 metres from the proposed Wonga East area.

- There are no highly connected surface water sources (alluvial aquifers) in the proposed Wonga East area.
- There are no highly connected alluvial surface water sources defined as a reliable water supply within the proposed Wonga East area.

3.4.2 Potential Impacts of Geological Structures on Groundwater Pathways

A number of submissions raised concern over the presence of pathways for hydraulic conductivity between the mine workings and Cataract Reservoir. The presence of geological structures, particularly the Corrimal Fault, was raised, with concern expressed over the potential impacts of subsidence and the possible loss of storage of Cataract Reservoir waters as a result of mining.

Since the exhibition of the LW6 Modification Environmental Assessment, a number of reports have been prepared to investigate the significance of geological structures within the Russell Vale Colliery Wonga East study area (refer to **Appendix B**). These include:

- *Geological Report on the Wonga East Area* (Wollongong Coal Limited, 2014a).
- Memo with technical notes from the inspection of the Corrimal Fault at Maingate 6 undertaken on 22 May 2014. *Geological Report on the Corrimal Fault* (Wollongong Coal Limited, 2014b).

The Groundwater Assessment prepared by GeoTerra (2014a), also addresses the potential for geological structures, or other linear features, to provide a leakage conduit from the surface to deeper aquifers below the Bald Hill Claystone (**Appendix C**).

As discussed in the Modification Environmental Assessment, a significant benefit of previous mining activity undertaken within the Bulli and Balgownie Seams is that the dykes and faults in the area are very well defined. The presence of geological structures, such as Dyke D8 and the Corrimal Fault, have been considered in the assessment.

The hydraulic conductivity and the potential instability of each geological structure has been taken into account in the subsidence modelling and is discussed in the following sections as relevant to the extraction of LW6.

Corrimal Fault

The Corrimal Fault (also referred to as Fault 1 or F1) is the only geological fault that has been intersected in the Wongawilli seam workings to date.

The Geological Report on the Corrimal Fault (Wollongong Coal Limited, 2014b) in **Appendix B** provides a review of the geological structure of the Corrimal Fault and establishes confidence in the location and characteristics of the fault.

The Corrimal Fault was first intersected in the Wongawilli seam during the development of Maingate 5. Further mine development of Maingate 6 has shown the fault to fragment into several small scale faults of an erratic nature. The main fault plane is still evident but the Corrimal Fault has become a structurally disturbed zone and is displaying characteristics typical of a terminating structure. It is anticipated that the fault will continue to decrease and terminate within around 500 metres from its intersection with Maingate 6 (Wollongong Coal Limited, 2014a).

Given the anticipated termination of the fault, and based on a review of related surface features, it is considered that the Corrimal Fault does not extend from the mine workings to the Cataract Reservoir (Wollongong Coal Limited, 2014b). Intersection of the fault with the overlying Bulli and Balgownie Seams indicates that there is no water make occurring on the fault plane from these overlying workings or potential migratory groundwater from overlying strata. No water make has been noticed on the structure through the intersection with the Wongawilli seam to date. As such, hydraulic conductivity between the mine workings and the Reservoir via the Corrimal Fault is considered unlikely.

Reactivation along the fault plane as a result of subsidence and goaf formation is also considered unlikely, particularly given the fragmentation and anticipated termination of the fault as it progresses towards the north-west. The recent extraction of LW4 and LW5 has not resulted in evidence of reactivation of the fault, as identified through the field inspection of surface features (Wollongong Coal Limited, 2014b).

Dyke D8

The Dyke D8 is considered to be the only geological structure with the potential for increased hydraulic conductivity. Dyke D8 underlies Cataract Creek between the proposed LW7 and LW9 (as part of the Underground Expansion Project), but does not intersect Cataract Reservoir until a distance of approximately 550m west of the proposed LW10. This separation along the dyke, between the reservoir and the proposed LW6, is considered to reduce the likelihood of hydraulic conductivity between the reservoir and the mine workings. Previous mining within the Bulli and Balgownie Seams does not indicate a history of water ingress, despite previous workings being undertaken through the dyke, adjacent to and directly under Cataract Creek and Cataract Reservoir (Wollongong Coal Limited, 2014a). As such, hydraulic conductivity between the mine workings and the reservoir via the Dyke D8 is considered unlikely.

There is no indication on subsidence monitoring lines for LW4 and LW5 indicating excessive movement on the projection of the dyke.

3.4.3 Potential for Hydraulic Connectivity

A number of submissions raised concern over the potential for increased strata permeability and loss of surface and groundwater flows as a result of extraction of LW6, and the subsequent impacts on surface water features and upland swamps. The potential for surface to seam fracturing and aquifer drainage was raised, as well as the issue of Reservoir leakage into the mine workings. Concern regarding misplaced confidence in the Bald Hill Claystone was also raised.

The Groundwater Assessment (GeoTerra, 2014a) provides an overview of the local and regional groundwater system and notes that recharge to the shallow, and subsequently deeper regional groundwater system occurs over an extended period of months to years. Recharge derived from precipitation is predominantly transported via the horizontal flow regime in the Hawkesbury Sandstone, with the majority of water discharged from temporary seeps in the swamps and creek beds.

Based on in-situ monitoring, the hydraulic characteristics of strata overlying or adjacent to the extracted Bulli, Balgownie and Wongawilli seam workings have been altered due to subsidence. This subsidence may have generated atmospheric depressurisation up to the lower Bulgo Sandstone following extraction of LW4 and LW5 in the Wongawilli Seam (GeoTerra, 2014a).

Where mining in all three seams has occurred, or will occur, there is a potential for interaction between surface water features and the top of the depressurised groundwater zone that is recharged from rainfall and adjacent creeks. The potential may be enhanced if there is interaction between the hillslope basal shear plane that may have been reactivated by subsidence and the top of the zone of depressurisation above each longwall panel (GeoTerra, 2014a).

Mine Groundwater Inflow

The predicted modelled inflow of water into the proposed workings for LW4, LW5 and LW6 are shown in **Table 2**. Measured inflow is also presented for LW5, post extraction.

Table 2 Predicted Groundwater Mine Inflow associated with LW6 400 Metre Extraction

Stage	Measured Inflow (ML/day)	Predicted Inflow (ML/day)	Predicted Inflow (ML/year)
Pre Longwall 4	n/a	0.63	230
Post Longwall 5	1.05	1.10	402
Post Longwall 6 (first 400m)	-	0.80	292

*ML/day = mega litres per day, ML/year = mega litres per year

The rate of inflow to the workings due to the proposed extraction of the first 400 metres of LW6 is predicted to reduce from the current measured 1.05ML/day (383.3 ML/year) (post LW5) to the modelled 0.8 ML/day (292 ML/year). It should be noted, however, that 72ML/year of this inflow would be sourced from upgradient seepage out of adjoining decommissioned workings within the Bulli and Balgownie seams (GeoTerra, 2014b).

The modelled seepage rates into the workings may be enhanced if unidentified fracture related storages are intercepted, which may lead to short term increases of potentially up to 0.1 - 0.5ML/day, which would be expected to dissipate over a period of weeks to months.

Inflows and Storage within Cataract Reservoir

Cataract Reservoir has a full operating storage of 97,190ML. The lowest level of the storage as advised by the Sydney Catchment Authority is 27,620ML (29.3 percent capacity), as recorded on 20 July 2006 (GeoTerra, 2014b).

The modelled transfer of stored water within Cataract Reservoir to the underlying groundwater system due to depressurisation of the regional groundwater system as a result of extraction of the first 400 metres of LW6 is predicted to be 0.0009ML/day (0.33ML/year).

The modelled sub-surface transfer of 0.33ML /year from the stored waters of the reservoir at the end of the proposed mining is less than 0.001 percent of the low storage level, or 0.0003 percent of the reservoir's full storage capacity, which is considered to have a negligible impact on the storage of Cataract Reservoir (GeoTerra, 2014b).

Further information regarding the effect on surface water inflows is addressed in **Section 3.5.3** and **Appendix C**.

Basement Hydrogeology

The Groundwater Assessment (GeoTerra, 2014a) provides an overview of the basement hydrogeology characteristics of the region.

The Narrabeen Group sedimentary lithologies, including the Bulgo Sandstone, Scarborough Sandstone, Bald Hill Claystone, and Newport and Garie Formations, comprise significantly lower yielding aquifers compared to the Hawkesbury Sandstone. The Groundwater Assessment (GeoTerra, 2014a) notes that these lithologies are characterised by very minor productive supplies within the Southern Coalfields due to a generally deeper elevation below surface and very low permeability.

Previous experience of mining under Cataract Creek, and the lack of significant long term effects or physical disturbance to the creek, is considered to be attributed to the presence of the Bald Hill Claystone outcrop (SCT, 2014). Due to partial erosion into and through the Bald Hill Claystone in the valley of Cataract Creek, the Hawkesbury Sandstone and Upper Bulgo Sandstone may not be hydraulically separated within the eroded area. However, where it is not eroded, the semi confining integrity of the Bald Hill Claystone is anticipated to remain following subsidence.

Based on current observations on the lack of observable stream bed cracking or delamination, it is not anticipated that the stream reaches containing exposed Newport and Garie Formations, Bald Hill Claystone or the upper Bulgo Sandstone will experience the same degree of surface cracking observed over Hawkesbury Sandstone reaches in other streams in the Southern Coalfields, due to the enhanced ductility of the exposed rock strata (GeoTerra, 2014a).

Potential Impacts to Upland Swamps and Surface Water Features

The Groundwater Assessment (GeoTerra, 2014a) states that the creeks and perched swamps are separated from the underlying regional groundwater system by a profile of unsaturated strata.

Although the groundwater modelling indicates that "surface to seam" depressurisation has potentially occurred, and the figures in the groundwater assessment indicate the theoretical separation distance from this zone to surface, strata depressurisation cannot transgress through unsaturated strata between the surface water system and the underlying, separated, groundwater system. This means that although the modelled depressurisation (which is associated with subsidence related fracturing) may be predicted to reach the surface, based on the theoretical Tammetta (2012) methodology, the streams and swamps will not necessarily be adversely affected by subsidence, unless vertical conductivity is enhanced due to subsidence, and extends to the base of the swamps or stream beds (GeoTerra, 2014a).

Therefore, as surface water streams and perched upland swamps are separated by a profile of unsaturated strata, the streams and swamps are also considered to be hydraulically separated from the underlying "depressurisation" zone within the regional groundwater system. As a result, surface water features and upland swamps are considered unlikely to be affected by potential depressurisation as a result of mining of the first 400 metres of LW6.

The potential impacts on surface water features and upland swamps are addressed in more detail in **Section 3.5** and **Section 3.6**, respectively.

3.4.4 Groundwater Quality

The Groundwater Assessment Addendum – Longwall 6 (400m Extraction) (GeoTerra, 2014b) discusses observations that indicate that groundwater quality within the regional groundwater system has not been adversely affected by previous mining. However, there may be some localised increased iron hydroxide precipitation and limited lowering of pH if the groundwater is exposed to “fresh” surfaces in the strata through dissolution of unweathered iron sulfide or carbonate minerals. It is important to note, however, that many Hawkesbury Sandstone aquifers in the Southern Coalfield already have significant iron hydroxide levels, and that ferruginous seeps can also be observed in previously un-subsided catchment areas.

The degree of iron hydroxide and pH change is difficult to predict, and can range from no observable effect to a distinct discolouration of the formation water. The discolouration does not pose a health hazard, however it can cause iron hydroxide precipitation at seepage points in local streams which can also be associated with algal matting and / or lowering of dissolved oxygen levels in the creek at the seepage point (GeoTerra, 2014b).

As a result of the proposed workings, pH acidification of up to one unit may occur, however the change may be reduced if the aquifer has sufficient bicarbonate levels. Outside of isolated iron hydroxide seepages, no adverse groundwater quality impacts are anticipated from the proposed LW6 subsidence areas.

3.4.5 Groundwater Monitoring and Management

A number of submissions queried the proposed adaptive management measures presented by Wollongong Coal in relation to surface and groundwater. It was raised that critical impact thresholds should be identified to enable these adaptive measures to be adequately identifying and reporting on adaptive responses to those impacts. More information was requested on the proposed management measures, including additional groundwater monitoring through the establishment of an additional borehole between LW6 and the Reservoir.

The proposed groundwater monitoring for LW6 was addressed in Section 4.2.4 of the Modification Environmental Assessment. Further information on the adaptive management measures and impact thresholds are provided in this section.

Wollongong Coal currently implements a Water Management Plan. This Plan would be updated to include potential impacts, management and monitoring for the LW6 Modification Area. The Water Management Plan identifies the groundwater monitoring program and the surface and groundwater response plan, which includes potential mitigation and remediation measures. Monitoring measures from the Water Management Plan include:

- Monitoring of paired swamp piezometers (also refer to **Section 3.6.3**) and shallow sandstone piezometers to assess streamflow and rainfall response and potential water level reduction. The frequency, location and purpose of monitoring are discussed in the Plan.
- Monitoring of swamp pool levels and testing of water quality.
- Monitoring of open standpipe piezometers and multilevel vibrating wire piezometers to measure the basement groundwater levels and compare against predicted water levels.

The Groundwater Assessment (GeoTerra, 2014a) considers additional groundwater related monitoring that could be used to enhance the adaptive management process. This may include:

- Continuation of the existing mine water pump monitoring and updating the mine water balance.
- Additional drilling, with a range of vibrating wire piezometers and core testing to establish the mechanical and hydraulic properties of the overburden in proximity to water dependent systems in the catchments (including swamps).
- Installation of additional deep vibrating wire piezometers and extensimeters to assess/quantify the impacts of fracturing within the subsidence zone.
- Installation of paired shallow piezometers (where appropriate) targeting swamps and the underlying shallow Hawkesbury Sandstone aquifer to assess their hydraulic connection and climatic implications.
- Sediment profiling in swamps to characterise type, thickness and sensitivity to differential subsidence.
- Updating of the numerical modelling when sufficient additional data becomes available to enhance the prediction of subsidence zone fracture distributions, connectivity and groundwater transmissivity capacities.

The additional groundwater monitoring network would be implemented by Wollongong Coal, and initial drilling would ensure those open piezometers between LW6 and the Cataract Reservoir are established. The additional

groundwater monitoring network is currently being implemented by Wollongong Coal with installation of multilevel vibrating wire piezometers and / or open standpipe piezometer, as approved by SCA (GeoTerra, 2014a).

The primary measure for preventing potential impacts to groundwater is the avoidance of mining directly under the reservoir, rivers, creeks and tributaries. LW6 does not directly undermine creeks or tributaries however predicted subsidence impacts may occur to nearby watercourses. The adaptive management approach has been implemented across the Southern Coalfields for impacts that are not feasible to be fully avoided.

The TARP contained within the Water Management Plan provides trigger levels (or thresholds) and required responses to TARP criteria exceedances. Where exceedances are experienced or considered likely, a Contingency Plan is also proposed to be implemented. Within the TARP, each feature is assigned a trigger level based on previous baseline data and assessment. Trigger levels are generally classified as follows:

- Normal.
- Within predictions.
- Exceeds predictions.

The level of response and adaptive management depends on the results of monitoring. Should impacts exceed trigger levels and require a remedial response, a number of available measures are identified in the TARP (such as chemical injection) however will require expert advice at that time on the feasibility of such measures.

3.4.6 Water Licensing

It was raised in submissions that Wollongong Coal has not considered the licensing implications with respect to loss/reduction in baseflows and existing entitlements.

Wollongong Coal acknowledges that water access licences (WALs) are required to be sought for groundwater taken in the course of mining, in accordance with the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011*. Mining impacts that would give rise to licensing requirements include:

- Inflows into mine workings (mine water make).
- Leakage from shallow aquifers.

Wollongong Coal currently holds a groundwater licence under Part 5 of the *Water Act 1912* for 365ML/year (Licence No. 10BL602992). As the current licence is held under Part 5 of the *Water Act 1912*, Wollongong Coal would need to convert its existing licence to a WAL. Wollongong Coal would only need to secure additional licensing should the proposed mining exceed the current 365 ML/year allocation.

Updated assessments by GeoTerra (2014a; 2014b) provide further consideration of licensing requirements as a result of the LW6 Modification and the wider Preferred Project for the Underground Expansion Project.

The LW6 Modification is predicted to result in a maximum inflow of 292 ML/year (including 73ML/year of seepage inflow from adjoining, upgradient decommissioned workings). This volume does not exceed the current allocation and further licensing would not be required for the mining of 400 metres of LW6.

However, predicted maximum inflow for the Preferred Project is 620 ML/year (including 73ML/year of seepage inflow from adjoining, upgradient decommissioned workings). Wollongong Coal will therefore require a WAL for at least an addition 182 ML/year.

3.5 Surface Water

An updated surface water assessment has been prepared by WRM (dated May 2014). This updated assessment has taken into account additional modelling undertaken to assess the potential impact of subsidence cracking in tributaries on the streamflow in Cataract Creek. The assessment has also taken into account the full period of available climate data. In addition, an updated groundwater assessment as well as an addendum assessment for LW6 have been prepared as described in **Section 3.4.1**. GeoTerra (2012c) has also prepared a response to submissions as part of the Underground Expansion Project Preferred Project Report which responded to a number of groundwater and surface water issues.

3.5.1 Set-backs from Cataract Reservoir and Sensitive Surface Water Features

A number of issues were raised regarding the zone surrounding the Cataract Reservoir and whether the set-back utilised for the subsidence and water assessments would protect the stored waters of the reservoir.

The Metropolitan Special Area is a Schedule 1 area which includes the water storages and surrounding land.

The adoption of the Cataract Reservoir Notification Area as a no mining zone will render Wonga East non-viable, and is inconsistent with the underlying intent of the area as a trigger for notification and appropriate impact assessment, rather than a zone of prohibition. The revised layout for Wonga East is partially within the Notification Area but outside the 35 degree angle of draw from the stored waters.

The Dams Safety Committee (DSC) is a statutory body with legal powers to manage mining to protect the stored waters in Cataract Reservoir. The colliery has been working with the DSC for many years and it is considered that the management process that has been adopted in the past continues to be appropriate. The 0.7 times depth (approximately 200m) stand-off from the Full Supply Level (FSL) of the reservoir is the primary control for protecting the stored waters of Cataract Reservoir and this stand-off is expected to provide a high level of protection notwithstanding the presence of previous extraction in the Bulli Seam. Further, due to underlying geology there would be no direct connection between the reservoir and mining horizon.

Wollongong Coal believes that this provides an adequate buffer from the Cataract Reservoir and that remaining issues of a technical nature can easily be resolved as part of an application for DSC approval. The updated groundwater assessment (GeoTerra, 2014a; 2014b) and surface water assessments (WRM, 2014) provide an updated model for potential impacts to the reservoir, including reservoir yield and quality. **Section 3.5.3** below (and **Appendix D** and **Appendix E**) discuss these potential impacts in more detail.

3.5.2 Potential Impacts to Streams of the Cataract Catchment

A number of concerns were raised in relation to potential subsidence impacts and damage to stream environments. This included potential for cracking of stream beds and loss of surface water from Cataract Creek and its tributaries, and the damage it would have on surface water supplies flowing in to Cataract Reservoir.

The first 400 metres of proposed extraction of LW6 would be contained within land managed by the Sydney Catchment Authority, and within the Cataract Creek and Cataract River catchments.

No extraction is proposed under the main channel of Cataract Creek, Cataract River or Cataract Reservoir, with the mining layout of LW6 designed to minimise valley closure related stream flow and pool water level impacts on the bed of the respective creeks and the reservoir.

The proposed workings do not underlie the stored waters (up to the high water mark) of Cataract Reservoir. The proposed 400 metres of extraction also does not directly underlie first order or higher stream beds.

Stream Health

The predicted subsidence impacts of the Underground Expansion Project and LW6 are expected to result in only small changes to the stream bed profile. As a result, localised reductions in bed gradients are not likely to cause significant additional ponding. Any localised increase in bed gradient is likely to be within the range of those occurring naturally, and as the stream bed material comprises competent rock, the resultant localised increases in stream power and tractive force are unlikely to cause bed scour (WRM, 2014). The extraction of LW6 is therefore unlikely to result in perceptible impacts to existing stream health, including flow rates and water turbidity.

Valley Closure and Fracturing of Stream Beds

Experience in Hawkesbury Sandstone river channels suggests that where valley closure is less than 200 millimetres across major river channels, such as Cataract Creek, a total loss of surface flow is unlikely to occur. Predicted subsidence impacts for major river channels relevant to the LW6 Modification Area are identified in SCT (2014). Valley closure of up to 290 millimetres is expected to occur over Cataract Creek and its tributaries as a result of the full extraction of LW6. However, given the underlying geology (including Bald Hill Claystone and upper Bulgo Sandstone) and based on a current lack of observable stream bed cracking or delamination due to previous mining, impacts on surface flows in Cataract Creek and its tributaries is not anticipated to the same degree as surface cracking observed over Hawkesbury Sandstone reaches in other streams in the Southern Coalfields (GeoTerra, 2014a).

Potential for Loss of Surface Water in the Catchment

Potential risks of surface water loss may occur as a result of the following mechanisms (as cited by the Planning Assessment Commission for the Metropolitan Coal Project):

- 'Rainfall on the broader catchment, which previously found its way to watercourses by surface or subsurface flow infiltrates through fractures and is permanently lost to the surface water system.
- Water in streams that are subject to fracturing is lost from the surface water system to the groundwater system and does not reappear' (PAC, 2009).

A potential mechanism for the loss of streamflow in Cataract Creek following extraction of LW6 is the loss of flow via cracking in the tributary catchments overlying the subsidence area. Valley closure resulting minor fracturing in the stream bed may occur across the first order tributary of Cataract Creek located in proximity to the proposed LW6 Modification Area (refer to **Figure 2**), which may lead to minor diversion of stream flow or minor reduction in pool holding capacity. Additional valley closure of Cataract Creek may also occur (refer SCT, 2014). It is not anticipated, however, that the total volume of water entering Cataract Creek will be observably affected due to upstream bed fracturing.

It is anticipated that the water will flow via subsurface fractures and discharge down gradient into the lower section of the streams, and/or into Cataract Creek and/or Cataract Reservoir. As such, the change is anticipated to be a sub-surface diversion, not an overall loss, to the surface water balance (GeoTerra, 2014b). This sub-surface diversion may also occur as a result of strata depressurisation (refer **Section 3.4.3**).

