Russell Vale Colliery – Underground Expansion Project

Review Report

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2 April 2015

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ISBN 978-0-9942315-4-3

Executive Summary

The Commission has been asked to review the Russell Vale Colliery Underground Expansion Project. The project is seeking to mine 4.7 million tonnes of coal over a period of up to 5 years, from the Wongawilli Seam, under a protected part of Sydney's drinking water catchment. Coal would be extracted through the existing pit top at Russell Vale, at an increased rate of up to 3 million tonnes per year. The mine has an approval (granted in 2011) to extract up to 1 million tonnes of coal a year for 3 years (to October 2014). That approval has been modified 3 times, and will currently expire on 31 December 2015.

This project would provide up to 5 years employment for the mine's existing workforce, along with associated economic multiplier benefits for the region, and royalties revenue for the State of NSW. Notwithstanding the benefits the mine would bring, the project's location, in a sensitive and protected part of Sydney's drinking water catchment, and with pit top facilities in close proximity to residential suburbs of Wollongong poses particular risks and challenges.

As requested by the Minister, the Commission held a public hearing on the project on 3 February 2015 and received submissions both for and against the proposal. In support of the application, the Illawarra Business Chamber and a number of individual businesses and mine workers spoke of the employment and economic multiplier contribution the mine would have, especially for the region's economy. Concerns and objections were raised by a number of special interest groups and local residents. Most concerns and objections fell into one of two key categories, those relating to impacts on the Sydney's drinking water catchment and associated biodiversity; and those affecting surrounding residential receivers, particularly traffic, noise and air quality. Some also highlighted the need for an independent expert economic analysis of the project, and particularly questioning the economic benefits and employment multipliers claimed by the proponent.

The Commission noted significant concerns from a number of government agencies, including objections from Water NSW (the former Sydney Catchment Authority). Water NSW is particularly concerned about the risks of water losses to the catchment and water quality impacts and associated treatment costs, should upland swamps be impacted and/or lost, along with their associated ecosystem functions. The Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development; Dams Safety Committee; Office of Environment & Heritage; the Environment Protection Authority and the Department of Trade and Investment's Division of Resources & Energy have also raised significant concerns about various aspects of the project.

As noted at the hearing and in a number of submissions, considerable bodies of work have examined the southern coal fields and the impacts associated with mining in Sydney's drinking water catchment areas over the last decade. The most recent is the NSW Chief Scientist and Engineer's review, "*On measuring the cumulative impacts of activities which impact ground and surface water in the Sydney Water Catchment*" (NSW Chief Scientist and Engineer, 2014). This was preceded by various other inquiries and reviews, including the Thirlmere Lakes Inquiry; the Southern Coal Fields Inquiry; and PAC and Commission of Inquiry reviews of other mines in the area.

As attested in these documents, the region includes important water and ecological resources and features that represent a significant component of Sydney's drinking water resource. While the NSW Chief Scientist and Engineer found that impacts to this resource, both water quality and quantity, could be addressed with engineering solutions (e.g. treatment plants and additions to dams), she noted that these would have large economic ramifications for the Government and the people of NSW (NSW Chief Scientist and Engineer, 2014 p 16).

The Department of Trade & Investment's Division of Resources & Energy notes that this proposal is considered small and would be ranked 50 out of 56 producing coal mines in NSW if approved (DRE, 2015). In advising the Department of Planning & Environment of the significance of the resource, the Division of Resources & Energy concluded "*that the significance of the resource lies mainly in its ability to maintain coal production from the Southern coalfield and utilisation of the Port Kembla Coal Terminal*" which, it goes on to confirm, is currently underutilised. According to the DRE, the net present value of the royalty stream "*is estimated to be approximately $26 million*" (DRE, 2015).

Given the importance of the water and ecological resources in the vicinity of the proposed mining area, and the significance of the potential risks to these assets, the Commission sought further clarification and updated advice from the relevant government agencies, including the Commonwealth's Independent Expert Scientific Committee for Coal Seam Gas and Large Coal Mining Development. The Commission also sought the expert advice of Emeritus Professor Jim Galvin and Dr Colin Mackie, who have significant expertise in subsidence and groundwater respectively, and have both been involved in some of the earlier Inquiries in the southern coal fields.

The advice the Commission has received from the Dams Safety Committee, Water NSW, the Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development and some independent experts is consistently critical of the residual uncertainties and risks relating to current plans. Outstanding issues include: uncertainty about potential connections with pre-mined upper seams; precise delineation of the Corrimal fault; and the inability to seal off the adit below escarpment if there is leakage into the mine.

The proponent has provided volumes of documentation in response to various concerns raised throughout the process, but ultimately these have not been able to satisfy these residual concerns sufficiently to provide confidence that the Sydney Catchment would be protected to the level expected. This is a reflection of the complexity of the issues and the need for more detailed of information and scientific knowledge in this area, as highlighted by the NSW Chief Scientist and Engineer, who found "*The underground* [water] *system is much less instrumented and much less understood*" (2014, p. v). There are also residual concerns and uncertainties about whether the mine's pit top site is capable of handling the additional throughput capacity sought without unacceptable impact on the proximal local community.

The Commission is conscious of the factors weighing in favour of the proposed mine expansion including continuation of current employment and economic benefits to the region. However, at this stage the Commission does not have sufficient information or confidence to anticipate a determination for approval without additional risk mitigation strategies being developed and implemented. The Commission has provided recommendations outlining additional assessment work that needs to be provided to enable determination of the proposed mine expansion.

The Minister asked the Commission to pay particular attention to the potential impacts to upland swamps and water resources; and residents in the vicinity of the Russell Vale pit top.

In regards to upland swamps, the Commission recognises that the upland swamps are complex ecosystems, and predicting the ecological and hydrological response of each upland swamp being undermined is difficult. The Commission notes that while these swamps have been undermined previously, the resulting impact on the swamps remains uncertain. There is general agreement that at least some of the swamps to be undermined would be damaged to some extent by the proposed mining. The Department of Planning & Environment and the Office of Environment & Heritage briefed the Commission on an offset policy framework for upland swamps which is currently being

developed. While the Commission visited a partially degraded swamp on private land, owned by the proponent that might provide a suitable offset, the Commission heard concerns from special interest groups about potential offset arrangements and it will be important that any potential offset policy addresses the key elements recommended in this report.

As highlighted by Water NSW (the former Sydney Catchment Authority), a biodiversity offset policy for upland swamps could only ever address biodiversity issues and does not resolve potential hydrological impacts and loss of ecosystem functions.

While it is possible that water quantity and quality impacts might be able to be adaptively managed and acceptable, the subsidence and groundwater advice the Commission has received from the Independent Expert Scientific Committee and E/Prof Galvin and Dr Mackie all highlight risks and uncertainties that need to be resolved. The Commission has found that an integrated risk assessment, focusing on, but not limited to, the interactions, impacts, effects and consequences (including environmental consequences) of key areas of uncertainty surrounding the groundwater, surface water and subsidence impacts is warranted in order to credibly establish the efficacy of an adaptive management regime to respond to potential impacts of the project.

Potential impacts to residents in the vicinity of the Russell Vale pit top have also drawn concerns from both the community and the Environment Protection Authority. The site adjoins a number of residential streets making noise and traffic impacts difficult to manage at current production levels, which are less than one third of the proposed 3 million tonnes per year maximum. The Commission has recommended further consideration of noise, including justification for recommended increases in noise levels from the 2011 approval, air quality and traffic impacts, and additional restrictions of coal truck haulage hours.

The Commission has considered all the available information including additional information requested from relevant agencies and experts. There is no disagreement about the importance of protecting Sydney's drinking water catchment, both in terms of the water quality and quantity. The proponent has argued that this can be achieved by the proposed mining layout and mining methods, acknowledging that the mine plan has been substantially modified and reduced compared with the original proposal. Advice from Water NSW and the Commonwealth's Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development have both identified significant risks with respect to the proponent's modelling of the predicted impacts.

The Commission acknowledges that there will always be some degree of uncertainty and risks in any modelled predictions and experts legitimately may have differing views. In such cases the decision maker needs to take into account a risk assessment that predicts the likelihood of an event occurring and then the consequence of such an event should it occur. In order to successfully manage the identified risks, appropriate risk mitigation strategies could be developed and implemented.

The Commission considers that the likelihood of the proposed mine causing a significant detrimental impact on the Sydney water catchment water quantity or quality is low, however the consequence, if such an event did occur, could be substantial and irreversible. The precautionary principle requires the Commission to have regard to likelihood and consequence of these risks for each proposal.

At this stage, the Commission does not have sufficient information or confidence to determine the merits of the proposal sufficient for a determination for approval. It may be possible for the proposal, or a modified proposal to be approved if all the additional information identified in this Review report provides a greater level of confidence for the protection of the water quality and

quantity in the Sydney Catchment Area and satisfies all the other issues identified in this review. The Commission has recommended that a risk management panel oversee any additional assessment.

Recommendations:

Water/Subsidence

1. The establishment of a risk assessment panel, constituted by an independent chair, Water NSW, the Dams Safety Committee, the Division of Resources and Energy and the proponent to oversee an integrated risk assessment, particularly focusing on links between subsidence and water (both groundwater and surface water) impacts of the proposal. This risk assessment, including associated work rerunning the groundwater modelling as recommended by Dr Mackie; and addressing the issues raised by the relevant agencies and experts (as highlighted in this report), needs to be completed before the application can be determined.

Upland Swamps

2. The establishment of a network of piezometers within and surrounding the upland swamps, the establishment of this network should be guided by the relevant authorities (i.e. Office of Environment & Heritage, Water NSW, the Dams Safety Committee and the Department of Planning & Environment). This network will collect additional baseline data and monitor the impacts to the swamps, through changes to the groundwater supporting the swamps, from the mining. This monitoring data should be made available to the independent risk assessment panel.

3. Any more definitive policy developed regarding triggers for offsets and mitigation measures under the *"Policy Framework for Biodiversity Offsets for Threatened Upland Swamps and Associated Threatened Species Impacted by Longwall Mining Subsidence"* should be made available for consideration by the independent risk assessment panel (see Recommendation 1).

4. Any potential offset policy should address key elements including:
    a. the potential delayed onset of subsidence and associated hydrogeological and ecological impacts to swamps;
    b. potential ecological and structural tipping points; and
    c. mechanisms to adequately secure offset sites (with consideration of the current land tenure and exploration licence and mining lease tenements of the proposed offset site; and the need for site specific offset management plans).

Socio-Economic

5. The proponent's economic assessment, in particular the estimated costs and benefits, should be updated to reflect the current economic climate.

6. The final assessment and determination of the project should be informed by an independent analysis of the economic costs and benefits of the project, including any additional information/updated economic assessment provided by the Applicant. The independent analysis should be managed by the Department of Planning & Environment.

Noise

7. The Commission recommends that further consideration of the noise impacts of the project needs to be provided including consideration of further noise mitigation measures as recommended by the EPA. Detailed justification should be provided for any deviations from the existing noise limits in current planning approval. Also clarification should be provided on the outcomes and applicability of the noise audit required in the 2011 approval.

Air

8. The $PM_{2.5}$ emissions from the proposal need to be assessed prior to any determination of the application.

9. Consideration of best practice standards needs to be provided to demonstrate that air emissions would be minimised and to justify the proposed increase in coal handling capacity.

10. The mine's existing monitoring and reporting systems should be strengthened to clearly demonstrate compliance with current conditions, environmental standards and reporting goals (i.e. for $PM_{2.5}$ emissions).

Flooding/Bellambi Creek

11. Any new approval should retain the existing requirement to realign Bellambi Creek or a full justification why this is no longer necessary to provide protection to the creek downstream from the pit top surface area.

Traffic

12. The proponent should negotiate with Council and Roads & Maritime Services regarding maintenance contributions to mitigate impacts from the increase in truck movements along the haulage route.

13. Consideration should be given to further limiting the hours of truck movements.

14. Proponent should investigate and cost a number of options to reduce the noise impacts to the most effected residents along Bellambi Lane, particularly those near the intersections with the Princes Highway and the Northern Distributor. Options to be considered by the proponent, should include, but not be limited to:
    a. construction of a coal truck parking area (for trucks to wait prior to the commencement of haulage hours) within the mine boundary;
    b. construction of a noise barrier near the intersections of Bellambi Lane/Princes Highway and Bellambi Lane/Northern Distributor; and
    c. use of pavement modifications along Bellambi Lane to reduce truck/trailer banging.

15. No increase in the currently approved maximum rate of extraction should be approved without clear demonstration that facilities can handle the additional volume without unacceptable impacts for local residents.

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Glossary

Commission: The Commission to review this application, constituted by Mr Paul Forward (chair); Mr Joe Woodward PSM and Mr Brian Gilligan

Council: Wollongong City Council

DoE: Commonwealth Department of the Environment

DSC: NSW Dams Safety Committee

DRE: Division of Resources & Energy (within the Department of Trade & Investment)

DP&E: Department of Planning & Environment

EA: Environmental Assessment.

EEC: Endangered Ecological Community (under both the TSC Act and EPBC Act)

EPA: Environment Protection Authority

EP&A: Environmental Planning and Assessment Act 1979.

EPBC: Environment Protection and Biodiversity Conservation Act 1999

Independent Expert Scientific Committee: Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development

LGA: Local Government Area.

Minister's Requirements: Requirements provided by the Minister of the Department of Planning for an environmental assessment or environmental impact statement.

NOW: NSW Office of Water.

OEH: Office of Environment and Heritage

PAC: Planning Assessment Commission.

PM_{10}: Particulate matter with an aerodynamic diameter smaller than 10 micrometres.

$PM_{2.5}$: Particulate matter with an aerodynamic diameter smaller than 2.5 micrometres

The proponent: The applicant under Part 3A of the EP&A Act 1979, in this report being Wollongong Coal Limited. 'Proponent' includes the proponent's EA consultants.

The proposal: The subject of the application under Part 3A of the EP&A Act 1979, in this report being the Russell Vale Colliery Underground Expansion Project (UEP).

SCA: Sydney Catchment Authority (now Water NSW)

TOR: Terms of Reference.

TSC: Threatened Species Conservation Act 1995.

TSP: Total suspended particulate matter

Water NSW: formerly Sydney Catchment Authority (SCA)

1. Introduction and Terms of Reference

On 9 December 2014 the Minister for Planning, the Honourable Pru Goward MP requested the Chair of the Planning Assessment Commission (the Commission) to conduct a review of the Russell Vale Colliery Underground Expansion Project. The Minister's request was made under Section 23D of the *Environmental Planning and Assessment Act 1979* and Clauses 268R and 268V of the *Environmental Planning and Assessment Regulation 2000*. A copy of the Minister's request is provided in **Appendix 1**.

The Terms of Reference are as follows:

1. Carry out a review of the Russell Vale Colliery Underground Expansion Project, and:
    a) Consider the EA for the project, the issues raised in submissions, the formal response to submissions, the Preferred Project Report, the Residual Matters Report, the Department of Planning & Environment's preliminary assessment report of the project, and any other relevant information provided on the project to the Commission during the course of the review;
    b) Assess the merits of the project as a whole, paying particular attention to the potential impacts to:
        - upland swamps and water resources (especially Cataract Creek and the stored waters of Cataract Reservoir) resulting from mine subsidence; and
        - residents in the vicinity of the Russell Vale pit top resulting from noise and air emissions and the trucking of product coal;
    c) Apply all relevant NSW Government policies in that consideration and assessment; and
    d) Provide recommendations on any reasonable and feasible measures that could be implemented to avoid, reduce and/or offset the potential impacts of the project
2. Conduct public hearings on the project no later than 30 January 2015.
3. Complete the review by 20 March 2015, unless the Secretary of the Department of Planning and Environment agrees otherwise.

Mr Paul Forward (Chair) with Mr Brian Gilligan and Mr Joe Woodard PSM constituted the Commission.

2. Project Description

Wollongong Coal Pty Ltd (formerly Gujarat NRE Coking Coal Ltd) owns and operates the Russell Vale Colliery (Russell Vale) which is located in the Illawarra region, approximately eight kilometres (km) north of Wollongong and 70km south of Sydney (Figure 1). Jindal Steel and Power Limited acquired a majority stake in Gujarat NRE Coking Coal Ltd in October 2013. The mine was known as the NRE No. 1 Colliery prior to February 2014 (Department of Planning & Environment, 2014b).

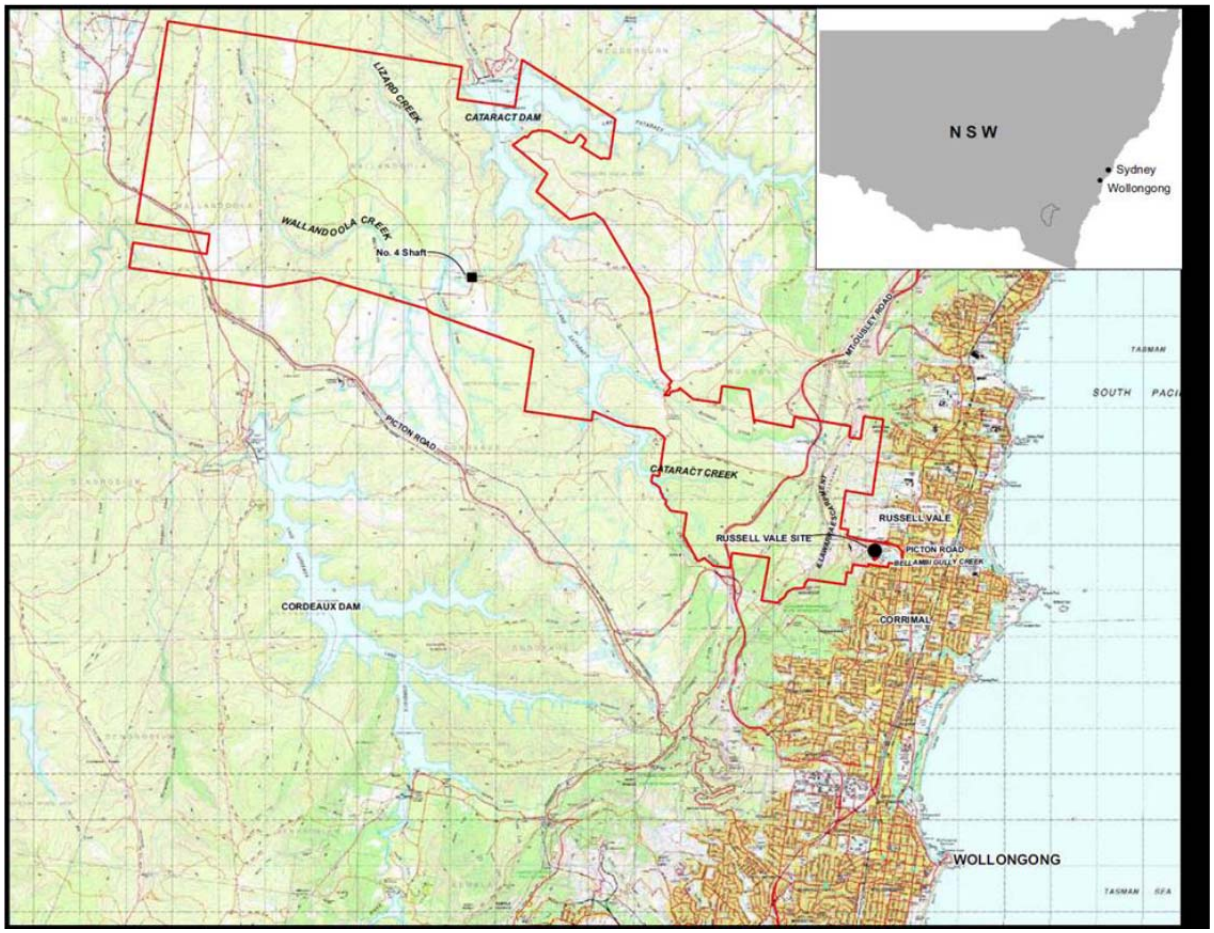

Figure 1: Regional location and existing project area (outlined in red)

2.1. Background and Historical Context

Underground mining has been undertaken at this mine since the late 1880s in the Bulli and Balgownie Seams. A range of mining techniques including bord and pillar mining, pillar extraction and longwall mining have been employed at Russell Vale since mining commenced in 1887. The top seam is the Bulli Seam which was mined using bord and pillar; and pillar extraction techniques in the early to mid-1900s. The middle seam, being the Balgownie Seam, was extracted using longwall mining techniques between 1970 to 1982 and 2001 to 2003. The mine produced very little coal from 2003 until 2012 when, longwall mining commenced in the underlying third seam; being the Wongawilli Seam (Department of Planning & Environment, 2014b).

