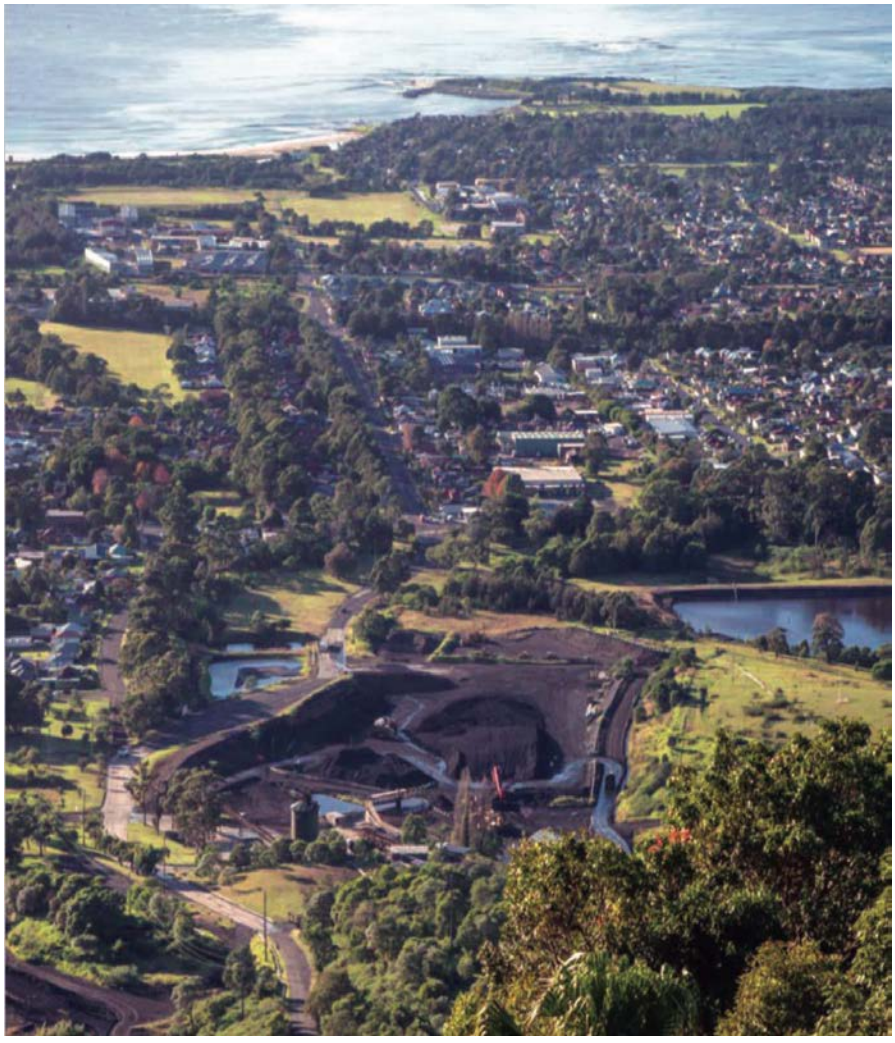
Russell Vale Revised Underground Expansion Project

State Significant Development (MP09_0013)

Planning Secretary's Final Assessment Report

September 2020



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Glossary

Abbreviation	Definition
AR	Addendum Report prepared by the Department (November 2015)
AHD	Australian Height Datum
BCA	Building Code of Australia
CIV	Capital Investment Value
Commission	Independent Planning Commission of NSW
CPP	Community Participation Plan
DAWE	Department of Agriculture, Water and the Environment (formerly DoEE)
Department	Department of Planning, Industry and Environment
DPI	Department of Primary Industries within the Department of Regional NSW
DRG	Division of Resources & Geoscience (now MEG)
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
FAR	Final Assessment Report
FRNSW	Fire and Rescue NSW
Ha	Hectares
Heritage	Heritage NSW, within the Department of Premier and Cabinet
IESC	Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development
Km	Kilometres

Abbreviation	Definition
LEP	Local Environmental Plan
MEG	Mining, Exploration and Geoscience within the Department of Regional NSW
Minister	Minister for Planning and Public Spaces
Mtpa	Million tonnes per annum
NPV	Net present value
NPWS	National Parks & Wildlife Service
NRAR	Natural Resources Access Regulator, within the Department of Regional NSW
RPPR	Revised Preferred Project Report and Response to Second PAC Review (Umwelt, July 2019)
PKCT	Port Kembla Coal Terminal
Planning Secretary	Secretary of the Department of Planning, Industry and Environment
Revised UEP	Revised Russell Vale Underground Expansion Project
ROM	Run-of-mine
RMS	Roads and Maritime Services, TfNSW
PAR	Preliminary Assessment Report prepared by the Department (December 2014)
RTS	Response to Submissions
Russell Vale	Russell Vale Colliery
SEARs	Planning Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSD	State Significant Development
SSI	State Significant Infrastructure
TfNSW	Transport for NSW
WCC	Wollongong City Council
WCL	Wollongong Coal Limited
WSC	Wongawilli Shire Council

Executive Summary

Background

The Russell Vale Colliery (Russell Vale) is an underground coal mine which has been operating for more than 130 years. The colliery is in the Illawarra Region, approximately 8 kilometres (km) north of Wollongong and 70 km south of Sydney.

Russell Vale currently operates under a Preliminary Works Project (PWP) development consent issued in 2011, however the colliery has been operating in "care and maintenance" since 2015.

Since 2009, the owners of Russell Vale have sought approval to expand longwall mining operations including mining beneath the Cataract Reservoir catchment which is a source of drinking water for Sydney.

An Environmental Impact Statement (EIS) was exhibited in 2013 (UEP 2013) for 18 longwall panels across two domains (Wonga East and Wonga West) extracting 31 million tonnes (Mt) of coal over 18 years.

The project was then substantially amended through submission of a Preferred Project Report (PPR) in September 2013 for 8 longwall panels in one domain (Wonga East) extracting 4.7 Mt of coal over 5 years.

Two public hearings were held by the Planning Assessment Commission on the PPR with reports completed in 2015 and 2016 with the Commission concluding after the second review that the social and economic benefits of the Preferred UEP were most likely outweighed by the magnitude of impacts to the environment. This conclusion was largely due to uncertainty associated with subsidence and groundwater impacts as a result of proposed longwall mining in the multi-seam mining environment present at Russell Vale.

Revised Preferred Project Report

In July 2019, in response to the Commission's second review WCL lodged a Revised Preferred Project Report (RPPR) with further major changes to the project to reduce impacts, particularly an amended mine plan which no longer involves longwall mining. The Revised Russell Vale Underground Expansion Project (Revised UEP) now involves mining by means of non-caving bord and pillar mining technique only, with workings designed to be long term stable with minimal subsidence impacts. It is proposed to extract up to 3.7 million tonnes (Mt) of run-of-mine (ROM) coal over 5 years at a production rate that would not exceed 1 Mt of product coal per year. WCL is also proposing to redesign, upgrade and continue to use its existing surface facilities site.

This Final Assessment Report (FAR) has been prepared by the Department of Planning, Industry and Environment (the Department) for consideration by the Commission. The report provides an assessment of the Revised UEP under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and provides consideration of Commission's *Second Review Report* (March 2016) and responses to that report prepared by WCL. The FAR should be read in conjunction with the Department's Preliminary Assessment Report (PAR) dated December 2014 and Addendum Report (AR) dated November 2015.

Statutory Context

In 2009, the UEP project application was originally lodged as a Part 3A application under the EP&A Act. The project has now been transitioned to a State Significant Development (SSD). In accordance with Section 4.5(a) of the EP&A Act and clause 8A of the *State Environmental Planning Policy (State and Regional Development) 2011* (the SRD SEPP), the Commission is the consent authority for the SSD application as more than 50 public submissions were duly made objecting to the project.