The predicted depressurisation associated with the extraction of 400 metres of LW6 is predicted to reduce baseflows to the connected surface water system by a maximum of 2.57ML/year, as shown in **Table 3** (GeoTerra, 2014a; 2014b). This maximum reduction in baseflow as a result of extraction of LW6 is predicted to occur in the year 2020. As no extraction is proposed under the main channel of Cataract Creek, Cataract River or Cataract Reservoir as part of the initial extraction of LW6, the potential for inflow losses are significantly reduced compared to the Underground Expansion Project.

Table 3 Modelled Cataract Creek, Cataract River and Bellambi Creek Stream Flow Changes due to Extraction LW6 compared to the Underground Expansion Project

	Baseflow Loss (ML/day)/(ML/year)		Change due to Proposed Mining Compared to Current Flows (ML/day)/(ML/year)	
	LW6 Modification	Underground Expansion Project	LW6 Modification	Underground Expansion Project
Cataract Creek				
Current	0.005 / 1.83		-	-
End of mining	0.007 / 2.55	0.018 / 6.57	0.002 / 0.73	0.013 / 4.74
2020 Peak	0.01 / 3.65		0.005 / 1.83	
Cataract River (Upstream of Cataract Reservoir)				
Current	0.0007 / 0.26		-	-
End of mining	0.001 / 0.365	0.004 / 1.46	0.0003 / 0.11	0.0033 / 1.20
1/1/2020	0.0025 / 0.91		0.0018 / 0.657	
Bellambi Creek				
Current	0.00015 / 0.055	0.0006 / 0.22	-	-
End of mining	0.0002 / 0.073	0.003 / 1.10	0.00005 / 0.018	0.0024 / 0.88
2020 Peak	0.0004 / 0.146		0.00025 / 0.091	
TOTAL (1/1/2020)			0.0071 / 2.57	0.0187 / 6.83

Wollongong Coal are committed to developing a closure based trigger system for managing impacts on Cataract Creek with the exact values to be determined based on the best available predictive models and assessment of existing closure data from LW4 and LW5. This will be undertaken in consultation with the appropriate regulatory authorities as part of the development of management plans for Cataract Creek.

3.5.3 Cataract Reservoir Supply and Drinking Water

The protection of Cataract Reservoir and stored drinking supply was raised as a concern in a number of submissions. These concerns related to the security of the Reservoir from water loss associated with subsidence impacts, and the need for consideration of different climatic scenarios such as drought.

Due to the set-back from the Cataract Reservoir as discussed in **Section 3.5.1**, no adverse stored water quantity or quality impacts are predicted to occur on, or in, Cataract Reservoir.

Potential risks to reservoir yield as a result of subsidence impacts have been assessed by WRM (2014) for the wider Underground Expansion Project area and by GeoTerra (2014b) for LW6. The model used in the WRM (2014) assessment for the Underground Expansion Project simulated the historical behaviour of the reservoir, including dry periods, and was used to investigate the potential for catchment inflow losses to prevent the reservoir from supplying water demands.

The GeoTerra assessment (2014a; 2014b) utilised a number of data sources, including the WRM (2014) data, and modelled the potential losses of flow to the Cataract Reservoir. It is anticipated that stream inflows (baseflow losses) would flow via subsurface features ultimately into the reservoir (as described in **Section 3.5.2** above). As a result of the extraction of the first 400 metres of LW6 the modelled volume for stream inflow was 2.57 ML/year (refer **Table 3**). This volume represents 0.01 percent of the low level, or 0.003 percent of the full storage capacity of Cataract Reservoir.

The modelled transfer of stored water within Cataract Reservoir to the underlying groundwater system due to depressurisation of the regional groundwater system (refer **Section 3.4**) in the vicinity of the reservoir due to extraction of LW6 is predicted to be 0.33ML/year. This represents less than 0.001 percent of the low level, or 0.0003 percent of its full storage capacity, which is considered to have a negligible impact on the storage of Cataract Reservoir (GeoTerra, 2014b).

3.5.4 Potential Surface Water Impacts to Upland Swamps

A number of submissions raised concern for potential impacts to upland swamps. Potential impacts to upland swamps require consideration of a number of issues including surface water, groundwater and biodiversity. To be consistent with the approach taken for the Preferred Project for the Underground Expansion Project, matters relating to upland swamps have been addressed as part of ecological studies and have therefore been addressed in Section 3.6 of this Submissions Report.

3.5.5 Potential Flooding Impacts

Wollongong City Council in its submission requested that flooding be addressed in consultation with Council to ensure consistency in floodplain risk management studies. It was also requested that the modification incorporate measures to reduce potential adverse flood impacts.

Flooding risk was addressed in Section 5.3 of the Water Management Report included as part of Appendix E of the Environmental Assessment for the modification request. The assessment considered flooding of the Bellambi Creek catchment and concluded that the proposed changes to mining operations at the Russell Vale Colliery would not add to the flooding potential of the catchment and/or downstream of the Princes Highway. Consultation with Wollongong City Council has been undertaken as part of the Underground Expansion Project.

A Flood Study has been prepared to understand existing flood conditions and to determine the necessary flood mitigation measures. This Study outlined a number of mitigation measures that would enable the site to manage a 1:100 ARI event (refer **Section 3.7.3**). This Study was modelled in accordance with blockage criteria outlined within the *Wollongong Development Control Plan 2009* for stormwater management.

3.5.6 Surface Water Management Measures

Surface Water Monitoring and Management

A number of submissions queried the proposed adaptive management measures presented by Wollongong Coal in relation to surface and groundwater. It was raised that critical impact thresholds should be identified to enable

these adaptive measures to be adequately identifying and reporting on adaptive responses to those impacts. More information was requested on the proposed management measures, besides a monitoring network.

Surface and groundwater monitoring, including monitoring of upland swamps, is proposed as described in **Section 3.4.5** and **Section 3.6.3**. This would be undertaken in addition to updating the Water Management Plan currently in place for the Colliery, including the stream, swamp and shallow groundwater TARP (identified in the Water Management Plan). The Water Management Plan (and TARP) are available for viewing on Wollongong Coal's website. The current adaptive management strategy would be adopted and updated, which would involve:

- A number of stream, swamp and groundwater triggers based on baseline monitoring and anticipated subsidence effects, with monitoring changes and / or specific triggers continuing to be developed as monitoring matures and refined in consultation with key stakeholders.
- Where a trigger is exceeded, the cause and effect would be investigated and a corrective management action plan would be developed if the cause is directly related to mining. The mitigation or remediation plans would outline methods to reduce ongoing impacts to levels below the impact assessment criteria as quickly as possible. This could include stream hand mortaring, stream grouting and use of other soft engineering works (considered in consultation with the SCA and other relevant agencies).
- Triggers are proposed to be continually refined, where required, within End of Panel or Annual Environmental Management Reports (AEMR).

Information on thresholds for these triggers has been previously provided in **Section 3.4.5** and are based on previous assessment and observed data. The surface water impact performance measures (in the section below) would also inform these trigger levels.

Surface Water Impact Performance Measures

The SCA's submission included suggested subsidence impact performance measures recommended to be met by the project.

Wollongong Coals agrees with these performance measures, except for special significance swamps (refer to **Section 3.6.2** and **Section 3.6.3** for further detail). Wollongong Coal would adhere to the following performance measures for surface water resources outlined in **Table 4** and would include these measures in the update of the current Water Management Plan. The performance measures for swamps of special significance are consistent with the performance measures prescribed by the Subsidence Management Plan Approval for the nearby Dendrobium Colliery. These measures are considered achievable by Wollongong Coal for the Underground Expansion Project and the extraction of the first 400 metres of LW6.

For the purposes of the performance measures in **Table 4**:

- *Negligible impacts* for a watercourse means no diversion of flow, no change in the natural drainage behaviour of pools and minimal iron staining, in accordance with the NSW Planning Assessment Commission (2009).
- *Minor impacts* include minor fracturing, gas release, iron staining and minor impacts on water flows, water levels and water quality, in accordance with Schedule 3, Specific Environmental Conditions – Mining Area for the Dendrobium Underground Coal Mine development consent conditions (NSW Department of Planning, 2008).

Table 4 Surface Water Impact Performance Measures

Surface Water Feature	Performance Measures
<i>Cataract Reservoir</i>	Negligible impacts including: - Negligible reduction in the quantity or quality of surface water inflows to the reservoir. - Negligible reduction in the quantity or quality of groundwater inflows to the reservoir. - Negligible increase in the quantity of water entering the groundwater system from the reservoir. - Negligible leakage from the reservoir to underground mine workings. - No connective cracking between the reservoir surface and the mine.
<i>Cataract Creek</i>	Negligible impacts including: - Negligible diversion of flows or changes in the natural drainage behaviour of pools. - Negligible gas releases and iron staining. - Negligible increase in water cloudiness. - Negligible increase in bank erosion. - Negligible increase in sediment load.
<i>Cataract River and Bellambi Creek</i>	Negligible impacts including: - Negligible diversion of flows or changes in the natural drainage behaviour of pools. - Negligible gas releases and iron staining. - Negligible increase in water cloudiness. - Negligible increase in bank erosion. - Negligible increase in sediment load.
<i>Special Significance Swamps</i>	Minor impacts including: - Negligible erosion of the swamp surface. - Minor changes in the size of swamps. - Minor change in ecosystem functionality of the swamp. - No significant change to the composition or distribution of species within the swamps. - Maintenance (or restoration) of the structural integrity of controlling rockbars.
<i>All other swamps</i>	No significant environmental consequences beyond predictions in the Environmental Assessment.

3.5.7 Surface Water Take and Licencing Requirements

Further assessment of water licensing requirements was requested in the submissions received from DP&I.

The LW6 modification and the broader Underground Expansion Project would be located within the area covered by the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011* (Unregulated River WSP). The Underground Expansion Project would be situated entirely within the Upper Nepean and Upstream Warragamba Water Source.

Water licensing requirements have been assessed in the updated groundwater assessment (GeoTerra, 2014a; 2014b). It has been identified that impacts that would give rise to licensing requirements include:

- Reduction in baseflows to streams due to drawdown of the regional aquifer.
- Additional runoff that infiltrates into the groundwater system via subsidence induced shallow cracking.
- Leakage from swamps.
- Leakage of water directly from the Cataract Reservoir.

Wollongong Coal currently does not hold licences for surface water use for the region covering the proposed mining area and would need to obtain Water Access Licences (WALs) for the total volume of surface water taken from the Upper Nepean and Upstream Warragamba Water Source. The predicted surface water “takes” requiring licensing by the Underground Expansion Project and LW6 Modification Area are shown on **Table 5**.

Table 5 Surface water licensing requirements

Surface water source	Predicted Surface Water “take” (ML/year) – LW6 Modification	Predicted Surface Water “take” (ML/year) – Underground Expansion Project Preferred Project
Wonga East Stream Baseflow	2.57	6.83
Cataract Reservoir Leakage	0.33	1.83
(Total)	2.90	8.66

Wollongong Coal intends to apply for a WAL for the annual take of up to 8.66 ML/yr of stream baseflow resulting from depressurisation of deeper aquifers to support the Underground Expansion Project. However, as the LW6 modification request may proceed prior to the determination of the Underground Expansion Project application, then a separate lower WAL volume would be sought. This separate WAL would be for 2.90 ML/year and would be sought from DRE.

Licensing for groundwater has been addressed in **Section 3.4.6**.

3.6 Ecology

An updated ecological assessment (Biosis, 2014) has been undertaken for the Underground Expansion Project and addresses a number of concerns relating to assessment methodology, potential impacts to upland swamps, and other issues raised in relation to biodiversity for the Underground Expansion Project. The assessment addresses a number of issues also relevant to the LW6 Modification Area which are referred to in this section. For the comprehensive assessment refer to Biosis (2014), included as **Appendix F** of this Submissions Report.

The updated ecological assessment has been prepared taking into account the revised subsidence model (SCT, 2014) and groundwater model (GeoTerra, 2014a). Subsidence modelling for the first 400 metres of LW6 is shown on **Figure 2** and an addendum assessment was completed for the potential changes to groundwater and connected surface water systems associated with the extraction of the first 400 metres of LW6 (GeoTerra, 2014b). These updated specialist inputs have also been considered in the responses provided below.

3.6.1 Survey for Giant Dragonfly

It was raised in submissions that no surveys have been undertaken for the threatened Giant Dragonfly (Petalura gigantea). Biosis has since undertaken an updated assessment (Biosis, 2014) which included a review of potential habitat within the Wonga East area, including swamps CCUS4 and CRUS1 located above LW6 (Biosis, 2014).

Additional surveys were undertaken by Biosis in December 2013 and January to February 2014. These additional surveys focused on identifying significant breeding habitat through surveys for exuviae of the Giant Dragonfly, as it is breeding habitat for this species that is likely to be susceptible to impacts from subsidence and consequent changes in soil moisture. Exuviae were located in upland swamps CCUS4 and CRUS1 in areas with deep, organic soils. In CCUS4 this was at the downstream extent of these swamps, where there was an accumulation of groundwater and open vegetation. In CRUS1 this was in pockets of groundwater dependent Tea-tree Thicket with an open overstorey, created by underlying geology.

Of the upland swamps where exuviae of the Giant Dragonfly was observed, only CCUS4 is at risk of impacts as part of the initial extraction of LW6 (which mines directly beneath CCUS4). Although impacts to Giant Dragonfly habitat in upland swamp CRUS1 may be indirectly impacted through upper sections of these upland swamps being mined beneath, the risk of impact to water availability in these upland swamps is low (refer **Section 3.6.2**). The risk of changes in water availability impacting on habitat for the Giant Dragonfly in CCUS4 is considered high. However, impacts are unlikely to result in a significant impact to the local population of this species, as the Giant Dragonfly has been recorded elsewhere in the immediate area, and the species has regularly been observed in previously undermined upland swamps.

3.6.2 Upland Swamps

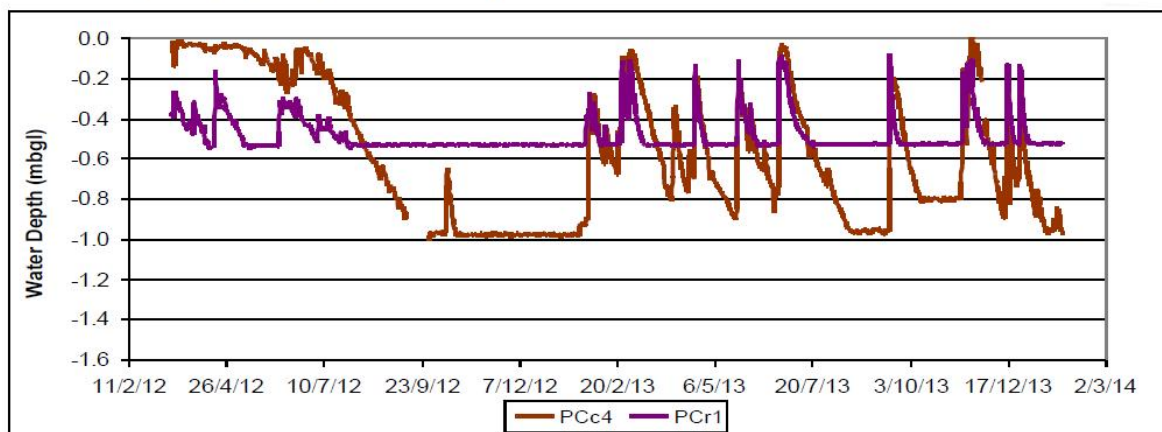
Baseline Data and Historical Impacts

Issues were raised regarding the availability and use of more recent monitoring and baseline data in order to assess impacts to upland swamps as a result of subsidence. In particular, focus on water level response following periods of rainfall.

Updated reports produced by GeoTerra (2014a; 2014b) show the water levels with respect to mining of LW4 and LW5. This includes updated data following completion of LW5. The updated Biosis assessment (2014) used updated data to revise the upland swamp impact assessment, and show swamp hydrographs for CCUS4 and CRUS1 which would be undermined by LW6 (refer to **Figure 3**). The following is drawn from the hydrographs:

- The piezometer in swamp CCUS4 (PCc4) overlies first workings in the Bulli Seam, and undergoes evapotranspiration as well as drainage after rainfall with overland seepage outflow to a northerly draining gully then to Cataract Creek. Possible adverse effects due to prior subsidence may be evident in this swamp due to its enhanced drainage recession rates.
- The piezometer in swamp CRUS1 (PCr1) overlies pillar extraction workings in the Bulli Seam, and undergoes evapotranspiration as well as drainage after rainfall with overland seepage outflow to a southerly draining gully then to Cataract River. Possible adverse effects due to prior subsidence may be evident in this swamp due to its enhanced drainage recession rates. However, as the swamp has limited humic matter with numerous shallow outcropping or subcropping sandstone outliers, it is equally possible that the swamp has little storage capacity and drains / evaporates rapidly as a result.

Hydrograph – Upland Swamps CCUS4 and CRUS1



Rainfall

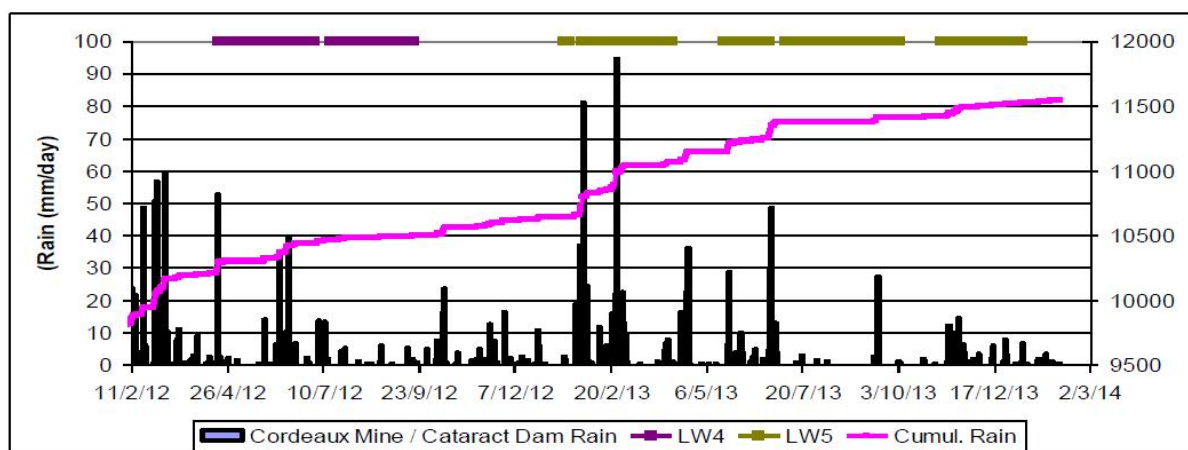


Figure 3 Hydrograph monitoring results for CCUS4 and CRUS1

Groundwater data from piezometers located in upland swamps indicate varying water levels. The monitored locations within swamps CCUS4 show sustained groundwater levels for prolonged periods following rainfall. This corresponds with the vegetation communities within these upland swamps, with CCUS4 supporting areas of MU43 Tea-tree Thicket and MU44c Cyperoid Heath. Both vegetation communities rely on permanent to intermittent waterlogging have been observed to be in good condition during recent surveys.

CRUS1, which supports a mix of MU42 Banksia Thicket and MU43 Tea-tree Thicket, is considered an anomaly. It has shallow soils and some areas of MU43 are known to be located in "bowls" within the underlying geology, resulting in water accumulation in depressions in bedrock.

It is worth noting that the upland swamps listed above have been subject to significant tilts and strains from past mining, substantially above what has been predicted by MSEC to result in fracturing of bedrock in waterways (DoP 2010) and the criteria listed in OEH (2012) for assessing the risk of negative environmental consequences to upland swamps. These levels of tilts and strains are likely to have resulted in fracturing of the bedrock beneath these upland swamps from past mining. However, monitoring data is not available to confirm whether this has definitely occurred.

While piezometer data from CCUS4 shows significant groundwater contact for prolonged periods following rainfall, other swamps that have previously been mined beneath in this area show rapid regression of groundwater levels following rainfall. Despite this, the vegetation in these areas is consistent with upland swamps, albeit often drier representation of swamp communities. In the absence of historic monitoring data it is acknowledged that it is difficult to draw a conclusion on what impacts if any, have historically occurred (Biosis, 2014).

While the scale of impacts from past mining is currently unknown due to a paucity of monitoring data from past mining activities, it is considered large scale loss of upland swamps in the Underground Expansion Project has not resulted from past mining (due to their current condition and having been previously undermined). Some upland swamps, such as CCUS4, show healthy vegetation communities and significant baseflow. The proposed upland swamp network monitoring program currently being developed (refer **Section 3.6.3**) will provide additional information on the scale of primary and secondary impacts.

Reliance on Subsidence Modelling

It was raised in submissions that the modification did not contain information relating to subsidence modelling if there is only extraction of 400 metre section of LW6, and potential impacts this may have on upland swamps.

Since the lodgement of the Modification Environmental Assessment for LW6, SCT has revised subsidence predictions as part of changes to the wider Underground Expansion Project (SCT, 2014). Reassessment of subsidence predictions following monitoring of LW4 and LW5 indicates that past mining has resulted in the softening of the underlying rock strata, and that subsidence is occurring over a much shorter distance than has previously occurred in un-mined areas, with subsidence largely restricted to immediately above the goaf. Whilst this means that subsidence movements occur over a smaller area, it also means that tilts and strains are greater than previously predicted (SCT, 2014).

When strains are greater than about 1-2 mm/m in tension and 2-3mm/m in compression, perceptible fracturing of the sandstone strata below swamps is expected. Subsidence data for upland swamps are presented in SCT (2014) and indicate that extraction of the Wongawilli Seam would result in a maximum of 2.1 metres of subsidence within CCUS4, with tilts between 22 and 31 mm/m, tensile strain of between 6 and 10mm/m and compressive strains between 13 and 19 mm/m. It is therefore anticipated that some fracturing may occur.

Biosis (2014) acknowledges that it is unclear how sensitive swamps are to mining subsidence. There is a clear association between mining and short term loss of piezometric pressure after rain within the surface layers of some swamps. However, no significant detrimental impacts have been observed for the swamps located within the LW6 Modification Area despite having been previously subsided to levels that are of the same order as the subsidence expected above future longwall panels. This observation suggests that the drop in piezometric pressure observed when some swamps are mined under may not have had a significant impact on their long term condition (Biosis, 2014).

Potential Impacts to Upland Swamps

A number of submissions raised concerns regarding potential impacts to upland swamps. These concerns included the potential for the drying out and draining of upland swamps, and impacts to the general upland swamp

ecosystem which are addressed below. Loss of flow to surface water systems (including Cataract Creek) was also raised as an issue in conjunction with these ecological concerns.