On 12 August 2009, the former owner submitted a Part 3A project application for its proposed Underground Expansion Project (UEP). This project (MP 09_0013) involved a significant expansion of longwall mining across the Wonga East and Wonga West areas, to extract 31 million tonnes (Mt) of Run-of-Mine (ROM) coal over a project life of 18 years. The Commission notes that the application

was not considered adequate for public exhibition and a number of Modification Applications were approved for interim mining until the longer term mining plan could be finalised and determined. The Environmental Assessment supporting the UEP application was exhibited in early 2013.

In response to issues raised in agency and public submissions and an independent expert review of the Environmental Assessment undertaken for the Department of Planning and Infrastructure, the former owner made significant changes to the original project. These changes are outlined in the Preferred Project Report, which was submitted in September 2013. Under the Preferred Project Report, the UEP application has been amended by:

- reducing the proposed project life from 18 years to 5 years;
- reducing the total ROM coal production from 31Mt to 4.7Mt;
- removing all proposed longwall mining (seven panels) from the Wonga West area and removing one panel from the Wonga East area;
- reorienting the remaining eight longwall panels in the Wonga East area to minimise impacts to identified significant natural features; and
- removing the proposed Bulli West Seam first workings, Balgownie Seam first workings and Wonga Mains driveage (Department of Planning & Environment, 2014b).

While the UEP was being developed and assessed, an application known as the NRE No.1 Colliery Preliminary Works Project was lodged to allow for the continued extraction of up to 1 million tonnes per annum (Mtpa) of ROM coking coal for a period of three years. This application was made to bring the mine into the modern approval regime (as all mining operations in existing mining leases required approval under the *Environmental Planning and Assessment Act 1979* by 31 December 2011). The proposed coal extraction methodology was for first workings and pillar extraction only, from the Bulli and Wongawilli Seams. On 13 October 2011, the Commission granted project approval for the mining to continue at the Russell Vale Colliery, noting that the underground expansion project was likely to be assessed and determined within the three year timeframe of this approval.

A number of modification applications have been made relating to the approved Preliminary Works Project, in 2012 and 2014. On 4 May 2012, the former owner lodged an application (MOD 1) under section 75W of the *Environmental Planning and Assessment Act 1979* to modify the Preliminary Works Project approval to:

- extract coal using longwall mining techniques in the Wongawilli Seam from two panels (Longwalls 4 and 5); and
- develop the maingates for Longwalls 6, 7 and 8.

During the course of assessing MOD 1, the length of the second panel (Longwall 5) was shortened by the proponent (from 1,145m to 845m), primarily to reduce the potential impact on upland swamps. On 24 December 2012, the Commission approved the amended MOD 1 application, but excluded approval for the development of the maingates for Longwalls 7 and 8 on the basis that the application lacked an assessment of the subsidence impacts that would be caused by extraction of the longwall blocks (Planning Assessment Commission, 2012).

On 11 April 2014, the current owner lodged an application to further modify the Preliminary Works Project approval. The proposed modification (MOD 2) involved:

- extracting coal using longwall mining techniques for the first 400m of Longwall 6 in the Wongawilli Seam; and
- extending the existing project approval until 31 December 2015 (Planning Assessment Commission, 2014).

On 19 November 2014 the Commission approved the application for MOD 2, with amendments. The Commission determined that the upland swamp CCUS4, which was to be partly undermined, was a significant swamp and as a result, shortened the length of mining to 365m.

> *"The Commission finds a cautious approach should be adopted given the uncertainty of integrity of the swamps from previous mining impacts and the risk of reaching the swamp's tipping point. The Commission has determined that Longwall 6 should be reduced by approximately 35m, stopping prior to the waterfall outflow of CCUS4. This will allow monitoring and data collection of any changes in the swamp and the monitoring results would provide empirical information for the assessment and prediction of the potential changes to CCUS4 and formulation of adaptive management plan if mining is to proceed through the whole of Longwall 6.*
>
> *This finishing position also aligns with 10c/t (cut-through) on Maingate 6, which would allow the retrieval of the longwall if further mining of Longwall 6 is not recommended or approved in the assessment of the UEP* (Planning Assessment Commission, 2014)*."*

During the course of assessing MOD 2, the Commission was advised that the Department was assessing a third modification application (MOD 3) submitted by the current owner. This application was to seek an extension of the period under the approval during which mining operations may be carried out. The Preliminary Works Project time period was to expire on 13 October 2014. The MOD 3 extension was for 79 days until the 31 December 2014, by which time the MOD 2 application was expected to have been determined. As the Department considered the modification application to be very minor and purely administrative, approval was granted on 10 October 2014 (Department of Planning & Environment, 2014a).

The Commission notes that previous PAC's have raised concerns about determining various modification applications, and the unsatisfactory piecemeal approval being taken to this major mining project. The PAC determining MOD 2 stated:

> *"this Commission is put in a very difficult position. On the one hand, it shares objectors' concerns in regard to the piecemeal approach to gaining planning approval and agrees that ideally this application should not be considered in isolation in the absence of the expansion plan. On the other hand, this application is said to be essential to maintain the operation of the mine and the employment of existing mine workers until the expansion plan is determined* (Planning Assessment Commission, 2014)*."*

The current proposal has been modified and substantially cut back to reduce the potential adverse impacts of the mine. The consequence of this is that once again it presents the decision maker with a piecemeal application, considering the proponent's stated intention to lodge a subsequent application for a larger and long term mining approval.

2.2. Current Proposal

The proponent (formerly Gujarat NRE Coking Coal Ltd and now Wollongong Coal) is proposing to expand its longwall mining operations further to the northwest across the Wonga East area, to extract 4.7Mt of ROM coal over a project life of 5 years. The proposal involves the extraction of coal from eight longwalls, in three blocks (Longwalls 1-3, 6-7 and 9-11) and the continued operation of the mine's surface facilities . The major components of the project are summarised in Table 1 below, and depicted in Figure 2 and Figure 3 (Department of Planning & Environment, 2014b).

Table 1: Major components of the Russell Vale Underground Expansion Project (Preferred Project)

Aspect	Preferred UEP Project
Project Summary	• Continued longwall mining operations to extract 4.7Mt of ROM coal from the Wongawilli Seam in the Wonga East area over a period of 5 years; • Upgraded and continued operation of the pit top area, support facilities and utilities; • Continued minimal processing (sizing and screening) of up to 3Mtpa of ROM coal at the pit top area; • Continued exploration activities, environmental monitoring and maintenance of access to the existing underground workings and surface infrastructure within exploration and mining tenements in the Wonga West domain; • Continued transport of ROM coal from the mine by road to the Port Kembla Coal Terminal for export; and • Disposal of coal rejects adjacent to the mine site and rehabilitation of the site.
Project Life and Mining Schedule	• 5 years, in general accordance with the following sequence: o LWs 6 and 7 – 2015; o LWs 1 and 2 – 2016; o LWs 3 and 9 – 2017; o LW 10 – 2018; and o LW 11 – 2019.
Project Application Area	Covers an area of 6,973 ha and includes Consolidated Coal Lease 745, Mining Purposes Lease 271 and Mining Lease 1575.
Mining and Reserves	• Extraction of approximately 4.7 Mt of ROM coal; and • Production of up to 3 Mtpa of product coal for export.
Coal Production	• Coal production includes sizing and screening (no washing or other processing). The small amount of waste rock that may be produced during processing would be re-used on-site or else disposed of at the adjacent coal wash waste emplacement.
Water Demand and Supply	• Potable water demands at the Russell Vale pit top site would continue to be met by connection to Sydney Water's reticulated water supply; • Water demands at the No. 4 shaft would continue to be met by a combination of raw water purchased from Water NSW and recycled processed water; • Maximum groundwater inflows from both Bulli and Wongawilli Seams are estimated at 2.29 ML/day. It is predicted that total water demand for mining operations would be 4.2 ML/day; and • Water demand would be met by sourcing groundwater from old and new workings and surface water runoff from mine operational areas, with purchase of bulk raw water from Water NSW as required.
Employment	• Long-term employment of 300 employees and contractors; and • Short-term construction workforce of up to 100 employees at various stages of the project.
Pit Top Surface Facility	• Existing facilities include administration offices and amenities, workshops, car parking areas, internal roads, five portal entries, ROM coal stockpile area and reclaim tunnel, two decline conveyor belts, coal breaker building, truck load-out facilities, vehicle wash, weigh bridge, water treatment and management facilities, fuel and oil storage facilities and electrical substation; • Construction of two new stockpiles (140,000 tonnes each), truck loading facilities, a designated coal dispatch road and a 6ML settling pond; and • Upgrade of water management system.
Support Facilities	• Continued use of four ventilation shafts (Nos. 1, 2, 3 and 5) and an existing shaft to

and Utilities	provide personnel and materials access to the workings (No. 4); and • Access roads, water and electrical facilities.
Hours of Operation	• Underground operations: 24 hours, 7 days a week; and • Coal haulage: 7am to 10pm Monday to Friday; and 8am to 6pm Saturdays, Sundays and public holidays.
Mine Site Access	• Site access is via a private driveway from Bellambi Lane, at a signalised intersection; and • The main access to underground workings is via No. 4 shaft which is accessed from Picton Road.
Product Coal Transportation	Transport of ROM coal from the mine by road to the Port Kembla Coal Terminal for export.
Rehabilitation	Rehabilitation of all surface facilities following the completion of mining.
Capital Value	$85 million.

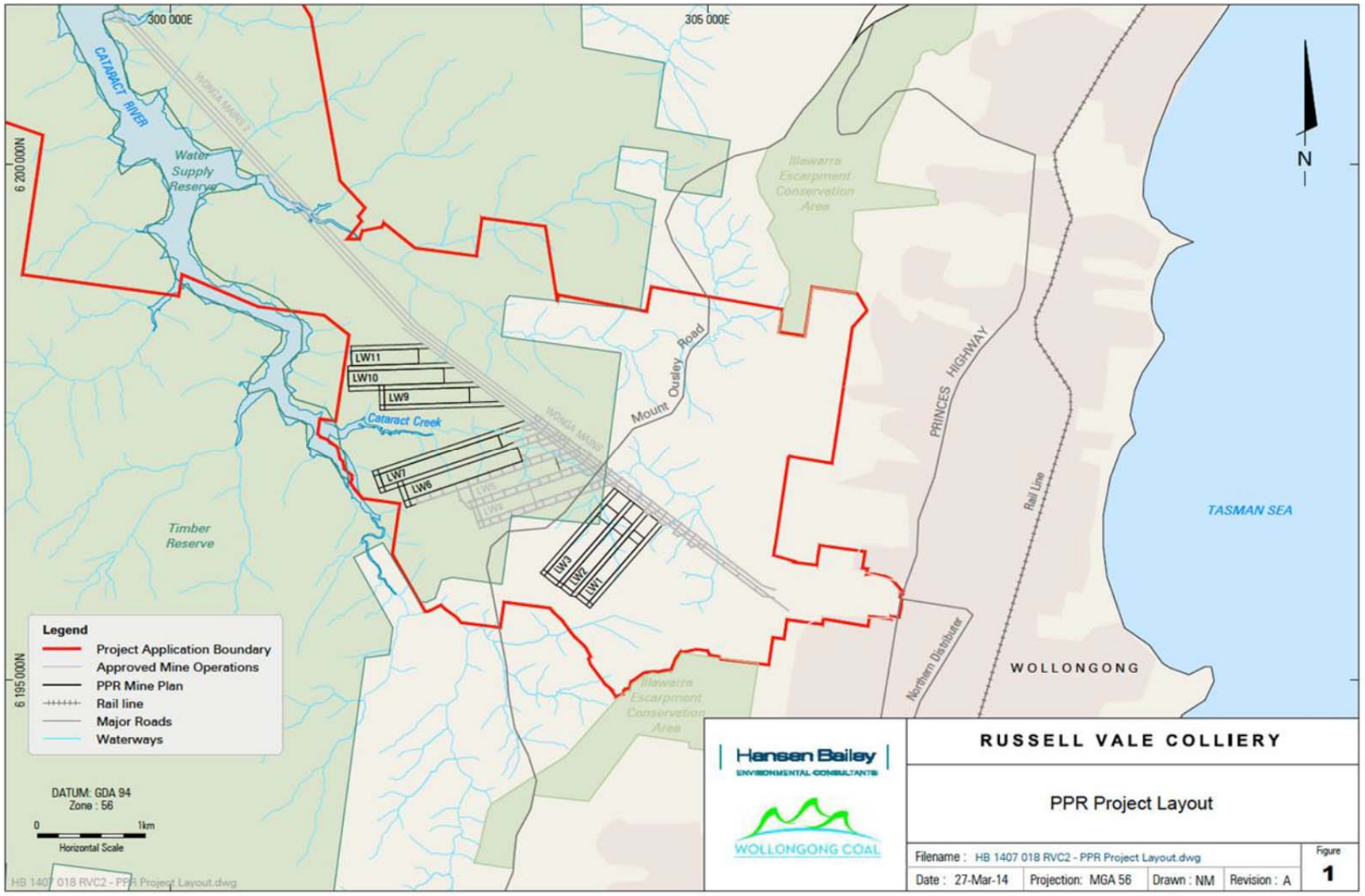

Figure 2: Preferred UEP longwall layout

Figure 3: Russell Vale Colliery pit top facilities

2.3. Project Surrounds

Russell Vale Colliery is located within the Wollongong and Wollondilly local government areas. The project application area covers over 6,500 hectares (ha) and the majority of this comprises an existing underground mining lease area, which lies under the Woronora Plateau Figure 4.

The surface facilities site, which is approximately 100ha in size, is located on the slopes of the Illawarra Escarpment, at Russell Vale, west of the Princes Highway. To the east and the south of the surface facilities site are the suburbs of Russell Vale and Corrimal respectively. There are also a number of ventilation shafts (Shafts 1, 2, 3 and 5) and an access shaft for personnel and materials to the workings (Shaft 4), located approximately 20km from the surface facilities site and is accessed from Picton Road.

The vast majority of the land that is covered by the underground mining lease is owned and managed by Water NSW, formerly Sydney Catchment Authority and lies within the Metropolitan Special Area water catchment. The site is overlain by the catchment area of the reservoir behind Cataract Dam, which supplies potable water to Sydney. It also includes part of the Mt Ousley Road, a Telstra fibre optic cable, fire trails and various electrical transmission lines. Other key features close to the area of proposed mining include Picton Road, Cataract River, Cataract Creek and Bellambi Creek.