Engagement

The Department publicly exhibited the RPPR from 1 to 29 August 2019. The Department received 202 submissions from the community and special interest groups, of which 78 supported and 124 objected to the Revised UEP. Public agencies overall indicated that the proposed bord and pillar mining method largely addressed previous concerns in relation to the UEP. However, several agencies commented and requested clarification on particular aspects of the proposal.

Assessment

In assessing the merits of the project, the Department has considered the submissions on the RPPR; the likely environmental, social and economic impacts of the project; the suitability of the site; relevant environmental planning instruments (EPIs); and the public interest, in accordance with the requirements of the EP&A Act. The Department has also considered advice on the Revised UEP received from the *Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development* (IESC) and independent peer reviewers on the subsidence and groundwater assessments.

Subsidence

The Revised UEP mining method has been designed to be long term stable with negligible risk of pillar failure, significantly reducing the potential for subsidence-related mining impacts when compared to the previously proposed longwall mining methods. The RPPR includes a Subsidence Assessment, as well as a Quantitative Assessment of the Risk of Pillar Failure. Both assessments were peer reviewed.

Subsidence impacts on built features within the study area, including roads, powerlines and telecommunication lines, are predicted to be very minor to negligible, and readily manageable via the Extraction Plan process. Subsidence impacts on natural features including upland swamps; cliffs and steep slopes; biodiversity; and drainage lines and creeks including the Cataract Creek and Cataract River, are also predicted to be negligible. Further, the small subsidence movements that are forecast for the proposed mining layout are not expected to cause perceptible impacts on Cataract Reservoir, including any risk of leakage or reduction in the water quality of the reservoir.

The probability of failure of the pillars in the Wongawilli Seam as a result of bord and pillar mining is predicted to be negligible. Investigations into the possibility of collapse of overlying mined coal seams as a result of bord and pillar mining showed there is no potential for further subsidence to occur from the Balgownie seam and the majority of the uppermost Bulli Seam as they are already fully subsided.

Despite the low level of predicted subsidence impacts, the Department has recommended a precautionary regulatory approach consistent with other underground coal mines, including strict performance measures to protect built and natural features and a requirement for WCL to prepare and implement an Extraction Plan including a comprehensive monitoring program and trigger action-response plans (TARPs) to provide a clear basis to demonstrate compliance with these performance measures.

Water Resources

The RPPR includes a Groundwater Assessment, as well as an Uncertainty Analysis, both of which were peer reviewed. These reports confirm that, even under worst case modelling scenarios, the predicted induced reduction in surface water flows (up to 10 ML/year) is negligible and would have no discernible impact on Sydney's drinking water catchment. Predicted peak increase in groundwater inflow into the mine workings is also minimal (288 ML/year) and WCL currently holds water access licences to account for this groundwater take.

The Commission and the IESC previously raised the issue of uncertainty of the influence of the mining adits on long-term groundwater levels, flow and quality after cessation of mining. It is predicted that in around 2057 a maximum of approximately 110 ML/year of groundwater would discharge out of the Russell Vale adit(s). This would occur irrespective of the proposed mining in the Wongawilli Seam.

The Department accepts that WCL is required to take responsibility for management and operational cost of treating adit discharge water following mine closure, but considers that further studies are required to inform long-term treatment, discharge and reuse options within the water catchment as a whole. Accordingly, the Department has recommended that WCL prepare an Adit Water Discharge Management Plan, in consultation with WaterNSW and the NSW Environment Protection Authority (EPA) and to the satisfaction of the Secretary.

Surface Operations

The surface facilities site is surrounded by the residential areas in Russell Vale and Corrimal. The Revised UEP proposes a new site layout and significant upgrades of the surface facilities which would minimise amenity impacts on neighbouring residences to acceptable levels. WCL has also committed to restricting operating times and limiting truck movements.

The RPPR includes revised Noise and Air Quality Impact Assessments associated with the Russell Vale surface facilities site. The EPA confirmed the noise and air assessments satisfactorily meet the relevant guidelines. The assessments predict that the mitigation and management measures proposed would ensure the noise (construction, operational and traffic) and air quality (dust) levels would comply with applicable EPA criteria.

The Department has recommended conditions requiring preparation and implementation of a Construction Management Plan, as well as Noise and Air Quality Management Plans, to ensure these standards are achieved.

WCL has indicated its intention to construct stormwater management and flood mitigation works at the surface facilities under the existing PWP consent. The Department has issued a Penalty Notice to WCL for breaching an order issued in December 2016 for failing to implement Bellambi Gully diversion works required by its existing PWP consent. Further, on 23 July 2020 the Department issued a new Order to prepare and submit detailed design plans and construct the works within 12 months. However, it is important to note these works do not form part of the Revised UEP.

Economic and Social

The RPPR includes an Economic Impact Assessment which estimates that direct benefits of the Revised UEP to NSW would be $117 million in net present value (NPV) terms. The project is also expected to generate total indirect benefits to NSW of $57 million (NPV). The Revised UEP would also

require an operational workforce of around 205 employees and contractors during the 5-year operation, as well as an additional short-term construction workforce of 22 employees.

The Department of Regional NSW - Mining, Exploration and Geoscience (MEG) considered that the project would still represent an efficient development and utilisation of coal resources which would foster significant social and economic benefits, including an estimated 800 additional indirect jobs in both mine and non-mine related services.

The Department recognises that there is inherent uncertainty in estimating costs and benefits over the life of a mine. However, when considering conservative assumptions, the Department considers that the Revised UEP would result in economic benefits to the local and regional areas and to the State of NSW, and is therefore considered justified from an economic efficiency perspective.

Other Impacts

The Department has also undertaken a comprehensive assessment of the full range of other potential impacts, including traffic, site water balance, visual amenity, biodiversity, greenhouse gas emissions, heritage and rehabilitation.

The Department accepts that these potential impacts are likely to be minor and able to be managed, mitigated or offset to achieve an acceptable level of environmental performance, subject to the recommended conditions of consent.

Evaluation

The Department considers that the Revised UEP bord and pillar mining method has addressed key issues raised by the Commission, particularly in relation to the uncertainty associated with subsidence and groundwater impacts as a result of proposed longwall mining in the multi-seam mining environment present at Russell Vale. The proposed mining has been designed to be long term stable with negligible risk of pillar failure and is predicted to result in very minor to negligible subsidence-related impacts on built and natural features, including Cataract Reservoir, surface water resources in the region and upland swamps.

The Department considers that the new surface facilities site layout, significant infrastructure upgrades and operational restrictions would minimise amenity impacts on neighbouring residences to acceptable levels. The Department recognises the relationship of the coal resource to the existing approved operations, and the synergies this presents for utilising existing infrastructure and reducing capital costs.

The Department has recommended conditions to address the residual impacts and risks of the Revised UEP. The conditions were developed in consultation with government agencies and Wollongong City Council (WCC). Overall, the Department considers that the benefits of the Revised UEP outweigh its residual costs, that the project is in the public interest and is approvable, subject to the strict conditions of consent.

Contents

1 Introduction

1.1 Background

1. Wollongong Coal Limited (WCL) owns and operates the Russell Vale Colliery (Russell Vale) located in the Illawarra Region, approximately 8 kilometres (km) north of Wollongong and 70 km south of Sydney (**Figure 1**).

2. Since 2009, the owners of Russell Vale have sought approval to expand longwall mining operations at the colliery. Expansion was proposed beneath the Cataract Reservoir catchment which is a source of drinking water for Sydney. Primarily due to uncertainty associated with subsidence and groundwater impacts as a result of proposed longwall mining in a multi-seam mining environment present at Russell Vale, this application has not yet been determined. WCL has substantially revised the proposed mine design to address these uncertainties and longwall mining is now no longer proposed.