Potential impacts to upland swamps have been assessed in Biosis (2014) and may result from the following mechanisms:

- Fracturing of bedrock beneath upland swamps, resulting in increased secondary porosity and permeability, with potential to drain into deeper sandstone strata.
- Tilting in upland swamps resulting in the re-distribution of perched water levels and surface runoff. This may result in changes in in-flow to upland swamps and / or changes in saturation of vegetation sub-communities.
- Titling in upland swamps resulting in increased potential for development of nick points, scouring and erosion.
- Changes in baseflow discharge and from upland swamps.

It has been noted that monitoring by BHP Billiton Illawarra Coal (BHPBIC) and OEH has demonstrated that mining has resulted in fracturing of bedrock beneath upland swamps and consequent loss of the perched aquifer, loss of water flow at the base of the swamp and loss of soil moisture. Such impacts have been posited to 'alter the ecological function of the upland swamp and a high likelihood of eventual loss of vegetation communities and habitat that characterize upland swamps' (OEH submission on the Preferred Project Report for the Underground Expansion Project).

Data from previous mining of the Bulli and Balgownie seams indicates that at least some of the upland swamps in the LW6 area have experienced levels of subsidence likely to have resulted in fracturing of bedrock and a risk of negative environmental outcome. A previous report by Biosis (2013) concluded that data from piezometers located in some upland swamps across the wider Wonga East area show regression of groundwater consistent with a 'fractured' swamp (e.g. CCUS3, CCUS6 and CRUS1), whilst others do not (e.g. CCUS2, CCUS4 and CCUS5).

Based on the historical analysis of upland swamps it is suggested by Biosis (2014) that fracturing of bedrock beneath upland swamps does not necessarily result in the loss of the swamp. This is supported by the review undertaken by Evans & Peck (2014), which concluded that the water retention characteristics of upland swamps had not been affected by past mining. Evans & Peck conclude that the majority of upland swamps in this area have maintained a perched groundwater system and do not show evidence of cracking, despite past mining. However, it is acknowledged that there is currently a paucity of suitable monitoring data from past mining to determine the long-term impact on these swamps.

CCUS4 has been identified as a significant swamp within the LW6 Modification Area that drains via a first order watercourse (and low point of LW6). CCUS4 has previously been subsided 0.6 - 0.8 metres by mining in the Balgownie Seam and has been observed by Biosis (2014) to still be in good health. Proposed mining of LW6 in the Wongawilli Seam is expected to cause up to 2.1m of additional subsidence. Impacts such as cracking of the sandstone base and surface water diversion may occur as a result of proposed mining due to short-term increased strains on the upper margins of LW6 under CCUS4. In addition to fracturing of the base of CCUS4, there is potential for impacts to the sandstone formation at the downstream extent of this upland swamp. Impacts on the integrity of this formation (such as cracking or rockfall) may result in a significant impact to the water holding capacity of CCUS4.

The risk assessment undertaken by Biosis (2014) indicates that there is an increased risk of a secondary impact to upland swamp CCUS4 as a result of the revised subsidence assessment (SCT, 2014) which predicts higher tilts and strains than the previous SCT (2012) assessment for CCUS4 (refer to **Section 3.3.1**). Further information on the potential impacts to upland swamps above LW6 as a result of increased tilt and strains is provided in **Table 6**.

Table 6 Discussion of Tensile and Compressive Strains for Upland Swamps within LW6

Swamp	Discussion of tilts and strains
CCUS4	CCUS4 supports MU43 Tea-tree Thicket and MU44c Cyperoid Heath, which are reliant on permanent to semi-permanent water availability, as well as MU42 Banksia Thicket. Soils are 15 – 179 cm in depth and consist of humic sandy clays to minerals sands. Strains and tilts have increased following the revision of subsidence data by SCT (2014). The location of water-dependent communities, including MU44C Cyperoid Heath and MU43 Tea-tree Thicket at the base of LW6 are in areas of lowest strain and tilt and are considered unlikely to experience the full range of predicted impacts. Observations by Biosis (2014) suggest the natural water cycle occurs in the swamp including evapotranspiration (loss of water in plants to the atmosphere) as well as gradual drainage after rainfall, and that there is no evidence of adverse effects due to prior subsidence. An overhanging sandstone formation, approximately 7.1 metres high, forms a waterfall at the base of CCUS4. This sandstone formation forms a rockbar at the downstream extent of upland swamp CCUS4. There is evidence of impacts from previous mining, including collapse of a section of this sandstone formation and some cracking of the sandstone outcrop, to the west of the waterfall below CCUS4. Horizontal compression of this sandstone formation has the potential to result in rockfall or tensile cracking of this sandstone formation (SCT, 2014). As this sandstone formation forms a rockbar at the downstream extent of CCUS4, fracturing that might occur is likely to result in changes in hydrology such as potential changes to the water holding capacity of CCUS4.
CRUS1	CRUS1 supports a mix of MU43 Tea-tree Thicket and MU42 Banksia Thicket. Based on the shallow soil profile, MU43 Tea-tree Thicket is likely to persist in areas of water accumulation resulting from rock terracing, as evident from analysis of slope and testing of soil depths (Biosis, 2014). Only the upper section of this upland swamp is located within the predicted subsidence zone of LW6. Soils in this area are between 25 and 70 cm, and consist of mineral sands. These areas are unlikely to support significant groundwater, given the shallow depth of soil and the lack of connectivity between the perched aquifer and the deeper groundwater system, which is supported by the types of vegetation present at the swamp. Observations by Biosis (2014) suggest the natural water cycle occurs in the swamp including evapotranspiration as well as gradual drainage after rainfall. However, possible adverse effects due to prior subsidence may be evident in this swamp due to its enhanced drainage recession rates. However, as the swamp has limited humic matter with numerous shallow outcropping or subcropping sandstone outliers, it is equally possible that the swamp has little storage capacity and drains / evaporates rapidly as a result.

Biosis (2014) acknowledges that there is currently insufficient data available to draw the conclusion that fracturing of bedrock beneath an upland swamp leads to a high likelihood of eventual loss of the vegetation communities and habitat that characterise upland swamps. As such, an upland swamp network monitoring program is currently being developed (refer to **Section 3.6.3**). This monitoring program would assist Wollongong Coal in determining whether impacts are negligible, as well as providing information on primary and secondary effects of longwall mining on upland swamps. **Section 3.6.3** outlines how Wollongong Coal proposes to achieve these aims and what corrective actions will be undertaken should greater than negligible impacts to CCUS4 occur. This includes the development of a Biodiversity Offset Strategy if triggers, outlined in the conditions of approval and identified in the Biodiversity Management Plan, are exceeded.

One piezometer is located within CCUS4 and LW6 (PCc4) and has been monitoring groundwater during the mining of LW4 and LW5. Monitoring from this bore would continue before, during, and after LW6 in order to assess potential impacts to CCUS4. Two more monitoring bores are proposed to be drilled in July-August 2014. These monitoring bores would form part of the upland swamp network monitoring program.

Assessment of Swamps of 'Special Significance'

A number of submissions raised concern for upland swamps identified as 'special significance' for which a negligible impact is required, or adjusting the mine plan where negative environmental consequences may occur.

Biosis has undertaken an updated impact assessment for potential impacts to upland swamps within the Underground Expansion Project, and not just those identified as being of 'special significance' (Biosis, 2014). The assessment for upland swamps relied on the revised subsidence model (refer **Section 3.3.1**) and was undertaken in accordance with the OEH (2012) methodology for upland swamps of 'special significance'.

Biosis (2014) has identified that both CCUS4 and CRUS1 located within LW6 meet the criteria of 'special significance'. A risk assessment has been undertaken to determine whether the upland swamps (including CCUS4 and CRUS1 partially undermined by LW6) would be at risk of negative environmental consequences. This is further discussed in Section 3 of the *Upland swamp environmental assessment guidelines* (OEH, 2012), which states proponents must assess the following:

- *'If negative outcomes are predicted for a special significance swamp, the mining plan should be adjusted in advance so that no negative environmental outcomes are anticipated.'*
- *'If no negative environmental outcomes are predicted, then proceeding to mining, monitoring and adaptive management.'* (OEH 2012, p.12)

The upland swamp assessment undertaken by Biosis (2014) considered, in addition to fracturing of bedrock, other factors such as groundwater availability (and thus potential for draining), changes in flow accumulation (to assess risk of erosion and scouring and potential changes in water availability), orientation in relation to longwalls (to assess potential for ponding) and vegetation sub-communities (to assess the presence of species reliant on soil moisture and thus with greatest risk of change).

Given the location of likely depressurisation (as shown in GeoTerra, 2014b in **Appendix D**) there is an increased risk of drainage and increased risk of fracturing as a result for increased strains for the upland swamp of 'special significance' CCUS4. However, for the upland swamp of 'special significance' CRUS1 the risk of depressurisation is low. The modelling indicates that although the perched, ephemeral groundwater water table associated with upland swamps could undergo a water level reduction it is not anticipated to have a significant overall effect on stream baseflow or stream water quality. However, temporary, localised effects may be observed.

The final risk assessment undertaken by Biosis (2014) for the Underground Expansion Project identified CCUS4 as having a high risk of negative environmental impacts and CRUS1 as having a low risk of negative environmental impacts. The extraction of the first 400 metres of LW6 is considered to have the same level of risk to the upland swamps as for the full extraction of LW6. A summary of how this has been determined is shown in **Table 7** and a comprehensive discussion is provided in Biosis (2014). As such it is concluded that CCUS4 is the only upland swamp of 'special significance' at risk of a more than a negligible impact (as defined by the PAC, refer **Section 3.5.6**).

Table 7 Final Risk Assessment for Upland Swamps Potentially Impacted by LW6

Swamp	Initial Risk Assessment (Risk of Negative Environmental Consequences)	Groundwater	Flow Accumulation	Compressive Tilts and Strains	Final Risk Assessment
CCUS4	Yes	Moderate	Low	High	High
CRUS1	Yes	Low	Low	Low	Low

The mining of only the first 400 metres of LW6 may result in some short-term increased strain on the upper margins of CCUS4 however this is unlikely to result in impacts beyond those predicted as part of the Underground Expansion Project should the full extraction of LW6 occur (pers comms Biosis 2014). It is noted that evidence of successful remediation measures is limited should impacts to upland swamps occur.

A Biodiversity Offset Strategy would be developed if triggers, outlined in the conditions of approval and identified in the Biodiversity Management Plan, are exceeded. These triggers are outlined in **Section 3.6.3**. The Biodiversity Offset Strategy would be developed in consultation with OEH.

3.6.3 Swamp Monitoring and Management

Triggers and Adaptive Management

It was raised that critical impact thresholds should be identified to enable adaptive measures. This section identifies the thresholds or 'triggers' that inform the adaptive management process for upland swamps.

Triggers currently used for upland swamps in the LW5 Biodiversity Management Plan are shown in **Table 8** for which similar triggers would be adopted for LW6. In determining whether more than negligible impacts have occurred to swamps, monitoring of piezometers and visual inspections would assess changes to:

- The size of the swamp.
- Functioning of a swamp.
- Composition of distribution of species within the swamp.
- Drainage of water, or redistribution of water within the swamp.

Table 8 Trigger levels for Upland Swamps

Trigger Level	Action(s) / Reporting
Within prediction (Level 1): - Negligible drainage of water from, or redistribution of water within a swamp, as illustrated by no observable mining induced change in groundwater levels. - Negligible change to the composition or distribution of species, as illustrated by no statistically significant difference between control and impact sites or between before and after mining at impact sites. - No change to vegetation recorded during observational monitoring.	- Continue monitoring. - Report negligible impact in End of Panel reports
Within prediction (Level 2): - Negligible drainage of water from, or redistribution of water within a swamp, as illustrated by a short term water level reduction greater than variability observed in similar swamps and effect not persisting after a >2 year ARI rainfall event. - Negligible change to the composition or distribution of species, as illustrated by a short term (one year duration – first year after mining commences) significant statistical difference between control and impact sites or between before and after mining at the impact sites. - Minimal dieback recorded during observational monitoring. Dieback restricted to single area.	- Continue monitoring. - Review frequency and location of monitoring and determine if additional monitoring is required. - Inform SCA, OEH & DRE of potential impact - Report potential impacts in End of Panel reports

Trigger Level	Action(s) / Reporting
Exceeding prediction: - Piezometers become or stay dry where it has not done so before. - Change to the composition or distribution of species, as illustrated by a long term (greater than one year) significant statistical difference between control and impact sites or between before and after mining at the impact sites. - Significant dieback recorded during observational monitoring. Dieback not restricted to single area.	- Engage ecologist to investigate and report on the cause of trigger exceedences and advise of potential impacts. - Inform SCA, OEH & DRE of investigation outcomes. - Review monitoring program, including frequency and location, and modify if necessary. - Develop and implement impact mitigation and remediation measures in consultation with SCA, OEH and DRE. - Develop a monitoring plan to determine the success of mitigation/ remediation measures. - If mitigation/ remediation measures are unsuccessful determine whether offsets will be required, and develop an offset strategy. - Report in annual and End of Panel reports to inform relevant agencies of results of monitoring

Monitoring and Management of Upland Swamps

A number of submissions raised the need for continued biodiversity monitoring before commencement of mining as well as during and after, in order to differentiate potential mining impacts from natural variation, and to inform and implement active, iterative and adaptive management measures. A number of concerns were raised for the lack of proactive mitigation measures and the need to meet subsidence impact performance measures set by SCA.

The revised assessment undertaken by Biosis (2014) has identified that subsidence impact performance measures set by the SCA (for negligible impacts) are not achievable for the upland swamp of special significance, CCUS4. The performance measures proposed to be met for LW6 will be as described previously in **Section 3.5.6**. It is acknowledged that there is a lack of proactive mitigation measures for upland swamps and that monitoring and adaptive management is the primary measure presented for potential impacts. The LW5 End of Panel Report (Ecology and Heritage) (Biosis, 2014b) demonstrates how this program of monitoring, inspection and targeted action and response would be implemented.

End of Panel reports are currently prepared for Wollongong Coal and require field inspection by an ecologist in conjunction with reviews from other monitoring programs, including the subsidence monitoring program and surface and ground water monitoring program. The reports generally provide:

- An outline of monitoring programs conducted to date.
- Visual impacts to ecology and cultural heritage noted during End of Panel inspections.
- An assessment of the results of monitoring undertaken to date.
- A comparison of observed impacts versus those predicted to occur.
- An assessment of whether actions outlined in the Trigger Action response Plan (TARP) have been triggered.
- Conclusions on impacts resulting from the extraction of the longwall, as well as cumulative impacts from adjacent longwalls.

A Biodiversity Monitoring Plan (BMP) would be developed for LW6 (commensurate with the existing BMP for LW5) and would include an upland swamp monitoring plan to determine, as far as possible, the historic impacts on swamps and establish a comprehensive monitoring regime for water, ecology and geotechnical elements of swamp communities. Key elements of the monitoring plan would include:

- 3D subsidence surveys to gather data on subsidence levels.
- Shallow piezometers to monitor changes in water levels and quality in upland swamps.
- A network of weirs to monitor baseflow from upland swamps and inflows into Cataract Creek.

- Monitoring to obtain data on climatic conditions.
- Vegetation monitoring, as outlined above.

The aim of the upland swamp monitoring plan would be to determine whether subsidence associated with longwall mining is resulting in impacts to the ecological functioning of upland swamps. The plan would be developed in consultation with relevant stakeholders including OEH, DRE and SCA as required.

The existing shallow piezometers installed within the upland swamps at the Russell Vale Colliery would be monitored to gauge changes in standing water levels and swamp groundwater quality over the active mining area. Key water quality parameters would also be monitored on a regular basis for the duration of mining and for an appropriate time following mining. A monitoring program would be designed and implemented to:

- Assess the swamp hydrology.
- Provide advance warning of potential breaches of subsidence predictions.
- Detect adverse impacts on a swamp and underlying strata hydrology.
- Characterise the relationship between swamp/s and their role in recharging the regional groundwater systems.

Water levels would be measured from a network of shallow piezometers in potentially impacted swamps and reference sites, before and after mining. Evaporation and rainfall data would also be collected. Should the standing water level or groundwater quality be unacceptably affected due to subsidence, Wollongong Coal would investigate methods in liaison with the OEH and SCA and ameliorate as required.

A number of remediation measures for upland swamps have been previously outlined in the Water Management Plan should impacts occur, including:

- Remediation of cracks in the base of streams associated with Upland Swamps using similar methods to remediation of creeks.
- Use of coir log dams to prevent erosion of knick points.
- Maintenance of swamp moisture in desiccated swamps using water spreading.

However, there has been little evidence of successful remediation of impacts to upland swamps. A Biodiversity Offset Strategy would be developed if triggers, outlined in the conditions of approval and identified in the Biodiversity Management Plan, are exceeded and cannot be remediated (see below).

Suitable Offsets

A number of submissions raised that where it may not be feasible for the project to meet the negligible impact criteria for upland swamps then a suitable offset strategy should be prepared.

If required, Wollongong Coal would prepare an Offset Strategy for upland swamps where a more than negligible impact is likely to occur (such as for CCUS4). The area to be offset would be incorporated into the Strategy and a suitable 'like for like' offset determined should greater than minor impact occur.

While there is some difficulty in sourcing and securing offsets that meet the 'like for like' principle given the majority of upland swamps are located on public land, with limited potential offsets sites located on private land, land managed by Wollongong Coal west of Mt Ousley Road currently supports a number of upland swamps that could provide potential offsets sites. These upland swamps are currently impacted by recreational motor vehicles, particularly motorbikes, and substantial work would be required to adequately protect these sites as required. Consultation with OEH would be undertaken to determine the suitability of proposed offsets.

3.7 Environmental Management Commitments

3.7.1 Environmental Management Plans

A number of submissions raised the need for updates to the existing environmental management system and management plans for the Russell Vale Colliery.

Wollongong Coal has prepared a number of environmental management plans in accordance with project approvals for the Preliminary Works Project and the subsequent modification for the extraction of LW4 and LW5. These management plans have been reviewed and updated to incorporate comments from the EPA and DP&E and other relevant agencies, where required. Wollongong Coal's environmental management plans and licences are available for public viewing and download on its website (<http://wollongongcoal.com.au/management-compliance-r/>) and include:

- Air Quality and Greenhouse Gas Management Plan.
- Biodiversity Management Plan.
- Conservation Management Plan.
- Heritage Management Plan.
- Noise Management Plan.
- Rehabilitation Management Plan.
- Surface Facilities Water Management Plan.
- Traffic Management Plan.
- Water Management Plan.
- Subsidence Management Plans, including various plans for the monitoring and management of subsidence impacts on:
 - Built features.
 - Biodiversity.
 - Electricity transmission lines.
 - Heritage.
 - Public safety.
 - Water.

Environmental management plans for the extraction of the first 400 metres of LW6 would be prepared in line with the existing management plans, as listed above. The existing environmental management plans would be updated specific to the proposed 400 metre extraction of LW6, in accordance with future approval conditions, subject to approval of this modification. Updated management plans would be made available on Wollongong Coal's website.

Trigger Action Response Plans (TARPs) would be prepared for incorporation into the relevant management plans for LW6, and would include trigger levels for monitoring to assess performance and triggers for the implementation of contingency measures. The TARPs would be prepared in line with those previously prepared for LW4 and LW5, currently available on Wollongong Coal's website.

Measures specific to the environmental management of subsidence, groundwater and surface water are addressed in **Section 3.3.3**, **Section 3.4.5** and **Section 3.5.6**, respectively.

3.7.2 Upgrade of Mine Infrastructure

A number of submissions raised concern with regard to the antiquated nature of mine infrastructure at the Russell Vale Colliery, with subsequent impacts on noise and air quality.

As part of the Preliminary Works Project, approval was granted to upgrade existing mine infrastructure including surface conveyors and coal handling infrastructure, coal sizing, screening, crushing and load-out facilities, site noise and dust controls and a stockpile for ROM coal.

This upgrade is currently underway and is required to meet current standards with regard to environmental performance and management. Measures to mitigate and manage potential impacts on air quality and noise are addressed in **Section 4.1** and **Section 4.2**, respectively.

3.7.3 Outstanding Commitments and Non-compliance

It was raised in submissions that Wollongong Coal (previously Gujarat NRE) has a history of non-compliances and has failed to implement a number of required actions from previous stages of the Preliminary Works Project, or has sought to remove previous conditions of consent.

Wollongong Coal has accepted responsibility for past and current non-compliance issues and is working with regulators to improve compliance and to avoid future issues. Extensive work has been undertaken recently in consultation with several government agencies including DP&E, DRE, EPA, SCA and DoE to further improve on existing management systems. Environmental management plans developed as part of the Preliminary Works Project, and recently updated for the extraction of LW4 and LW5, would assist in managing compliance in the future (refer to **Section 3.7.1**).

Wollongong City Council has requested to be contacted when matters relevant to the Preliminary Works Project have been implemented. Wollongong Coal is committed to future engagement with Council with regard to the project, where relevant.

In addition, the requirement for an Annual Review report and regular Independent Audits would provide the basis for ongoing compliance and continual improvement. Non-compliances with approval conditions, as raised in submissions, have been discussed with the relevant agencies and are addressed in the following sections.

Environmental Protection Licence

Non-compliances with the Environmental Protection Licence are managed by the EPA and listed on the EPA's public register. Information can also be obtained from DP&E regarding matters relevant to this project.

Wollongong Coal has taken additional steps to improve compliance with its Environmental Protection Licence and to improve transport management, including:

- Introducing a three strike warning system to truck drivers regarding failure to comply with the Driver's Code of Conduct.
- Commencement of Wollongong Coal's Coal Distribution Auditing Program.
- Upgrade of all trucks with dash board warning light to achieve covering of the load.
- More signage to achieve covering of the load.
- Road sweeping on Bellambi Lane once a week whilst loading from the open stockpile area.
- Installation of a dedicated water pipeline for the truck washing facility.
- Modification of the existing truck washing facility to provide improved cleaning.
- Regular toolbox talks with all truck drivers regarding requirements of Driver's Code of Conduct

All of the above measures have been incorporated into Wollongong Coal's Traffic Management Plan (2012) and would continue to be implemented for the extraction of the first 400 metres of LW6, as proposed in this modification.

Bellambi Creek Realignment

An issue was raised in submissions with regard to conditions for the Preliminary Works Project which require Wollongong Coal to realign Bellambi Creek before any further mining activities can be undertaken.