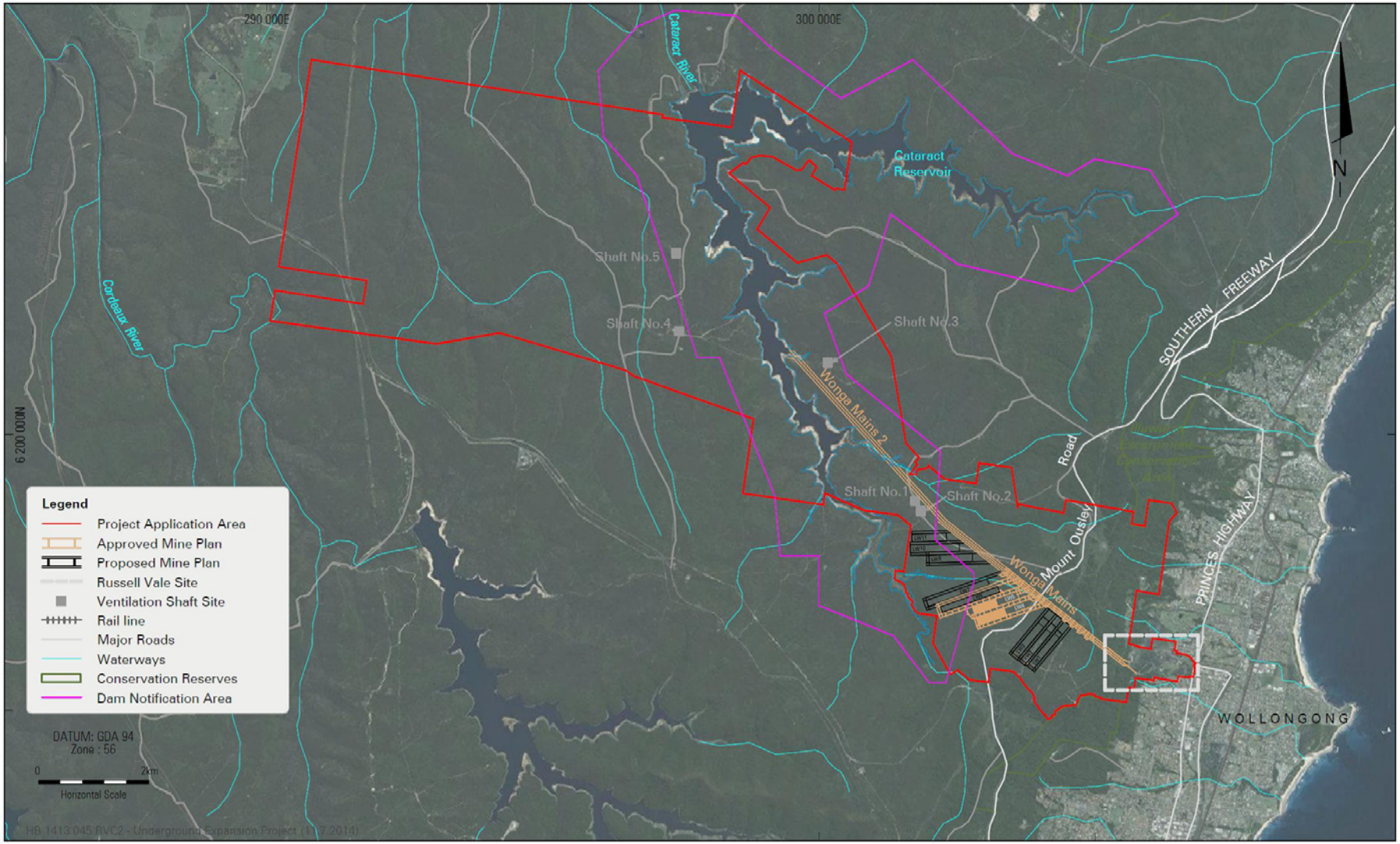

Figure 4: Proposed mining areas and existing workings at Russell Vale Colliery

3. Commission Activities

3.1. Public Hearings and Submissions

In accordance with the Commission's terms of reference, a public hearing was held on the Tuesday 3 February 2015 at the WIN Entertainment Centre, Wollongong. A total of 45 verbal submissions were made to the Commission at the hearing, comprising 17 special interest groups and 28 individuals. All persons seeking to be heard were heard. A number of written submissions were also made to the Commission. A summary of these submissions is at **Appendix 2** of this Report.

326 submissions made during the earlier assessment process were provided by the Department of Planning & Environment to the Commission.

3.2. Documents, Meetings & Site Inspections

Through the course of the review the Commission accessed a wide range of documents including, but not limited to:

- the proponent's Environmental Assessment;
- the proponent's Preferred Project Report, Response to Submissions and the Residual Matters Report;
- the Department of Planning & Environment's Assessment Report; and
- submissions from government agencies, special interest groups and the public.

During the review, the Commission met with the Department of Planning & Environment for a briefing on the project (28 January 2015) and again on the 20 February 2015 (joint meeting with the Office of Environment & Heritage regarding the *Draft Policy Framework for Biodiversity Offsets for Threatened Upland Swamps and Associated Threatened Species Impacted by Longwall Mining Subsidence*). The Commission also met with Wollongong Council (2 February 2015), Water NSW (10 February 2015), the Environment Protection Authority (19 February 2015), Wollondilly Council (19 February 2015), and the NSW Dams Safety Committee (20 February 2015). Summaries of the issues discussed at each meeting are provided in **Appendix 3**. Submissions from the agencies are provided in **Appendix 4**.

The Commission visited the site on 2 February 2015 with Wollongong Coal staff and their consultants. The site visit included a tour of the pit top area and aspects of the underground mine. This briefing by the proponent and their consultants included the changes that have occurred to the project, since it was originally submitted in 2009. Other topics on which the Commission was briefed included:

- mine planning, since November 2013 when the new company took over;
- subsidence predictions of the redesigned layout;
- ecology and swamps; the predicted impacts on these from the project;
- upland Swamp CCUS4, as this swamp is to be directly undermined by the continuation of Longwall 6;
- surface and groundwater modelling, predictions and impacts;
- flooding of Bellambi Gully, and the updated Flood Study by Cardno;
- pit top amenity, noise and air quality measures;
- the mine's usage of Bellambi Lane; and
- future planning proposal by the proponent.

As part of the briefing the Commission inspected the pit top, including the conveyor and its portal, the stockpile areas, the emplacement area, and the water management system on site to capture

stormwater runoff. The Commission was escorted by proponent staff into the mine, to view the underground workings and the longwall machinery positioned on Longwall 6.

On the 4 February 2015, the Commission undertook a site visit of the Metropolitan Special Areas, with representatives of the Office of Environment & Heritage, Water NSW and Biosis. The Biosis representative was involved to provide the Commission with details of the proposal, the potential impacts and remediation and offset options that might be required. The Commission visited upland swamps: CCUS1, CCUS4, CRUS1; Cataract Creek and the Waratah Rivulet. A summary of the site inspection is provided in **Appendix 3**.

3.2.1. Meetings with Agencies

Briefing with the Department of Planning & Environment

The Commission met with the Department of Planning & Environment on 28 January 2015, for a briefing on the project. A number of topics were discussed at the briefing, in particular the considerable changes made to the project since it was originally submitted in 2009. The revised project is smaller in scale than the original application, and has included the realignment and removal of a number of longwall panels in response to objections made on the original application.

Other topics discussed included:

- on-going concerns from a number of State agencies and others regarding the predicted impacts, and the level of uncertainty surrounding these predictions;
- water NSW's (formerly the Sydney Catchment Authority) on-going objection to the project, due to the longwalls extending into the dam Notification Area;
- the upland swamps, the concern in the broader community for their on-going protection, and any proposed offsets for damage cause by undermining these;
- the draft policy framework for biodiversity offsets that the Department of Planning & Environment is drafting together with the Office of Environment & Heritage;
- the economic assessment carried out by the proponent, and the multiplier used by the proponent;
- conditions for noise limits at the pit top are higher than the original approved noise limits (2011 approval); and
- possible future expansion proposals.

Meeting with Wollongong City Council

The Commission met with staff from Wollongong City Council on 2 February 2015. The key topics discussed at this meeting were Wollongong Council's ongoing concern with the subsidence predictions and impacts; the upland swamps; the flood mitigation works at the pit top; on-going concerns from residents regarding noise and traffic impacts from the mine along Bellambi Lane.

Meeting with Water NSW

On the 10 February 2015, the Commission met with representatives of Water NSW (formerly Sydney Catchment Authority). Water NSW reaffirmed the new Board's position with regard to longwall mining within the dam Notification Areas, and within the Sydney Catchment. A number of topics were discussed, including Water NSW's residual concerns surrounding:

- the levels of uncertainty associated with the subsidence predictions;
- the nature and full extent of both the Corrimal Fault and dyke D8;
- the potential for a connection between the Cataract Reservoir and the mine workings, and the implications of such a connection;
- the potential for a reduction in both water quality and quantity in Cataract Reservoir, Cataract River, Cataract Creek and tributaries;

- the significant impacts to the upland swamps of Special Significance; and
- the impacts on cliffs and steep slopes.

These are considered to be unacceptable to Water NSW. Water NSW is particularly concerned with the number of uncertainties and risks, and the impacts of these uncertainties as they relate to water, and any potential connection between the Cataract Reservoir and its tributaries and mine workings.

Meeting with Wollondilly Council

The Commission held a teleconference with Wollondilly Council staff on 19 February 2015. Wollondilly Council staff outlined their concerns regarding the environmental impacts from longwall mining within the Sydney Catchment. Wollondilly Council also expressed their concerns of the lack of scientific adequacy within the application. Wollondilly Council stated that when scientific rigour is lacking, then the precautionary principle should be applied particularly given the importance of the Sydney water catchment area.

Meeting with Environment Protection Authority

The Commission met with representatives of the Environment Protection Authority on 19 February 2015. The key topics discussed at the meeting were: noise criteria at the pit top; the noise criteria in the 2011 Preliminary Works Project approval being more stringent than the noise criteria proposed in the Department's draft conditions; noise criteria for Bellambi, as this was raised in a number of submissions and at the public hearing; air quality criteria at the pit top; and the realignment of Bellambi Gully as well as the control of the discharge of water from the Bellambi Gully; and noise from trucks on Bellambi Lane.

Meeting with Dams Safety Committee

On 20 February 2015, the Commission met with representatives of the NSW Dams Safety Committee. A key topic of discussion was how the dam Notification Areas are defined and the legislative role that the Dams Safety Committee has within the Notification Areas. The Dams Safety Committee advised that any proposed development in the Notification Area requires careful consideration of the potential impacts to both the structural integrity of the dam wall and the stored waters of the reservoir. The Notification Area is not necessarily a 'no-go' zone for development.

The Dams Safety Committee representatives outlined their residual concerns with the project which include:

- uncertainties that are associated with triple seam mining, in particular relating to the impact on the stored waters of the reservoir;
- the location of and the impact that the Corrimal Fault may have on the longwall mining, in particular in Longwall 7, as it is one of the closest longwalls to the reservoir;
- the unusual groundwater results from a borehole in the vicinity of Longwalls 9, 10 and 11, which requires further investigation, as the borehole appears to show a connection to the reservoir; and
- that if large volumes of water do enter the mine, the mine adit will not be able to be sealed, and water will continually leak from the mine below the escarpment.

The Dams Safety Committee also informed the Commission that the *Dams Safety Act 1978* is currently under review.

Joint meeting with the Department of Planning & Environment and the Office of Environment & Heritage

The Commission met with representatives of both the Department of Planning & Environment and the Office of Environment & Heritage on 20 February 2015 to be briefed on the *Draft Policy Framework for Biodiversity Offsets for Threatened Upland Swamps and Associated Threatened*

Species Impacted by Longwall Mining Subsidence. This draft policy framework will sit within the Biodiversity Offsets Policy for Major Projects. The draft policy framework is being developed in recognition that the upland swamps have a status not different from other threatened species or communities, but the subsidence induced impacts on them are difficult to define, predict, measure and remediate and that any impacts may not be evident for several years post mining.

4. Potential impacts to Sydney's drinking water catchment Special Areas

4.1. Water

The underground mine workings of the Russell Vale Colliery are located within the southern coal fields, and more specifically, within a declared catchment area, the Metropolitan Special Areas.

The proponent is seeking approval to mine eight longwall panels in an area known as Wonga East. The area supplies Cataract Reservoir, a key part of Sydney's drinking water resource, and the majority is owned by Water NSW (formerly known as the Sydney Catchment Authority). As noted by the NSW Government's Dams Safety Committee, Cataract Reservoir (and its associated supply catchment) is a significant component of Sydney's drinking water resource.

Cataract Reservoir

Cataract Reservoir is a Water NSW owned and operated reservoir, and is one of a number of reservoirs that supplies water for the greater Sydney population. "*Cataract Dam is a major water supply dam which is prescribed by the Dams Safety Committee. It is a 56m, mass gravity dam that forms a significant part of the integrated asset base, supplying Sydney with water via the Upper Canal and Prospect Reservoir."* (NSW Dams Safety Committee, 2015). Previous mining of the Metropolitan Special Areas, including directly under the reservoir, has occurred in three different coal seams over the last 100 years. Mining is now proposed near but not directly under the reservoir.

In addition to the reservoir itself, there are a number of waterways, draining to Cataract Reservoir (see Figure 5), that could be potentially impacted by this proposal including:

- Cataract Creek and a series of first and second order tributaries of Cataract Creek, which runs through the area proposed to be undermined;
- Cataract River (a separate waterway to Cataract Creek) runs to the south of the proposed mining area, with parts of longwalls 1, 2, 6 and 7 within the Cataract River catchment; and
- Bellambi Creek is to the north of the proposed mining area, with parts of longwalls 9, 10 and 11 within its catchment (not to be confused with Bellambi Gully Creek which flows through the pit top site east towards the escarpment and into the ocean and is discussed in Section 6.3).

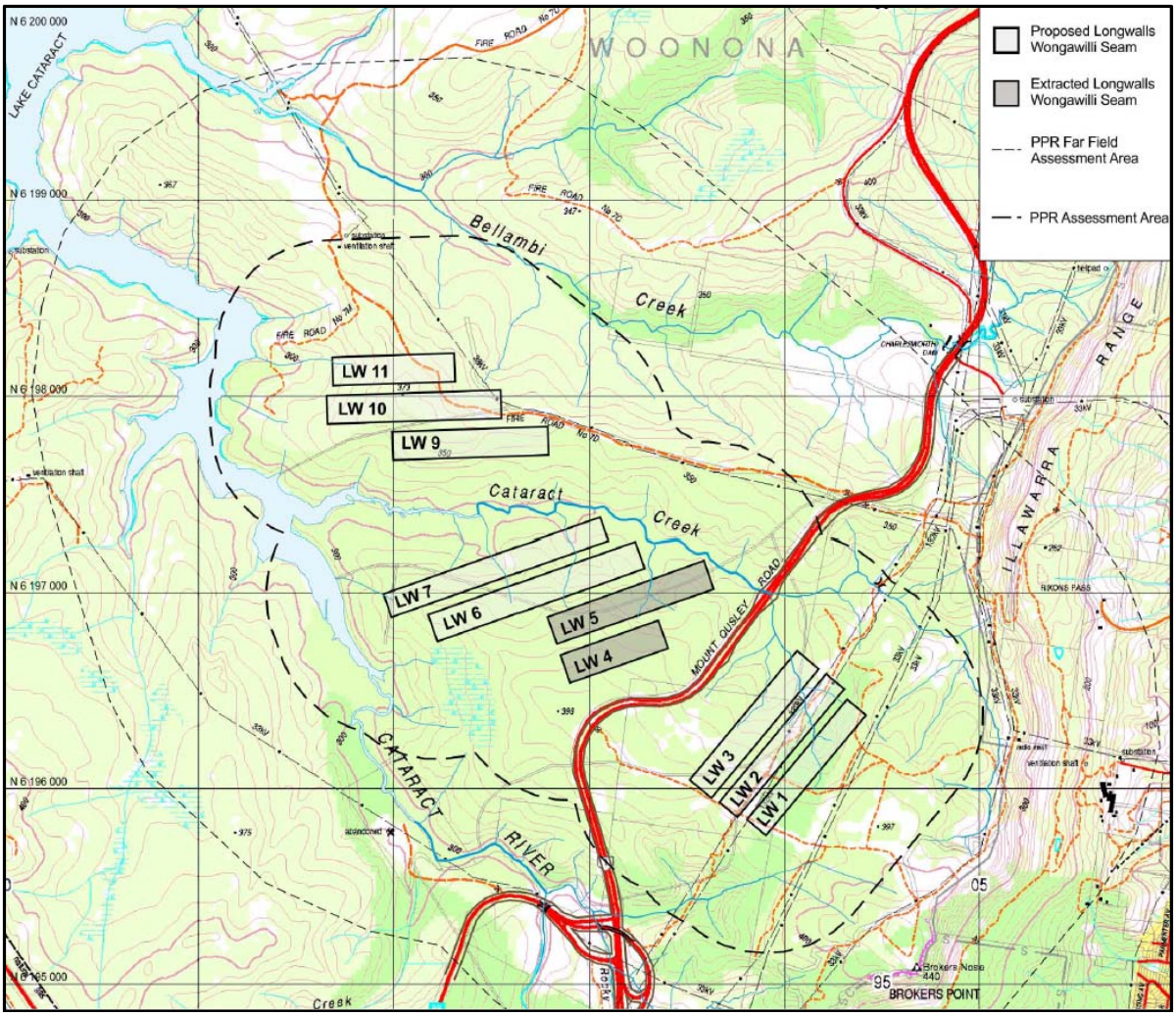

Figure 5: Waterways and Catchments in the project area (source: (SCT Operations Pty Ltd, 2014))

Cataract Creek

Cataract Creek is a relatively steep watercourse, particularly in its headwater sections, and flows directly into the Cataract Reservoir through a series of short pools, rock bars and boulder fields. Some first and second order tributaries of Cataract Creek are proposed to be undermined directly, however the third and fourth order sections of the Creek (the main creek channel) will not be directly undermined. Cataract Creek has previously been undermined to varying extents (SCT Operations Pty Ltd, 2014).

The proponent's groundwater consultant (GeoTerra/GES, 2014) notes that the base of Cataract Creek lies within the Bulgo Sandstone and not the Hawkesbury Sandstone; unlike a large proportion of creeks within the Woronora Plateau. The proponent's subsidence consultant (SCT (2014)) believes that the Bulga Sandstone responds differently to compressive strains; due to it being a softer material, which deforms more easily, reducing the stress present at the surface. It is believed that this is why there is little evidence of impacts from previous mining along Cataract Creek.

Longwall mining causes subsidence of the overlying material (mainly expected directly above the longwall panels), with implications for surface topography; overburden; and surface and groundwater resources in the vicinity of the panels. While the proponent's proposed mining would not directly undermine Cataract Reservoir or main beds of Cataract River, Cataract Creek and Bellambi Creek, it would directly undermine first and second order tributaries of Cataract Creek. In addition to this, the western extents of Longwall panels 6, 7, 9, 10 and 11 are in relatively close

proximity to Cataract Reservoir's full supply level and within the Dams Safety Committee's dam Notification Area for Cataract Reservoir (Department of Planning & Environment, 2014).

Previous Inquiries in the region

There have been considerable volumes of work produced examining the impacts of underground coal mining in the southern coal fields in recent years. This has included the Southern Coal Fields Inquiry, "*Impacts of Underground Coal Mining on Natural Features in the Southern Coalfield Strategic Review"*; the PAC Reviews of the Metropolitan and Bulli Seam Operations; and the NSW Chief Scientist and Engineer's 2014 report "*On measuring the cumulative impacts of activities which impact on ground and surface water in the Sydney Water Catchment*". Over the course of these enquiries evidence of the impacts of mining in these areas has continued to mount, for example, in relation to swamps - the Planning Assessment Commission's 2010 "*Bulli Seam Operations PAC Report*" notes that:

> "*In the 18 months or so since the Metropolitan Coal Project information was collated, the focus of some government agencies and NGOs has been on gathering information on some swamps that have been recently undermined by longwalls. The information points to significant impacts on the hydrology of the swamps in question and the potential for serious environmental consequences.*" (Planning Assessment Commission, 2010)

Considerable work by government has also occurred, for example in defining areas of 'special significance' (for example with listing in the *Threatened Species Conservation Act 1995*) and working to develop policies in relation to these. Nonetheless, some agencies and public submissions advise that uncertainties remain, with the relatively recent NSW Chief Scientist and Engineer's report emphasising for example that *the hydrogeology of the overburden over coal is especially poorly understood*, posing particular problems for assessing the cumulative impacts of mining; as well as highlighting the need for more data, not just on water, but including "*specifically to understand more comprehensively the role of sensitive ecological features of the Catchment"* (NSW Chief Scientist & Engineer, 2014).