3. WCL is now seeking approval for a substantially Revised Russell Vale Underground Expansion Project (**Revised UEP**) which involves mining by means of non-caving bord and pillar mining technique only, with workings designed to be long term stable with minimal subsidence impacts. It is proposed to extract up to 3.7 million tonnes (Mt) of run-of-mine over 5 years at a production rate that would not exceed 1 Mt of product coal per year.

4. This Final Assessment Report (FAR) has been prepared by the Department of Planning, Industry and Environment (the Department) for the consideration of the Independent Planning Commission of NSW (the Commission). The report provides an environmental assessment of the Revised UEP under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and includes consideration of Commission's *Second Review Report* (March 2016) and responses to that report prepared by WCL.

5. This FAR should be read in conjunction with the Department's Preliminary Assessment Report (PAR) dated December 2014 and Addendum Report (AR) dated November 2015, available on the Department's major projects website at: www.planningportal.nsw.gov.au/major-projects/project/39666

1.2 Project Setting

6. Russell Vale 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 extensive underground mining lease area, which lies under the Woronora Plateau west of the Illawarra Escarpment (**Figure 1**).

7. The surface facilities site comprises approximately 100 ha, located on the foot slopes of the Illawarra Escarpment at Russell Vale, west of the Princes Highway (**Figure 2**). Residential areas in Russell Vale and Corrimal are located to the east and south of the site, respectively.

8. The development site is overlain by the catchment area of the Cataract Reservoir, which supplies drinking water to parts of 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.