Bellambi Creek runs to the south of Stockpile Area 1, passes beneath Stockpile 1 via an 1800 millimetre diameter concrete pipe culvert and then reorients toward the east. Bellambi Creek flows from the end of the 1800-millimetre pipe, under the Princes Highway, past several industrial premises, under the northern distributor, through residential streets, under the railway line, through the Holy Spirit High School's grounds, and then flows out into the ocean. The creek passes through a number of culverts under main transport structures and roads, or disturbed creek beds through urban areas.

Bellambi Creek, upstream of the 1800 millimetre diameter pipe culvert, is a steep sided vegetated gully with trees and large submerged boulders evident. There is evidence of accumulation of rubble and debris in the invert of the gully. During August 1998, the Illawarra region experienced a major storm event, which records for the Colliery indicate was in the vicinity of a 100 year average recurrence interval (ARI) event. Although the existing site had diversion drains and a piped system, the stormwater system failed and resulted in diversion of clean water through the coal stockpile causing considerable environmental damage downstream.

The extreme rainfall events of August 1998 resulted in major erosion and landslips along the Illawarra Escarpment upslope of the Russell Vale Colliery. The effect of this was that the headwaters of Bellambi Creek carried the stormwater and associated debris for a period of time until it silted up and overflowed the bank at the M3 culvert, located adjacent to the pit top area concrete apron. The stormwater and associated debris then travelled down to the existing ROM stockpile at that time which became unstable and fluidised to the extent of being washed down Bellambi Lane and contaminated Bellambi Creek.

A Flood Study has been undertaken for the Bellambi Creek catchment to understand existing flood conditions and to determine the necessary flood mitigation measures, and this study has been included in **Appendix G**. The Flood Study modelled a number of scenarios to assess flooding through the site, and has taken into account the blockage criteria within the *Wollongong Development Control Plan 2009*. It has been concluded that overland flows are mainly contained within the stockpile area before continuing as sheet flow downstream towards Bellambi Lane. The Flood Study recommended the following mitigation measures to reduce clean runoff entering the stockpile area, while conveying site runoff in a controlled way to Bellambi Creek:

- Raising the stockpile area access road and installing new culverts to convey the site runoff beneath the access road, into a proposed grass-lined swale before discharging into Bellambi Creek.
- Implementing a debris control structure at the 1800 millimetre diameter pipe opening to reduce probability of blockage within the system due to debris from upstream catchment.
- Formalising the swale in the vicinity of the existing 600 millimetre clean water inlet. This would provide increased temporary storage for stormwater which helps to manage peak flows from the upstream catchment and to enable the clean water runoff to be captured before entering the stockpile area.
- Culverts may be installed across the access road along the northern boundary of the site to direct flows from catchment M8 directly towards Bellambi Creek, in order to reduce clean water runoff conveyed into the stockpile area.
- Consideration of upgrade to the existing 600 millimetre diameter clean water pipe to an 825 millimetre diameter pipe although the other proposed mitigation measures does not rely on this upgrade (and was not modelled in the proposed scenario model).
- Appropriate maintenance should be carried out immediately upstream and downstream of the existing debris control structures within the Bellambi Gully to minimise the potential for blockage of the system.

Wollongong Coal is proposing the following actions to prevent a re-occurrence of the Bellambi Creek flooding event:

- Wollongong Coal would review and implement a number of the recommended mitigation measures identified in the Bellambi Creek Flood Study which were considered adequate to convey the 1:100 ARI, in particular the recommended swale and culvert structures.
- Wollongong Coal would review and revise the current Surface Facilities Water Management Plan to identify and implement further mitigation measures for Bellambi Creek if required.

Evidence available to Wollongong Coal suggests that the above mitigation measures would be sufficient to manage potential flood impacts and that realignment of Bellambi Creek is not required to reduce the risk of repeat of the 1998 event. As such Wollongong Coal has requested as part of the Preferred Project Report for the Underground Expansion Project that the DP&E remove this condition from an approval given for the Underground Expansion Project.

Noise Walls

An issue was raised regarding a noise wall commitment as part of the modified Preliminary Works Project for LW4 and LW5, which is yet to be implemented. This commitment required improved noise mitigation measures to be assessed and implemented, in consultation with the Community Consultative Committee, as an alternative to the two acoustic noise walls included in the statement of commitments for the Preliminary Works Project.

Noise modelling undertaken for the Preliminary Works Project identified that the predicted noise levels at Receivers 1 - 4 (R1 – R4) located in Corrimal would increase by a maximum of 3 dB(A) as a result of the removal of the proposed acoustic noise walls. The Director-General's Environmental Assessment Report for the Preliminary Works Project (DP&I (now DP&E), 2011) identified that exceedance of the Project Specific Noise Criteria both with and without the noise walls were predicted at these receivers. As a result, DP&E considered that the barriers were "of limited beneficial effect" and that the "proposed barriers would be visually intrusive".

The Director-General's Environmental Assessment Report for the Preliminary Works Project (DP&I (now DP&E), 2011) also identified that the upgrade of existing mine infrastructure, as discussed in **Section 3.7.2**, would lead to further reductions in noise impacts. The upgrade of mine infrastructure undertaken to date has included the replacement of the original 40 metre cubed (m³) twin axial mine exhaust fan, located at the Pit Top area, with two 90m³ ventilation fans.

As part of the assessment of the Preferred Project Report for the Underground Expansion Project, a noise assessment of the new 90m³ ventilation fans was undertaken (BGMA Pty Ltd, 2012). The assessment concluded that the two 90m³ ventilation fans operate within the required noise constraints, and that they will not adversely impact on the acoustic amenity of the local community.

Based on advice from both DP&E noise professionals and respected noise consultants, Wollongong Coal does not believe that erecting the noise walls is the most effective method of reducing noise impacts on the local community. Wollongong Coal will utilise the existing Noise Management Plan (refer **Section 3.7.1**) to enable appropriate actions to be implemented to meet specific noise criteria determined as appropriate for the operation of the Russell Vale Colliery.

Vegetated wind breaks

It was raised in submissions that Wollongong Coal has refused to design and plant vegetated windbreaks on site to reduce coal dust from blowing offsite.

This submission relates to an EPA State-wide Environmental Protection Licence update which required all coal mines to undertake an assessment of best practice dust management activities on site. Wollongong Coal engaged PAE Holmes to undertake an assessment in accordance with this requirement, however this assessment did not form part of the Preliminary Works Project and considered parts of the Russell Vale Colliery, such as the reject emplacement area to the north of the site, that are outside of the scope of the Preliminary Works Project MP10_0046 approval.

Vegetative wind breaks were mentioned in the PAE Holmes report as a method of wind speed reduction but were also identified as the least effective measure of the methods mentioned, and were not included as an example of best practice dust management activities.

The PAE Holmes report identified that the majority of emissions were attributed to the reject emplacement area. Wollongong Coal is currently undertaking planting of vegetation around the site, however to act as an effective wind break, vegetation needs to be located in close proximity to the area that is to be protected. This is not possible for the reject emplacement stockpile area. Instead, Wollongong Coal uses stockpile sprays and water carts to suppress dust in the active stockpile areas, and has enclosed the Wongawilli conveyor system from the transfer point to the start of the tripper gantry to reduce dust emissions. Real time air monitors have also been installed in two locations across the site to monitor dust emissions, with triggers for additional management measures incorporated into the Air Quality and Greenhouse Gas Management Plan.

4.0 Response to Other Issues Raised

4.1 Air Quality and Health

4.1.1 Airborne Particulates and Potential Health Impacts

A number of concerns were raised with regard to potential increases in coal particulates and dust pollution from the mine on to nearby populated areas, including implications for potential health impacts. This is also linked to a lack of PM_{2.5} data and modelling. It is implied that design measures that could reduce coal dust impacts are not implemented or investigated by Wollongong Coal.

As discussed in the Environmental Assessment for the modification request, coal handling and extraction would continue consistent with current, approved operations at the Russell Vale Colliery. No amendments to air quality related conditions of approval are required, and no changes to air quality performance or impacts would occur above approved operations.

Wollongong Coal has also proposed the inclusion of an air and noise monitoring program as part of its Noise Management Plan and Air Quality and Greenhouse Gas Management Plan to achieve compliance with requirements of the Preliminary Works Project approval conditions for air and noise compliance monitoring (**Section 3.7.1**). Steps taken to achieve compliance with Wollongong Coal's Environmental Protection Licence, and measures to improve transport management, have also been described previously in **Section 3.7.3**.

Based on the outcomes of consultation with regulators and DP&E during the development of conditions for the Underground Expansion Project, Wollongong Coal would comply with the conditions of project approval that relate to air quality.

While it has been noted that PM_{2.5} has the potential to cause adverse health impacts, there is currently a lack of evidence to suggest that 2.5 µm particles are a significant issue from the operations of underground coal mines in the Southern Coalfield (PAE Holmes, 2010). Nonetheless, Wollongong Coal has accepted the community's concern regarding the PM_{2.5} issue and has subsequently installed real time air quality monitors. While there are no requirements for Wollongong Coal to model or monitor particles of 2.5µm diameter, the new air quality monitoring system measures 2.5µm particles, in addition to PM₁₀. As part of a recent undertaking to the DP&E, these monitors were installed in 30 September 2013 and complement the already installed and depositional dust monitors on site and in the community.

Wollongong Coal is also extending its depositional dust network to three local schools in the area to provide better background data on local dust levels and particularly coal particle distribution from the Colliery. The gauges have already been installed in two of the three schools (the Corrimal Public School gauge is still to be installed).

Wollongong Coal is committed to minimising the creation of airborne particulates through implementation of its Air Quality and Greenhouse Gas Management Plan and in consultation with regulators and the community.

4.1.2 Dust Generation from Trucks

Concern was raised that the modification would result in an increase in airborne particulates and exhaust from truck movements.

No changes to current truck movements would occur as a result of the modification and therefore no increase in air pollution from mine vehicles is anticipated. Wollongong Coal trucks only contribute a small volume of dust compared to the large numbers of existing vehicles using Bellambi Lane, Memorial Drive and Princes Highway. Wollongong Coal haulage trucks are not the only, nor the predominant source, of diesel vehicle emissions in the area as there are other industries using diesel vehicles and machinery, and the Princes Highway and Memorial Drive are used by large numbers of diesel vehicles not associated with Wollongong Coal's operations.

In addition, Wollongong Coal has taken additional steps to improve transport management, in line with its Environmental Protection Licence and Traffic Management Plan, as discussed in **Section 3.7.3**.

4.1.3 Exhaust Fan

Concern was raised regarding potential air quality impacts from the large exhaust fan above the residential area which is often referred to as a portal.

Since the initial assessment in the Underground Expansion Project Environmental Assessment, the original twin axial mine exhaust fan at the Pit Top has been replaced by two ventilation fans, as discussed in **Section 3.7.3**. Wollongong Coal is in the process of installing sensors in these fans to monitor emission parameters including gases such as methane and carbon dioxide. Monitoring results and air quality management actions would be guided by the Air Quality and Greenhouse Gas Management Plan (refer to **Section 3.7.1**).

Current emissions of particulates, gases and other elements from operating ventilation shafts in the Southern Coalfields are historically well below the relevant limits set by regulation as evidenced by the historical emissions data provided for BHP Billiton Illawarra Coal's Ventilation Shaft No. 6 Project (PAE Holmes, 2010). The exhaust fans at Russell Vale Colliery do not significantly contribute to air quality emissions from the site.

4.2 Noise

A number of submissions raised concern over noise pollution caused by colliery operations and the need for new truck loading facilities to minimise noise impacts, and concerns of emissions from the pit top exhaust fan over the community.

A Noise Audit was completed in December 2012 at Russell Vale Colliery by PEL Pty Ltd. The results showed that the Colliery was in compliance with its noise limits as specified in the Preliminary Works Project Part 3A approval, with the exception of one minor unauthorised evening truck movement. This non-compliance was addressed and all drivers must comply with Wollongong Coal's Drivers Code of Conduct.

Current activities are quieter than historical operation of the Colliery, as Wollongong Coal no longer operates a washery on the site. Works undertaken to upgrade the mine's exhaust fan (refer to **Section 3.7.2 and Section 3.7.3**) have also resulted in significant improvements to noise emissions and a consequent reduction in noise complaints.

Further, Wollongong Coal's trucking contractor has accepted a 50 kilometre per hour voluntary speed restriction to minimise the likelihood of road traffic / pedestrian incidents. This has also lead to a reduction in noise generated by traffic movements. All drivers working for Wollongong Coal are subject to the Drivers Code of Conduct and are held accountable to their responsibilities by the haulage contractor and Wollongong Coal.

Through implementation of its Noise Management Plan (refer to **Section 3.7.1**) and in accordance with its Environmental Protection Licence, Wollongong Coal is committed to working with DP&E and EPA to implement best practice noise management measures.

4.3 Community Consultation

4.3.1 Timing of Exhibition Period

An issue was raised regarding the timing of the public exhibition of the modification EA, which overlapped with public holidays and where the general public did not have sufficient time to respond.

The Environmental Assessment was publicly exhibited from 22 April 2014 until 13 May 2014. The timeframe for exhibition is a statutory period that was set by the Director-General.

4.3.2 Flow of Information to the Community

Concerns were raised regarding a lack of community consultation however it is unclear whether these concerns relate to the modification of LW6, the Preliminary Works Project, or the Underground Expansion Project.

Wollongong Coal attempts at all times to communicate truthfully and transparently with the community. While Wollongong Coal and previous owners/ managers of the Colliery have had both actual and perceived failures in dealing with the community in the past, Wollongong Coal is committed to continual improvements in community consultation.

The physical works envisaged as part of the LW6 modification request have already been subject to:

- Wollongong Coal consultation undertaken for the Underground Expansion Project, including issue of newsletters, a 1800 community hotline, and community meetings and information sessions. The full extraction of LW6 was identified in these consultation materials and activities.
- The public exhibition and response process for the Underground Expansion Project, which included information, submissions and responses relevant to LW6.
- Further community input through the upcoming PAC process for the Underground Expansion Project, which is relevant to LW6.
- The statutory public exhibition process for the modification request itself, including this Submissions Report.

In light of the above communication activities, Wollongong Coal considers itself to be familiar with the community's issues and concerns with both the Underground Expansion Project and the LW6 modification request.

4.3.3 Outstanding Requests for Information

A submission raised a number of questions regarding the operation of the Russell Vale Colliery which are said to have not been answered. These questions relate to mining of V Panels in the Bulli seam, the current work force at Russell Vale and a current list of community and sports groups that Wollongong Coal will donate to.

Wollongong Coal has approval to remove remnant coal from the V-Mains Panel, an extraction area in the Bulli seam between earlier longwalls to the south of Wonga West. However, the extraction of this resource is not considered viable due to geological and economic constraints and is therefore no longer proposed.

Workforce and employment at the Russell Vale Colliery is addressed in **Section 4.43.6.3**.

Wollongong Coal acknowledges that contributions to local community and sporting groups are important to the wider community. Wollongong Coal has historically supported 21 different community groups and sporting organisations to the sum in the order of \$1.4 million in total. Wollongong Coal is committed to continuing contribution to the local community where relevant and commercially prudent to do so.

4.4 Socio-economic

4.4.1 Outstanding Debt

Submissions raised concern about Wollongong Coal meeting environmental and financial obligations and causing economic stress. It has also been suggested that Wollongong Coal has evaded paying government taxes and royalties.

The LW6 modification application would allow initial extraction of 400 metres of LW6 to progress in order for Russell Vale Colliery to remain operational and retain existing employees. Without a short term continuation of operation, the Colliery will be unable to pay taxes and royalties and will be unable to retain existing employees.

The valuation of the greater Underground Expansion Project has been estimated to generate \$18 million in NSW State royalties (to which the proposed modification would contribute), which would be payable by Wollongong Coal.

4.4.2 Employment

It was suggested that employment figures have been inflated by Wollongong Coal and fluctuations in employment at the colliery suggest that job losses are imminent due to financial pressures given the current price of coking coal and investment capital available to Wollongong Coal.

Over 300 employees have been estimated in the Environmental Assessment which is greater than the 287 employees noted at Russell Vale Colliery on 4 April 2013. Employment numbers at all mines fluctuate depending on site activities, stage in mine life and economic conditions. Employment is a fact of commercial operations and needs to be considered in the assessment process.

Employee numbers included in the Environmental Assessment and actual employee numbers for an ongoing operation are reliant on two elements:

- Operational viability dictated by coal prices and operating costs.
- Gaining approvals to allow ongoing proposed operations in a timely manner.

Employee levels at the mine would continue to fluctuate, particularly when development into new parts of mining areas occur or when upgrades of equipment take place. However, without ongoing approvals for continued extraction all employees are at risk.

4.5 Sustainability and Greenhouse Gas

4.5.1 Ecologically Sustainable Development

Concern was raised that the project does not consider the principles of ecological sustainable development as it would compromise the ecological character and integrity of the Cataract catchment.

The principles of ecological sustainable development (ESD) have been assessed as part of the wider Underground Expansion Project (ERM, 2012) and are still considered to be applicable to the LW6 modification. In particular, the precautionary principle has been applied as follows:

'The environmental consequences of the project have been assessed as accurately as possible using appropriate specialists in relevant disciplines. Assessments were undertaken in accordance with the relevant State Government Technical and Policy Guidelines listed in the project DGRs. The assessment process involved computer modelling, field validation, scientific analysis and interpretation of the individual and cumulative environmental impacts of the project. This process has enabled the potential impacts of the project to be predicted with a reasonable degree of certainty.

All predictions, however, contain a degree of uncertainty, which reflects the variable nature of the environment. To minimise uncertainty a conservative approach was adopted in regards to mine planning and use of reasonable worst case scenarios in the assessment of impacts.' (ERM, 2012)

Since this original assessment, the mine plan for the Underground Expansion Project has been amended which reduces the overall potential impacts of the project. The LW6 modification is consistent with the principles of the wider Underground Expansion Project (as amended by the Preferred Project Report).

An ecological assessment of potential impacts has been undertaken, in addition to surface and groundwater assessments. These consider potential impacts to the ecological character and integrity of the Cataract catchment, for which impacts are considered manageable through a suite of mitigation measures and a targeted monitoring program. Provided these measures are implemented the project would not compromise the integrity of the surrounding catchment.

4.5.2 Greenhouse Gas Emissions

A number of concerns were raised regarding the exclusion of greenhouse gas information by Wollongong Coal. This included concern for the lack of mitigation measures and a greenhouse monitoring regime (as defined in previous applications). Concern was also raised regarding methane waste as a result of mining proposals, and the implications of coal mining on global climate.

The extraction of the first 400 metres of LW6 would not alter the existing operations of the Russell Vale Colliery but would extend the operations in the short term. A specific greenhouse gas assessment for the first 400 m of LW6 has not been undertaken as part of the Environmental Assessment. However, greenhouse gas emissions resulting from the development would be less than those assessed in the Underground Expansion Project.

The greenhouse gas assessment for the Underground Expansion Project identified the greenhouse intensity of the Underground Expansion Project would equate to approximately 0.35 tCO_{2-e} for each tonne of ROM coal material extracted. This would equate to approximately 350,000 tCO_{2-e} per annum and includes the transportation and end use of saleable coal (Scope 3). For further information on the total project emissions refer to the Underground Expansion Project Preferred Project Report (NRE, 2014).

A number of actions have been undertaken by Wollongong Coal to reduce its fugitive emissions, including:

- Reducing the ventilation fan speed at the No.5 Shaft.
- Installing structures in underground areas to stop air from currently unused areas of the mine entering the ventilation system and reducing air flow from other areas.

These actions are estimated to have reduced emissions from No.5 Shaft by around 77 percent.

Wollongong Coal submitted the Air and GHG Management Plan to DP&E for its approval on 31 August 2012 to achieve compliance with requirements of the Preliminary Works Project approval conditions. This Plan has been approved and is available for viewing on Wollongong Coal's website.

The implications of coal mining on the global climate are difficult to quantify. However, information in the Underground Expansion Project Preferred Project Report (NRE, 2014) provides a conservative estimate based on data from the Carbon Dioxide Information Analysis Centre of the US Department of Energy. This estimate suggests that the Underground Expansion Project would contribute the following to global climate change:

- A 0.06 percent contribution to a 1ppm rise in CO₂ (or equivalent) from the Underground Expansion Project.
- A 0.0004 percent contribution toward a 1°C global temperature rise from the 5 year Underground Expansion Project.

The extraction of the first 400 metres of LW6 would contribute an amount less than that shown above for the Underground Expansion Project.

4.6 Heritage

Concerns raised with regard to Aboriginal heritage suggest that potential impacts to two sites (52-3-0322 and 52-3-0320) may be lost as a result of impacts to CCHS3, CCHS4 and CRHS1 which overlie LW4 and LW5. It was raised that these swamps provide heritage significance to Aboriginal people.

An assessment of Aboriginal heritage sites was undertaken within the modification Environmental Assessment. The assessment concluded that impacts to 52-3-0322, 52-3-0320 and 52-3-0325 as a direct result of mining the first 400 metres of LW6 would be negligible due to the distance from the edge of the 400 metres panel of LW6 (minimal subsidence) to those heritage items, and due to previous subsidence at the site without significant impact.

The Environmental Assessment for the LW6 modification application also considered potential impacts as a result of the wider Underground Expansion Project. Potential impacts as a result of the Underground Expansion Project were assessed as being very low (Biosis, 2013) and it is therefore considered the extraction of the first 400 metres of LW6 would also be very low to negligible.

It is noted that landforms and landscape features such as swamps form part of cultural heritage values as they were a key resource zone for Aboriginal peoples, providing a wide variety of edible plants and fauna species (ERM, 2012), and are therefore considered to have high archaeological potential. Areas of high archaeological potential in LW6 have been previously surveyed by ERM (2012) and Biosis (2013) and involved local Aboriginal representatives. The findings and recommendations documented in these respective reports show that all sites are of high Aboriginal social significance however not all sites are at risk of subsidence impacts. A number of sites have been avoided by longwall mining and a number of sites have also been relocated in consultation with Aboriginal groups.

4.7 Traffic

Concern was raised over the potential for the modification to increase accidents associated with truck transport of coal to the Port Kembla Coal Terminal.

No changes to the current operations, including the number of truck movements, are proposed as part of the modification. Further, Wollongong Coal's trucking contractor has accepted a 50km/hr voluntary speed restriction to minimise the likelihood of road traffic / pedestrian incidents. All drivers working for Wollongong Coal are subject to the Drivers Code of Conduct and would be held accountable to their responsibilities by the haulage contractor and Wollongong Coal.

4.8 Cumulative Impacts

A number of submissions raised concern that the LW6 modification did not consider the wider mining operations as well as the proposed Underground Expansion Project. It was also raised that the modification Environmental Assessment did not adequately consider cumulative environmental impacts of the proposal.