It is clearly difficult to predict with accuracy the impacts of underground mining in this area and it is against this background that the Commission must consider the Russell Vale Underground Expansion Project application, paying particular attention to the potential impacts to upland swamps and water resources, as outlined in the Minister's terms of reference to the Commission.

4.1.1. Issues raised in submissions and at public hearing

Submissions and presentations at the public hearing raised considerable concern that mining in Sydney's drinking water catchment, and the special areas in particular, should not be allowed, highlighting:

- the area's critical importance for Sydney's drinking water security;
- impacts on waterways from previous mining;
- uncertainty of predicted impacts; and
- the inconsistent protection measures in place for the area – with public access explicitly prohibited, but access and impacts from mining continuing to be allowed.

Examples of impacts from other longwall mining activities in the region were provided, including streambed cracking and associated drying of creek beds and pools, as well as floristic changes to swamps, said to indicate changing hydrology (drainage and/or drying) in the swamps. Concerns were raised about potential impacts to both water quantity and quality associated with the proposed mining. Potential water quality impacts of concern include potential iron staining and sedimentation (in the event a swamp dries out and begins to erode).

Of concern to a number of government agencies (Water NSW, the Dams Safety Committee and the Office of Environment & Heritage), community groups and some members of the public is the potential for a connection to be established between the surface water and groundwater resources and the mine workings, and although the likelihood may be low it could result in a permanent loss of water from the system. These concerns were also raised in the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development's (Independent Expert Scientific Committee) advice (September 2014) to the Commonwealth Department of the Environment and the Department of Planning & Environment.

4.1.2. Relevant Government Authorities

Due to the project's location within Sydney's drinking water catchment Metropolitan Special Area; in close proximity to Cataract Reservoir, and beneath endangered upland swamps, a number of agencies and authorities are involved in the consideration of this project.

Water NSW

Water NSW (formerly known as the Sydney Catchment Authority) owns much of the land under which the proposed longwall panels are located. Water NSW also notes that:

> "*The entire proposed mining area is located under a declared catchment area and under land managed as Schedule 1 Special Area (noting that the primary purpose of these areas is to protect the quality and quantity of water in our catchments and that a primary objective is to maintain their ecological integrity)…*
>
> *…a principle objective of Water NSW is 'to ensure that declared catchment areas and water management works in such areas are managed and protected so as to promote water quality and protection of public health and public safety, and the protection of the environment' "* (Water NSW, 2015).

Water NSW has also highlighted the provisions of *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011*, which specifies that consent for development on land in the Sydney Drinking Water Catchment cannot be granted unless it has a neutral or beneficial effect on water quality. Water NSW notes (2015) that as this project is being considered as a Part 3A application, under transitional arrangements the requirement does not specifically apply, nor does Water NSW have a concurrence role.

Dams Safety Committee

The Commission understands that, to provide a level of protection to the dam structure and the stored waters of the reservoirs, the dam Notification Areas were established following the Reynolds Enquiry (1977). The dam Notification Area is a line that triggers the Dams Safety Committee's involvement in the assessment of the proposal under Section 80 of the *Mining Act 1992* (NSW Dams Safety Committee, 2013). It is not an exclusion zone. The definition of the dam Notification Area is a 35° Angle of Draw from the full supply level + ½ the depth of cover to the mine workings (NSW Dams Safety Committee, 2010).

> *"The DSC is currently regulating mining within the Cataract NA* [Notification Area] *which surrounds the Cataract Dam, using its powers under the Dams Safety Act (1978) and the Mining Act (1992). The Proposed mining within the NA requires an application to the DSC to mine within the NA.*

It should be understood that the interests of the DSC are specific to the safety of the Dam and its stored waters (the reservoir).” (NSW Dams Safety Committee, 2015)

Commonwealth Department of Environment and Independent Expert Scientific Committee

The Independent Expert Scientific Committee provides expert scientific advice on the potential water-related impacts of coal seam gas or large coal mining proposals referred to it by Australian Government and state government regulators. This advice is provided to enable regulatory decisions on coal mining developments to be informed by the best available science. Under an agreement between the Australian government, and most of the states (including NSW) the government will seek the Independent Expert Scientific Committee's advice at appropriate stages of the assessment process, including for coal mining development that is likely to have a significant impact on water resources; and ensure that decision-makers take account of the Independent Expert Scientific Committee's advice in a transparent manner (2014).

In addition, due to potential impacts on threatened Coastal Upland Swamps, the project also needs to be considered by the Commonwealth Department of the Environment under the *Environmental Protection and Biodiversity Conservation Act 1999*. Biodiversity impacts on the swamps are considered in Section 4.2.

The Department of Planning and Environment

The Department of Planning and Environment has the assessment role, under the *Environmental Planning and Assessment Act 1979* and has provided a preliminary assessment report to the Commission for its consideration during this review. The Department engaged experts to review the subsidence, groundwater and surface Water issues associated with the application.

4.1.3. Commission process for considering the issues

Given their respective roles in the assessment of this project, the Commission considered the Water NSW, Dams Safety Committee and Independent Expert Scientific Committee submissions in detail and sought updated advice. As noted in Section 3.2, the Commission met with Water NSW and the Dams Safety Committee and sought written advice from the Independent Expert Scientific Committee. The Commission subsequently received detailed written responses from the Independent Expert Scientific Committee, Water NSW and the Dams Safety Committee (this latter at the request of the Department of Planning and the Environment).

Due to the highly technical nature of much of this material, the Commission sought expert advice on subsidence and groundwater issues. Emeritus Professor Jim Galvin is a member of the Planning Assessment Commission and has also been involved in a number of the southern coalfield inquiries mentioned above. The Commission sought his expert advice based on a desktop review of the subsidence work that has been done in relation to the project. Groundwater specialist Dr Colin Mackie has also had considerable involvement in earlier Inquiries in this region and the Commission engaged Dr Mackie to conduct an independent desktop review of the groundwater studies and findings.

4.1.4. Residual Concerns

The advice the Commission received is consistently critical of the residual uncertainties and risks to water resources associated with the current plans. Outstanding issues include:

- data gaps and associated uncertainties about the potential water loss impacts;
- the need to update the modelling and assessment predictions, both with additional data and due to the inadequacies identified in the groundwater model relied upon; and

- the risks associated with the mine adit's location, the resulting potential for drainage through the mine and both technical and feasibility questions about the capacity to provide suitable contingency and closure plans. Note the adit, or mine entrance, is located below the escarpment and any discharge from this area flows directly to the ocean.

The agency submissions and the expert advice to the Commission are provided in **Appendices 4 - 7**.

Cataract Reservoir

The Dams Safety Committee, Independent Expert Scientific Committee, Water NSW, E/Prof Jim Galvin and Dr Colin Mackie all identify or corroborate concerns about the potential risks to the waters of Cataract Reservoir. Of critical concern is the potential for connective cracking to form, draining stored waters. In many cases where such cracking occurs it is able to be plugged to prevent ongoing leakage – or could be allowed to fill a void, and eventually overtop back into the water system. In this case however a number of factors complicate and/or preclude such contingency options and even the capacity to readily agree on the potential for such an event to occur. The Commission notes some of the key concerns from the relevant agencies below.

The Dams Safety Committee nominates a number of uncertainties:

- the potential for inaccuracies in the historical records of the Bulli Seam Mine Plans, an issue it says is not uncommon and that the proponent's documents acknowledge in some places (yet relies on in others).
- the potential for the mine workings to intercept geological structures such as dykes and faults, in particular:
    - the presence (or absence) of the Corrimal Fault in the area proposed to be mined by Longwall 7 (if it occurs in this location, the Dams Safety Committee has indicated longwall mining would need to be set back from the Fault, and that it would not recommend approval of the western end of Longwall 7 in these circumstances). Alternatively, if it can be demonstrated that the Corrimal Fault is absent from Longwall 7, the Dams Safety Committee would not object to the extraction of coal from Longwall 7; and
    - the current anomaly between the proponent's documents, which suggest the impermeable nature of Dyke 8 and yet some lateral connectivity. Additional boreholes are needed "*to investigate the permeability of strata below the floor of the Reservoir to determine the potential for flow along this plan.*" (2015)
- discrepancies in the height of depressurisation (above the Bulli Seam extraction) figures used in the modelling.
- whether it is technically and/or feasibly possible to contain an inflow to the mine, given the presence of workings in 3 seams.
- whether the proposed reverse osmosis plant contingency option, as proposed by the proponent is feasible.

Water NSW, raises many of the same concerns regarding the Corrimal Fault, the dyke and the potential for connective cracking to form between the Reservoir and the mine and the difficulty of the stopping leakage, should it arise.

More specifically, the Independent Expert Scientific Committee, response to the Commission highlights the need for additional geotechnical information and assessment, including:

- *"validation of goaf fracturing and depressurisation heights and lateral extent, especially in multi-seam mining areas of the project area;*

- *improved conceptualisation of reactivation of fractures associated with previous mining, including of the Bulli Seam;*
- *improved delineation of the extent of the Corrimal Fault;*
- *improved understanding of the extent, reactivation capacity, connectivity and hydraulic properties of bedding shear planes ".* (2015, p. 2)

E/Prof Jim Galvin's advice also highlights: "*there is potential for the consequences of leakage into Russell Vale Colliery Mine workings to be much higher than in the case of other collieries that mine in the vicinity of stored waters. This is because the mine is an adit mine that has its entrance well below the water level of the overlying Cataract Reservoir (and above a residential area). Unlike a shaft entry mine where equilibrium can be restored by allowing the mine to flood to the surface, it is not inconceivable that any major leak could be unstoppable and escalate over time*." (2015) In relation to subsidence in particular, E/Prof Galvin noted that:

- the assessment does not present cumulative surface strains and tilts and that this information would be beneficial for assessing subsidence impacts and consequences;
- the 35 degree angle of draw relied on by the proponent has its origins as a control for limiting vertical surface displacement at a point, which is not the issue in this matter: "*the critical issue is the amount of structural disturbance to the rock mass and the potential that this creates for hydraulic connections to the reservoir.*" The concept is said to warrant more critical review and assessment as a control.
- the inbye end of Longwall 7 is located under coal pillars in the Bulli Seam in workings that go right up to the edge of the full storage level for Cataract Reservoir.
- a multidisciplinary approach is required to assess the risks of the proposal, including input from a specialist in groundwater (noting the concerns that the height of depressurisation is uncertain).

Dr Colin Mackie provided specialist input on groundwater to the Commission. Dr Mackie found that the original model was unsuitable. In correspondence responding to questions from Dr Mackie, the proponent's consultant agreed with Dr Mackie's concerns and provided a number of additional model simulations, using the *"more appropriate 'pseudo soil' parameterisation of the groundwater model"* (Mackie Environmental Research Pty. Ltd., 2015).

Notwithstanding this, Dr Mackie considers that there are a number of issues that are outstanding and need to be addressed. These are:

- *"reasoning behind the use of the same value of drainable porosity for all strata in the groundwater model since this parameter significantly influences the evolution of the phreatic surface and mine inflows;*
- *discussion of revised model calibrations including presentation of hydrographs showing measured and predicted pressure heads using the 'pseudo soil' option;*
- *illustration of model pressure heads (in plan) in the coal seams, Bulgo Sandstone and Hawkesbury Sandstone prior to, during and post mining (50 and 100 years);*
- *assessment of the long term steady state groundwater flow systems post mining and identification of shallow and surficial areas that are likely to be dewatered;*
- *assessment of potential leakage via the adit and assessment of the role played by the abandoned overlying workings (and their adits) in constraining the recovery of pore pressures;*
- *risk assessment associated with potential leakage from Cataract Dam via the proposed panel extractions and adit (see also Galvin & Associates report to the PAC dated 05/03/2015);*
- *mitigation measures that might be invoked to minimise impacts"* (Mackie Environmental Research Pty. Ltd., 2015)

The Commission notes that in addition to the concerns raised, the Dams Safety Committee has also advised that it has "*no concerns with the extraction of all of Longwall 6 within the Notification Area…*" (NSW Dams Safety Committee, 2015). In considering this advice, it is important to understand the DSC's interests "*are specific to the safety of the Dam and its stored waters*" (2015), consequently impacts to water resources supplying the dam, and the catchment more broadly, are beyond the scope of the Dams Safety Committee's consideration. Further, the Dams Safety Committee was not aware of the outcomes of Dr Mackie's review of the groundwater modelling. The Commission is satisfied these factors explain the difference in the Dams Safety Committee's position, compared to that of Water NSW, the Independent Expert Scientific Committee and experts engaged by the Commission. The advice and position of the agencies and experts is consistent and/or congruous.

Cataract Creek

In addition to its concerns about Cataract Reservoir, Water NSW also raised concerns about the uncertainties associated with the predicted impacts to Cataract Creek and its associate tributaries and swamps. It is particularly concerned about reductions in both water quantity and quality in this water system. Many of the same issues and uncertainties apply, including:

- limitations to the datasets being used;
- the accuracy of plans for previous overlying mine workings; and
- that the subsidence impacts could be greater and more complex than predicted, with more profound environmental consequences than predicted by the proponent (Water NSW, 2015).

Additional concerns specific to the Cataract catchment raised by Water NSW included:

- questions and concerns with the surface water and groundwater modelling parameters and predictions (especially the predicted reductions in stream baseflows);
- the residual risks to the capacity of the channel of Cataract Creek; and
- that impacts to swamps of 'special significance' are *"likely to result in significant impacts to the hydrological regime of the swamp including a reduction in baseflow to Cataract Creek and...*" (Water NSW, 2015).

The Independent Expert Scientific Committee also raised a number of these issues, and further highlighted:

- the need for *"measurement and estimation of surface flows, including baseflow and subsequent inclusion of baseflow measurements as calibration targets in model calibration."* [for groundwater modelling];
- the need to "*measure hydraulic conductivity and assess connectivity between shallow regional groundwater systems and deeper groundwater systems"* (2015).

Specifically in relation to surface water, the Independent Expert Scientific Committee advised that:

- *"site specific studies and hydrological and ecological monitoring, and fine scale models, are needed to characterise the hydrology and ecological requirements of the swamps*."
- "*justification for scenarios used to model losses in tributary flow, losses of streamflow in Cataract Creek and losses in catchment yield to Cataract Reservoir is needed*."
- "*surface water monitoring data should be collected and provided to support model predictions"*;
- "*evidence should be provided to support the proponent's assumption that swamp contribution to streamflow is proportional to its catchment area. Swamps generally have a higher water-holding capacity, and subsequent increased capacity to release water to*

downstream tributaries over longer periods, than other catchment areas within shallower soils. In doing so, swamps generally contribute an important component of baseflow during extended dry periods";

- *"the most likely mechanisms through which flow will be lost from pools on Cataract Creek are fracturing of rockbars and loss of surface water to groundwater (underflow).*" and that modelling of pools within the project area, supported by monitoring data from existing longwall mining panels, should be used to determine potential losses. (2015)
- it is not satisfied that there is supporting evidence that redirected flows will re-emerge downgradient within Cataract Creek or the reservoir itself; and
- the predicted impacts to streamflow from subsidence, along with the predicted loss of baseflow from depressurisation need to be considered together to determine the total predicted impact to streamflow.

In short, the latest correspondence from the Independent Expert Scientific Committee and from Water NSW is clear in its advice to the Commission. There are a number of residual concerns about impacts to tributaries to Cataract Creek and more monitoring data and analysis is required.

In addition to the advice the Commission has received during the review, the Commission notes that the Division of Resources & Energy's (a part of the NSW Department of Trade & Investment) 2013 submissions also raised a number of concerns, particularly about the subsidence predictions. The concern largely relates to uncertainties about the mine layout and how it relates to previous bord and pillar workings in the Bulli Seam, consistent with those raised by the Dams Safety Committee and Water NSW. Specifically, Division of Resources & Energy indicates:
"… both the prediction of mine subsidence and the management of the aforementioned two key risks rely critically on the understanding of:

- ***The Mine Layout of Bulli Pillar Working****. Considering the above-mentioned hand-mining techniques and time of mining, there is a need to confirm the assumption used by the Applicant that the currently available Bulli Pillar Workings mine layout is correct. Evidence suggests that certain significant coal barriers as marked on the historical mine plan actually do not exist, and*
- ***The Current Conditions of the Bulli Pillar Workings****, in particular, the existence, nature, geometry, distribution and stability of any significant voids and/or standing pillar/remnants within the Bulli Pillar Working"* (Division of Resources & Energy, 2013(b)).

"If the above two key technical issues are not addressed by the Applicant, the uncertainties related to the nature/magnitude, extent/location and timing of subsidence development in Wonga East will be high" (Division of Resources & Energy, 2013(b)).

It further advised that:

- *"as a general comment, it is assessed that the Applicant has underestimated the subsidence that may arise from the proposed longwalls in Wonga East;*
- *risk of irregular subsidence development above the Bulli Pillar Workings is not considered in the Applicant's subsidence predication. The Applicant should be required to address this risk considering the nature of Bulli Pillar Workings, and the recently observed severe deformations above the extracted Longwall 4; and*
- *risk of pillar run within the Bulli Pillar Workings is not adequately considered in the Applicant's subsidence prediction. Despite the occurrences of mining-induced fractures well outside the normal limit of mine subsidence which were observed during the extraction of Longwall 4, no significant impacts of pillar run were observed during the extraction of Longwalls 4 and 5. This observation does suggest that risk of pillar run in areas with conditions similar to those of Longwalls 4 and 5 should be low. However, without site-specific*

investigations into the two identified key technical issues, the same conclusion can't be drawn for surface areas outside the footprints of Balgownie Longwalls at the subject site or for areas with conditions that are distinctly different from those of Longwalls 4 and 5. None of these cases have been adequately investigated by the Applicant.