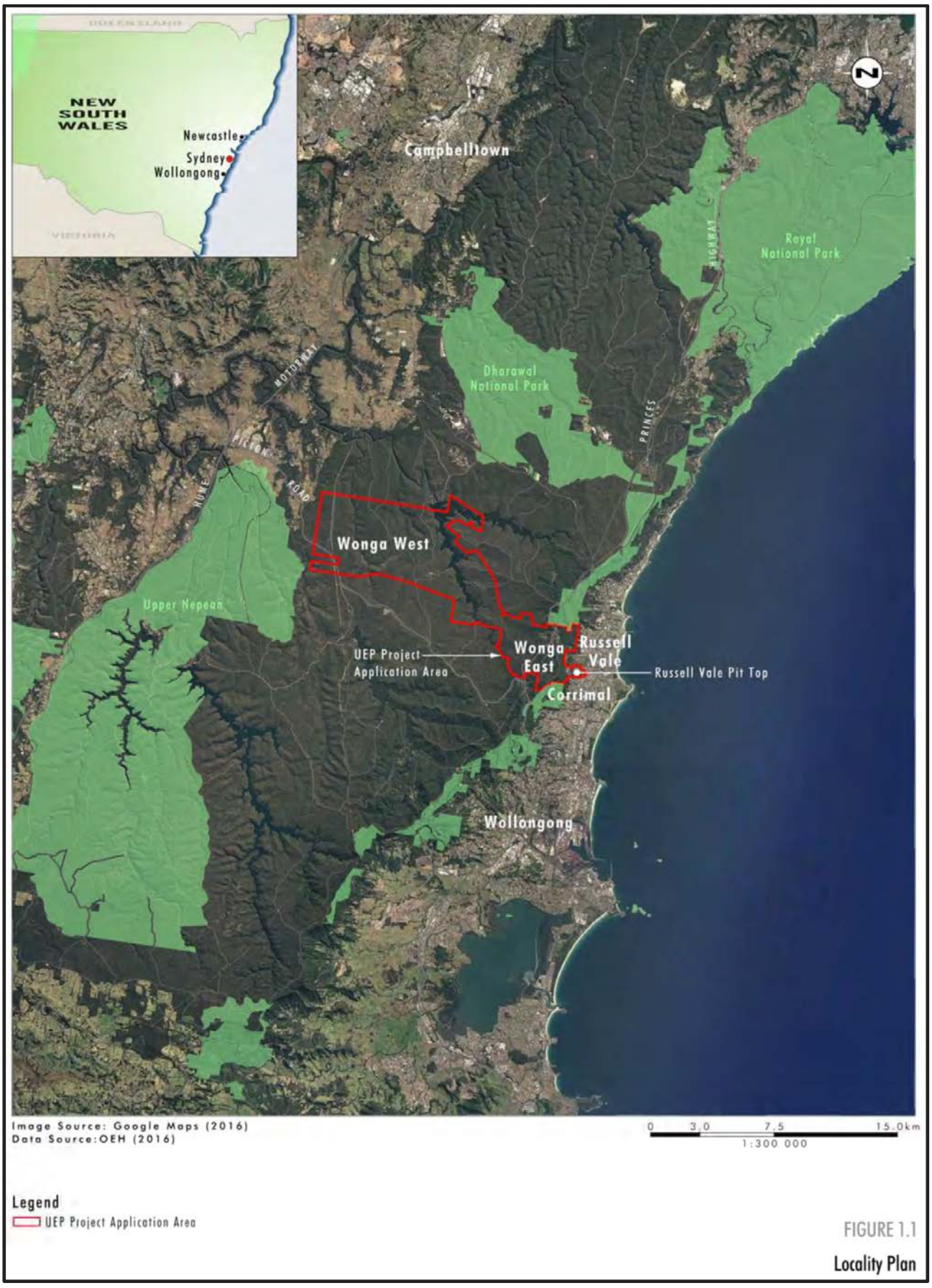

Figure 1 | Regional Location Plan

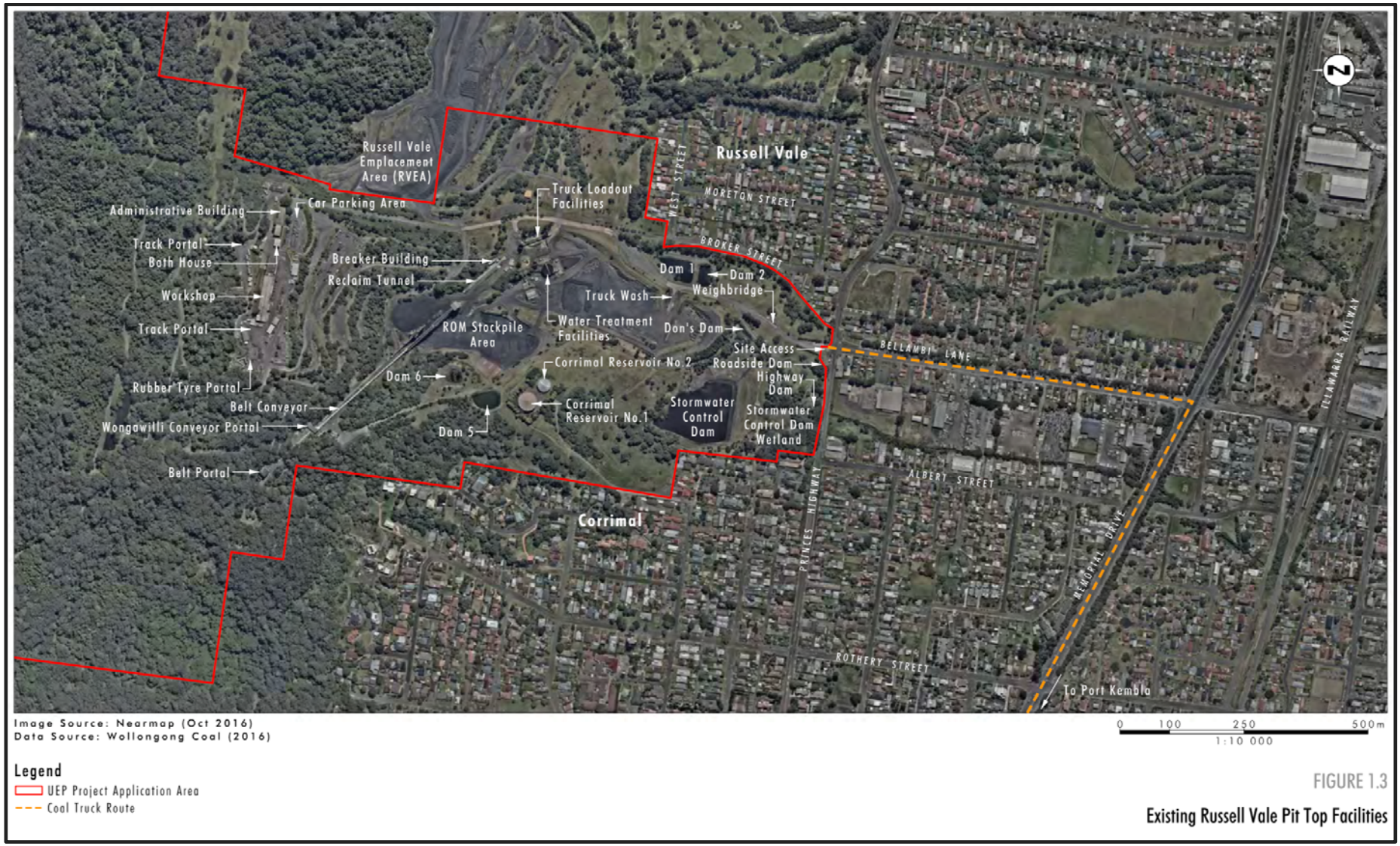

Figure 2 | Existing Surface Facilities Site

1.3 History of Mining

9. Extensive multi-seam underground mining has been undertaken at Russell Vale since 1887, with the extraction of the uppermost Bulli Seam mined using pillar extraction techniques (early to mid-1900s) and the underlying Balgownie Seam using longwall mining techniques (between 1970-1982 and 2001-2003). More recently, longwall mining was undertaken in the lower Wongawilli Seam (2012– early 2014).

10. All three seams outcrop along the Illawarra Escarpment and the workings are accessed by adits directly into the seams. Coal has historically been processed at the surface facilities site and hauled by truck from Russell Vale to Port Kembla Coal Terminal (PKCT), via Bellambi Lane and Memorial Drive (**Figure 2**).

1.4 Existing Project Approval and Operations

11. Mining at Russell Vale was most recently undertaken under the Preliminary Works Project (PWP) approval (MP 10_0046) which was granted by the then Planning Assessment Commission under the former Part 3A of the EP&A Act on 13 October 2011. In summary the approval allowed:

- extraction of up to 1 million tonnes per annum (Mtpa) of run-of-mine (ROM) coking coal through first workings and pillar extraction from the Bulli and Wongawilli Seams for a period of three years;
- upgrade of existing mining infrastructure at the mine's surface facilities site; and
- trucking of ROM coal from Russell Vale to PKCT for export.

12. The project approval was subsequently modified on three occasions (see **Table 1**).

Table 1 | Summary of modifications

Mod No.	Summary of Modification	Approval Authority	Type	Approval Date
MOD 1	To permit extraction of coal using longwall mining techniques in the Wongawilli Seam for two panels (Longwalls 4 and 5) and develop main gates for Longwalls 6, 7 and 8	Planning Assessment Commission	Section 75W	December 2012
MOD 2	To permit the extraction of coal using longwall mining techniques for the first 400 metres of Longwall 6 and an extension of the operation of the Colliery until 31 December 2015	Planning Assessment Commission	Section 75W	November 2014
MOD 3	To extend the operation of the Colliery until 31 December 2014, while waiting for determination of MOD 2	Department	Section 75W	October 2014

13. On 2 March 2018, WCL submitted an additional modification application (MOD 4) for revised stormwater management and flood mitigation strategies at the surface facilities site, however this application has subsequently been withdrawn by WCL (refer to Sections 2.1 and 7.5).

14. On 1 June 2018, the PWP project approval (MP10_0046) was transitioned to State Significant Development under Part 4 of the EP&A Act. The current consent only allowed mining till 31 December 2015 with the colliery currently operating in "care and maintenance".

1.5 Previous UEP Assessments and Commission Reviews

15. Following public exhibition and public hearings/reviews by the then Planning Assessment Commission there have been substantial revisions to the mine plan since the original UEP application in 2009. A detailed summary of the assessment history is provided in **Appendix A.**

16. A brief chronology of the key events is presented in **Table 2**. Documentation referred to in this table is available at: www.planningportal.nsw.gov.au/major-projects/project/39666

Table 2 | Chronology of Events

Date	Event
Original Part 3A application (UEP 2009)	
Aug 2009	• UEP 2009 proposed 18 longwall panels across Wonga East and West domains extracting 31 Mt of coal over 18 years. • Former Russell Vale owner (Gujarat NRE Coking Coal Ltd) submitted the original UEP Environmental Assessment (EA) (UEP 2009) to the Department which was considered inadequate for public exhibition.
Exhibition of EA (UEP 2013)	
Feb-Apr 2013	• The Department publicly exhibited the revised EA (UEP 2013) which retained the same mine plan as UEP 2009.
Preferred Project Report (PPR) and Response to Submissions (RTS)	
Sept 2013	• WCL submitted an amended project application, including a Preferred Project Report (PPR) and Response to Submissions (RTS). • The PPR removed all mining from Wonga West and one longwall panel from Wonga East extracting 4.7 Mt over 5 years.
Oct-Nov 2013	• The Department publicly exhibited the PPR and RTS.
Dec 2014	• The Secretary's Preliminary Assessment Report (PAR) for the Preferred Project was referred to the Commission for public hearings and review recommending approval subject to strict conditions.
First Commission Review 2015	
Apr 2015	• The Commission referred its First Review Report to the Department. • The Commission made 15 recommendations regarding additional work and assessment that was required to be carried out prior to a determination being made
May-Sep 2015	• In response to the Commission, WCL established an Independent Risk Assessment Panel and undertook a range of technical studies • WCL submitted its Response to Planning Assessment Commission Review Report – Part 1 (Part 1 Response) and Part 2 (Part 2 Response)
Oct 2015	• The Secretary's Addendum Report (AR) was referred to the Commission for a second review recommending approval subject to strict conditions.
Second Commission Review 2016	
Mar 2016	• The Commission referred its Second Review Report to the Department. • The Commission concluded that the social and economic benefits of the Preferred UEP were most likely outweighed by the magnitude of impacts to the environment

2 Revised Project

2.1 Revised UEP Mine Plan

17. In July 2019, WCL submitted a *Revised Preferred Project Report* (RPPR), including a response to the Commission's *Second Review Report*, for the Revised UEP to the Department (see **Appendix B**).

18. Longwall mining is no longer proposed. The Revised UEP involves mining by means of bord and pillar mining techniques only, with workings designed to be long term stable with minimal subsidence impacts. It is now proposed to extract up to 3.7 Mt of ROM coal over 5 years at a production rate that would not exceed 1 Mt of product coal per year. Mining is proposed in the Wonga East area only, with no mining within the Wonga West area or underneath the full supply level of Cataract Reservoir.

19. The target resource remains the Wongawilli Seam, which has a depth of cover ranging from 200 – 320 meters (m) in the eastern and 400 – 450 m in the western portion of the application area. Square pillars are proposed with widths either 25 m or 30 m. Pillars are designed to be permanently stable with a large width to depth ratio (8 or 10:1). Each mining panel generally includes 5 headings of 5.5 m width, separated from adjacent panels by solid coal barriers of generally greater than 40 m width.

20. WCL is committing that all future mine planning at Russell Vale would be based on non-caving bord and pillar mining methods. To reinforce this commitment, WCL is proposing to retrieve and sell the current longwall mining equipment, which would require the mining of a 25 m section of Longwall 6 (LW 6) to facilitate access and remove the equipment from the mine.