The modification application has considered cumulative impacts as follows:

- Collaboration between groundwater, surface water and ecology specialists to inform the interaction and dependency between these issues for presenting adequate technical assessments. For example, the ecology report relies on surface and groundwater data to inform the assessment on upland swamps.
- Modelling undertaken for specialist assessments has included historical data and a wide catchment of data to enable cumulative impacts to be considered.
- An addendum groundwater model for LW6 has been included which takes into account cumulative water inflows and potential losses from aquifers.
- In considering the assessments for the wider Underground Expansion Project the modification application has inherently addressed cumulative impacts of all proposed extraction works in total.

The modification is consistent with the existing operations and therefore is not anticipated to generate significant cumulative impacts above those already assessed as occurring as part of the Preliminary Works Project.

5.0 Conclusion and Justification

Wollongong Coal currently operates the Russell Vale Colliery under existing project approval for the Preliminary Works Project (MP 10_0046). Wollongong Coal has sought a modification to the existing project approval MP 10_0046 to extract coal from the first 400 metres of LW6 in order to continue operation in the short-term.

Wollongong Coal is also currently seeking approval for its Underground Expansion Project, which if approved would allow for continued mining for a period of five years. Determination of this application is not expected until late 2014. The modification application would allow operations to continue without the need to place the colliery into care and maintenance, with consequential adverse impacts on staff currently employed on the site. The additional extraction would permit the colliery to continue to operate in a sustainable and efficient manner with maintenance of full employment, until such time as a determination of the Underground Expansion Project application is made.

The Modification Environmental Assessment for the extraction of the first 400 metres of LW6 was placed on public exhibition for 21 days from 22 April 2014 until 13 May 2014. A total of 39 submissions were received by the DP&E, including nine submissions from local and State government authorities and agencies, four from community and specialist interest groups and 26 from private individuals. Key issues raised included:

- Concerns regarding the planning approvals process and approach.
- Justification for the need for the project, including consideration of alternatives.
- Subsidence related impacts and management strategies.
- Groundwater modelling and potential impacts.
- Surface Water impacts.
- Ecological impacts.
- Outstanding environmental management commitments.

A number of issues raised were not specific to the LW6 modification and were more broadly applicable to the current Underground Expansion Project proposal. Where possible those issues have been responded to in this Submissions Report as they relate to the first 400 metres of LW6. These issues have also been responded to in the Response to Submissions for the Underground Expansion Project Preferred Project Report (NRE, 2014) and Residual Matters Report (Hansen Bailey, 2014).

Since exhibition of the Modification Environmental Assessment, a number of technical studies have been updated and new information provided in response to regulatory submissions on the Preferred Project Report for the Underground Expansion Project (MP 09_0013). The updated and additional technical studies have been undertaken to assess the broader Underground Expansion Project, however these are relevant to the assessment of extraction of the first 400 metres of LW6, which is consistent with the wider Underground Expansion Project (as amended by the Preferred Project Report). In addition, a separate *Groundwater Assessment Addendum – Longwall 6 (400m Extraction)* (GeoTerra, 2014b) and an additional subsidence contour (Figure 2) have been prepared, specific to the extraction of the first 400 metres of LW6.

As result, submissions received on the Modification Environmental Assessment for LW6 have been addressed with regard to new and updated information, which closes out a number of the key issues raised in submissions. The updated and additional technical studies are appended to this Submissions Report for further reference.

This Submissions Report, including the findings of updated and additional technical studies, is largely consistent with the initial Modification Environmental Assessment, which demonstrates that the proposed modification could be conducted with minor environmental impacts, and consistent with the requirements of the existing project approval.

Wollongong Coal is committed to extracting coal from the first 400 metres of LW6 subject to an adaptive management approach, with ongoing monitoring and trigger action response to manage identified elevated impacts. This Submissions Report provides additional information with regard to the monitoring and management measures proposed as part of this adaptive management approach. Subject to implementation of this approach, and in light of predicted low environmental impacts, the proposed modification is unlikely to have a significant impact on the natural, built or human environments.

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References

Biosis (2013) *NRE No. 1 Colliery – Underground Expansion Project: Preferred Project Report – Heritage*, prepared for Gujarat NRE Coking Coal Ltd.

Biosis (2014) *Russel Vale Colliery – Underground Expansion Project: Preferred Project Report – Biodiversity*, prepared for Wollongong Coal Ltd, June 2014.

DoP (2010) *The PAC review of the Bulli Seam Operations Project*. State of NSW through the NSW Planning and Assessment Commission

ERM (2012) *Aboriginal Heritage Assessment*.

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GeoTerra (2012) *NRE No. 1 Colliery Major Expansion Groundwater Assessment*, prepared for Gujarat NRE Coking Coal Ltd, November 2012.

GeoTerra (2014a) *Russel Vale Colliery Underground Expansion Project Preferred Project Report for Wonga East Groundwater Assessment*, prepared for Wollongong Coal Ltd, June 2014.

GeoTerra (2014b) *Russel Vale Colliery Underground Expansion Project Longwall 6 (400m Extraction) Wonga East Groundwater Assessment Addendum*, prepared for Wollongong Coal Ltd, June 2014.

GeoTerra (2014c) *Russel Vale Colliery Underground Expansion Project Groundwater and Surface Water Response to Submissions Residual Matters Addendum*, prepared for Wollongong Coal Ltd, 19 June 2014.

Gujarat Natural Resources Environment (NRE) Coking Coal Ltd (undated). *Underground Expansion Project Preferred Project Report Including Response to Submissions*

Hansen Bailey (2014) *Underground Expansion Project Residual Matters Report*, prepared for Wollongong Coal Limited, 20 June 2014

OEH (2012) *Upland swamp environmental assessment guidelines. Guidance for the underground mining industry operating in the southern coalfield (Draft)*. NSW Office of Environment and Heritage.

Planning Assessment Commission (PAC) (2009) *The Metropolitan Coal Project Review Report*, NSW Planning Assessment Commission, May, 2009.

Planning Assessment Commission (PAC) (2011), *Project Approval for Bulli Seam Operations Project*, NSW Planning Assessment Commission, issued 22 December 2011.

PAE Holmes (2010) *Air Quality Impact Assessment – BHP Billiton Illawarra Coal – Ventilation Shaft No. 6 Project*, prepared for BHP Billiton Illawarra Coal, 9 August 2010

SCT (2014) *Update of Subsidence Assessment for Wollongong Coal Preferred Project Russell Vale No 1 Colliery*, prepared for Wollongong Coal Ltd, June 2014.

Wollongong Coal Limited (2014) *Russell Vale Colliery Longwall 5 - End of Panel Report*, May 2014. Available at: <http://wollongongcoal.com.au/monitoring-r/>

WRM (2014) *Russel Vale Colliery Wonga East Underground Expansion Project Surface Water Modelling*, prepared for Wollongong Coal Ltd, May 2014.

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Appendix A

Register of Submissions

Appendix A Register of Submissions

Submission ID	Name/Agency	Issue	Comment	Reference in Submissions Report
1	Wollongong City Council	Ecology	The modification may result in subsidence impacts (surface or groundwater flow reduction/loss) which may adversely affect the upland swamps CCUS4 and CRUS1 as they overlie the proposed 400 metre section of A2 LW6. Recommendation that the proposed 400 metre section of A2 LW6 be repositioned to the other end of A2 LW6 as this area is clear of the overlying CCUS4 and CRUS1.	3.6.2 and Appendix F
1	Wollongong City Council	Outstanding commitments	Request to be provided with advice as to when each of the works listed in the original Statement of Commitments (Appendix 3 to the Preliminary Works Project Approval) were completed to the satisfaction of NSW Planning and Infrastructure and/or schedule of required completion dates (if not yet completed).	3.7.1
1	Wollongong City Council	Surface water	Request that the proponent be directed to commence the required Bellambi Gully Creek realignment and channelisation works as soon as possible, in order to mitigate potential flooding impacts to downstream properties. Recommendation that this be included as a new/revised condition as part of the modification approval, if granted.	3.7.2
2	NSW Trade and Investment - Division of Resources and Energy	Ecology	Proponent must continue background flora and fauna monitoring before commencement of mining of LW6, or, satisfy OEH and DRE that sufficient data has been collected to differentiate potential mining impacts from natural variation (particularly for CRUS1 and CCUS4 swamp vegetation).	3.6.2 and 3.6.3 and Appendix F
2	NSW Trade and Investment - Division of Resources and Energy	Rehabilitation	Recommend inclusion of approval condition requiring appropriate rehabilitation of any impacts resulting from subsidence or as a result of the Subsidence Management Plan monitoring program (DRE noted during inspection that clearance has occurred to provide line of sight for surveying/monitoring).	3.3.3, 3.7.1
2	NSW Trade and Investment - Division of Resources and Energy	Rehabilitation	Recommend inclusion of approval condition requiring the Rehabilitation Management Plan / Mining Operations Plan to be updated to take into account new mining areas and potential impacts requiring rehabilitation.	3.3.3
2	NSW Trade and Investment - Division of Resources and Energy	Planning	Further extraction of LW6 or other longwalls and first workings/development (consistent with the current application MP13_0013) are to be considered under separate applications.	3.1.1
2	NSW Trade and Investment - Division of Resources and Energy	Subsidence	Proponent must continue the implementation of subsidence risk management strategies used during extraction of LW4 and LW5.	3.3.3
3	Dams Safety Committee	Groundwater	The EA provides no discussion or groundwater modelling that addresses the likely impact of geological structures (Corrimal Fault and dyke D8) on subsidence, or the possible loss of storage via a structure connecting the Cataract Reservoir to the mine. Further: Evidence regarding absence or presence of the Corrimal Fault is contradictory. The Corrimal Fault is present in the area to be extracted by the first 400 metres of LW6. No assessment of the height of connective fracturing in the fault zone is presented. The presence of pathways for loss of Reservoir water and the impact of mining on hydraulic conductivity are not addressed in the current groundwater modelling.	3.4 and Appendix D
3	Dams Safety Committee	Groundwater	Multiple seam operation complicates development of Contingency and Closure Plans for Reservoir water entering the mine. In the case of the proposal, seals are an improbable solution to containing an inflow. Recommend inclusion of approval condition requiring that Contingency and Closure Plans be developed, agreed to by all parties, and in place before extraction of LW6 commences.	3.3.1, 3.3.3, 3.4.5, 3.5.6, Appendix B and Appendix D
3	Dams Safety Committee	Groundwater	Recommend inclusion of approval condition requiring that a borehole be established between LW6 and the Reservoir, before LW6 extraction commences, to investigate/monitor groundwater pressure in the Bulgo Sandstone below the level of the thalweg.	3.4.5
3	Dams Safety Committee	Groundwater	Recommend inclusion of approval condition requiring that a geological risk assessment be undertaken with emphasis on identifying possible conduits for loss of Reservoir water to the mine or to catchments outside of the Reservoir's.	3.4, 3.5 and Appendix D
3	Dams Safety Committee	Groundwater Surface water	Recommend inclusion of approval condition requiring that a program be implemented to collect and analyse data and report on the water chemistry of the overlying strata, the water entering the mine and the Reservoir waters. At a minimum, this should involve monthly sampling for algae, trace elements and Tritium isotopes. Sample boreholes between the mine workings and the Reservoir should be established.	3.4.5, 3.5.6, Appendix D and Appendix E
3	Dams Safety Committee	Subsidence	The EA refers to a variety of working section thicknesses, which would alter the maximum subsidence depending on which one is worked. No working section plan is provided to assess the varying height of extraction through the fault zone.	3.3.2 and Appendix B
4	Environment Protection Authority	Compliance	If the modification is approved it must comply with the EPL, POEO Act and associated regulations.	3.1.2
4	Environment Protection Authority	Planning	The EPA does not support the trend for approval modifications to allow short term works to continue in the absence of the UEP being finalised. Many key environmental issues regarding continued operations are still subject to determination under the UEP.	3.1.1
4	Environment Protection Authority	Planning	Modification should only be granted approval is a commitment is provided by WC that no further modifications will be sought prior to determination of the UEP, and that a provision be attached to the amendment that it expires on 30 June 2015.	3.1.1
5	Heritage Council of NSW	Heritage	No comment.	No response required.
6	Office of Environment and Heritage	Ecology	The proposed extraction of LW6 will not meet a performance measure of negligible environmental consequence for the upland swamps CCUS4 and CRUS1, as significant impacts to both swamps are considered likely. If amendments to the mining layout to avoid or minimise impact are not considered feasible, a biodiversity offset strategy should be prepared.	3.6.2 and Appendix F
6	Office of Environment and Heritage	Ecology	It has been previously recommended that a survey for the threatened Giant Dragonfly (<i>Petalura gigantea</i>) be undertaken and, as this has not to date occurred, the recommendation is reiterated.	3.6.1 and Appendix F
6	Office of Environment and Heritage	Groundwater	Potential for surface to seam fracturing and aquifer drainage has not been adequately assessed. There is no discussion on how the mine will interact with CCUS4 and CRUS1 and other aquifers. Until this has been completed, OEH does not recommend that the modification be approved.	3.4.3 and 3.6.2 and Appendix D
6	Office of Environment and Heritage	Planning	The modification is a continuation of the piecemeal approach to planning and approval of this mine, which fails to consider the cumulative impacts of this activity. It is recommended that the modification be refused at the work sought be assessed as part of the PPR for the UEP.	3.1.1
6	Office of Environment and Heritage	Surface water	It is unclear as to whether adequate consideration has been given to the potential adverse impacts associated with flooding. It is suggested that Wollongong City Council be consulted to ensure consistency with Council's current and forthcoming risk management studies. The modification should incorporate measures to reduce potential adverse flood impacts and downstream flood risk.	3.5.5

Submission ID	Name/Agency	Issue	Comment	Reference in Submissions Report
7	Roads and Maritime Services	Traffic	The modification would not increase traffic generation. Therefore Roads and Maritime do not object to the modification subject to any technical implications regarding subsidence being referred to the Wollongong Coal RMS Longwall Mining Technical Committee.	Comment noted.
8	Sydney Catchment Authority	Ecology	The EA states that potential impacts on upland swamps would be minimal, and that there is potential for bed cracking beneath the swamps. Further, the EA argues that the upland swamps are thriving and that impacts from previous mining have not been significant on their long term condition. This claim is difficult to substantiate due to the lack of baseline data. It is concluded that the modification is unlikely to have negligible impacts on the two swamps located above the 400 metre section of LW6. As these swamps are considered to be of special significance, more than negligible impacts would be considered unacceptable.	3.6.2 and Appendix F
8	Sydney Catchment Authority	Geology	Concerns remain regarding the intersection of the Corrimal Fault and dyke D8 with the LW6 gateroads. It is critical that the understanding of the extent of the Corrimal Fault and the implications of dyke D8 is fully understood prior to a decision to approve the modification.	3.4.2 and Appendix C
8	Sydney Catchment Authority	Groundwater	The primary mitigation option to address uncontrolled inflows to a mine is sealing portals. In this case, this option is not viable.	3.4.5 and Appendix D
8	Sydney Catchment Authority	Groundwater	The EA does not include groundwater modelling that addresses the possibility of losses from the Reservoir as a result of mining. The current modelling does not consider the presence of pathways for loss of Reservoir waters or the impact of mining on hydraulic connectivity. Further, the EA states that mobilised shear planes are considered to be pathways by which a piezometer (located above the Bulli workings, 540 metres from the Reservoir) responds to changes in Reservoir levels. This suggests that there is a potential significant risk of leakage from the Reservoir as a result of the extraction of LW6. It has not been demonstrated that the modification would result in negligible leakage from the Reservoir to mine workings nor that there would be no connective cracking between the Reservoir and the mine.	3.4.1, 3.5 and Appendix D
8	Sydney Catchment Authority	Groundwater Surface water	A risk assessment on the potential for hydraulic connection between mine workings and stored waters as well as surface/groundwater and mine workings should be carried out with the top event assuming a fault zone associated with the Corrimal Fault.	3.4.2 and 3.4.3
8	Sydney Catchment Authority	Mitigation and management	The proponent considers the adaptive management approach to be appropriate in mitigating impacts associated with the modification. Such an approach is not appropriate given the goal of protecting a reservoir, and due to the lag time for mining-related impacts to manifest and changes required to be implemented.	3.3.3, 3.4.5, 3.5.6, 3.6.3
8	Sydney Catchment Authority	Planning	Concern remains regarding the piecemeal assessment and approval process being adopted for longwall mining in the Wonga East area.	3.1.1
8	Sydney Catchment Authority	Planning	Recommendation that the DSC Notification Area around Cataract Reservoir be adopted as an Exclusion Zone where no mining is allowed.	3.5.1
8	Sydney Catchment Authority	Subsidence	The EA is based on subsidence modelling carried out on the assumption that complete mining of LW6 and the adjacent LW7 occurs. The EA therefore does not contain information on subsidence modelling if there is only extraction of 400 metres of LW6. There is no information on the likely subsidence characteristics at the end of the 400 metre section which overlaps with an upland swamp and a low point from which water drains from part of the swamp. The EA also states that ' <i>experience with extraction from LW4 and LW5 suggests that modelled subsidence significantly overestimates what is observed in the field</i> ', a statement that is not substantiated by the recently received LW5 End of Panel Report. For these key reasons, the SCA considers the subsidence modelling to be unsatisfactory.	3.3 and Appendix B
8	Sydney Catchment Authority	Subsidence	There are indications that old goaf areas seemingly protected by barrier pillars and main road pillars are not immune to impacts resulting from mining activity over a kilometre away. These findings have implications for the duration of monitoring regimes and on the level of subsidence impacts.	3.3 and Appendix B
8	Sydney Catchment Authority	Surface water	Statements regarding the setback of mining from Cataract Reservoir are of significant concern and do not provide confidence that the 0.7 times depth stand-off from the full supply level of the Reservoir can be used as an effective primary control for protecting the stored waters of the Reservoir.	3.5.1, Appendix B and Appendix D
8	Sydney Catchment Authority	Surface waterPlanning	As the modification is predicted to have an impact on water quality, it will not have a neutral to beneficial effect on water quality.	3.1.2
8	Sydney Catchment Authority	Surface water Ecology	Recommendation that the SCA performance criteria developed for the proposed mining area be adopted (see submission for further detail).	3.5.6 and 3.6.3 and Appendix D
9	Department of Primary Industries	Surface water	Fisheries NSW advise concern with this mine due to potential impacts on Cataract Creek, a known spawning habitat for the endangered Macquarie Perch. However, the proponent has identified that LW5 has been mined closer to Cataract Creek and has caused no significant impacts or detectable changes, and as the proposed works in LW6 are significantly more distant from the creek it is expected that there will be lesser impacts. Accordingly, Fisheries NSW has no objections to the proposed modification.	Comment noted. No response required.
9	Department of Primary Industries	Groundwater	The methods used to estimate the volume of groundwater and surface take, and other considerations of groundwater impact, do not meet the degree of rigour required by the NSW Aquifer Interference Policy. According to the EIS, a numerical model is under development but has not been used in this assessment.	3.4.1 and Appendix D
9	Department of Primary Industries	Groundwater/Ecology Monitoring and management	There is reasonable risk to two coastal upland swamps listed under the TSC Act, which may be dependent on groundwater. Accordingly, additional studies should be provided to assess the long-term viability of these assets. The mitigation and management measures should be commensurate to this risk and should include a carefully designed and complete groundwater monitoring network with more expansive shallow monitoring bores.	3.6.2 and 3.6.3 and Appendix F
9	Department of Primary Industries	Monitoring and Management	No details are given for what options there might be for a Trigger Action Response Plan (TARP), apart from suggesting changes to how future mining takes place. Given the possible risk of adverse groundwater and related ecosystem impacts, the proponent should provide a detailed TARP so that feasibility of any proposed actions can be assessed.	3.1.3
9	Department of Primary Industries	Surface waterPlanning	As a consequence of aquifer depressurisation there is an estimated 0.6 to 0.7 ML/day volume of take from the surface water features that contribute flow within the Upper Nepean and Upstream Warragamba Water Source of the <i>Water Sharing Plan for the Greater Metropolitan Region Unregulated and Alluvial Water Sources 2011</i> . As has been advised in relation to previous proposals at this site, licencing the take of this water requires further assessment. The volume of take from the surface water features would need to be re-evaluated once the updated numerical model is completed. The proponent should provide details on short term and long term requirements for both surface and groundwater licensing for each relevant water source, and a strategy to obtain these licences. Prior to taking water, the proponent must hold sufficient licences within each water source.	3.5.7 and Appendix D
9	Department of Primary Industries	Surface water	An impact assessment of net loss of water to Cataract Dam under different climatic scenarios should be considered (e.g. normal, dry, very dry), including the economic impact of that loss.	3.5.3 and Appendix D and Appendix E