- *concerns regarding the undermining of Cataract Creek by Longwall (LW) 8 & 9 with regard to impact on water loss, species impact given that LW4 experienced an actual 1.4 metres of subsidence compared to much smaller level of subsidence predicted for LW 8 & 9.*
- *concerns regarding the undermining of swamps CCUS1 (by LW 3) and CCUS5 (by LW8) given their special significance and high risk of impact"* (Division of Resources & Energy, 2013a).
- *there is a high level of uncertainty about the predictions made for important surface features in Wonga East (e.g. Cataract Creek), due to a lack of site-specific investigations into the two key technical issues listed above;*
- *in summary, the Applicant should be required to revise the subsidence prediction and to up-date the subsidence impact assessment based on the revised subsidence prediction"* (Division of Resources & Energy, 2013(b)).

The proponent has provided further subsidence information since the Division of Resources & Energy's submission was made in 2013. It is possible that the later work has allayed the Division of Resources & Energy's concerns. Given the detail, and accordance of the issues raised by other agencies and experts, the Commission did not consider it necessary to seek further views from Division of Resources & Energy as this can be done prior to any determination for the project.

4.1.5. Commission's Considerations and Recommendation

Advice from various government agencies, committees and experts have raised significant issues and uncertainties that need to be addressed. Some of these issues have been acknowledged by the proponent, yet have not been resolved, for example, in relation to the risks to Cataract Reservoir, the proponent acknowledges that:

> *"it should be recognised that there are limited options to control any significant inflow through sealing up the longwall panels of the mine portals. The Wongawilli Seam, the Balgownie Seam and the Bulli Seam are all hydraulically connected through the intersecting goafs that are interconnected between all three seams and there is not considered to be any credible way to control inflow to the mine from Cataract Reservoir by preventing water egress from the mine. The Bulli Seam working are in the shallow cover areas above the portals on the Illawarra Escarpment."* (Gujarat NRE Coking Coal Ltd, 2013).

The Proponent's acknowledgement of this issue makes the Dams Safety Committee and E/Prof Galvin's recommendations for further risk assessment and contingency planning critically important.

Commission's Consideration

The Commission considers that due to the ongoing uncertainties surrounding the groundwater, surface water and subsidence interactions, and the seriousness of the consequences of these interactions, there is a need for further work to be undertaken before the merits of this application can be adequately assessed. The Commission has found that an integrated risk assessment, focusing on, but not limited to, the interactions, impacts, effects and consequences (including environmental consequences) of key areas of uncertainty surrounding the groundwater, surface water and subsidence impacts is warranted in order to properly establish the potential impacts of the project. The potential for leakage from the Cataract Reservoir through geological structures should also be assessed, given the seriousness of the consequences if a connection between the Cataract Reservoir and the mine occurs. Given the importance of protecting the catchment water there needs to be a high degree of confidence that this will be protected before any final determination can be made.

The Commission considers that this work should be overseen by a risk assessment panel. Representatives of Water NSW, the Dams Safety Committee, the Division of Resources & Energy (part of the NSW Department of Trade & Investment) and the proponent should constitute the members of the risk assessment panel. An independent chair should preside over the panel.

The Commission envisages that a key role for the panel would be to determine which organisations or experts would undertake peer reviews of the additional work required, as recommended in this report. Subject to any approval ultimately being granted, the panel should have an ongoing role, to ensure that any monitoring and adaptive management regimes that are implemented are suitably addressed and managed. In addition the Commission considers that the panel could also have a dispute resolution role into the future, particularly regarding trigger/response impacts when considering the impacts to the upland swamps.

Dr Mackie recommended that *"the PPR-RM [Preferred Project Report – Residual Matters] be amended to include the revised modelling and any additional assessments that might be directed towards resolving the above noted issues"* (2015). The Commission accepts the recommendation provided by Dr Mackie.

Commission's Recommendation

1. The establishment of a risk assessment panel, constituted by an independent chair, Water NSW, the Dams Safety Committee, the Division of Resources and Energy and the proponent to oversee an integrated risk assessment, particularly focussing on links between subsidence and water (both groundwater and surface water) impacts of the proposal. This risk assessment, including associated work rerunning the groundwater modelling as recommended by Dr Mackie and addressing the issues raised by the relevant agencies and experts (as highlighted in this report), needs to be completed before the application can be determined.

4.2. Upland Swamps

The Coastal Upland Swamps occurring in the project site are classified as Endangered Ecological Communities under both State and Commonwealth legislation. Prior to the classification of the Coastal Upland Swamps as Endangered Ecological Communities, some of these swamps were classified as 'swamps of special significance'. This classification was designed to afford these swamps with a higher level of protection, and conservation status. The Commission notes that in the Metropolitan PAC Review Report the PAC classified 'special significance status' as being based on: *"an assessment of a natural feature that determines the feature to be so special that it warrants a level of consideration (and possibly protection) well beyond that accorded to others of its kind. It may be based on a rigorous assessment of scientific importance, archaeological and cultural importance, uniqueness, meeting a statutory threshold or some other identifiable value or combination of values"* (Planning Assessment Commission, 2009).

Further in the Bulli Seam Operations PAC Review Report, the PAC identified a number of *"issues to be considered for 'special significance' status"* which were:

- size;
- complexity;
- contiguous habitat;
- presence of EECs or Threatened Species;
- threatened species;
- scientific importance; and
- swamp contribution to catchment hydrology.

As outlined in both PAC reviews, classifying 'special significance' is subjective and therefore problematic. The Bulli Seam Operation PAC, concluded that the proponent's classification was *"not credible and cannot be relied upon"* (Planning Assessment Commission, 2010).

Since these PAC Reports were published, the Coastal Upland Swamps have been classified as Endangered Ecological Communities, in 2012 under the NSW *Threatened Species Conservation Act 1995* and in 2014 under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Given the recent classification of the Coastal Upland Swamps as EECs, the 'special significance' status is often still referred to, and the Commission understands that not all of the swamps are equal, and this 'special significance' status is used to refer to swamps are considered most important.

Coastal Upland Swamps are swamps which are periodically waterlogged swamps on the Hawkesbury Sandstone plateaus, where generally the mean annual rainfall is in excess of 950mm. Of the 5360ha of Coastal Upland Swamps, 83% of these occur on the Woronora Plateau, which also represents the greatest extent and one of the oldest recorded occurrences of upland wetlands on the Australian mainland. However the size of mapped swamps is highly skewed, *"with the largest 5% of swamps (>14ha) accounting for just less than half (47%) of the total area of the community. Large swamps also contribute disproportionately to species diversity and hydrological function, due to their large volumes of peaty sediments that contribute sustained high-quality flows to discharge streams and their diverse array of habitat mosaics that encompass suitable conditions for a wide array of species"* (NSW Office of Environment & Heritage, 2012).

Since the exhibition of the original Environmental Assessment for the proposal, a number of modifications to the mine layout have occurred in response to concerns regarding the environmental impact of the proposal. (See Section 2.1 for an outline of the historic context). The Preferred Project Report outlines the changes made to the proposal which impact on the upland swamps (Gujarat NRE Coking Coal Ltd, 2013):

- removal of the Wonga West study area (no longwall mining proposed as a part of this proposal, though it is noted that it is expected that this will be part of a future application);
- redesign of the Wonga East study area, which includes:
    - removal of Longwall 8;
    - reducing the length of Longwall 7, starting further away from Cataract Dam; and
    - re-orientation of Longwalls 1 – 3 and 9 – 11.

The redesign will no longer undermine upland swamp CCUS1 (near Longwall 3) and minimise the extent of upland swamp CCUS5 and CCUS10 that will be undermined (near Longwalls 7 and 9 respectively).

While beyond the proposal currently being reviewed, the Commission acknowledges the concerns raised by a number of government agencies, community groups and members of the public with regard to foreshadowed future mining in the Wong West area.

The Wonga East study area supports 32 upland swamps, an endangered ecological community listed under both the Commonwealth *Environmental Protection Biodiversity Conservation Act 1999*, and the NSW *Threatened Species Conservation Act 1995*. Swamps CCUS1, CCUS4, CCUS5, CCUS10, CRUS1, CRUS2 and CRUS3 are recognised as being swamps of 'special significance'. Of these 32 upland swamps in the Wonga East study area nine would be directly impacted by subsidence arising from the proposal, being CCUS1, CCUS2, CCUS4, CCUS5, CCUS10, CCUS11, CCUS12, BCUS4 and BCUS11 (Gujarat NRE Coking Coal Ltd, 2013).

As noted elsewhere in this report (Section 2.1) this area has been undermined previously with varying levels of impact from subsidence.

The proponent states that the majority of these upland swamps are thriving in terms of the health of the vegetation and baseflows. The proponent further suggests that a drop in the near-surface piezometric pressure observed following undermining in other upland swamps within the Southern Coalfields may not have a significant impact on the long-term health of the upland swamps. The Department of Planning & Environment expressed the view that it is unable to agree to this suggestion; citing the absence of long-term longitudinal studies of swamp health, pre, during and post mining (Department of Planning & Environment, 2014b).

4.2.1. Potential Impacts to Upland Swamps

The proposal has the potential to impact on nine upland swamps. These nine swamps together cover an area of approximately 17.51 ha (Department of Planning & Environment, 2014b). The entire area of these swamps is not predicted to be impacted. The proponent's subsidence consultant (SCT Operations Pty Ltd, 2014) predicts that the impacts associated with the proposed longwall mining are expected to be limited to the area (approximately 9ha) directly undermined.

The proponent's ecologist, Biosis, predicts (2014) that the potential impacts to these swamps 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 run-off. This may result in changes in in-flow to upland swamps and/or changes in saturation of vegetation sub-communities;*
- *tilting in upland swamps resulting in increased potential for development of nick point, scouring and erosion; and*
- *changes in baseflow discharge from upland swamps."*

The Biosis initial risk assessment (2013) of the upland swamps found that assessed two swamps (BCUS4 and CCUS4) have a moderate risk of impact, while the other 10 swamps were assessed as having a low risk of impact. Additional work was carried out, and following the re-orientation and removal of Longwall 8, a number of swamps were no longer considered likely to be impacted by mining. However, the identification of the rockbar and waterfall at the outlet of upland swamp CCUS4 lead to an increased in the risk assessment ranking of this upland swamp to high (Biosis, 2014).

The Department is supportive of the final risk ranking assessment undertaken by Biosis; however the Office of Environment & Heritage, still questions Biosis' final risk ranking assessment. The Office of Environment & Heritage has undertaken its own risk ranking assessment of the nine impacted swamps, and has determined that only one swamp (CCUS1) has a risk assessment ranking of low (Office of Environment & Heritage, 2015). Table 2 below highlights the difference between the Biosis' and the Office of Environment & Heritage's final risk ranking assessment.

Table 2: Comparison of Final Risk Ranking, between Biosis and OEH

Swamp	Swamp Area (area undermined) (ha)	Biosis Final (highest) Risk Ranking	OEH Final (highest) Risk Ranking
CCUS1	4.81 (0.24)	Low	Low
CCUS2	1.21 (1.21)	Low	High
CCUS4	1.77 (1.77)	High	High
CCUS5	3.45 (1.04)	Low	High
CCUS10	1.63 (0.41)	Low	High
CCUS11	0.34 (0.34)	Low	High
CCUS12	1.84 (1.84)	Low	Moderate to High
BCUS4	2.20 (1.87)	Medium	High
BCUS11	0.26 (0.26)	Low	High

(Biosis, 2014) & (Office of Environment & Heritage, 2015)

The Commission notes the different ranking of the upland swamps within the Wonga East study area, and that determining the impact and risk ranking is a difficult process, due to the complex nature of the swamps, uncertainties about hydrology of individual swamps, limited baseline data and sensitivities to change over extended periods of time. The Commission notes that all key stakeholders agree that undermining the swamps will cause impacts. There remains disagreement as to the environmental consequences that the undermining impacts will produce.

While the predicted subsidence levels are largely agreed, the environmental consequences of the predicted subsidence remain contentious. The swamps have been previously undermined; however the impact of this previous mining is uncertain, as there is no long-term monitoring data available for the swamps. A number of presentations and submissions, including those from Water NSW and the Office of Environment & Heritage, have argued that since there is limited knowledge about the previous impacts and environmental consequences, the risk of the swamps reaching their tipping point (the point where the system can no long function effectively as a swamp) increases.

At the public hearing, a number of presenters submitted that the predicted impacts to the swamps were too great and the environmental consequences of the predicted impacts were unclear. The presenters stated that these swamps (and Sydney Catchment's Metropolitan Special Area more broadly) should not be undermined at all. Presenters also submitted that:

- the swamps provide ecosystem function to the catchment; and that this loss of function could lead to water quality and quantity impacts within the catchment's Metropolitan Special Area;
- the swamps need to be enhanced rather than damaged;
- The swamps are small and threatened by mining practices, and are increasingly susceptible to climate change and changing weather and fire regimes, once they have been impacted by mining, through the loss of the perched water tables;
- the vegetation within the swamps is changing, vegetation communities that are tolerant to drier conditions are becoming the dominate species/communities within the swamps; and
- the swamps above Longwalls 4 and 5 have been impacted by longwall mining; these swamps are now rain responsive swamps (they do not retain water for long periods of time).

The Commission recognises that the upland swamps are complex ecosystems, and predicting the ecological and hydrological response of each upland swamp being undermined is difficult. The Commission notes that while these swamps have been undermined previously, the resulting impact on the swamps remains uncertain. A number of questions have been raised during this review including:

- What additional impact can the swamps handle, how close are the swamps to their tipping point?
- Will the cracking of the bedrock base of the swamp (which is likely to occur) lead to permanent draining of the swamp, and what is the ecological consequence of this?
- Will the swamps be able to maintain their ecological function within the catchment?
- If water is lost from the swamp, will it re-appear further down in the catchment, or is it lost from the catchment, e.g. does the water enter the mine workings?

The Commission notes that the Planning Assessment Commission (PAC) has encountered the same concerns and uncertainties regarding the potential impacts to the upland swamps from the proposed longwall mining before, most recently when considering the current mine's modification 2 (for the partial extraction of Longwall 6). In response to these uncertainties (that were raised during the determination of this modification), the PAC (2014) considered that:

> *"a cautious approach should be adopted. That is to limit extraction of Longwall 6 to the western edge of CCUS4 to allow monitoring and the data collection of any changes in the swamp. Monitoring should include hydrological changes. The monitoring results would provide empirical information for the assessment and prediction of the extent of changes to CCUS4 and formulation of adaptive management plan if mining is to proceed through the whole of Longwall 6."*

The Commonwealth Department of the Environment also has a role, as the proposed mining has been declared a controlled action under the *Environmental Protection Biodiversity Conservation Act 1999*. Consequently it is sensible and logical for the Commission to also consider the Commonwealth's view. Also, comments regarding the Commonwealth Department of the Environment's role were made during the public hearing. The Commission understands that due to the Department of the Environment's statutory timeframes; the Department of the Environment would be unlikely to be in a position to provide advice to the Commission on the predicted impacts to the upland swamps prior to the finalisation of this report. The Commission understands that, at the time of writing, the Department of the Environment was yet to make the Controlled Action available for public comment. The Commission notes that the statutory timeframe for the assessment of the proposal under the *Environmental Protection Biodiversity Conservation Act 1999* will be outside the timeframe for this review. It would be logical for the biodiversity issues to be

considered in consultation with the Commonwealth in the next stage of the assessment process, prior to any determination.

The Commission notes that based on input to this and/or earlier applications, it is largely agreed by the proponent, the Office of Environment & Heritage, Water NSW, the Department of Planning & Environment and the Commonwealth Department of the Environment, that there can be a substantial lag time between the mining, and the appearance of ecological changes within the swamps, which increases the difficulty in determining the impacts caused by mining. It may also be difficult to distinguish between mining related impacts and other natural variations in hydrology. Further, effective remediation may not be practical.

4.2.2. Potential Offsets for Upland Swamps

Biodiversity offsets are sometimes accepted when impacts cannot be avoided or mitigated. The *NSW Biodiversity Offsets Policy for Major Projects* (Offsets Policy) provides guidance on providing suitable offsets. The Commission notes that offsets provided under this policy, are calculated by the amount of clearing of vegetation undertaken as part of the project. For underground mining impacts, where clearing of vegetation on the surface is generally limited, calculating offsets for vegetation impacts is difficult. The method of calculating offsets, as provided in the policy, was criticised by a number of speakers at the public hearing, as the impact in terms of vegetation clearing is minor, and the impact here is associated with the loss of perched water tables that provide water for the upland swamps.

The Office of Environment & Heritage in its submission to the Commission (2015) has reiterated its position that the proposal *"should adhere to the 'avoid, mitigate, offset' hierarchy for offsetting a project's impact upon biodiversity values."* The Department of Planning & Environment (2014b) states that it has carefully considered *"when, where and what (size and nature) offsets are required as part of the Underground Expansion Project."*

The Department of Planning & Environment (2014b) is recommending that any approval for the proposal, should contain a trigger (rather than a performance measure) which would require proportional offsets to be provided for impacts greater than 'negligible' environmental consequences, and where remediation is not possible or is not effective. The Department of Planning & Environment is recommending a trigger to be defined as:

- *"greater than negligible erosion of the surface of the swamp;*
- *greater than negligible changes in the size of the swamp;*
- *greater than negligible changes in the ecosystem functionality of the swamp;*
- *greater than negligible changes to the composition or distribution of species within the swamp; and*
- *greater than negligible change to the structural integrity of controlling rockbar/s for the swamp."*

A number of concerns have been raised by other Government agencies including the Office of Environment & Heritage and Water NSW, and the wider community as to the enforceability of these proposed triggers. The Office of Environment & Heritage in its submission to the Commission (2015) state that it *"supports that offsets should be provided for 'greater than negligible' subsidence impacts upon coastal upland swamps, as outlined in the draft conditions. However, the draft conditions do not contain a mechanism for offsets to be committed to or secured. It is important the PAC ensures that consent conditions dealing with offsetting subsidence impacts are enduring, enforceable and auditable."*

Concerns have been raised by the Office of Environment & Heritage, and some community environment groups that without long-term baseline data, it would be difficult to accurately

separate mining induced impacts from climate driven impacts. Further it was argued that the triggers being proposed by the Department of Planning & Environment are secondary impacts and that there could be a very substantial time lag before these changes become apparent. It was suggested that the trigger for offsets, if the swamps are to be undermined, should be a primary impact, such as the loss of the shallow groundwater aquifer. This could be monitored and measured through the use of piezometers installed within and surrounding the upland swamps. Dr Ann Young argued, at the public hearing, *"that the impact of the swamps be gauged by the piezometric levels in the swamp sediments, and not by changes to erosion, size, species composition, rockbar integrity and 'ecosystem functionality' (a term that seems to be measured by vegetation change but which any swamp researcher would consider should be measured by maintenance of water table)"* (Young, 2015).