21. The proposed Revised UEP includes the construction of development mains into the Wonga Central Area, which was approved under the existing PWP consent, but not substantially developed before mining operations ceased in 2015.

22. The Revised UEP mine plan proposal is shown in **Figure 3**. The proposed 5 year mining schedule is shown in **Figure 4**. The 5 year schedule also includes the mining of the remainder of the approved Wonga Central Development Mains commencing 18 months into the mining schedule.

Bord and Pillar (First Workings) Vs Longwall Mining

23. A comparison of longwall mining method previously proposed as part of the Original and Preferred UEP applications with the bord and pillar mining method currently proposed as part of the Revised UEP is provided in **Table 3**. General subsidence behaviour associated with bord and pillar compared to longwall mining is illustrated in **Figure 5**.

24. Overall, subsidence levels associated with bord and pillar mining is expected to be very small and not perceptible at the surface. The levels of subsidence predicted are considered comparable to surface and ground variations that occur from natural and seasonal processes with the wetting and drying of soils.

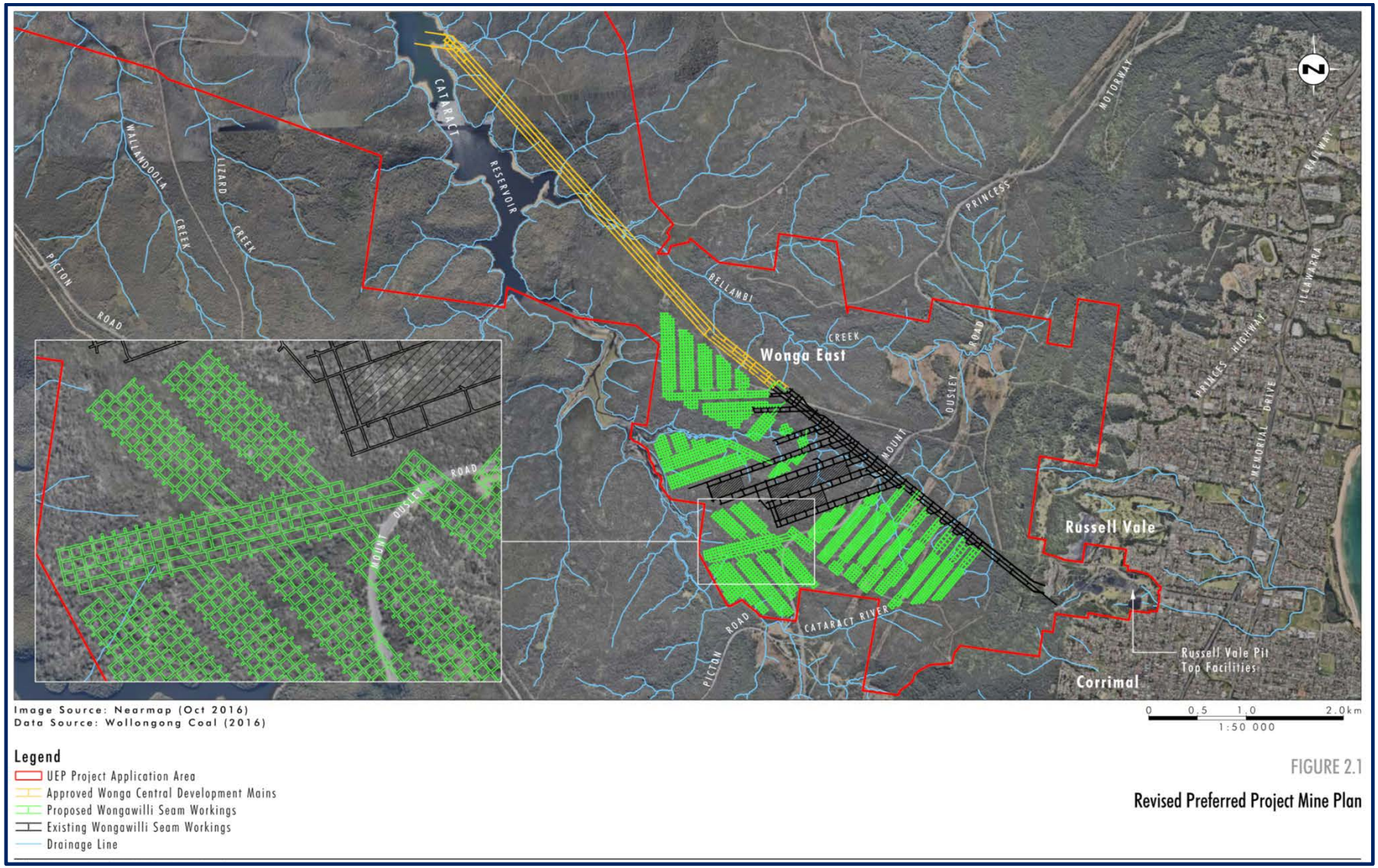

Figure 3 | Revised Preferred Project Mine Plan

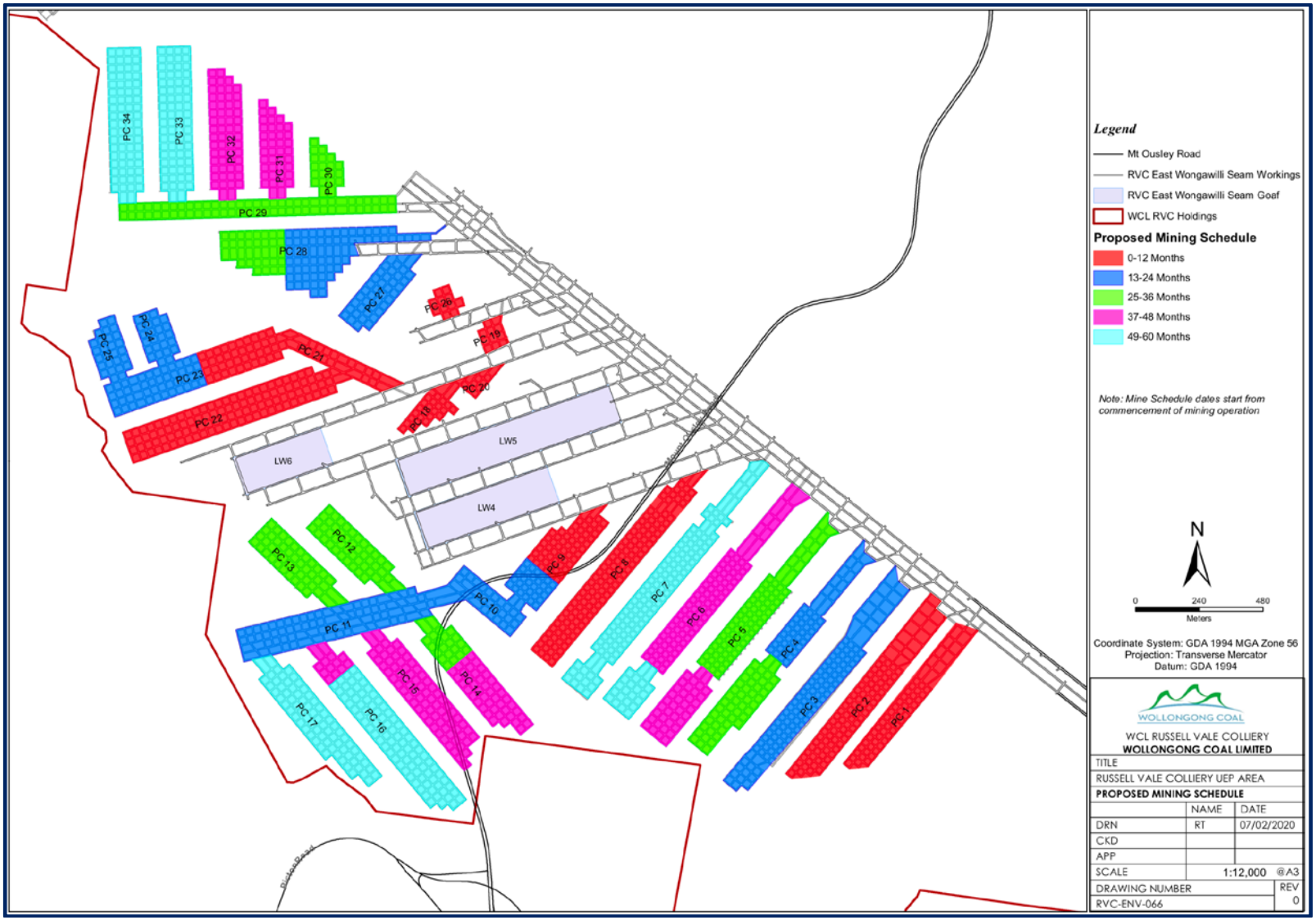

Figure 4 | Revised Mining Schedule

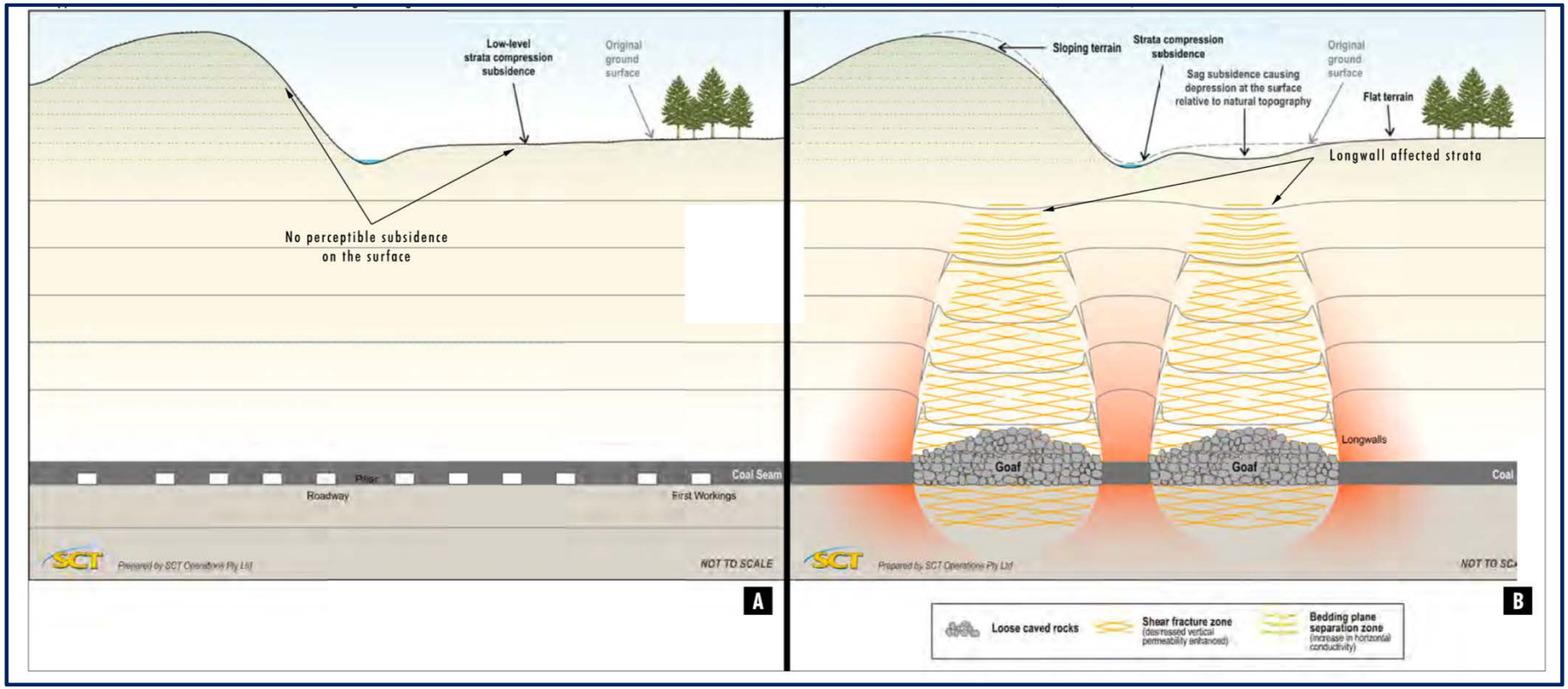

Figure 5 | General Subsidence Behaviour Associated with Bord and Pillar (A) Vs Longwall Mining (B)

Table 3 | Comparison of Bord and Pillar & Longwall Mining Methods

Aspect	Underground Mining Method	
	Bord and Pillar	**Longwall**
Design	Series of self-supporting roadways or 'tunnels' driven into the coal seam by a continuous miner, leaving behind a grid of pillars (blocks of coal) between the roadways that are designed to provide stability to the seam void in the long term and support the roof strata above the seam	Extraction of large panels of coal typically between 150 - 400 m wide and 1 - 4 km long. All coal within the panel is removed, creating a void into which the roof material and overlying rock collapses