Submission ID	Name/Agency	Issue	Comment	Reference in Submissions Report
9	Department of Primary Industries	Groundwater Mitigation and management	The proponent should include modelling objectives and uncertainty analysis within the description of predictive groundwater modelling. The table of commitments should include periodic audits of actual impacts against modelling predictions against observed groundwater and surface water impacts to confirm that modelling predictions for verification and validation of modelled predictions.	3.4.1, 3.4.5, 3.5.6 and Appendix D
9	Department of Primary Industries	Mitigation and management	The proposed surface water and groundwater management plans should identify critical impact thresholds in groundwater levels and quality and surface water flows and water quality to enable adaptive response and management of operations within the proposed Surface and Groundwater Management Plan. A mechanism for identifying and reporting variations from predictions should be clearly stated within the Plan. Mining works should not be permitted to commence until the Department is satisfied that sufficient monitoring is in place to ensure that impacts can be adequately measured. Note: to improve the coverage of baseline characterisation data, it is recommended that data loggers be installed in at least four key monitoring wells to enable continuous monitoring of groundwater levels in response to rainfall events.	3.3.3, 3.4.5, 3.5.6, 3.6.3 and Appendix D
9	Department of Primary Industries	Groundwater Planning	The observed ingress of groundwater into the mine workings, from monitoring undertaken as part of the water balance for extraction of LW4 and LW5, is approximately 1.1 ML/day. The proponent holds an aquifer water access licence (WAL 36488) which has a share component equal to 365 ML per year. The expected increase in groundwater ingress due to mining of the LW6 modification area is anticipated to exceed the limits of the current groundwater licence for the site. On this basis, the proponent will be required to secure additional groundwater entitlement. The proponent hasn't considered the licensing implications with respect to loss/reduction in baseflow/surface water and how these could be appropriately licensed consistent with the relevant Water Sharing Plan. LW6 and LW7 are expected to contribute similar inflow increases as LW5 (0.5 ML/day). Some additional flow may also come from Cataract Creek and Cataract Reservoir via the horizontal shear planes that are likely to be mobilised by mining LW6 and LW7. As the area is within the SCA controlled Metropolitan Special Area, groundwater development is generally not permitted as it is a protected area and there are no private bores.	3.4.6, 3.5.7 and Appendix D
9	Department of Primary Industries	Groundwater	There is moderate risk that the zone of depressurization would reach high enough to interact with both the basal shear planes and the delamination zone according to the method applied above (see submission for detail).	3.4.3 and Appendix D
9	Department of Primary Industries	Groundwater	The proponent advises that they are in the process of developing a revised numerical groundwater model to predict impacts of the broader project and address the requirements of the Aquifer Interference Policy. A numerical model is not used to assess the groundwater impacts for the LW6. The proponent has instead drawn upon interpretations based on an updated conceptual model along with measured mine dewatering extraction figures, bore hydrographs and some earlier technical reports. The rigour of the prediction of water take likely falls short of the requirements of the NSW Aquifer Interference Policy (AIP).	3.4 and Appendix D
9	Department of Primary Industries	Mitigation and management	Besides implementing a bore monitoring network and having a subsidence valley closure trigger it is unclear as to what measures (groundwater mitigation measures listed in the EA) actually mitigate and manage potential impacts to upland swamps and surface water features.	3.3.3, 3.4.5, 3.5.6, 3.6.3 and Appendix D and Appendix F
10	Illawarra Residents for Responsible Mining	Project need	WC has not put forward a justifiable reason for the necessity of this application.	3.2
10	Illawarra Residents for Responsible Mining	Consultation	The WC EA was again released at the time of public holidays. This time the exhibition encompassed the Easter - ANZAC Day a week when many people were on vacation. Its associated documentation contains a large amount of material for which the general public were given only two and half weeks to respond. This is unreasonable and unacceptable.	4.3.1
10	Illawarra Residents for Responsible Mining	Project need	WC has stated that the viability of this mine is dependent on the approval of this application. GNRE actually has approval to extract coal from the V Panels in the bulli seam right now. WC seem to insist instead on pursuing approval for the use of their longwall machine. This application should be rejected based on the fact that WC is misrepresenting the situation.	3.2
10	Illawarra Residents for Responsible Mining	Outstanding debts	WC have numerous outstanding obligations. These obligations are in the form of unpaid taxes, unpaid royalties, unfulfilled planning obligations, unpaid services and future possible legal actions. All of these outstanding debts should actually be resolved and paid for prior to any approval to this company. WC states that this minor application will ensure that that the company will be able to continue to meet its "environmental safety obligations". Government should insist on a substantial bond to cover any future unpaid costs.	4.4
10	Illawarra Residents for Responsible Mining	Outstanding commitments Surface water	The Preliminary Works approval required GNRE to realign Bellambi Creek. The company is now operating non-compliantly in regard to this issue and the community downstream from the mine is under constant threat of a flood event. It is imperative that the Bellambi Creek realignment is completed or resolved prior to any further development approval at the mine.	3.7.3
10	Illawarra Residents for Responsible Mining	Outstanding commitments Noise	The Preliminary Works approval required GNRE to construct sound walls on the northern side of the colliery to protect the residential area from noise generated on the site. Mod 1 conditioned that these sound walls could be removed following implementation of other sound attenuation measures, in consultation with the CCC. Measures have never been fully formulated with the CCC, alternative sound attenuation measures have never been instigated, and sound walls have never been constructed. This is unacceptable and it is imperative that noise issues are resolved prior to any further development approval at the mine.	3.7.3
10	Illawarra Residents for Responsible Mining	Noise Air quality	Application has been made in the Expansion Project, the subsequent PPR and now in this modification to continue to load coal off the stock pile and on unsealed roads. It is vital that new truck loading facilities are fully constructed and operational prior to any further approval at the mine. The noise and dust generation from this antiquated infrastructure impacts greatly on the local residents. Fifty tonnes of 0.25 micron dust is blown over the surrounding residential areas each year, and this is from their current 60,000 tonne stock pile.	4.1 and 4.2
10	Illawarra Residents for Responsible Mining	Cumulative	Cumulative impacts of previous and future approvals have not been considered. This small part of the longwall cannot be considered in isolation, but should be taken into consideration with the whole development. Impacts of the development in its entirety should be assessed at one time.	3.1.1 and 4.8
10	Illawarra Residents for Responsible Mining	Subsidence	The first 400 metres of the longwall will have the most dramatic effect on the swamps, the water catchment area and Cataract Dam. If this proposal is to be considered we believe the portion should be relocated towards the east beyond any impact of Cataract Creek. If WC were committed to lowering impacts to the catchment and dam they would propose mining the last 400 metres, use bord and pillar extraction, or consider other options.	3.3 and Appendix B
10	Illawarra Residents for Responsible Mining	Subsidence	The proposed first 400 metres of longwall already encroaches on the Wongawilli seam exclusion zone and the 35 degree marginal zone has already been compromised by the mining in the bulli seam above. This shows a blatant disregard for the safety of the Cataract Dam.	3.3 and Appendix B
10	Illawarra Residents for Responsible Mining	Consultation	The application makes no mention of community consultation. The flow of information from WC to the community via the CCC has stagnated, with WC actively obstructing the flow of information to affected and interested members of the community. Numerous requests for information and complaints have been made and remain unaddressed. It is regrettable that WC have neglected to hold an information session, and have refused to answer questions seeking details of the proposal directed to them by the community and a member of the CCC.	4.3
10	Illawarra Residents for Responsible Mining	Air quality	Numerous requests for information have been made regarding the large exhaust fan above the residential area. The fan is referred to in this application as a rubber vehicle portal. WC have refused to provide information about the monitoring data of this exhaust. The community can only assume that this is a pollution source and request that it is relocated further from the residential areas (preferably above the escarpment) or heavily regulated and monitored.	4.1.3

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10	Illawarra Residents for Responsible Mining	Traffic	Numerous complaints have been made about the inappropriate coal transport system. Bellambi Lane has been reclassified and is maintained by Wollongong City Council. This is a point of contention: why should Council spend \$100,000's of rate payers' money on a road that is primarily used and degraded by WC. WC does not pay royalties or carbon tax and certainly do not contribute to Wollongong City Council.	3.7 and 4.7
10	Illawarra Residents for Responsible Mining	Subsidence Ecology	The extraction of coal from LW6 will cause subsidence within an area that includes Cataract Creek and several upland swamps. The evidence that swamps cannot be safely undermined is overwhelming. Remediation of swamps is not possible and there are no examples of 'self-healing'. Such risks and uncertainties are unacceptable in relation to the need for biodiversity conservation.	3.6.2, 3.6.3 and Appendix F
10	Illawarra Residents for Responsible Mining	Subsidence Surface water	Two first order streams run directly over LW6 to form a second order tributary to Cataract Creek; these streams will be severely impacted by the subsidence over LW6. Subsidence, increased strata permeability and strata depressurisation risks redirection and loss of surface and ground water from the Cataract catchment, as the SCA believes has occurred as a result of the damage to the Waratah Rivulet. The widths of the longwalls that caused damage to the Waratah Rivulet were much the same as the width of LW6. Further, there appears to be little precedent fro multi-seam mining, for which additional subsidence factors of up to 80% have been suggested. Such risks and uncertainties are unacceptable in relation to our water supplies.	3.3.1, 3.3.2 and Appendix B
10	Illawarra Residents for Responsible Mining	Air quality	Residents in the vicinity are exposed to airborne particulates from the colliery's operations (stockpile, crushing facility, ventilation fan, trucking of coal). This modification does not measure or model small particulates. The exposure to particulates of 2.5 microns and less may extend for kilometres and could impact at least 1000 to 2000 homes. It is unacceptable for DoPI and the NSW Government to allow this kind of exposure. Any further approvals at this mine should address the ongoing impacts on the local community. Continued operation of the mine has a significant impact on the human environment.	4.1
10	Illawarra Residents for Responsible Mining	Noise	Residents in the vicinity are exposed to noise pollution from colliery operations and trucking. Countless complaints about noise remain unresolved.	4.2
10	Illawarra Residents for Responsible Mining	Greenhouse Gas	WC has neglected to address GHG emissions. There is no specific monitoring regime defined in the application or in any previous GNRE application. To date, this company has failed to adequately monitor dust and noise from its operations. We do not have confidence that it is monitoring or would monitor fugitive methane emissions adequately.	4.5.2
10	Illawarra Residents for Responsible Mining	Greenhouse Gas	It is wrong for the government to consider allowing CSG wells in the Illawarra on the basis that the methane is a valuable resource, while at the same time allowing large quantities of methane to be wasted only a few kms away by allowing proposals like this modification.	4.5.2
10	Illawarra Residents for Responsible Mining	Outstanding commitments Compliance	GNRE have proved that they are not capable of operating and resourcing this mine, or even self-regulation. They have failed to comply with basic conditions imposed on them by DoPI and the PAC, including implementing plans for noise management and the realignment of Bellambi Creek. WC are continuing that legacy by not investing in appropriate planning methodology or bringing infrastructure up to a standard that will reduce the impact on their neighbours.	3.7
10	Illawarra Residents for Responsible Mining	Socioeconomic	WC have cut 20% of its workforce over the last few months. The size of the workforce at Russel Vale was 293 (at last notification to the CCC) prior to these cuts. Subsequent to this notification a reduction to the workforce of 20% was announced. We therefore assume that the workforce of Russell Vale Colliery is 234 staff and that the figure of 300 staff cited in the EA on page 11 is inflated.	4.4.2
10	Illawarra Residents for Responsible Mining	Socioeconomic	Jobs and royalty revenues may be lost with the rejection of this proposal. However, broader community interests and intergenerational considerations are of greater significance. The number of jobs at stake is small relative to the regional workforce and likewise royalty revenues are very small relative to annual State and Federal incomes. The value of the natural assets at risk cannot be sensibly quantified: they are priceless.	4.4
11	Nature Conservation Council of NSW	Subsidence	This project poses unacceptable impacts to the community, Sydney's Water supply and the environment due to the excessive additional mine subsidence and associated cracking of the surface sandstone strata. It is irresponsible to consider developing this project and we urge the Planning Assessment Commission to refuse this protect.	3.3 and Appendix B
11	Nature Conservation Council of NSW	Ecology	Longwall coal mining can severely affect groundwater and upland swamp ecosystems. The proposed longwall is in the Metropolitan Special Area catchment and is located beneath two Upland Swamps of Special Significance. The modification will involve unacceptable risks to these Upland Swamp environments due to damage from mine subsidence.	3.6.2 and Appendix F
11	Nature Conservation Council of NSW	Groundwater Ecology	Sandstone rock fracturing below the upland swamps will greatly increase groundwater permeability. The two upland swamps of special significance will dry out due to the lowered groundwater levels. The peat soils that support these swamps will then decompose.	3.4.3, 3.6.2 and Appendix F
11	Nature Conservation Council of NSW	Surface water	Watercourses and swamps will be undermined and are an integral part of the Sydney Water Catchment system that supplies Cataract Reservoir.	3.5
11	Nature Conservation Council of NSW	SubsidenceSurface Water	The proposal involves longwall mining a third seam of coal beneath two previously mined seams. Single seam subsidence impacts are difficult to predict; the uncertainty is compounded by the triple seam mining and this poses acceptable risks to the water catchment area. Application of the precautionary principle should be the basis of assessment and rejection of this proposal.	3.3.1 and Appendix B
11	Nature Conservation Council of NSW	Groundwater Surface water	the project could cause serious and permanent damage to local aquifers, surface water environments and water supplies. The key issues facing groundwater and surface waters, from this development are drawdown and aquifer depressurisation, creek flow losses, resources threatening water quality and availability in the region, which poses inherent risk to the land, biota and community.	3.4, 3.5, Appendix D and Appendix E
11	Nature Conservation Council of NSW	Cumulative	The cumulative impacts to the Special Areas of this mining along with past and proposed future workings in the Wonga East area must be considered. A piecemeal approach driven by the financial imperative of one under-resourced foreign-owned mining company, is not only bad planning, it is negligent.	4.8
11	Nature Conservation Council of NSW	Planning	An application for mining LW6 is already under consideration by DoPI as part of the proposed Underground Expansion Project (MP 09_0013). It is clear that this proposal cannot sensibly be regarded as simply a modification to the Preliminary Works project. WC/GNRE is again attempting to incrementally establish its expansion project. DoPI should refuse this application and complete assessment of the proposed Underground Expansion Project in a systematic and transparent manner.	3.1.1
11	Nature Conservation Council of NSW	Project need	The application makes the misleading claim that this development is necessary so that WC can continue to mine. In fact, WC has an existing approval to mine the V panel.	3.2
11	Nature Conservation Council of NSW	Air quality	The development of the mine and extraction and transportation of the coal will cause the release of particulate mater (PM 10 and PM 2.5). Particulate pollution will increase morbidity and mortality; short-term exposure to particulate matter pollution can lead to diminished lung function, damage and inflammation of lung tissue. Coal dust will also impact the health of residents along the trucking route to Port Kembla Coal Terminal. This project should be refused based on the health risks associated with air pollution from mining, stockpiling and transporting coal.	4.1
11	Nature Conservation Council of NSW	ESD	This project goes against the principles of Ecologically Sustainable Development as it would degrade the ecological character of Wollongong LGA.	4.5.1
12	Colong Foundation for Wilderness Ltd	Subsidence	Objection to the modification on the basis that longwall mining over old workings will set a bad precedent, as predicted levels of valley closure, tensile and compressive strains are unacceptably high. Catastrophic cracking damage to the area above LW6, including upland swamps, is a mathematical certainty. Approval of the modification would establish unacceptable standards for mining in the drinking water catchment.	3.3 and Appendix B
13	Save our Water Catchment Areas	Subsidence Groundwater	Concern regarding SCT's advice that the subsidence characteristics of LW4 suggest failure of the bridging capacity of the overburden and consequential vertical 'block' collapse. Vertical block collapse will result in significant mine inflows and loss of rainfall runoff reaching storage.	3.3.1 and Appendix B

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13	Save our Water Catchment Areas	Groundwater	Concern regarding increased strata permeability/hydraulic-conductivity with consequential loss of rainfall runoff reaching storage. The hydraulic conductivity of the Hawkesbury Sandstone in Wonga East domain is nearly two orders of magnitude greater than in Wonga West - apparently because of subsidence effects.	3.4.3, Appendix B and Appendix D
13	Save our Water Catchment Areas	Groundwater	Concern regarding misplaced confidence in the Bald Hill Claystone as an aquitard.	3.4.3, Appendix B and Appendix D
13	Save our Water Catchment Areas	Ecology	Concern regarding impacts to swamps meeting the requirements for identification as being of Special Significance, for which the PAC and former OEH require negligible impact.	3.6.2 and Appendix F
13	Save our Water Catchment Areas	Cumulative	Failure to adequately consider cumulative impacts.	4.8
13	Save our Water Catchment Areas	Planning	Concern regarding incremental implementation of the expansion project, for which an application was first lodged in 2009 and which has yet to be satisfactorily completed. The PAC has acknowledged that this piecemeal approach erodes confidence in the NSW assessment and regulatory system.	3.1.1
13	Save our Water Catchment Areas	Planning	Abuse of the notion of a project modification - further lowering confidence in the NSW assessment and regulatory system.	3.1.1
14	Name withheld - Corrimal (2)	Surface water	LW6 is located in the Sydney Water Catchment Special Area, an area so vital to the integrity of the water catchment that a member of the public could be fined \$44,000 just for entering. Wollongong Coal acknowledges that the longwall may crack two upland swamps and Cataract Creek. Both swamps and Cataract Creek feed into Cataract Dam. Cataract Dam is one of the water storage dams for Sydney Water Catchment Area, an area that supplies drinking water for 4.6 million residents in Greater Sydney.	3.5 and Appendix B and Appendix D
14	Name withheld - Corrimal (2)	Groundwater	The development will increase groundwater inflows into the mine by half a million litres a year.	3.4.3 and Appendix D
15	Name withheld - Corrimal	Surface water	I am totally against this proposal as the impact on the local environment and water catchment areas will be devastating.	Comment noted.
15	Name withheld - Corrimal	Health	Transporting all that coal by truck to Port Kembla will negatively impact on the health of everyone living in the vicinity of Memorial Drive.	4.1
16	Name withheld - Erskineville	General	I believe this proposal to be thorough and with excellent environmental considerations. The long history of this mine, its current restructuring, new management and dedication to environmental impacts is impressive. So far as the company works closely with environmental bodies at each stage of advancement, I do not see any valid reasoning to not grant approval for longwall 6. The future economic stability of the Wollongong region and the vast number of people this mine employs both directly and indirectly calls for a swift response.	No response required.
17	Name withheld - Mount Pleasant	Ecology Surface water	Longwall coal mining is a listed Key Threatening Process in NSW. It damages the surface of the land and cracks water courses and swamps, causing water contamination and loss. (Damage of this sort has been documented already in relation to Waratah Rivulet.) The proposed mining undermines and threatens Cataract River, Cataract Creek, Lizard Creek, Wallandoola Creek and Cataract Reservoir, a number of upland swamps, including swamps of significance, Endangered Ecological Communities and Threatened Species habitats, major cliff lines and Aboriginal Heritage sites - including a sacred birthing site. The watercourses and swamps to be undermined are an integral part of the Sydney Water Catchment system that supplies Cataract dam. The catchment has already been badly damaged by mining, by this proponent and others, and thus there is good knowledge of the likely impacts of further mining.	3.5, 3.6.2 and 4.6 and Appendix F
17	Name withheld - Mount Pleasant	Socioeconomic	The limited royalties and jobs do not justify further damage, which will impact every future generation living in the area, not to mention the permanent damage caused to the natural environment.	4.4
17	Name withheld - Mount Pleasant	Surface water	The proposal includes 390 metre wide longwalls - the widest proposed to date for the Southern Coalfields. Longwalls of this width will certainly result in the loss of surface water. In a time of climate change and increasing frequency of El Nino and droughts, taking risks with surface water already in scarce supply is unacceptable.	3.3.1, 3.5 and Appendix B and Appendix D
17	Name withheld - Mount Pleasant	Subsidence	Single seam subsidence impacts are difficult to predict; the uncertainty is compounded by triple seam mining and this poses unacceptable risks to the catchment. Application of the precautionary principle should be the basis of assessment - and rejection - of this proposal.	3.3.2, 4.5.1 and Appendix B
17	Name withheld - Mount Pleasant	Health	The Russell Vale Colliery is the closest to residential areas of any in the Illawarra. Its proximity already causes significant public health impacts. These will become considerably worse if the modification is approved. New coal storage stockpiles are proposed, with options varying from 315,000 to 840,000 tonnes. These proposed stockpiles would be up to 42m high (or the height of a 14 storey building) and would be located 220m from residences, 375m from a school and 500m from a pre-school. This is an unacceptable development for such a heavily populated area. Moreover, the only exhaust fan from the Wongawilli seam blows pollutants over West Corrimal.	4.1
17	Name withheld - Mount Pleasant	Health	There is increasing awareness and concern about the health impacts of coal dust. A recent study by the World Health Organization found that any level of exposure to particulate pollution is dangerous to health. However, the proponent's studies included as part of the EA only measure particulates down to 10 microns; the Department of Planning and Infrastructure must consider the public health impacts of 2.5 micron particulates and smaller - these are among the most dangerous particulates, and measurement of them is especially important.	4.1
17	Name withheld - Mount Pleasant	Health	The development would result in 682 truck movements daily at peak times on Bellambi Lane and the Northern Distributor, or one truck every 80 seconds, causing unacceptable public health impacts from coal dust, diesel exhaust, noise and traffic congestion.	4.1
17	Name withheld - Mount Pleasant	Traffic	The Northern Distributor is already becoming unacceptably crowded and occasionally dangerous to drive on; these additional truck movements will push congestion to completely unacceptable levels.	4.7
17	Name withheld - Mount Pleasant	Outstanding commitments Compliance	GNRE is an unsuitable proponent. It has been responsible for multiple compliance failures, including failing to install subsidence monitoring points before commencing Longwall 4 and destroying tracts of upland swamp vegetation "by accident". It has demonstrated that it is unable to self-regulate and does not have the investment capital to modernise the mine and colliery infrastructure to acceptable standards.	3.1.2, 3.7, 3.6.3 and Appendix F
17	Name withheld - Mount Pleasant	Supporting documentation	The EA itself is below current standards, comprising documents that date back a number of years, and thus does not provide a robust basis for decision making at this point in time. At the very least, the proponent should be required to resubmit its EA so that it includes up to date documentation allowing a fully informed decision by the approver.	3.1.3
18	Name withheld - Paddington	Surface water	Wollongong Coal acknowledges that the longwall may crack two upland swamps and Cataract Creek. Both swamps and Cataract Creek feed into Cataract Dam. Cataract Dam is one of the water storage dams for Sydney Water Catchment Area, an area that supplies drinking water for 4.6 million residents in Greater Sydney.	3.5.3, 3.6.2 and Appendix D
18	Name withheld - Paddington	Groundwater	The development will increase groundwater inflows into the mine by half a million litres a year.	3.4.3 and Appendix D
19	Name withheld - Russell Vale	Planning	this proposal is not a "modification" to preliminary works - it is the further sneaky approach to gaining permissions for a contentious proposal by incremental applications and special pleading. This proposal seeks permission to undertake what is perhaps one of the most contentious elements of the overall project before the full project proposal is properly considered. This is procedurally insupportable and makes a mockery of the notion of proper processes for seeking approvals	3.1.1