Dr Tanya Mason in considering the issue (as requested by the Environmental Defenders Office and the Illawarra Residents for Responsible Mining) in her submission does not believe that the proposed management strategies are adequate to manage the environmental impacts. Dr Mason states that:

> *"I believe the monitoring regime required in the Recommended Instrument of Approval is inadequate. The document requires piezometers to be installed upslope and downslope in at least two swamps (the number of piezometers does not appear to be stipulated) and two flow monitoring points in swamps in which pairs of piezometers (upslope and downslope) are installed (p.10). A robust monitoring regime which safeguards against equipment failure and provides scientifically defensible data would require installation of further piezometers and flow monitoring points across at least three swamps: the monitoring design should be undertaken in consultation with hydrological experts"* (Mason, 2015).

Some presenters at the public hearing argued that the offsets being sought should be proportional to the level of impact. The Department of Planning and Environment suggests that the preference is for 'like-for-like' physical offsets, however given the limited number of swamps available to be protected under an Offsets Management Plan, the offsets could also include direct payments into the Office of Environment & Heritage's offset fund (which is yet to be established) or funding or undertaking of other supplementary measures, including:

- actions outlined in threatened species recovery programs;
- actions that contribute to threat abatement programs;
- biodiversity research and survey programs; and/or
- rehabilitating degraded habitats (Department of Planning & Environment, 2014b).

At the public hearing a number of presenters commented that the swamps should be protected and not undermined at all. The impact on the upland swamps is permanent and the damage cannot be remediated or offset. In addition the majority of potential swamps offered as part of an offset strategy are located within the Metropolitan Special Area Catchments, which is largely cover by exploration licences. Dr Ann Young commented on the need for like-for-like offsets for swamps, stating that:

> *"like-for-like can be achieved by permanent reservation to the centre of the earth of significant clusters of swamps within the publicly owned land of the Upper Nepean and Woronora catchments. I realise that this will sterilise future coal reserves but I contend that the protection of catchment outweighs this resource loss.*

The integrity of the surface landforms of the catchments, both as ecological niches and as water supply features, should not be compromised for short-term economic benefit" (Young, 2015).

Further it was commented by several presenters that while a swamp could by offset ecologically, it cannot be offset hydrologically. This concern was acknowledged by Water NSW.

The Commission notes that there is the potential to provide 'like-for-like' offsets for the upland swamps. Two upland swamps are located within the Special Areas for Cataract Reservoir, and are on land owned by the proponent. These swamps are in a somewhat degraded state, largely due to illegal vehicular access. The Commission saw one of these upland swamps when it inspected the area with officers from Water NSW and the Office of Environment & Heritage. The potential of setting aside these swamps for offsetting requirements was briefing discussed. The Commission considers that these swamps could be suitable for offsetting requirements, though this decision should be made by the relevant authorities and would be subject to remediation before handover.

The Commission understands that the Department of Planning & Environment and the Office of Environment & Heritage are jointly developing a *"Policy Framework for Biodiversity Offsets for Threatened Upland Swamps and Associated Threatened Species Impacted by Longwall Mining Subsidence"*. The Commission understands that this draft framework will provide for the calculation and provision of offsets for damage due to longwall mining subsidence, and sit under the *NSW Biodiversity Offset Policy for Major Projects*. The Commission has been briefed on the policy formulation work currently underway and considers that the framework being developed should be able to provide offsets for swamps that currently would not necessarily be covered by the existing Offsets Policy.

4.2.3. Commission's Consideration and Recommendation

Consideration

The Commission notes the level of concern and uncertainty that continues to surround the environmental consequences of undermining the upland swamps. The Commission accepts the advice from the Office of Environment & Heritage, Water NSW and many concerned groups and individuals, that by the time some of the impacts are measurable, the damage has been done, adaptive management and mitigation measures may not provide effective protection to the swamps or the species they support.

The Commission considers that additional work is required to provide a degree of certainty to the predictions. This can in part be achieved through the establishment of a piezometric network, within and surrounding the upland swamps, and the proposed longwalls. The Commission notes that the proponent has installed some piezometers, though this network needs to be completed in consultation with the relevant authorities (i.e. Office of Environment & Heritage, Water NSW, the Dams Safety Committee and the Department of Planning & Environment). The number and location of these piezometers should be guided by the relevant authorities.

The Commission acknowledges the debate about whether offsets should be contemplated for swamps of special significance in Sydney's drinking water catchment special areas. The Commission notes that the Commonwealth Department of Environment has shown some acceptance of an offset approach in its approval to mine Longwall 6 in late 2014. The Office of Environment & Heritage is also working to develop an offset arrangement, with the Department of Planning & Environment. The Commission considers that any policy framework for offsetting impacts to upland swamps of special significance will need considerable thought and detail in order to provide the basis for a workable Offset Strategy for this project.

Any offset policy will need to address key uncertainties and risks such as the potential delayed onset of subsidence and associated hydrogeological and ecological impacts to swamps; potential ecological and structural tipping points; mechanisms to adequately secure offset sites (with consideration of the current land tenure and exploration licence and mining lease tenements of the proposed offset site and the need for site specific offset management plans). The Commission particularly considers that the trigger for any offsets provided should be a primary impact trigger, related to piezometric detection of changes to shallow groundwater aquifers which are measureable, enforceable and auditable. As noted in Section 5 difficulties in quantifying the value of swamps and their associated ecosystem functions have also been highlighted. To the extent possible, it will also be important to recognise and consider the scale and value of the impacts, so that these can be factored into the relevant economic cost and benefit considerations for the State and people of NSW. Further if any biodiversity offset policy developed provides for contributions to a conservation fund, it would be important to ensure that the scale and nature of the contributions reflect the values of the swamps impacted.

Recommendations

1. The establishment of a network of piezometers within and surrounding the upland swamps, the establishment of this network should be guided by the relevant authorities (i.e. Office of Environment & Heritage, Water NSW, the Dams Safety Committee and the Department of Planning & Environment). This network will monitor the impacts to the swamps, through changes to the groundwater supporting the swamps, from the mining. This monitoring data should be made available to the independent risk assessment panel (see Section 4.1.3).

2. Any more definitive policy developed regarding triggers for offsets and mitigation measures under the *"Policy Framework for Biodiversity Offsets for Threatened Upland Swamps and Associated Threatened Species Impacted by Longwall Mining Subsidence"* should be made available for consideration by the independent risk assessment panel proposed earlier in the report (see Section 4.5).

3. Any potential offset policy should address key elements including:
    a. the potential delayed onset of subsidence and associated hydrogeological and ecological impacts to swamps;
    b. potential ecological and structural tipping points; and
    c. mechanisms to adequately secure offset sites (with consideration of the current land tenure and exploration licence and mining lease tenements of the proposed offset site).

5. SOCIO-ECONOMIC BENEFITS AND IMPACTS

5.1. Significance of the resource

On 4 November 2013, the NSW Government amended the Mining SEPP to clarify the factors to be considered in the decision-making process for proposals for mining of mineral resources. The amendment introduced a statutory requirement that the consent authority must consider the significance of the resource, in terms of:

- the economic benefits of developing the resource both to the State and the region in which the development is proposed to be carried out; and
- any advice from the NSW Department of Trade & Investment's Division of Resources & Energy as to the relative significance of the resource in comparison with other mineral resources across the state.

Other factors, including environmental, social and economic impacts, must continue to be considered.

The Commission recognises that although the provisions of the Mining SEPP do not strictly apply to the proposal because it is a transitional Part 3A project, some consideration should be given to the Mining SEPP in its review of the proposal.

The Southern Coalfield is a major source of high-quality hard coking coal used for the production of steel, both in Australia and internationally. The unique nature of hard coking coal makes it an important contributor to the local, regional and State economies (Department of Planning & Environment, 2014b). According to the Secretary's assessment report, the resource is also significant due to its relationship to the existing preliminary works project, and the synergies this presents in terms of utilising existing infrastructure and reducing the capital costs. In addition, the proximity of the colliery to the coast and the Port Kembla Coal Terminal is a major factor supporting export of coal from the region.

The activity generated by the proposed underground expansion project and the economic benefits this produces are outlined in detail in the proponent's Preferred Project Report. In summary, the proponent has suggested the benefits include:

- the continued direct employment of 219 people and additional direct employment of 81 people during operation;
- direct employment of an additional 100 people during construction;
- $85 million in capital investment during construction ($18 million) and operation ($67 million)
- $34 million to the State in royalty revenue; and
- $110 million to the Commonwealth in tax revenue.
- the indirect employment of 1,498 full time equivalent positions in the Illawarra Region.

The estimated revenue generated by the project is based on 52.6 percent coking coal sold at a rate of $150 per tonne; and 28.6 percent thermal coal sold at a rate of $90 per tonne. Production is expected to average 934,000 tonnes per annum and adjusted by 8 percent over five years to determine the present value at the end of the project (Department of Planning & Environment, 2014b).

The second consideration when determining the significance of the resource under the Mining SEPP is any advice received from the Division of Resources & Energy. In January 2015, the Division of Resources & Energy provided written advice to the Department in support of the project, on the

basis that it is a responsible utilisation of the State's coal resources and will provide diversity of supply within the NSW coal industry. The Division of Resources & Energy also noted that the proposal will generate employment opportunities and bring economic benefits to the local region and to the State as a whole.

5.2. Economic modelling

The proponent's Environmental Assessment included an assessment of the social and economic impacts associated with the original expansion project. These impacts were subsequently revised in the Preferred Project Report, to be made relevant to the amended proposal.

Concern was raised at the Public Hearing regarding the economic modelling undertaken for the Underground Extension Project. In particular, the following issues were raised:

- the multipliers used by the proponent are high, and overestimate the benefits of the project;
- the costs of the project have been underestimated;
- an inconsistent approach has been used to assess the benefits and costs of the project. The benefits are based on a "no-mining" scenario, while the social costs are based on a "continued operation" scenario;
- more weight has been given to short-term economic benefits rather than long-term ecological costs;
- the coal price used by the proponent is too high and is decreasing;
- secondary economic and social benefits, such as indirect employment associated with the project, should not be considered. If they are, the secondary costs must also be considered by the proponent; and
- an economic case for the expansion of the mine has not been made and the expansion should be rejected.

In addition to the above, the community expressed concern that no independent cost/benefit analysis has been undertaken. This expectation is based on the Planning Minister's commitment (June 2014) to obtain separate expert economic analysis for all future applications for major mining projects.

Another issue raised at the Public Hearing was that the external costs associated with the project have not been quantified, in particular the value of the upland swamp communities and the cost implications associated with managing/treating turbid water. The Environmental Assessment did not assign a value to the external costs of the original project, such as environmental and community impacts. The proponent's rationale for this was that the economic valuation of these impacts is an extremely difficult exercise, with no accepted guidelines or methods (Gujarat NRE Coking Coal Ltd, 2013).

The Preferred Project Report acknowledges that the potential effect of subsidence on the Metropolitan Special Area with respect to Sydney's raw water supply needs to be considered from an economic perspective. In the absence of government methodology, the proponent has adopted the Sydney Catchment Authority's valuation of catchment areas from its 2011/2012 Annual Report. Using these figures, it is concluded that the value to NSW of the area potentially affected by the project is between $70,228 and $1,811,943 (Gujarat NRE Coking Coal Ltd, 2013). The Water NSW's submissions do not comment on the acceptability of this particular estimate, but note concerns raised by others and recommend "*that the true environmental costs, including water and ecosystem losses, needs to be quantified and legitimately assessed prior to further consideration of the project*" (Water NSW, 2015). A number of objectors and community interest groups have criticised this

valuation method, with reference made to a social economic assessment from 2009 for the Bulli Seam Operations Project. This assessment gave the swamps an economic value of approximately $2 million per hectare.

In response to objectors, the proponent has explained that the 2009 assessment does not take account of the principle of diminishing marginal utility (that as more areas of upland swamp are protected, the community's value of the remaining swamps will reduce). The proponent calculates that if the $2 million figure is adopted, then the 4.89ha of swamps affected by the project would have an overall value of between $9.85 million and $11.58 million (Gujarat NRE Coking Coal Ltd, 2013). However, this estimate is only considered relevant by the proponent if the affected areas are completely lost or significantly degraded as result of the project. Notwithstanding this, the proponent notes that the economic benefits of the project from royalties alone exceed this estimated cost, although this assumes the mine would proceed at the full extraction rate sought.

5.3. Department's position

The Department of Planning & Environment expects that the project would benefit local and regional communities, based on the high proportion of workers who reside in the area, indirect employment opportunities and the circulation of salaries throughout these communities (Department of Planning & Environment, 2014b). In addition, the investment in capital and operational expenditure associated with the project is expected to benefit local and regional areas as well as NSW.

The Secretary's assessment report acknowledges that current coking and thermal coal prices are approximately 12 to 15 percent lower than the assumed prices contained in the Preferred Project Report. The Department of Planning & Environment recognises that it is difficult to predict future coal prices and that there is uncertainty regarding the use of multipliers to determine indirect benefits and increases to regional output.

The Department of Planning & Environment has considered alternate multipliers in order to identify the potential range in economic benefits that may be generated by the project. In doing so, it concludes that in the event that coal prices continue at current levels over the short-term, there will be an approximate reduction in royalties of $5 million and taxes by $110 million. Notwithstanding this, the proposal would still lead to considerable benefits to the local/regional economy and State and Australian Governments (Department of Planning & Environment, 2014b).

5.4. Commission's Considerations and Recommendations

Considerations

The Commission has reviewed all relevant documentation relating to the economic costs and benefits of the projects. The following conclusions have been reached:

- Based on the economic benefits outlined in the Secretary's assessment report and the advice of the Division of Resources & Energy, the Commission accepts that the resource can be considered significant as its extraction would deliver benefits to the region and state of NSW.
- The Commission recognises that if the project is not approved, there may be adverse socio-economic impacts.
- The Commission recognises that high-quality coking coal is an integral part of the steel production process, and therefore a market for this resource is likely to exist for many decades, including when knowledge about the catchment area and engineering solutions to potential impacts are more advanced. However, it is noted that a number of the key factors

relevant to the economic assessment have changed in recent times, including the value of the Australian dollar and coal prices. This would have reduced the benefits of the project, as stated by the proponent. It is recommended that the proponent's economic assessment be updated to reflect the current economic climate.

- The Commission recognises the community's concern that the projected impacts from the project are not adequately addressed in the proponent's economic assessment. This includes the cost of externalities, which the Commission recognises is difficult to quantify.
- The Commission notes that the proponent has used various Water NSW (formerly the Sydney Catchment Authority) reporting information to calculate the value of the catchment areas proposed to be impacted. The Commission considers that Water NSW's view on these figures should be sought and considered in any subsequent updating of the analysis of this issue.
- The Commission's notes that no independent peer review of the proponent's costs and benefits has been undertaken. As part of the determination of the project, an independent economic assessment should be carried out; including a review of any updated economic assessment provided by Wollongong Coal Limited and/or updated advice provided to the consent authority.

Recommendations

1. The proponent's economic assessment, in particular the estimated costs and benefits, should be updated to reflect the current economic climate.

2. The final assessment and determination of the application should be informed by an independent analysis of the economic costs and benefits of the project, including any additional information/updated economic assessment provided by the Applicant. The independent analysis should be managed by the Department of Planning & Environment.

6. Impacts from the Pit Top Areas

The Commission's terms of reference require it to assess the potential impacts to residents in the vicinity of the pit top, resulting from noise and air quality emissions and the trucking of product coal. In submissions and at the Public Hearing the Commission heard a number of concerns from local residents about noise, air quality and water contamination around the pit top area of the site.

When considering the proponent's application as it relates to the pit top activities and particularly the noise and dust impacts, the application can be considered as two distinct components:

- the first is to continue mining activities on the site for another 5 years;
- the second is to significantly increase production levels from the current 1MT a year, to the proposed 3MT per year.

In order to determine whether an extension to the life of the mine is acceptable it is necessary to understand whether the project is complying with current standards and the existing criteria that apply to the project. If the facility is able to be controlled to meet current standards, then the impacts of an expansion (increase in production) might be considered.

Alternatively a proponent might argue that although it is not currently meeting accepted standards, the upgrade development works and new facilities required to increase the capacity of the facility would also bring the performance of the entire larger facility into compliance with current standards. This was argued for the 2011 application. Regardless of which case is made, the Commission considers that it is important to establish the current performance of the facility. In relation to noise in particular, the Department has instead argued that the mine has occupied the site for over a century and that surrounding sensitive receivers have moved to the area knowing of the mine's existence and impacts.

6.1. Noise

The Commission understands that noise around the Russell Vale pit top has been an ongoing issue for the mine, and was the subject of detailed consideration in 2011 in the assessment of the preliminary works project determined at that time. At that time the noise impact assessment adopted suburban assessment criteria for surrounding potentially-affected receivers (Department of Planning & Infrastructure, 2011a). The assessment predicted exceedances of these criteria and at that time the proponent had proposed the construction of noise bunds to help mitigate the impact (2011a). The Department's assessment found that the noise bunds would have limited effect on noise and would be visually intrusive (2011a). Instead a detailed noise audit was required to be completed within 2 years of that 2011 approval, along with decommissioning and replacement of the Bulli decline conveyor, and implementation of a noise management plan that continuously strives to achieve long term noise objectives (2011a).

Despite those requirements on the 2011 approval, noise impacts are an ongoing issue, with a number of concerns raised in submissions on the project and at the public hearing. Following the public hearing, the proponent responded to some of these concerns advising that measures such as the retrofitting of quieter reversing alarms are in progress (Hansen Bailey, 2015); although the vehicle the Commission travelled in, when escorted underground, was not fitted with the less intrusive (buzz or quack) alarm typically used on mine sites.

As highlighted by the Department's assessment, the pit top has been in active use for much of the past century and it could be argued that residents have encroached on the mine site. The Department argues that the area should be assessed as a Suburban/Industrial interface and that the

proposed night time noise levels are actually an improvement on the existing and historical levels, see the following table extracted from the Department's assessment report.