Subsidence Levels	Pillars designed to be long term stable (low probability of pillar failure), so vertical subsidence would be very small (<100mm and generally <30mm), which is comparable to surface and ground variations that occur from natural and seasonal processes with the wetting and drying of soils	Vertical and horizontal subsidence movement at the land surface, which can extend beyond the edge of the longwall panel (typically 1 to 2 m for a deep longwall mine)
Relative Production Rates	Low	High

Source: Subsidence from Coal Mining Activities (IESC, June 2014)

25. WCL considers the bord and pillar mining method is the only feasible alternative to address the Commission's concerns associated with subsidence and groundwater impacts of the previously proposed longwall mining in the multi-seam mining environment present at Russell Vale, despite the lower production rates and resource recovery options that would result from using this method.

26. The Department notes that WCL's documentation in relation to the Revised UEP refers to a "first workings" mining method to describe the proposed bord and pillar mining technique. This terminology is applied because the bord and pillar technique is typically associated with the "first workings" phase of underground mining projects, and is often used to prepare the workings (development of main headings, cut throughs for mine access, etc) ahead of the extraction phase or "second workings".

27. However, for the Revised UEP, the bord and pillar method is also proposed to be used for coal extraction. To avoid confusion between "first and second workings" terminology, the Department has adopted the term "bord and pillar" mining technique throughout this FAR, instead of "first workings", to refer to the mining method proposed as part of the Revised UEP for coal extraction.