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19	Name withheld - Russell Vale	Outstanding commitments	Wollongong Coal (previously Gujarat NRE) continue a pattern of failure to implement required actions from previous stages of projects and seeking to have conditions previously required removed after the actions to which the conditions were attached are concluded. The community can have no confidence that the conditions which relate in particular to the impacts that this mine in a residential area has on the amenity of the residents will ever be met. We have already heard that the company has no intention of beginning the long promised Bellambi gully works which are required to prevent flooding of homes downstream of the mine site which were supposed to be completed long ago at any time in the foreseeable future - indeed, having undertaken the works to which the condition applied they will now seek to have the condition removed.	3.1.2, 3.7
19	Name withheld - Russell Vale	Outstanding commitments Compliance	There is no sign that the company has the financial capacity to undertake the works they seek permission for and to meet its obligations to future monitoring and remediations which are a condition of their existing approvals.	3.7
19	Name withheld - Russell Vale	Outstanding debts	The company is believed to owe substantial sums and indicates that it must have this approval in order to continue to meet its environmental and safety obligations. If that is a true statement of the financial position of the company then they do not have sufficient funds to undertake this project or any future mining in this environmentally sensitive area.	4.4
19	Name withheld - Russell Vale	outstanding commitments	The Bellambi Creek realignment must be completed before any further approvals are granted. The residents of this area expect that current standards and expectations will be applied to the present owner of the mine, just as current planning standards apply to the residents when they seek approvals.	3.7.3
19	Name withheld - Russell Vale	Noise Air quality	Application has been made in the Expansion Project, the subsequent PPR and now in this modification to continue to load coal off the stock pile and on unsealed roads. It is vital that new truck loading facilities are fully constructed and operational prior to any further approval at the mine. The noise and dust generation from this antiquated infrastructure impacts greatly on the local residents. Fifty tonnes of 0.25 micron dust is blown over the surrounding residential areas each year, and this is from their current 60,000 tonne stock pile.	4.1 and 4.2
19	Name withheld - Russell Vale	Air quality	WC has been refusing to design and plant vegetated windbreaks on site that would drastically reduce the 670 tonnes of coal dust currently being eroded from their small stockpile each year. Fifty tonnes of dangerous 0.25 micron dust is blown over the surrounding residential areas each year and this is from their current 60,000 tonne stock pile.	3.7 and 4.1
19	Name withheld - Russell Vale	Cumulative	Cumulative impacts of previous and future approvals have not been considered. This small part of the longwall cannot be considered in isolation, but should be taken into consideration with the whole development. Impacts of the development in its entirety should be assessed at one time.	3.1.1 and 4.8
19	Name withheld - Russell Vale	Subsidence	The first 400 metres of the longwall will have the most dramatic effect on the swamps, the water catchment area and Cataract Dam. If this proposal is to be considered we believe the portion should be relocated towards the east beyond any impact of Cataract Creek. If WC were committed to lowering impacts to the catchment and dam they would proposed mining the last 400 metres, use bord and pillar extraction, or consider other options.	3.2, 3.3 and Appendix B
19	Name withheld - Russell Vale	Mine design Subsidence	This proposal should not be considered if any further piecemeal approval is to be allowed it should be relocated towards the east beyond any impact on Cataract Creek, this will mean that there is no impact on upland swamps, there will be less potential impact on Cataract Dam and less potential future impact on Cararact Creek. If WC were committed to lessening the impact on the catchment area and dam to enable them to continue operation they would provide options rather than just resolutely continue with their proposed PPR layout. They could for instance divide the LW6 down the middle with gateroads and mine it in two halves. This would drastically reduce subsidence and risk to our precious water catchment. They could mine the first portion of longwall 6 using bord and pillar to reduce subsidence and damage to the Special Areas. They could also mine the eastern portion of longwall 6 first, thus avoiding the problematic western section.	3.2, 3.3 and Appendix B
19	Name withheld - Russell Vale	Compliance	WC needs to be more active in proposing solutions to their own financial, management and planning difficulties, rather than relying on the Govt agencies and community to take pity on their self-induced woes.	3.7
19	Name withheld - Russell Vale	Subsidence	The proposed first 400 metres of longwall already encroaches on the Wongawilli seam exclusion zone and the 35 degree marginal zone has already been compromised by the mining in the bulli seam above. This shows a blatant disregard for the safety of the Cataract Dam. The recently released end-of panel report for Longwall 5 at this site makes clear the failure of modelling methods to correctly predict subsidence under these unprecedented conditions and the observed value (which may yet increase with further settling) lies barely within the upper bound of the amended model. It is an unacceptable risk to test the validity of modelling procedures by approving the riskiest of the presently proposed (but unapproved) alignments. If the modelling offered as the basis for approval is found to be deficient, the most vulnerable area will have been used as the test site. This is against all proper risk management principles which would see models tested in areas of minimum risk.	3.3.1, 3.3.2 and Appendix B
19	Name withheld - Russell Vale	Subsidence Ecology	The extraction of coal from LW6 will cause subsidence within an area that includes Cataract Creek and several upland swamps. The evidence that swamps cannot be safely undermined is overwhelming. Remediation of swamps is not possible and there are no examples of 'self-healing'.	3.6.2, 3.6.3 and Appendix F
19	Name withheld - Russell Vale	Subsidence Ecology	Swamps CRHS1, CCHS3 and CCHS4 have special significance status under DECCW (now OEH) 2011 draft guidelines, and CCHS3 and CCHS4 include rare Tea-Tree communities. Recommendation 18 of the Metropolitan Coal PAC report includes the following; "swamps of special significance will be protected from negative environmental consequence report and the PAC reports for the Metropolitan Coal and Bulli Seam Operations (BSO) projects".	3.6.2, 3.6.3 and Appendix F
19	Name withheld - Russell Vale	Aboriginal heritage	Aboriginal site 52-3-0322 is located on the edge of CRHS1 and Aboriginal site 52-3-0320 is on the edge of CCHS3. CCHS3 and CCHS4 overly Longwall 5 and CRHS1 is within the subsidence zone of Longwall 5. Approving Longwalls 4 and 5 would approve the loss of these swamps.	4.6
19	Name withheld - Russell Vale	Subsidence Surface water	Two first order streams run directly over LW5 to form a second order tributary to Cataract Creek; these streams will be severely impacted by the subsidence over LW5. Subsidence, increased strata permeability and strata depressurisation risks redirection and loss of surface and ground water from the Cataract catchment, as the SCA believes has occurred as a result of the damage to the Waratah Rivulet. The widths of the longwalls that caused damage to the Waratah Rivulet were much the same as the width of LW4 and LW5. Further, there appears to be little precedent for multi-seam mining, for which additional subsidence factors of up to 80% have been suggested. Such risks and uncertainties are unacceptable in relation to our water supplies.	3.3.1, 3.6.2, Appendix B and Appendix F
19	Name withheld - Russell Vale	Groundwater	Recent work by Professor Philip Pells (Thirlemere Lakes report and addenda, and research accepted for publication in Australian Geomechanics) shows that the Bald Hill claystone layer cannot be counted on to protect surface and near surface waters from depressurisation and water loss.	3.4.3
19	Name withheld - Russell Vale	Groundwater Ecology	The Gujarat EA is misleading in several respects, for instance it suggests that a report by Geoterra (Appendix I) indicates little or no impact to swamps over Longwalls 4 and 5.	This comment is taken to be related to the Underground Expansion Project as it does not relate to LW6 Modification EA.
19	Name withheld - Russell Vale	Ecology	This report refers specifically to CRHS1, which is not located above the longwalls, and makes no mention of the swamps that are directly over the longwalls.	This comment is taken to be related to the Underground Expansion Project as CRHS1 does not overly LW6.

Submission ID	Name/Agency	Issue	Comment	Reference in Submissions Report
19	Name withheld - Russell Vale	Subsidence	The EA provides no subsidence information, predicted or observed, for Longwall 4. Longwall 5 would reactivate and compound the subsidence of Longwall 4.	This comment is taken to be related to the Underground Expansion Project as it does not relate to LW6 Modification EA.
19	Name withheld - Russell Vale	Subsidence	There appear to be no predictions for valley closure or upsidence, other than a mention of upsidence in CRHS1.	This comment is taken to be related to the Underground Expansion Project as CRHS1 does not overly LW6.
19	Name withheld - Russell Vale	Mitigation and management	Appendix J does not seem to contain monitoring and management plans referred to in the EA. The EA provides essentially no mitigation information.	3.1.3 and 3.7.1
19	Name withheld - Russell Vale	Surface water	The Metropolitan Special Area is a Schedule 1 area for which SCA consent is required, it is not a Schedule 2 area as the EA suggests.	3.5.1
19	Name withheld - Russell Vale	Planning	The EA makes no reference to the Sydney Drinking Water SEPP or its embodied Neutral or Beneficial Effect (NorBE) on water test.	3.1.2
19	Name withheld - Russell Vale	Precautionary Principle	We have a responsibility to preserve the catchment special area and its underlying land and aquifers undamaged, so that future generations of this area can have the access to drinking water that we have taken for granted in our lifetime.	4.5.1
19	Name withheld - Russell Vale	Air quality	Residents in the vicinity are exposed to airborne particulates from the colliery's operations. These operations include; a coal stockpile located just 200m from people's homes; a resizing (crushing) facility; an enormous ventilation fan that blasts air from the underground mine directly at homes in West Corrimal; and trucking of coal past people's homes to Port Kembla Coal Terminal. All of these issues are factors which resort to modern technology could significantly alleviate. If the costs of mining at this site are inconsistent with maintaining proper environmental standards for the community then the mine is uneconomic and the proprietors should close it down.	4.1
19	Name withheld - Russell Vale	Planning	The proponent of this project publicly encourages the view that the mine has been located here for longer than any of the residents. This does not justify the mine being operated at standards which applied in the early 20th century. The mine was only recently purchased by the present company - indeed the current proprietors are very much the newcomers here. "We were here first" is not the basis on which the planning decisions must be made. They must be made in the context of the laws and conditions now governing planning and the undertakings given by those who seek the community's support to govern them.	3.1.1
20	Name withheld - Russell Vale (2)	General	This submission is a duplicate of the submission <i>Name withheld - Russell Vale</i> (submission no. 19). Issues raised in this submission have been addressed above.	Addressed as per submission no. 19
21	Name withheld_Marrickville	Subsidence Surface water	The proposed longwall is in the Sydney Water Catchment Special Area. Falling within the expected subsidence area are two Upland Swamps of Special Significance listed under the Threatened Species Conservation Act 1995. The first of these (CRUS 1) flows directly into Cataract Reservoir. The second (CCUS4) drains into Cataract Creek and then on into Cataract Reservoir. The watercourses and swamps to be undermined are an integral part of the Sydney Water Catchment system that supplies Cataract Reservoir. Longwall coal mining is a listed Key Threatening Process; it is known to damage the surface and crack water courses and swamps, causing water contamination and loss.	3.5, 3.6.2 and Appendix D
21	Name withheld_Marrickville	Groundwater	The development is expected to increase groundwater inflows to the mine from an average of 1.1 million litres a day to around 1.6 million litres a day (Ref: EA, p.ii). The four coal mines operating in the Sydney Water Catchment Special Area currently drain 3 billion litres (or 1,200 Olympic sized swimming pools) from the Special Areas. The Sydney Water Catchment Area supplies drinking water for 4.6 million residents of Greater Sydney area.	3.4.3 and Appendix D
21	Name withheld_Marrickville	Subsidence	The proposal involves longwall mining a third seam of coal beneath two previously mined seams. Single seam subsidence impacts are difficult to predict; the uncertainty is compounded by triple seam mining and this poses acceptable risks to the water catchment area. Application of the precautionary principle should be the basis of assessment - and rejection - of this proposal.	3.3.1 and Appendix B
21	Name withheld_Marrickville	Cumulative	Although WC claims the incremental environmental impacts of Mod 2 over and above impacts from existing operations are likely to be minimal, the cumulative impacts to the Special Areas of this mining along with past and proposed future workings in the Wonga East area must be considered. A piecemeal approach driven by the financial imperative of one under-resourced foreign-owned mining company, is not only bad planning, it is negligent.	3.1.1 and 4.8
21	Name withheld_Marrickville	Planning	An application for mining longwall 6 is already under consideration by DoPI as part of the Underground Expansion Project (MP 09_0013). It is clear that this proposal cannot sensibly be regarded as simply a modification to the Preliminary Works project. WC/GNRE is again attempting to incrementally establish its expansion project. Moreover, recent ICAC findings have exposed extensive corruption in the planning process, in particular in regard to water and coal mining. To stem further erosion of public confidence in the Major Project planning process, DoPI should refuse this application and complete assessment of the Underground Expansion Project in a systematic and transparent manner.	3.1.1
21	Name withheld_Marrickville	Project need	The application makes the misleading claim that this development is necessary so that WC can continue to mine. In fact, WC has an existing approval to mine the V panel. It is both inappropriate and irresponsible to take up the valuable time of government agencies and community members once again to consider a half-baked application aimed at solving the immediate cash flow problems of this company.	3.2
21	Name withheld_Marrickville	Health	Russell Vale Colliery is located in what is perhaps the most densely populated area of any colliery in Australia, with houses and schools bordering the site and just 250m from the huge coal stockpiles. Moreover, the only exhaust fan from the Wongawilli seam - not even mentioned in this EA - blows pollutants over West Corrimal. This development will increase human morbidity and mortality from respiratory and cardiovascular disease caused by coal particulate pollution in the area of Russell Vale, Corrimal, Bellambi and surrounding suburbs. Coal dust will also impact the health of residents along the trucking route to Port Kembla Coal Terminal.	3.7.1 and 4.1
21	Name withheld_Marrickville	Outstanding commitments Compliance	WC has been responsible for multiple compliance failures and has demonstrated that it is unable to self-regulate. The Russell Vale Colliery contains antiquated infrastructure and WC has failed to fulfil requirements of previous development approvals to upgrade the facilities on the site to modern standards. These failures include: construction of a sound wall and coal loading facility and the realignment of Bellambi Creek to prevent flooding of residents downstream in the event of a major flood event. The company has also failed to pay carbon tax and mining royalties. It even failed to pay its own workers for several months in 2013.	3.1.2, 3.7 and 4.4
21	Name withheld_Marrickville	Outstanding commitments Compliance	Although WC has a different name and a different major shareholder and director, the corporation is in essence the same as GNRE, with the same staff, the same financial problems and, as is apparent from this application, the same style of using brinkmanship to incrementally establish its unapproved expansion. WC should receive no special treatment for its financial woes as the new investors' due diligence would have informed them of the company's financial and planning situation.	Comment noted.
21	Name withheld_Marrickville	Socioeconomic	Jobs and royalty revenues may be lost with the rejection of this entirely unacceptable proposal. However, the broader community interest and intergenerational considerations are of greater significance. The number of jobs at stake is small relative to the regional work force and likewise the royalty revenues, if they are ever collected, are very small relative to annual State and Federal incomes. The value of the natural assets that would be put in harm's way by this proposal cannot be sensibly quantified; they are priceless.	4.4 and 4.5.1

Submission ID	Name/Agency	Issue	Comment	Reference in Submissions Report
22	Chris Williams_Wombarra	General	This submission uses a proforma letter and raises the same issues as those raised in the submission <i>Name withheld_Marrickville</i> (submission no. 21). Issues raised in this submission have been addressed above.	Addressed as per submission no. 21
23	Doreen Armstrong_Hunters Hill	Surface water	I object to this project going forward. Especially as it would be tampering with Sydney's drinking water.	3.5.3 and Appendix D
24	Dr Ann Young_Thirrourl	Ecology	Strongly support the incorporation into the approval conditions of active, iterative adaptive mining and the commitment to change the mine plan or stop mining if impacts exceed specified limits. The reality is that adaptive mining may well be useful in response to monitoring of Cataract Creek, if the closure does happen at about 12mm/100m of mining, as for LW5. This would allow intervention before the 200mm limit was reached - if closure reached anywhere near this level when only 400m of mining is proposed. However it will be of no value for the upland swamps. No 'deterioration in the health' of the swamps will be observable within the time of mining - unless 'health' is defined as loss of piezometric head in the swamp sediments, there will be no opportunity for 'proactive amendments..to extraction activities'. I support defining health by the maintenance of piezometric head but am only too well aware that is not done elsewhere in the Southern Coalfield.	3.5.6, 3.6.2 and 3.6.3 and Appendix F
24	Dr Ann Young_Thirrourl	Monitoring and Management	The standards set for this proposal need to be appropriate for any future extensions to the mine. If approval is given, the monitoring of environmental impacts needs to provide information that can inform adaptive mining in the future.	3.1.3 and 3.7.1
24	Dr Ann Young_Thirrourl	Ecology	Regarding the assertion that the swamps in Wonga East are headwater and not valley infill swamps, and do not contribute significantly to stream base flow: the combined contribution of a large number of headwater swamps should not be discounted, especially if they lie in the same sub-catchment. Even if the headwater swamps' water tables respond rapidly to rainfall and their interaction with near-surface groundwater is negligible, they are still important components of the catchment hydrology, or so we should assume until we at least have a water balance model which disproves the observational evidence.	3.6.2 and Appendix F
24	Dr Ann Young_Thirrourl	Ecology	Regarding the conclusion that the swamps are relatively dry, dominated by Banksia thicket, with thin dry soils which have low humic content. In short, although they both have some tea tree thicket (ie biodiversity indication), they are relatively unimportant. Yet both of those which would be affected by LW6 qualify as swamps of special significance. If this is to be discounted, then we need to have an open discussion about the criteria for assessing acceptable damage to the environment.	3.6.2 and Appendix F
24	Dr Ann Young_Thirrourl	Ecology	Regarding the assertion that ' <i>previous mining of the Bulli and Balgownie seams has occurred beneath CRUS1 and CCUS4 with no adverse impacts documented. During the extraction of coal from LW5, CCUS4 subsided approximately 0.8 metres with no observable adverse impacts (Hansen Bailey, 2014)</i> ' (p. 46). Indeed no adverse impacts have been documented - until very recently, none were measured. Further, the Hansen Bailey report is an in-house report, not a published document. A more measured statement is given on p 14 of Evans Peck's January 2014 review of the PPR Surface Water - <i>Given that the previous mining occurred 30 years ago, it is possible that the existing vegetation has had time to adapt to any change in swamp hydrology. Overall, it appears that the majority of the headwater swamps that have been subject to subsidence from previous mining have maintained a perched groundwater system that does not show evidence that cracking may have occurred.</i> The present swamps may in fact be drier than they would have been if there had not been previous mining.	3.6.2 and Appendix F
24	Dr Ann Young_Thirrourl	Ecology	No adverse impacts have been documented [on upland swamps] - until very recently, none were measured! And the Hansen Bailey report is an in-house report, not a published document. A more measured statement is given on p 14 of Evans Peck's January 2014 review of the PPR Surface Water - <i>Given that the previous mining occurred 30 years ago, it is possible that the existing vegetation has had time to adapt to any change in swamp hydrology. Overall, it appears that the majority of the headwater swamps that have been subject to subsidence from previous mining have maintained a perched groundwater system that does not show evidence that cracking may have occurred.</i> The present swamps may in fact be drier than they would have been if there had not been previous mining.	3.6.2 and Appendix F
24	Dr Ann Young_Thirrourl	Ecology	It is implied in the Evans and Peck report that cracking occurred under previous mining under subsidence of about 1m and the swamps were not destroyed. But the Underground Expansion EA records 'no subsidence record' for the Bulli Seam bord & Pillar, and maximum strain of 3mm/m for the Balgownie Seam longwalls (1.4m subsidence). The OEH strain criteria are <0.5 mm/m tensile and < 2mm/m compressive strains; the predicted values are for CCUS4 6.7 and 13.4 mm/m; and 9.2 and 18.5 mm/m, both with 1.4m subsidence. So it is with good cause that the Mod2 report says that the predicted strains above LW6 are likely to cause 'perceptible cracking'. There is good reason to anticipate further damage to the swamp hydrology and thence vegetation; and no clear evidence presented about the past impacts.	3.6.2 and Appendix F
24	Dr Ann Young_Thirrourl	Ecology	I notice that there has been no search for the giant dragonfly, but I do not accept that the changed layout for the PPR entirely removed the possibility of there being useful habitat in the area.	3.6.1 and Appendix F
24	Dr Ann Young_Thirrourl	Groundwater	Subsidence has increased the conductivity of the ridge south of Cataract Creek - that is, between Cataract Creek and Cataract River - to a depth of 140m. Cracking and lamination of the sandstone has allowed drainage to divert laterally from parts of the Creek (Appendix D1). The clear implication is that the near-surface of the sandstone is being dehydrated and it is not just loss of water from the swamp sediments but from the upper Hawkesbury Sandstone which should concern us.	3.3 and Appendix B
24	Dr Ann Young_Thirrourl	Ecology	The case has not been made satisfactorily either that the swamps under threat are not significant or that impacts on them will be no greater than has already occurred. I reject the idea that the swamps under consideration are of little value and are anyway unlikely to be damaged any more than they have been by previous mining. Some of the swamps in Wonga East area are small and have low biodiversity eg CCUS3, but the ones to be affected by LW6 are not in that category. I have not visited CRUS1 but I commented last year that 'I have been to CCUS4. It is a wet swamp in good condition, and the monitoring of the piezo and the stream site here will be crucial to understanding the impact of subsidence. The data in the Geoterra report (Annexure P Fig 14) show that water levels declined from June to September 2012 during a period of low rainfall. The question is whether the levels respond to rainfall after the swamp is undermined by LW5.' It is disappointing to see no updated results from the piezometers presented in the current report. Monitoring data should be presented and used to inform decisions about the proposal.	3.6.2 and Appendix F
24	Dr Ann Young_Thirrourl	Ecology/Socioeconomic	I consider that the available evidence strongly suggests that there will be loss of water from the swamps sediments in CCUS4 and CRUS1 (or at least part of the latter). This will lead over time to poor swamp health and potential loss of habitat for threatened species. The question then becomes - how does the Government explicitly set and maintain criteria for deciding how to balance the impacts on swamps and water catchment values against the economic benefits of coal mining?	3.6.2
24	Dr Ann Young_Thirrourl	Planning	Does approval of a small activity (400m of LW6) imply tacit approval of the larger project (the Preferred Project and later extension into Wonga West)?	3.1.1
24	Dr Ann Young_Thirrourl	Cumulative	How are the cumulative impacts of multiple activities within the catchment being considered?	4.8
25	Dr Joseph Davis_Thirrourl	Subsidence Surface water	In my view too much damage has already been caused to Cataract Creek and from what I have read the consensus on the likely cause of existing damage is subsidence due to previous mining activity. I certainly would be very dismayed if cracks in the creek bed caused by any future mining activity led to water disappearing from the watercourses in the area.	3.5 and Appendix D and Appendix E
25	Dr Joseph Davis_Thirrourl	Surface water	I also do not ever wish to see a situation where methane leaking to the surface makes creek water flammable.	3.5.6
25	Dr Joseph Davis_Thirrourl	Aboriginal heritage	The area around Cataract Creek and its associated upland swamps are very special items of environmental significance not only to NSW but to the nation - including the nation of first peoples.	4.6
25	Dr Joseph Davis_Thirrourl	Surface water	I do not wish to see long-wall mining with the potential to result in loss of surface water to occur anywhere near the proposed site and believe that the proposal should be rejected purely on environmental grounds.	3.5 and Appendix D and Appendix E
25	Dr Joseph Davis_Thirrourl	Socioeconomic	In my view no kind of potential economic benefit in terms of either employment or profit should be allowed to jeopardize our precious water catchment and associated areas of environmental significance.	Comment noted.