Table 3: Night time noise levels - historic, current and proposed

Receiver ID	Location	Noise Level dB(A)		
		Historic	Existing Night	Proposed Night
R1	16 West S, Russell Vale	56	45	43
R2	30 West St, Russell Vale	52 – 59	47	44
R4	13 Broker St, Russell Vale	48	45	43
R9	109 Midgley St, Corrimal	N/A	42	43
R12	46 Lyndon St, Corrimal	Low 40s – 47	40	39

Source: Extract from the Department of Planning and Environment's Assessment (2014b), p45

While it acknowledges the Department's position, the Commission notes that some speakers at the public hearing advised that the mine was closed from 1996 to 2004; and that at that time the mine was not expected to reopen. The Commission has some sympathy for the view put by those residents, namely: that the mine should not be considered as a continuously operating facility that has been encroached on, but as an operation that commenced in 2004.

The Commission has not examined the history of this period in detail, noting that a range of factors would need to be considered to determine whether a person who moved to the area during the period when the mine was not operating was justified in assuming the mine would not reopen. At present the majority of the pit top site is zoned RU1 Primary Production, under the *Wollongong Local Environmental Plan 2009*, and the plan does not allow underground mining in this zone. Nonetheless the Department's assessment (2014b) points out that the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* makes underground mining permissible on any land in NSW, with consent.

To put this into more recent context, the Commission thought it important to compare the noise levels that were required in the 2011 approval for the mine with those proposed for the current approval. Consideration of the various affected properties is complicated by the fact that this application has adopted different identification numbers to those in the 2011 approval. To avoid confusion the Commission has considered properties by street rather than receiver identification number. Further it appears the impacts of the mine were not fully accounted for in the 2011 assessment, as some properties that are now identified as being impacted by noise from the mine (particularly those in Taylor Place Corrimal), are not listed as affected properties in the 2011 approval. Table 4 (over page) compares the existing night time noise limits that apply under the 2011 approval with the actual noise levels and predicted levels associated with this application.

Table 4: Night time Noise levels (dBA) $L_{Aeq(15\ min)}$

Location	2011 Approval, limit applies from 1 January 2014[x]	2011 Approval, long term noise goal[x]	2012 Noise Audit^	Existing ~	Department's proposed levels #
West St Russell Vale	39	37	44.3*	45-47	43-44
Broker St Russell Vale	40	37	38.6 – 43.8*	43-45	43
Midgley St Corrimal	36	36	35.1	42-46	43
Lyndon St Corrimal	38	38	37.8-38.2	40-42	39
Moreton St Russell Vale	38	37	37.8	unknown	48
Taylor Place Corrimal			38.2	42	40-42
Princes Hwy Russell Vale	35	35	NA	43	41
Princes Hwy Corrimal	35	35	NA	44	44
All other privately owned land	35	35	NA	NA	48

[x] Sourced from the 2011 conditions of approval for the current operation (Department of Planning & Infrastructure, 2011a)
^ attended monitoring with exclusion of insects and traffic (Pacific Environment Limited, 2012)
~ Sourced from the Department's preliminary assessment report (Department of Planning & Environment, 2014b)
# Sourced from the Department's recommended conditions (Department of Planning & Environment, 2014)
*exceedance said to be due to unauthorised heavy trucks accessing the site during the evening and night - with remedy action taken

The proposed noise levels are significantly higher than those that were required to be met in the 2011 approval. The current Assessment Report does not address this difference but the Department has since advised that the proponent was not able practically to achieve the noise levels required by the 2011 approval and that the higher levels now proposed should be able to be met and would be acceptable to most of the residents.

It is important to remember that previous approvals have also grappled with the noise issues at the site. In the 2011 approval of the current preliminary works project on the site (Department of Planning & Infrastructure, 2011b), a noise audit was required to be prepared to investigate and evaluate reasonable and feasible measures to mitigate noise and comply with long term noise levels. A schedule of tightening noise limits was also imposed, in an attempt to bring the proponent into compliance with the applicable limits in the Industrial Noise Policy. The night time results from the noise audit are shown in Table 4. There is a considerable difference between the results of the proponent's noise audit and those said to represent the existing operations and these differences need some explanation.

The Commission accepts that the proposal is permissible and acknowledges the historical operations of the mine, but considers that as this is a new application (under Part 4 of the EP&A Act rather than a modification as per the previous recent approvals), and the existing approval to mine is due to expire on 31 December 2015, the project should be considered on its merits, rather than simply against the mine's historic noise impacts.

This is consistent with the advice the Commission has received from the Environment Protection Authority which reiterates its concerns about the proposed noise limits, noting "*the proposed limits exceed what the EPA would consider licencing to*" and …. *"noise from the premises will be clearly audible and likely to be considered as intrusive by some members of the surrounding community"* (2014a). In its letter to the Commission dated 13 March 2015 the Environment Protection Authority has recommended additional information is required on a range of reasonable and feasible measures that could be installed to reduce noise to more desirable levels. In particular, the EPA recommended consideration of:

- *conveyor runner bearing design;*
- *replacement of metal clips used to join conveyors with vulcanised joints;*
- *use of noise barriers on site boundaries and noise barriers around identified noisy equipment on site;*
- *maintaining a volume of coal in bins so that coal is not dumped into an empty bin;*
- *minimising dump height from mobile plant;*
- *noise dampening material in coal bins/deflection plates;*
- *noise cladding on conveyor winder houses and conveyor rope rollers;*
- *enclosed motor rooms, etc*. (NSW Environment Protection Authority, 2015, p. 3)

It also suggests that modified coal handling and transport arrangements, could also reduce site noise.

> "*The EPA recommends the PAC seek information on noise reductions with different load out operations, in particular longwall to conveyor to bin to truck, compared to longwall to conveyor to stockpile to FEL to truck. Some coal loading from stockpiles will be required to deal with longwall changeouts or underground production problems, however an assessment of different stockpile/bin loading ratios, between 100 per cent bin load out to 100 per cent stockpile load out could be useful. If bin use is found to reduce site noise, the PAC could consider requiring progressive implementation of bins, and/or regulating load out from stockpiles during times when it would provide lesser impact to residents."* (NSW Environment Protection Authority, 2015, p. 3)

The Environment Protection Authority's letter (2015) also highlights the sporadic nature of the mine's production activities in recent years, noting that while it has approval to produce of coal a year, it has actually produced less than half this volume in two out of the last three years. The Environment Protection Authority raise concerns about the site's capacity to handle the additional throughput sought and suggested that a return to "*constant and elevated production levels will be a new experience for some local residents*" (NSW Environment Protection Authority, 2015).

Notwithstanding the concerns it has raised, the Environment Protection Authority proposes a number of improvements that could be made on site to manage noise and dust as well as additional information on reasonable and feasible mitigation and control measures that should be sought (NSW Environment Protection Authority, 2015). The Commission considers that the Environment Protection Authority's suggestions are helpful and need to be thoroughly explored and/or pursued.

6.1.1. Commission's Considerations and Recommendations

Considerations

The Department of Planning & Environment appears to have adopted a different approach to assessing noise impacts in this application, compared to the 2011 application. Consistent with the concerns raised by the EPA, the Commission finds that further detailed consideration of the noise

issue needs to be provided to the decision maker. In particular it will be important to ensure that, if the Department maintains its recommendation to approve the application:

- the assessment demonstrates that the site is capable of handling the existing and proposed coal production levels;
- clear justification is provided for any deviation from the existing regime of noise limits and management measures on the site; and
- the outcomes of the noise audit are used to inform the assessment and any conditions of approval.

In summary, the proposed less stringent noise levels have not been justified adequately by the information available to the Commission nor have additional practical measures been adequately investigated to meet intrusive noise levels recommended by the Industrial Noise Policy.

Recommendation

1. The Commission recommends that further consideration of the noise impacts of the project needs to be provided including consideration of further noise mitigation measures as recommended by the EPA. Detailed justification should be provided for any deviations from the existing noise limits in current planning approval. Also clarification should be provided on the outcomes and applicability of the noise audit required in the 2011 approval.

6.2. Air Quality

The Commission's terms of reference for the review require it to pay particular attention to the potential noise and air quality impacts to residents in the vicinity of the pit top. As noted earlier in this report the project's site context is unusual, as the pit top area is surrounded by suburbs of the City of Wollongong. The Commission acknowledges the mine has a long history on the site and that the suburbs of Wollongong have gradually encroached on the site. This history is complicated by the fact that the mine appeared to have ceased operations and the changing demographics at that time.

The Commission heard from a number of local residents at the public hearing raising concerns about various dust sources associated with the pit top, particularly including stockpiles and emplacement areas (not technically part of the site being considered by the Commission) and emissions from trucks transporting coal to the Port Kembla Coal Terminal.

The Department has assessed the air quality impacts of the proposal noting that the mine would produce emissions from a range of sources including from the transfer and handling of coal on the site, the loading of trucks and from the coal stockpiles (Department of Planning & Environment, 2014b). The Department's assessment accepts the proponent's predictions that emissions of total suspended particulates (TSP) and particulate matter with an aerodynamic diameter smaller than 10 micrometres (PM_{10}) would generally comply with the current air quality standards and that emissions would be managed through the continued operations of the mine's existing real-time air management system.

The Commission accepts that the particulate emissions considered by the Department of Planning & Environment are predicted to comply with the current air quality standards, with potential for exceedances of the 24 hour average criteria on those days where background particulate levels are already elevated and close to the criteria. There are a number of limitations to the proponent's modelling and predicted results however. Further, given the mine is an existing operation, it is important to understand whether there have been any compliance issues with the existing coal handling capacity and so whether an increased capacity might be supported. In relation to compliance, the Commission notes that Environment Protection Licence lists a number of pollution

reduction programs that have been imposed on the mine, by the EPA, over the last decade. The most recent of these (completed in December 2013) was a requirement to install extra measures to ensure trucks leaving the site have their loads covered (NSW Environment Protection Authority, 2014b). The Environment Protection Authority has also advised the Commission (2015) that site specific best management practices were required to be assessed for the site and that improvements might also be seen with the installation of conveyors to coal bins, rather than the current front end loading from stockpiles.

6.2.1. Existing requirements and performance

The Commission notes the proponent's existing Environment Protection Licence requires air quality monitoring, but that this is limited to dust deposition gauges, which measure deposited ash, combustible solids and incombustible solids in grams per square metre per month (NSW Environment Protection Authority, 2014b).

Through the existing planning approval the mine is also required to regularly assess real time air quality monitoring data and modify and/or suspend its operations on site to ensure compliance with conditions in the planning approval (MP10_0046). The proponent is required to report and make information available on its website, however when the Commission examined the information on the website it was relatively limited in scope. Information on monitored PM_{10} levels was summarised in the latest Annual Review/Annual Environmental Management Report (Wollongong Coal Limited, 2015) however the data is presented as a monthly average from each of the two monitors and only covered the 6 months from January to June 2014. The Commission is not satisfied this level of reporting is sufficient for the current activities. Amongst other things the annual report would need to address both the annual average and 24 hour average PM_{10} criteria, to demonstrate compliance with current conditions; as well as including evidence of the adaptive management and ongoing improvements implemented throughout the reporting period. Any new mining activities, including expansions should be required to comply with best practice mitigation, management, monitoring and reporting.

6.2.2. Need for the $PM_{2.5}$ fraction to be assessed

While there is no current limit or standard criteria for $PM_{2.5}$ levels, both annual and 24 hour average reporting goals have been in place at a national level, through the National Environmental Protection Measures, for many years. Indeed, the proponent has advised the Commission that its air quality monitoring network includes monitoring of both PM_{10} and $PM_{2.5}$ (Hansen Bailey, 2015). It is now standard practice for mining applications to include an assessment of both the project specific and cumulative $PM_{2.5}$ emissions and associated impacts. The significance of $PM_{2.5}$ emissions in relation to human health has been highlighted by NSW Health on various projects across NSW; and in the recent National Environment Protection Council Impact Statement (Department of the Environment, 2014) and associated submissions, such as that from the CSIRO (CSIRO, 2014), it has also been discussed in numerous review and determination reports published by the Planning Assessment Commission (for example in the Commission's recent review of the Warkworth Continuation Project (Planning Assessment Commission, 2015).

The Commission acknowledges that underground mining projects are typically expected to produce significantly lower particulate emissions than those associated with open cut mining. Nonetheless, this project is located in a relatively urban environment, and so the background $PM_{2.5}$ fraction is likely to be higher than is typically found in rural mining areas. In light of this, and the mine's proximity to residential suburbs, the Commission considers that an assessment of the mine's $PM_{2.5}$ emissions and contribution to cumulative levels is warranted.

6.2.3. Consideration of the PM_{10} fraction

The proponent has modelled the PM10 emissions and impacts of the project, including the cumulative impacts (Environmental Resources Management Australia Pty Ltd, 2012). Cumulative levels were predicted using background monitoring data from 2011, when no exceedances of the 24 average PM_{10} levels were recorded at the Wollongong monitor (the closest to regional monitoring station). Consideration of the Office of Environment and Heritages air quality data suggests that air quality criteria have been exceeded in some other years, including on a number of occasions since 2011. The Department's assessment notes that "*that the 24-hour PM_{10} emissions can be adequately managed through the continued operation of the real-time air management system."* The Department of Planning & Environment's assessment report (2014b) and indicates the Environment Protection Authority has also accepted this system. Given the projects dust contribution is predicted to be relatively small on the days when background air quality is high the Commission accepts the Government's recommended approach should be able to ensure the mine site does not cause PM_{10} air quality criteria to be exceeded.

6.2.4. Need to minimise emissions and meet best practice standards

As noted in the Department's assessment report and in the Environment Protection Authority's Dust Stop program, dust minimisation and best practice control measures need to be implemented to ensure the project's impact on the surrounding community is minimised. The mine has a long history on the site and some of the infrastructure currently in place will inevitably be less effective than that of a brand new facility. The Commission acknowledges that it would not be reasonable to expect the proponent to completely replace its existing pit top infrastructure for this proposed 5 year mining activity. Nonetheless, as noted in other parts of this report, the Commission is aware the mine has received numerous small extensions to its activities in recent years, so the potential for ongoing deferral of improvements is also a concern.

The proponent is seeking to increase its coal handling capacity from the previously approved 1 million tonnes per year, to the proposed 3 million tonnes per year. Increases in coal handling will almost inevitably increase the potential air emission sources and levels from the site, with associated air emission impacts. The Commission considers that further consideration of options to improve the performance of the mine in controlling dust is therefore warranted. Further given the proposed increased handling capacity, all new and/or upgraded infrastructure would need to include the best control and minimisation features and technologies available.

6.2.5. Commission's Considerations and Recommendations

Considerations

The Commission finds that although the proponent's has predicted the mine would be able to comply with current air quality criteria, further assessment is warranted. The assessment needs to consider the emissions in the $PM_{2.5}$ fraction against the current reporting levels in the National Environmental Protection Measures and to demonstrate how the increased coal handling capacity (proposed to increase from the existing 1 million tonnes a year, to 3 million tonnes a year) would be managed to minimise emissions and achieve best practice.

Recommendations

The Commissions recommends:

1. The $PM_{2.5}$ emissions from the proposal need to be assessed prior to any determination of the application.

2. Consideration of best practice standards needs to be provided to demonstrate that air emissions would be minimised and to justify the proposed increase in coal handling capacity.

3. The mine's existing monitoring and reporting systems should be strengthened to clearly demonstrate compliance with current conditions, environmental standards and reporting goals (i.e. for $PM_{2.5}$ emissions).

6.3. Water Management

The pit top is located in the foothills of the Illawarra Escarpment, and water management of the pit top is critical, as the surface water from the site, flows into residential areas. Flooding of the site and flooding impacts within Bellambi Gully are considered together. Bellambi Gully drains the clean surface water from the site, and has in the past flooded causing impacts to residents downstream of the pit top. Water quality is addressed separately.

6.3.1. Flooding and Bellambi Gully

Bellambi Gully runs for 4.3km and has a catchment area 427 ha. Surface runoff flows from the Illawarra Escarpment, down through the heavily vegetated steep slopes, before entering the formalised Bellambi Gully watercourse. The outfall of Bellambi Gully is on the beach, approximately 3 km from the boundary of the Russell Valley Colliery pit top. There are a number of pipelines and drainage lines that convey Bellambi Gully flows, and blockages of these pipes has led to flooding, as was the case in 1998. In the 1998 event, clean water runoff overflowed into the coal stockpile area and then flowed into Bellambi Gully and flooding of residential areas downstream occurred, due to pipeline blockage (Cardno (NSW/ACT) Pty Ltd, 2015).

Wollongong City Council, at the meeting with the Commission (2 February 2015) raised its ongoing concerns regarding Bellambi Gully and the proponent's proposed flood mitigation measures. The Commission notes that the Statement of Commitments provided by the proponent in the 2011 Preliminary Works Project approval, that works would be undertaken within 12 months to replace the underground pipe section of Bellambi Gully, with a *"suitably designed and engineered open bypass channel constructed on the southern side of the coal stockpile area"* (Department of Planning & Infrastructure, 2011a). These works were further conditioned in the 2012 approval, to be completed by 31 December 2013 (Department of Planning & Infrastructure, 2012).

The Commission heard similar concerns at the public hearing, and questions were asked as to why the proponent had not carried out these conditioned works. Further it was contended that Bellambi Gully runs black with coal during storm events.

The Department of Planning & Environment, in its briefing to the Commission confirmed that these realignment works had yet to be commenced, and that the proponent was considering other flood mitigation measures, instead of the realignment works proposed. The Department of Planning & Environment is not convinced that the measures provided in the proponent's flood study (Cardno 2014) will adequately address the concerns that have been raised by Wollongong City Council, as the modelling did not include 100% blockage of all pipes less than 6m diameter (Department of Planning & Environment, 2014b). Therefore the Department of Planning & Environment has recommended in the draft conditions (Schedule 4, Condition 10, Table 7) that require the proponent to:

- *"clean water diversion & storage infrastructure:*
    - *Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site;*
- *Bellambi Gully Channel & Diversion:*
    - *design, install and maintain the main channel and culvert to convey the 100 year ARI flood or greater using the Wollongong City Council 'policy based' conduit blockage criteria: and*
    - *design, install and maintain the swale alongside the stockpile access road to convey the 100 year ARI flood or greater"* (Department of Planning & Environment, 2014b).

6.3.2. Commission's Considerations and Recommendations

Considerations

The Commission notes that the revised flood study has been prepared in accordance with the Wollongong City Council's blockage policy. The Commission agrees with the position of both Wollongong City Council and the Department of Planning & Environment that the realignment works proposed by the proponent should be constructed within the recommended timeframe of 12 months.

Recommendation

1. Any new approval should retain the existing requirement to realign Bellambi Creek or a full justification why this is no longer necessary to provide protection to the creek downstream from the pit top surface area.