2.2 Changes to Surface Operations

28. In response to concerns raised by the Commission regarding amenity impacts associated with the Russell Vale surface facilities, WCL is proposing substantial design improvements and the adoption of a range of additional mitigation and management measures at the site to reduce impacts. Key elements proposed are illustrated on **Figure 6** and include:

- redesigned surface facilities to minimise amenity impacts on local community;
- construction and use of a new coal processing plant to improve the quality of product coal and to minimise impacts on the environment and local community;

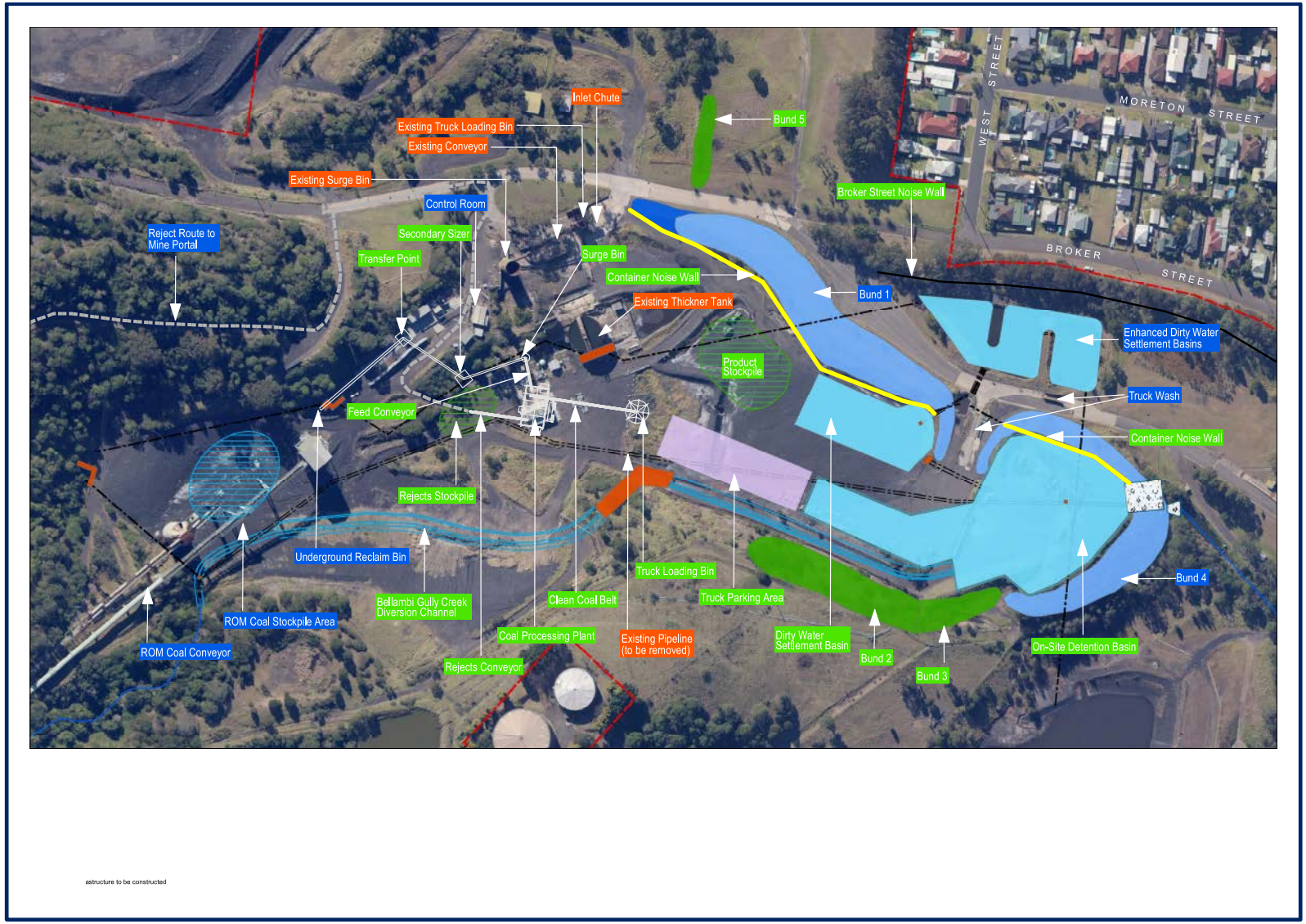

Figure 6 | Russell Vale Surface Site Facilities – Current and Proposed Plant and Infrastructure

- additional noise mitigation works surrounding the site, including a new 4 m high noise barrier, extension of the height of 5 existing bunds and acoustic treatment of the coal processing infrastructure;
- limited operation hours for surface facilities and product coal transport, typically to daytime hours only; and
- reduced trucking rates and establishment of a designated on-site truck parking area to avoid off-site parking.

29. As described in detail in Section 7.5 of this FAR, WCL is intending to construct stormwater management and flood mitigation works at the surface facilities site. These include clean water diversion drains upstream of the site; a new by-pass channel along the southern boundary of the site; reconfiguration and enlargement of the on-site detention basin and upgrade of the existing on-site dirty water capture and treatment system (see **Figure 6**).

30. These works are intended to be completed by WCL under the existing PWP consent and do not form part of the Revised UEP.

2.3 Comparison of Preferred and Revised UEP

31. **Table 4** below provides a summary of the key mine plan and operational revisions of the Preferred UEP against the Revised UEP.

Table 4 | Summary of Mine Plan and Operational Revisions

Aspect	Preferred UEP (2014)	Revised UEP (2019)
Project Life	5 years	No change
Mining Design and Method	Longwall mining (8 longwalls in 3 blocks) in the Wongawilli Seam across the Wonga East area	Non-caving bord and pillar mining technique in the Wongawilli Seam across the Wonga East area Longwall equipment to be recovered and sold
Mining Reserves	Approximately 4.7 Mtpa of ROM coal	Approximately 3.7 Mtpa of ROM coal
Extraction Rates	Up to 3 Mtpa of ROM coal	Up to 1.2 Mtpa of ROM coal
Production Rates	3 Mtpa of product coal	1 Mtpa of product coal
Hours of Operation	*Underground Operations:* • 24 hours, 7 days a week *Surface Facilities and Product Transport:* • 24 hours, 7 days a week. • 7.00am - 10.00pm, Mondays to Fridays • 8.00am - 6.00pm Saturdays, Sundays and Public Holidays	*Underground Operations:* • No change *Surface Facilities and Product Transport:* • 7.00am - 6.00pm, Mondays to Friday • 8.00am - 6.00pm Saturday. No Sundays or Public Holidays • Provision for restricted operation until 10.00pm Monday to Friday subject to the approval of the Secretary, to cater for unexpected Port closures or interruptions • Use of some surface facilities required to support underground operations (primary sizer building, decline conveyor and tripper system) 24 hours, 7 days a week

Aspect	Preferred UEP (2014)	Revised UEP (2019)
Surface Facilities Infrastructure	• Two new stockpiles of 140,000 t capacity each with associated reclaim facilities • New sizing plant • New truck loading facilities • Upgrade of existing surface conveyers	• One new product stockpile (approx. 14,000 t capacity) and one new rejects stockpile (approx. 1,500 t capacity) • New enclosed coal processing plant to improve coal quality • New secondary sizing plant • New surge bin in more shielded location • New enclosed conveyors for transfer of ROM coal to secondary sizer, processing plant and truck loading facility • New truck loading facility • Construction of noise barrier along access road and extension to height of existing bunds • Establishment of a designated truck parking area
Coal Transport	Transport by road to the PKCT for export	No change
Transport Rates and Hours	• An average of 17 coal truck loads per hour (maximum 22) between 7.00am - 10.00pm on Mondays to Fridays • An average rate of 19 coal truck loads per hour (maximum 26) between 8.00am and 6.00pm Saturdays • An average rate of 10.5 coal truck loads per hour (maximum 14) between 8.00 am and 6.00 pm Sundays and Public Holidays	• An average of 16 coal truck loads per hour between 7.00 am - 6.00 pm Monday to Friday and 8.00 am - 6.00 pm Saturday • No coal transport Sundays or Public Holidays • If coal transport is required during the evening to cater for unexpected port closures or interruptions, these movements would be limited to an average of 12 trucks per hour between 6.00 pm - 10.00 pm Mondays to Fridays only • Trucks arriving at the site between 6:00 am - 7.00 am Monday to Friday or between 7.00 am - 8.00 am Saturday would be required to proceed to the truck parking area on site and turn off engine until loading commences at 7.00 am Monday to Friday or 8.00 am Saturday
Mine Waste Management	Waste rock used onsite or disposed of at an appropriately licensed facility	Coarse rejects from the processing plant to be trucked off site as fill if it meets requirements for virgin excavated natural material (VENM), stockpiled for emplacement underground or used in the rehabilitation of the site
Employment	Operational workforce of 300 employees and contractors Short-term construction workforce of up to 100 employees	Operational workforce of 205 employees and contractors Short-term construction workforce of 22 employees
Rehabilitation	Progressive rehabilitation over project life, with rehabilitation of all surface facilities following the completion of mining	No change
Capital Investment Value	$85 million	$35.3 million

3 Strategic Context

3.1 Southern Coalfield

32. The Revised UEP is located in the Southern Coalfields of NSW. The Southern Coalfield is one of the five major coalfields located within the within the Sydney-Gunnedah Basin. It is located south of Sydney and to the west of Wollongong with topography that is defined by the Illawarra and Woronora Plateau.