Submission ID	Name/Agency	Issue	Comment	Reference in Submissions Report
26	Gareth Johnston_Annandale	General	This proposal disregards the rights of many people local near and far alive today and infringes on the rights of those yet to be born. This proposal presents significant risks to the environment and passes costs to this least able to afford it. This allows for the unbridled impacts of emissions and chemicals to pollute a vulnerable catchment. This proposal should not be permitted.	EA assessed potential environmental impacts and further discussion on key environmental issues addressed in 3.0 and 4.0 of Submissions Report.
27	Name withheld_Corrimal (3)	outstanding commitments	Bellambi Creek Realignment: This is a major concern to the local community. This is a condition imposed on WC by the Preliminary Works approval (postponed in Mod 1). WC is operating non-compliantly at this very moment. The only reason WC/GNRE can offer for this work not being carried out is financial. This Mod 2 application should be refused by the PAC until this work is carried out or the situation fully resolved.	3.7.3
27	Name withheld_Corrimal (3)	Consultation	The community was informed that there would be no further fractionating of the planning process and that the proponent was prepared to wait until there was a decision on the Major Expansion project (PPR). This statement was deceptive. This was the first Planning Development application to be made by WC and it is regrettable that they have started by neglecting to hold an information session to present the proposal and answer questions from the community. Three simple questions were asked of WC during the Mod 2 exhibition period, firstly as a resident of the area and secondly as a member of the CCC. WC has refused to answer them. They were, 1.Have the V Panels in the Bulli seam been mined yet and if so when? 2.What is the current work force at Russell Vale today? 3.A list of all the community and sports groups that WC donate to as from today (this information has previously been requested)? I as a resident take this refusal to answer simple questions as obstructive. Regrettably, WC is continuing the abysmal consultation record of GNRE.	3.1.1 and 4.3.3
27	Name withheld_Corrimal (3)	Air quality	The huge exhaust fan exists on the colliery site just above the residential area, it can clearly been seen on several aerial website. This fan has never been part of any GNRE or WC planning applications. In this application it is referred to as a rubber tyre vehicle portal. Requests have been made via the CCC about monitoring information from this fan but WC has cited 'commercial in confidence'. This fan should be relocated away from the residential area or heavily monitored with the data freely available to the community. This Mod 2 application should be refused by the PAC until this work is carried out or the situation fully resolved.	4.1.3
27	Name withheld_Corrimal (3)	Socioeconomic	Employment figures have been inflated by the proponent for brinkmanship purposes. WC has cited a figure in February 2013? The last notification to the CCC was 293 and this is prior to the 20% staff cuts. We therefore must assume that the workforce of Russell Vale Colliery is 234 staff and WC has stated that further staff cuts are immanent. This company uses staff losses on one hand to justify their application whilst dismissing staff on the other because of financial reasons.	4.4.2
27	Name withheld_Corrimal (3)	Outstanding debts	WC have numerous outstanding obligations. These obligations are in the form of unpaid taxes, unpaid royalties, unfulfilled planning obligations, unpaid services and future possible legal actions. All of these outstanding debts should actually be resolved and paid for prior to any approval to this company. WC states that this minor application will ensure that that the company will be able to continue to meet its "environmental safety obligations". Government should insist on a substantial bond to cover any future unpaid costs.	4.4
27	Name withheld_Corrimal (3)	Greenhouse Gas	WC has neglected to even include a section addressing GHG emissions. This is typical of a company that does nothing to reduce its carbon footprint. This is in spite of the fact that technology is available now to reduce fugitive methane emissions, and that other mines in the area are using technology to reduce emissions.	4.5.2
27	Name withheld_Corrimal (3)	Greenhouse Gas	We submit that it is wrong for the government to consider allowing CSG wells in the Illawarra on the basis that the methane is a valuable resource, while at the same time allowing large quantities of methane to be wasted only a few kms away by allowing proposals like this WC proposal.	4.5.2
27	Name withheld_Corrimal (3)	Groundwater	It is shocking to think that this proposal is even being considered without the completion of the Ground Water Modelling report. This report is required for the PPR assessment. Given that this proposal will drain 500,000 litres of water from our catchment area, this application should be postponed until the Ground Water Modelling report is completed. How many water tanks and water saving devices are required by residents of the area to save 500,000 litres of water?	Appendix D
27	Name withheld_Corrimal (3)	Subsidence	If WC were committed to lowering impacts to the catchment and dam they would propose mining the last 400 metres, use bord and pillar extraction, or consider other options. They could for instance divide the LW6 down the middle with gateroads and mine it in two halves. This would drastically reduce subsidence and risk to our precious water catchment. They could mine the first portion of longwall 6 using bord and pillar to reduce subsidence and damage to the Special Areas. They could also mine the eastern portion of longwall 6 first, thus avoiding the problematic western section.	3.2 and Appendix B
27	Name withheld_Corrimal (3)	Health	WC state that the continuation of mining will not impact on the surrounding residential any more than it currently does. The current mining practice at Russell Vale already impacts on the neighbours and there needs to be upgrades to every application until there is satisfactory practice and infrastructure at this colliery.	3.7 and 4.1
27	Name withheld_Corrimal (3)	Noise Air quality	GNRE and now WC are continuing to operate this mine with antiquated and outdated infrastructure. They have made application in their Expansion Project, their subsequent PPR and now in this Modification to continue to load coal off the stock pile and on unsealed roads. It is vital that these truck loading facilities are full constructed and operational prior to any further approval at this mine. The noise and dust generation from this antiquated infrastructure impacts greatly on the local residents.	3.7.1, 4.1 and 4.2
27	Name withheld_Corrimal (3)	Air quality	WC has also been refusing to design and plant vegetated windbreaks on site that would drastically reduce the 670 tonnes of coal dust currently being eroded from their small stockpile each year. Fifty tonnes of dangerous 0.25 micron dust is blown over the surrounding residential areas each year and this is from their current 60,000 tonne stock pile. It is vital that these issues are fully resolved and operational prior to any further approval at this mine.	3.7 and 4.1
28	Jenny Bradford_Campbelltown	Surface water	Please reconsider this action , our water needs to stay safe and clean.	3.5.3 and Appendix D
29	Jess Moore_Wombarra	Subsidence Surface water	The proposed longwall is in the Sydney Water Catchment Special Area and will involve damage to this area as well as loss of surface and groundwater. The watercourses and swamps to be undermined are an important part of the system that supplies Cataract Reservoir. Within the expected subsidence area for the longwall are two Upland Swamps (CRUS1 and CCUS4) listed under the Threatened Species Conservation Act 1995, and Cataract Creek.	3.5, 3.6 and Appendix D, Appendix E and Appendix F
29	Jess Moore_Wombarra	Subsidence	The proposal involves longwall mining a third seam of coal beneath two previously mined seams. Subsidence impacts are difficult to predict, and these are tripled with this proposal, introducing risk to a sensitive and vital area.	3.3.1 and Appendix B
29	Jess Moore_Wombarra	Cumulative	The application does not consider the cumulative impacts to the Special Areas of this proposal along with past workings, when cumulative damage to the drinking water supply is a major risk that must be considered.	3.3.1, 3.5.3 and 4.8

Submission ID	Name/Agency	Issue	Comment	Reference in Submissions Report
29	Jess Moore_Wombarra	Air quality Health	This proposal will increase coal particulate pollution. Russell Vale Colliery is located in a densely populated area, with houses and schools bordering the site. Coal dust will impact the health of local residents, and those along the truck route to Port Kembla Coal Terminal.	4.1
30	Jess Moore_Wombarra(2)	General	This submission is a duplicate of the submission <i>Jess Moore_Wombarra</i> (submission no. 28). Issues raised in this submission have been addressed above.	Addressed as per submission no. 28
31	John Spira_Austinmer	Surface water	Wollongong Coal acknowledges that the longwall may crack two upland swamps and Cataract Creek. Both swamps and Cataract Creek feed into Cataract Dam. Cataract Dam is one of the water storage dams for Sydney Water Catchment Area, an area that supplies drinking water for 4.6 million residents in Greater Sydney.	3.5.3, 3.6.2 and Appendix D
31	John Spira_Austinmer	Groundwater	The development will increase groundwater inflows into the mine by half a million litres a year.	3.4.3 and Appendix D
31	John Spira_Austinmer	Air quality	Russell Vale Colliery is located in what is perhaps the most densely populated area of any Australian colliery. Mod 2 will increase morbidity and mortality in surrounding residential areas from respiratory and cardiovascular disease caused by coal particulate pollution.	4.1.1
32	Kaye Osborn_Corrimal	Socioeconomic	Mining accounts for 3001 jobs in the Illawarra out of a workforce of 195,000 and an employed population of approximately 175,000. Therefore all the jobs in the mining industry in the Illawarra region account for 1.7% of jobs in the region. The less than 250 jobs (allowing for recent redundancies) at the Russell Vale Colliery account for 0.14% (that is one seventh of one percent) of jobs in the region. No-one likes to see people in the Illawarra lose their jobs; this is a region of high unemployment. However, when we are talking about inevitable damage to the swamps and creeks of the Sydney Water Catchment Special Areas that this development entails, it is important to put the actual job losses that would result from this project not being approved (and the colliery/mine going into caretaker mode) into context of the regional economy. Wollongong Coal's Russell Vale operations are a very, very small part of the Illawarra economy.	4.4.2
32	Kaye Osborn_Corrimal	Socioeconomic	Over several years, year by year, the financial situation of this colliery has deteriorated. It has become apparent that the colliery is unsustainable given the current price of coking coal and the investment capital available to both the previous proponent, Gujarat NRE and this proponent, Wollongong Coal. Granting of serial stop-gap approvals such as this Modification 2, longwall by longwall, enables a development which has shown that it is not viable to limp along. This causes economic stress in the local region, not only from the company's mounting debt and inability to pay its workers and local suppliers but also by fomenting economic uncertainty.	4.4
32	Kaye Osborn_Corrimal	Outstanding commitments Compliance	What is most alarming about this particular proposal is the assertion that if approval is not granted and the mine has to go into care and maintenance mode until WC gets further mining approval there will be "increased risks over time in relation to the Proponent's commercial ability to continue to meet its environmental and safety obligations" (my emphasis). If a proponent does not have the financial capacity to meet the environmental and safety responsibilities of the operation between approvals the proponent should not be allowed to mine. (And the delay in GNRE's mining approvals was of its own making.) The proponent especially should not be allowed to mine in an area of such conservation value and strategic importance to the Greater Sydney region as the Sydney Water Catchment Special Areas.	3.2 and 3.7
32	Kaye Osborn_Corrimal	General	A poll conducted in NSW between April 30 and May 3, 2013 by Essential Research found that 87% of people want coal and coal seam gas banned in water catchments and within 2 kilometres of rivers and wetlands. Although a less reliable indicator, an Illawarra Mercury newspaper on-line poll opened on 6 May showed at 12 May, 2014 that 68.3% of respondents believed that Wollongong Coal should not be allowed to expand its mine operations.	Comment noted.
32	Kaye Osborn_Corrimal	Outstanding commitments Compliance	WC has been responsible for multiple compliance failures and has demonstrated that it is unable to self-regulate. The Russell Vale Colliery contains antiquated infrastructure and WC has failed to fulfil requirements of previous development approvals to upgrade the facilities on the site to modern standards. These failures include: construction of a sound wall and coal loading facility and the realignment of Bellambi Creek to prevent flooding of residents downstream in the event of a major flood event. The company has also failed to pay carbon tax and mining royalties. It even failed to pay its own workers for several months in 2013.	3.1.2, 3.7 and 4.4
32	Kaye Osborn_Corrimal	Planning	WC, like GNRE before it is using brinkmanship to incrementally establish its unapproved expansion. Jindal Steel's due diligence would have informed them of Gujarat NRE's financial and planning situation before they acquired a majority stake in GNRE.	3.1.1
32	Kaye Osborn_Corrimal	Subsidence Surface water	The proposed longwall is in the Sydney Water Catchment Special Area. Falling within the expected subsidence area are two Upland Swamps of Special Significance listed under the Threatened Species Conservation Act 1995. The first of these (CRUS 1) flows directly into Cataract Reservoir. The second (CCUS4) drains into Cataract Creek and then on into Cataract Reservoir. The watercourses and swamps to be undermined are an integral part of the Sydney Water Catchment system that supplies Cataract Reservoir. Longwall coal mining is a listed Key Threatening Process; it is known to damage the surface and crack water courses and swamps, causing water contamination and loss.	3.5, 3.6.2 and Appendix D
32	Kaye Osborn_Corrimal	Groundwater	The development is expected to increase groundwater inflows to the mine from an average of 1.1 million litres a day to around 1.6 million litres a day (Ref: EA, p.ii). The four coal mines operating in the Sydney Water Catchment Special Area currently drain 3 billion litres (or 1,200 olympic sized swimming pools) from the Special Areas.	3.4.3 and Appendix D
32	Kaye Osborn_Corrimal	Subsidence	The proposal involves longwall mining a third seam of coal beneath two previously mined seams. Single seam subsidence impacts are difficult to predict; the uncertainty is compounded by triple seam mining and this poses unacceptable risks to the water catchment area. Application of the precautionary principle should be the basis of assessment - and rejection - of this proposal.	3.3.1 and Appendix B
32	Kaye Osborn_Corrimal	Health	Russell Vale Colliery is located in what is perhaps the most densely populated area of any colliery in Australia, with houses and schools bordering the site and just 250m from the huge coal stockpiles. Moreover, the only exhaust fan from the Wongawilli seam – not even mentioned in this EA - blows pollutants over West Corrimal. This development will increase human morbidity and mortality from respiratory and cardiovascular disease caused by coal particulate pollution in the area of Russell Vale, Corrimal, Bellambi and surrounding suburbs. Coal dust will also impact the health of residents along the trucking route to Port Kembla Coal Terminal.	3.7 and 4.1
32	Kaye Osborn_Corrimal	Greenhouse Gas	The fact that information on Greenhouse Gas emissions and mitigation have been omitted from the proposal is a serious omission that should be addressed before the proposal is considered by DoPI.	4.5.2
32	Kaye Osborn_Corrimal	Cumulative	Although WC claims the incremental environmental impacts of Mod 2 over and above impacts from existing operations are likely to be minimal, the cumulative impacts to the Special Areas of this mining along with past and proposed future workings in the Wonga East area must be considered. A piecemeal approach driven by the financial imperative of one under-resourced foreign-owned mining company, is not only bad planning, it is negligent.	3.1.1, 3.5.3 and 4.8
32	Kaye Osborn_Corrimal	Planning	An application for mining longwall 6 is already under consideration by DoPI as part of the Underground Expansion Project (MP 09_0013). It is clear that this proposal cannot sensibly be regarded as simply a modification to the Preliminary Works project. WC/GNRE is again attempting to incrementally establish its expansion project. Moreover, recent ICAC findings have exposed extensive corruption in the planning process, in particular in regard to water and coal mining. To stem further erosion of public confidence in the Major Project planning process, DoPI should refuse this application and complete assessment of the Underground Expansion Project in a systematic and transparent manner.	3.1.1
32	Kaye Osborn_Corrimal	Project need	The application makes the misleading claim that this development is necessary so that WC can continue to mine. In fact, WC has an existing approval to mine the V panel. It is both inappropriate and irresponsible to take up the valuable time of government agencies and community members once again to consider a half-baked application aimed at solving the immediate cash flow problems of this company.	3.2
33	Kerrie Christian_Bulli	Surface water	From a sustainability perspective it is not appropriate to waste precious dam water. It is already known that there have been problems with water loss from creeks from Appin mine generated subsidence - and if we enter another drought period water conservation is a must.	3.5.3 and Appendix D

Submission ID	Name/Agency	Issue	Comment	Reference in Submissions Report
33	Kerrie Christian_Bulli	Socioeconomic	For the last 150 years coal mining has been an important part of the Illawarra's regional economy - however its contribution to employment in the region has been dramatically shrinking ever since 1982. And for over 100 years the NSW Government has taken the view that our State's Dams must be protected.	4.4.2
33	Kerrie Christian_Bulli	ESD	The Black Diamond Heritage Centre requests that any approval for the Wollongong Coal Longwall extension must not compromise the integrity of the special nature of the Cataract Dam and its catchment area - and that the decisions be made in accordance with the Precautionary Principles developed in Rio 1992 in concert with the Gro Harlem Bruntland 1987 Report "Our Common Future" on Ecological Sustainable Development.	4.5.1
34	Kerrie Christian_Bulli(2)	General	This submission is a duplicate of the submision <i>Kerrie Christian_Bulli</i> (submission no. 33). Issues raised in this submission have been addressed above.	Addressed as per submission no. 33
35	Kerrie Christian_Thirroul	General	Location for the new longwall, Longwall 6, is in the Sydney Water Catchment Special Area, an area so vital to the integrity of the water catchment that a member of the public could be fined over \$44,000 just for stepping foot in there. I and a number of others have sought permission to access the Sherbrooke area of the Cataract Dam catchment area and this has been denied us because of the integrity demanded by the Sydney Catchment Authority. So to read this proposal is totally bizarre and inappropriate. If the Cataract Dam catchment is too special to allow restricted and controlled visits onto the site then it is too special to allow it to be damaged by longwall mining underground.	3.1, 3.3 and Appendix B
35	Kerrie Christian_Thirroul	Surface water Ecology	Further Wollongong Coal acknowledges that the longwall may crack two upland swamps and Cataract Creek. Both swamps and Cataract Creek feed into Cataract Dam. Cataract Dam is one of the water storage dams for Sydney Water Catchment Area, an area that supplies drinking water for 4.6 million residents in Greater Sydney. There has been pressure to mine under Cataract Dam for over 100 years and the government vetoed this in the early 20th Century years because they wanted to keep it pristine. This position should remain unchanged.	3.5, Appendix D, Appendix E and Appendix F
35	Kerrie Christian_Thirroul	Groundwater	The development will increase groundwater inflows into the mine by half a million litres a year.	3.4.3 and Appendix D
35	Kerrie Christian_Thirroul	Sustainability	From a sustainability perspective it is not appropriate to waste precious dam water. It is already known that there have been problems with water loss from creeks from Appin mine generated subsidence - and if we enter another drought period water conservation is a must.	4.5
35	Kerrie Christian_Thirroul	Planning Subsidence	If Longwall 6 is approved, it may presuppose the approval of this mine's Major Expansion Project, a large and controversial project of triple seam coal mining in the Special areas. This would potentially compound the concerns raised to date.	3.1 and 3.3
36	Melissa Haswell_Otford	Planning	I do not support Wollongong Coal's proposal to expand its longwall mining operation under the Special Protected Areas of Sydney's water catchment. The activities proposed do not represent a mere modification - they are significant and substantial actions with important environmental health risks.	3.1.1
36	Melissa Haswell_Otford	Health	Before any accurate assessment of the merits of this proposal versus its costs to the community, more information on potential direct health impacts is required. In particular, the current and enhanced risk of exposure of the local population to airborne particulates from the coal stockpiles at the Russell Vale Colliery, and from exposures and accidents associated with the truck transport of coal to the Port Kembla Coal Terminal need to be assessed.	3.7 and 4.1
36	Melissa Haswell_Otford	Surface water	It is imperative that we look at the existing and proposed impacts of longwall mining in our Special Protected Areas of the water catchment in light of decreasing reliability of water inflows at the same time as an increase in demand for the growing metropolitan and greater Sydney region.	3.5.3 and Appendix D
36	Melissa Haswell_Otford	Subsidence	There is no doubt that the four coal mines that have been operating in Sydney's water catchment have had a large, visible structural impact, which includes fracturing of rock bars and riverbeds, loss of flows and drainage of pools, interference with natural groundwater flows and surface to groundwater interfaces, mobilization of metals leading to high and toxic concentrations to aquatic life and degradation of ecological and aesthetic values of these important areas. At particular risk are the now endangered upland swamps, which play a key role in holding water and maintaining creek flows are badly affected by subsidence. Given existing impacts, I strongly object to the additional uncertainty of subsidence and subsurface and ground water impacts of mining a third seam underneath two previously mined seams.	3.3.1, 3.6.2, Appendix B and Appendix F
36	Melissa Haswell_Otford	Subsidence Ecology	The proposed Longwall 6 is located beneath two Upland Swamps of Special Significance that feed into the Cataract Reservoir. The reservoir's feeder creek, Cataract Creek, is also within the subsidence area. Based on existing knowledge about subsidence in these areas, there is every opportunity for unpredictable impacts to occur that will seriously impact on the ecological and structural integrity of this part of the catchment.	3.5, 3.6.2 and Appendix F
36	Melissa Haswell_Otford	Groundwater Surface Water	Increased water consumption from the proposed expansion will also be significant, with increased groundwater flows into the mine estimated to be 1.1-1.6 million litres each day, adding to the enormous use of ground and surface water to underground coal mining across the entire catchment, of an estimated 3 billion litres.	3.4.3 and Appendix D
37	Peter Ritchie_Corrimal	Ecology	There are significant risks to the area on the surface under the area to be longwalled, including- by the Companies own admission- likely draining of upland swamps and loss of flow in the Cataract Creek catchment. Upland swamps in the area are valuable ecosystems that are largely unique in the world and as such are irreplaceable. They provide filtration of water into the catchment as well as habitat for many species.	3.6.2 and Appendix F
37	Peter Ritchie_Corrimal	Surface water	I am concerned that there will be the loss of water flows in the catchment- more than ever we should be concerned about impacts on water catchment and it's subsequent effects on water supply for the whole Sydney Catchment area.	3.5.2 and Appendix D
37	Peter Ritchie_Corrimal	Planning	WC is aware that it faces significant issues with an overall expansion approval due to impacts to water flows in the catchment, draining of upland swamps, and other issues. This piecemeal approach needs to be halted and a single overall decision made about the totality of the plans for the project.	3.1.1
38	Su Morley_Islington	Greenhouse Gas	I am opposed to all new coal mines because of the danger that coal poses to the stability of Earth's climate. The short term financial gain of such projects in no way justifies the huge burden of climate chaos that coal is causing. The NSW Department of Planning is too close to the coal industry and needs to move away and start planning for mitigating climate change, and restructuring our economy to one powered by renewable energy. Anything less is negligent and morally corrupt.	4.5.2
39	Tim Nicholls_Bulli	General	This submission uses a proforma letter and raises the same issues as those raised in the submission <i>Name withheld_Marrickville</i> (submission no. 21). Issues raised in this submission have been addressed above.	Addressed as per submission no. 21

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