6.3.3. Water Quality

Water that is discharged from the pit top site is through a single licensed discharge point (Russell Vale LDP2) under the Environmental Protection Licence (EPL 12040). The proponent can discharge up to 2.5 ML/day under dry weather conditions (Beca Pty Ltd, 2011). Water is treated prior to discharge into Bellambi Gully. There are no amendments proposed to the EPL discharge limits as part of this project.

Beca (2011) state that the water quality with Bellambi Gully like a number of other coastal streams in Wollongong have varying water quality, and do exceed some ANZECC guidelines.
Table 5 below compares the water quality at the discharge point, to further down Bellambi Gully, and to the ANZECC guidelines.

Table 5: Water Quality Comparison

Analyte	Units	Russell Vale Discharge LDP2	EPL 12040 Concentration Limits LDP2	Bellambi Gully	ANZECC Guidelines
pH	pH	7.1 – 9	6.5 – 9.2	8.1 – 9.2	6.5 – 8(9)
Oil & grease	mg/L	<0.1	10	<0.1	NS
Total Dissolved Solids	mg/L	1100 – 1900	NS	1220 – 1900	125 – 2200
Total Kjeldahl Nitrogen	mg/L	0.4 – 1.1	NS	0.4 – 0.9	0.5
Total Phosphorus	mg/L	0.03 – 0.12	NS	0.08 – 0.3	0.05
Total Suspended Solids (TSS)	mg/L	13 – 27	50	1 – 52	NS

(Beca Pty Ltd, 2011)

As noted above in Section 6.3 it was raised at the public hearing that Bellambi Gully runs black with coal during storm events.

The Environmental Protection Authority, in its submission (dated 17 April 2013) noted that additional information was required to fully assess the impacts of the current and proposed future discharge from the site. The information should include, but not be limited to:

- *"baseline data;*

- *characterisation of the discharge waters (both flow and volume) including both stormwater runoff and mine water;*
- *as assessment of the likely impacts of pollutants in the discharge water on receiving waters;*
- *the relevant environmental values of Bellambi Gully Creek in particular relevant NSW Water Quality and River Flow Objectives for the Illawarra; and*
- *the identification of any proposed mitigation options in order to achieve these values, if required"* (NSW Environment Protection Authority, 2013).

The Environment Protection Authority reiterated this position, in a letter to the Commission (dated 13 March 2015).

Considerations

The Commission understands that the water quality within Bellambi Gully is associated with runoff and flooding of the pit top areas, as the pit top is upstream of the residential area. The Commission notes that the monitoring provided from the proponent at the licensed discharge point, is within the limits of the EPL. Further the Commission notes, that the agencies responsible for the EPL and pollution control issues have not raised significant concerns regarding water quality within Bellambi Gully. These agencies however, have raised concerns regarding the company's failure to comply with the conditions of the Preliminary Works Project approval, and subsequent modifications with regard to the realignment of Bellambi Gully, and flooding of the pit top areas. The Commission considers that the conditions of consent are adequate for managing water quality issues; though stricter compliance monitoring of the company might be warranted, given the concerns of a number of agencies.

6.4. Traffic

Bellambi Lane is a four lane road, which is the first leg of the haulage route from the Russell Vale Colliery to the Port Kembla Coal Terminal. This road formed part of State Highway 1 (the Princes Highway), as part of the construction of the Northern Distributor between 1992 and 2009 (Department of Planning & Environment, 2014b). During this time control of Bellambi Lane was transferred from Wollongong City Council to the NSW Roads & Maritime Services, while it was a link road between the Northern Distributor and the Princes Highway. Once the construction of the Northern Distributor was completed, control of Bellambi Lane was returned to Wollongong City Council.

With the increase in the amount of coal being extracted, the proponent is seeking to increase the annual production rate from 1Mtpa to 3Mtpa, all on which will be transported to the Port Kembla Coal Terminal by road. This will increase the number of trucks hauling coal along the approximate 16km haulage route from the mine to the Port Kembla Coal Terminal (Gujarat NRE Coking Coal Ltd, 2013). The current number of truck trips per hours is 11, and this will increase to 17 per hour, or 34 trucks movements per hour. This equates to one truck every 104 seconds driving along Bellambi Lane (Illawarra Residents for Responsible Mining Inc., 2015) and (Department of Planning & Environment, 2014b).

Cardno report (2014) that the increase in trucks to transport the expected 3Mtpa ROM coal, will not have a significant impact on the level of service of the haulage route, and that only small increases in delays at key intersections are predicted.

Wollongong City Council in its submission to the Department of Planning & Environment raised its concerns regarding the increase level of maintenance that would be associated with the increase in truck movements. Wollongong City Council requested that the proponent be required to *"enter*

negotiations with Council and RMS regarding the funding of additional road maintenance to mitigate the impact of additional trucks along the haulage route" (Wollongong City Council, 2013). The Commission notes that the Department of Planning & Environment did not support Council's view regarding maintenance contributions by the proponent.

A number of concerns and potential alternative options have been raised, in the submissions and at the public hearing, regarding the increase in truck numbers to transport the coal, and these have included:

- increased truck noise and vibration from the increase trucks;
- increased exposure to diesel fumes (please see section 6.2 for discussion of this issue);
- increased queuing of trucks along Bellambi Lane in the morning, prior to the approved haulage hours (this is already an issue for some residents of Bellambi Lane);
- peak haulage times, when there is a need to move more coal to the port, then the restrictions to haulage do not apply;
- 1979 approval (of the then South Bulli Colliery – now Russell Vale Colliery) capped road capacity for coal haulage at 2 Mtpa, it should remain at this level, therefore the proponent should not transport more than 1Mtpa via the road network;
- contribution by the proponent to Wollongong Council for maintenance of Bellambi Lane (since this road is a local road), Wollongong Council have also requested this;
- instead of trucking coal to the port, construct the previously recommended underground conveyor to the rail line near Bellambi Station, and load the coal into coal wagons; and
- if the mine continues to expand, as suggested by the proponent, then alternative transport modes and locations should be considered, e.g. the Maldon Dombarton link.

The Environment Protection Authority in its submission to the Commission, provided a Table 6 (over page) which highlights the stop/start nature of the Russell Vale Colliery and the production rates of the Russell Vale Colliery compared with the other Southern Coalfield mines.

Table 6: Comparison of Coal Production from the Southern Coalfield Underground Mines

	Dendrobium	West Cliff	Tahmoor	Metropolitan	Wollongong Coal	Wongawilli
EPL	3241	2504	1389	767	12040	1087
Loading	Bins	Bins	Bins	Frontend Loader	Frontend Loader	Frontend Loader
Transport	Train	Truck	Train	Train	Truck	Train
Approved (Mtpa)	5.2	10.5	3.0	3.2	1.0	2.0
Produced (Mtpa)						
2007	2.5	2.9	Data not available	Data not available	Data not available	Data not available
2008	3.5	4.5	1.4	1.22	0.550	0.040
2009	3.0	5.25	Data not available	Data not available	Data not available	Data not available
2010	3.25	5.25	Data not available	1.8	Data not available	Data not available
2011	3.6	5.5	1.6	1.9	Data not available	Data not available
2012	4.25	6.5	2.3	1.9	0.439	Data not available
2013	4.5	6.0	2.5	1.6	0.784	Data not available
2014	3.75	6.1	2.8	2.7	0.286	Data not available

(NSW Environment Protection Authority, 2015)

The Environment Protection Authority state that *"it is unclear if it is physically possible to mine and transport this amount of coal (proposed 3Mtpa) from Russell Vale Colliery in a calendar year, with current and proposed infrastructure, especially when compared with other mines in the southern coalfields. The colliery appears to have several constraints to coal production. These include the distance of current and future coal reserves to the Pit Top which will become greater over time, capacity of longwall, limited size of pit top for stockpiling, all truck loading carried out by frontend loader and not loading via bins, and coal transport restrictions from the mine to Port Kembla Coal Terminal"* (NSW Environment Protection Authority, 2015).

6.4.1. Traffic Noise

To allow for the increased extraction, there will be an increase in the number of trucks hauling coal from the mine to Port Kembla Coal Terminal for export. Cardno in its Traffic & Transport Impact Assessment for the proposal (2014) state that the existing operations for the mine use a 13 hour (7:30am to 8:30pm), 6 day a week (Monday through to Saturday) haulage regime. The proponent wishes to increase the haulage regime, to provide for the increase in production rate, to 15 hours a day on week days and 10 hours a day on weekends. The Commission notes that these longer haulage hours are currently conditioned within the existing 2011 Preliminary Works Project approval (Department of Planning & Infrastructure, 2011a). The Department of Planning & Environment report that the *"Road Noise Policy sets noise criteria for two periods – 7am to 10pm and 10pm to 7am"* (Department of Planning & Environment, 2014b).

One of the key concerns raised during the public hearing regarding noise, was that of traffic noise along Bellambi Lane. The Commission understands that the two sides of Bellambi Lane are zoned differently, and this has implications for noise criteria under the Industrial Noise Policy. The northern side of Bellambi Lane is zoned residential, so the noise criteria apply for these residents. However,

on the southern side of Bellambi Lane the zoning is light-industrial, and for the residents that do live on this side of the road, the noise criteria do not apply. These residents are termed 'isolated residents'.

The Bellambi Lane residents raised their concerns regarding the increase in trucks along Bellambi Lane, and the long haulage hours proposed. The residents' requested that the haulage hours be reduced to allow the residents some respite and sleep; 10pm it was contended is late for trucks to be hauling coal. The approach that 'the mine was there first' should not apply in this situation, as noted previously, the mine was closed for some 8 years, and it did not appear that the mine would reopen. The residents' spoke of their concern that there is no real time monitoring of noise along Bellambi Lane, and that this should be required.

The Commission notes the advice from the Environment Protection Authority (2015), in its submission to the Commission, which may assist with managing transport related noise impacts, including:

- *"a transport curfew to provide residents respite from coal transport;*
- *best practice acoustically treated trucks and trailers;*
- *investigation into pavement modifications at Princess Highway/Bellambi Lane intersection to reduce truck/trailer banging;*
- *investigation of impacts on noise and dust from coal transport fleets made up of different classes of vehicles. For example, would all coal transported in fewer A-Doubles (85 tonne), B-Doubles (65 tonnes) or other larger vehicles, have less impacts than a fleet made up of smaller semi-trailers (30-35 tonnes)/truck and dog arrangements? The EPA notes there are constraints on vehicle size on different roads and the use of A-Doubles on the haulage route from West Cliff Mine to the Port Kembla Coal Terminal is by special arrangement;*
- *installation of a sound barrier along Bellambi Lane. A sound barrier on the north side of Bellambi Lane may propagate transport noise towards the residents on the south side of Bellambi Land within the Industrial Zone;*
- *completion of a best practice bulk coal transport assessment and review. The review should investigate a range of alternate coal transport options. For example, use of conveyors to rail load out bins, or alternate locations for the haulage of coal from the mine such as a remote location (for example, existing or new vent shaft) on top of the escarpment; and*
- *negotiated agreements between the company and affected residents"*.

The Commission understands the concerns of the residents of Bellambi Lane, regarding traffic noise. The Commission acknowledges that the different noise standards that are required due to the differing zoning on each side of Bellambi Lane. The Commission particularly acknowledges the concerns of the residents along the southern side, as these residents' do not receive the level of noise protection, afforded their neighbours across the street. These are the residents who will be most impacted by the increase in truck movements, particularly in the mornings when the trucks are queueing outside the mine.

6.4.2. Commission's Considerations and Recommendations

Considerations

The Commission has given considerable thought to what options are available to provide these residents with a reduction in noise level, and has welcomed the advice from the Environment Protection Authority. The Commission considers that the proponent should investigate and cost a number of options to reduce the noise impacts to the most effected residents along Bellambi Lane,

particularly those near the intersections with the Princes Highway and the Northern Distributor. Options being considered by the proponent, should include, but not be limited to:

- Construction of a coal truck parking area (for trucks to wait prior to the commencement of haulage hours) within the mine boundary;
- Construction of a noise barrier near the intersections of Bellambi Lane/Princes Highway and Bellambi Lane/Northern Distributor; and
- Use of pavement modifications along Bellambi Lane, to reduce truck/trailer banging.

Recommendations

1. The proponent should negotiate with Council and Roads & Maritime Services regarding maintenance contributions to mitigate impacts from the increase in truck movements along the haulage route.

2. Consideration should be given to further limiting the hours of truck movements.

3. Proponent should investigate and cost a number of options to reduce the noise impacts to the most effected residents along Bellambi Lane, particularly those near the intersections with the Princes Highway and the Northern Distributor. Options to be considered by the proponent, should include, but not be limited to:
   a. construction of a coal truck parking area (for trucks to wait prior to the commencement of haulage hours) within the mine boundary
   b. construction of a noise barrier near the intersections of Bellambi Lane/Princes Highway and Bellambi Lane/Northern Distributor; and
   c. use of pavement modifications along Bellambi Lane, to reduce truck/trailer banging.

4. No increase in the currently approved maximum rate of extraction should be approved without clear demonstration that facilities can handle the additional volume without unacceptable impacts for local residents.

7. Conclusions and Recommendations

7.1. Conclusions

The incremental nature of this proposal is in keeping with the earlier modifications submitted and the Commission shares the view expressed in earlier PAC reports that this is not an acceptable way to undertake planning of a proposal that has the potential for significant environmental and community impacts. Effective consideration of cumulative impacts is particularly challenging.

The Commission has considered all the available information including additional information requested from relevant agencies and experts. There is no disagreement about the importance of protecting Sydney's drinking water catchment, both in terms of the water quality and quantity. The proponent has argued that this can be achieved by the proposed mining layout and mining methods, acknowledging that the mine plan has been substantially modified and reduced compared with the original proposal. Advice from Water NSW and the Commonwealth's Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development have both identified significant risks with respect to the proponent's modelling of the predicted impacts.

The Commission acknowledges that there will always be some degree of uncertainty and risks in any modelled predictions and experts legitimately may have differing views. In such cases the decision maker needs to take into account a risk assessment that predicts the likelihood of an event occurring and then the consequence of such an event should it occur. In order to successfully manage the identified risks, appropriate risk mitigation strategies need to be developed and implemented, overseen by the recommended risk management panel.

The Commission considers that the likelihood of the proposed mine causing a significant detrimental impact on the Sydney water catchment water quantity or quality is low, however the consequence, if such an event did occur, could be substantial and irreversible. The precautionary principle requires the Commission to have regard to likelihood and consequence of these risks for each proposal.

At this stage, the Commission does not have sufficient information or confidence to determine the merits of the proposal sufficient for a determination for approval. It may be possible for the proposal, or a modified proposal to be approved if all the additional information identified in this Review report provides a greater level of confidence for the protection of the water quality and quantity in the Sydney Catchment Area and satisfies all the other issues identified in this review.

7.2. Recommendations

The Commission has made several recommendations regarding additional work and assessment that is required to be carried out prior to a determination being made.

Water/Subsidence

1. The establishment of a risk assessment panel, constituted by an independent Chair, Water NSW, the Dams Safety Committee, the Division of Resources and Energy and the proponent to oversee an integrated risk assessment, particularly focusing on links between subsidence and water (both groundwater and surface water) impacts of the proposal. This risk assessment, including associated work rerunning the groundwater modelling as recommended by Dr Mackie; and addressing the issues raised by the relevant agencies and experts (as highlighted by this report), needs to be completed before the application can be determined.

Upland Swamps

2. The establishment of a network of piezometers within and surrounding the upland swamps, the establishment of this network should be guided by the relevant authorities (i.e. Office of Environment & Heritage, Water NSW, the Dams Safety Committee and the Department of Planning & Environment). This network will collect additional baseline data and monitor the impacts to the swamps, through changes to the groundwater supporting the swamps, from the mining. This monitoring data should be made available to the independent risk assessment panel.

3. Any more definitive policy developed regarding triggers for offsets and mitigation measures under the *"Policy Framework for Biodiversity Offsets for Threatened Upland Swamps and Associated Threatened Species Impacted by Longwall Mining Subsidence"* should be made available for consideration by the independent risk assessment panel (see Recommendation 1).

4. Any potential offset policy should address key elements including:
    a. the potential delayed onset of subsidence and associated hydrogeological and ecological impacts to swamps;
    b. potential ecological and structural tipping points; and
    c. mechanisms to adequately secure offset sites (with consideration of the current land tenure and exploration licence and mining lease tenements of the proposed offset site; and the need for site specific offset management plans).

Socio-Economic

5. The proponent's economic assessment, in particular the estimated costs and benefits, should be updated to reflect the current economic climate.

6. The final assessment and determination of the project should be informed by an independent analysis of the economic costs and benefits of the project, including any additional information/updated economic assessment provided by the Applicant. The independent analysis should be managed by the Department of Planning & Environment.

Noise

7. The Commission recommends that further consideration of the noise impacts of the project needs to be provided including consideration of further noise mitigation measures as recommended by the EPA. Detailed justification should be provided for any deviations from the existing noise limits in current planning approval. Also clarification should be provided on the outcomes and applicability of the noise audit required in the 2011 approval.

Air

8. The $PM_{2.5}$ emissions from the proposal need to be assessed prior to any determination of the application.

9. Consideration of best practice standards needs to be provided to demonstrate that air emissions would be minimised and to justify the proposed increase in coal handling capacity.

10. The mine's existing monitoring and reporting systems should be strengthened to clearly demonstrate compliance with current conditions, environmental standards and reporting goals (i.e. for $PM_{2.5}$ emissions).

Flooding/Bellambi Creek

11. Any new approval should retain the existing requirement to realign Bellambi Creek or a full justification why this is no longer necessary to provide protection to the creek downstream from the pit top surface area.

Traffic

12. The proponent should negotiate with Council and Roads & Maritime Services regarding maintenance contributions to mitigate impacts from the increase in truck movements along the haulage route.

13. Consideration should be given to further limiting the hours of truck movements.

14. Proponent should investigate and cost a number of options to reduce the noise impacts to the most effected residents along Bellambi Lane, particularly those near the intersections with the Princes Highway and the Northern Distributor. Options to be considered by the proponent, should include, but no be limited to:
    a. construction of a coal truck parking area (for trucks to wait prior to the commencement of haulage hours)within the mine boundary
    b. construction of a noise barrier near the intersections of Bellambi Lane/Princes Highway and Bellambi Lane/Northern Distributor; and
    c. use of pavement modifications along Bellambi Lane, to reduce truck/trailer banging.

15. No increase in the currently approved maximum rate of extraction should be approved without clear demonstration that facilities can handle the additional volume without unacceptable impacts for local residents.

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