33. The Southern Coalfield has a long history of coal exploration and mining, with underground mining being undertaken in the area for over 200 years. In addition to Russell Vale, there are nine nearby mining operations which are in various phases of operation, care and maintenance, or are being proposed, including:

- Appin and Appin West Colliery (Illawarra Coal Holdings Pty Ltd) – operating;
- West Cliff Colliery (Illawarra Coal Holdings Pty Ltd) – operating;
- Dendrobium Colliery ((Illawarra Coal Holdings Pty Ltd) – operating;
- North Cliff Colliery (Illawarra Coal Holdings Pty Ltd) – not operating;
- Metropolitan Colliery (Helensburgh Coal Pty Ltd) – operating;
- Wongawilli Colliery (Wollongong Coal Ltd) – under care and maintenance;
- Tahmoor Mine (Tahmoor Coal Pty Ltd) – operating;
- Berrima (Medway) Colliery (Boral Cement Pty Ltd) – under care and maintenance and closure; and
- Hume Coal Project (POSCO - Pohang Iron and Steel company) – proposed.

34. The Southern Coalfield has historically been a major source of high-quality hard coking coal used for steel making, both in Australia and internationally. The unique nature of this hard coking coal resource within NSW makes it a very important contributor to the local, regional and State economies. The proximity of the Southern Coalfield to the coast and the PKCT is a major factor supporting export of coal from the region. Coal from the Southern Coalfields also supports local industry, such as BlueScope Steelworks at Port Kembla which employs around 3,000 people.

35. Jindal Steel & Power Limited (Jindal), which is part of the largest steel group in India, holds a controlling interest in WCL. Jindal's investment in WCL is based upon its strategic need to secure high-quality metallurgical coking coal supply to service its steel making operations in India. Approximately 76% of its metallurgical coking coal requirements are currently being sourced from Australia, primarily from mines in Queensland (including the Moranbah, Goonyella Riverside, Kestrel, Sonoma and Lake Vermont Coal Mines). This represents significant export earnings for Australia.

36. The proposed Revised UEP would contribute to Jindal's objectives for a secure and stable supply of coking coal, as well as towards Australian export earnings in the short term. WCL is continuing to undertake exploration activities and studies in the Russell Vale central and western domains to secure a long term coal supply. However, WCL has committed that any future mining in these areas would be based on non-caving bord and pillar methods. The Department notes that any future mining in these areas would be subject to separate development applications.

37. The Revised UEP would also result in new direct employment of approximately 205 persons during operation and 22 during construction, and indirect employment of up to an additional 800 people. The majority of WCL's employees would reside within the Illawarra Region, with subsequent benefits for the regional economy. The development is estimated to result in a net economic benefit of $174 million (net present value) for NSW as a whole and $17 million to the Illawarra region through employment and expenditure, as well as royalty revenue to the State.

38. The Department therefore considers the Revised UEP both economically and socially important for the State and the Illawarra region in the short term, with potential long term benefits from future mining in other domains, subject to future applications.

3.2 Special Areas

39. The Southern Coalfield is unique in NSW, in that much of it is located beneath high-value native vegetation and streams set aside for Sydney's drinking water supply. This water catchment is divided between the Special Areas (Warragamba, Metropolitan and Woronora) and the outer broader catchment.

40. The Special Areas comprise the catchments of the Avon, Cordeaux, Cataract, and Nepean Dams (within the Metropolitan Special Area), which all supply water to the Macarthur and Illawarra regions, the Wollondilly Shire and metropolitan Sydney; and Woronora Dam (within the Woronora Special Area) which supplies water to Sydney's south, and to the northern suburbs of Wollongong. Russell Vale is located within the Metropolitan Special Area within the Cataract River catchment.

41. The Special Areas are managed by WaterNSW, which has a legislative function to protect and enhance the quality and quantity of water in Special Areas.

42. WaterNSW has adopted a set of principles that establish the outcomes it considers essential to protect the drinking water supplies of the Greater Sydney region from mining impacts. WaterNSW has confirmed that the mining principles relevant to the Russell Vale Revised UEP include the protection of water quantity, water quality, human health, water supply infrastructure, ecological integrity; and sound and robust evidence regarding environmental impacts.

43. WaterNSW has confirmed that the Revised UEP adequately address its mining principles, as well as the Independent Expert Panel for Mining in the Catchment reports (see Section 3.3 below). WaterNSW considers that:

- the bord and pillar mining method is much safer than longwall mining and is unlikely to cause significant surface subsidence or significant interaction with the overlying coal seams;
- the mining method is likely to minimise the potential groundwater impacts by limiting depressurisation within and immediately above the mined coal seam; and
- the proposed workings are likely to have negligible impacts on natural surface features including upland swamps, cliffs, steep slopes, drainage lines, creeks, Cataract Creek, Cataract River, and Cataract Reservoir.

44. Residual issues raised by WaterNSW in relation to the Revised UEP are described in Section 5.3 and considered by the Department in Section 7 of this FAR.

3.3 Independent Expert Panel for Mining in the Catchment

45. The Independent Expert Panel for Mining in the Catchment (IEPMC) was established in February 2018 to provide informed expert advice to the Department on the impact of mining activities in the Greater Sydney Water Catchment Special Areas, with a focus on risks to water quantity.

46. In November 2018, the IEPMC released its *Initial Report (Part 1)* in response to Terms of Reference 1. The *Initial Report* focused on the two active mines in the Special Areas, Dendrobium and Metropolitan.

47. In October 2018, the IEPMC released a *Final Report (Part 2)*. The *Final Report* includes a review of current coal mining in the Greater Sydney Water Catchment Special Areas with a focus on risks to the quantity of water available, the environmental consequences for swamps and cumulative impacts. The *Final Report* also provides a review and update of the findings of the *2008 Southern Coalfield Inquiry (Impacts of Underground Coal Mining on Natural Features in the Southern Coalfield – Strategic Review)* for mining operations, including Russell Vale.

48. The IEPMC made 27 recommendations in the *Final Report* to inform mine design and approvals, monitoring and performance. A list of these recommendations and how they have been considered for the Revised UEP is included in **Appendix C**.

49. The Revised UEP mine plan using bord and pillar mining has largely addressed key issues raised by the IEPMC, particularly in relation to the impact of mining in Special Areas on water quantity and swamps, including cumulative impacts. The Department considers that additional actions and commitments made by WCL align with recommendations made by the IEPMC, specifically in relation to:

- the assessment of regional groundwater impacts and consequences;
- the completion of an uncertainty analysis for groundwater predictions; and
- peer reviews of the Subsidence Impact Assessment and Groundwater Assessment.

50. In addition, the Department has recommended conditions to further address specific recommendations made by the IEPMC, including:

- Extraction Plan monitoring requiring early detection and control of any elevated risks of variance between predicted and measured subsidence effects;
- stream and riparian vegetation health and channel stability (geomorphology) monitored required along the full length of watercourses;
- suite of performance measures requiring negligible subsidence impact and environmental consequences for all watercourses, water supply (Cataract Reservoir) and swamps;
- comprehensive Upland Swamp Monitoring Program (USMP) and requirements for swamp offsets where swamp monitoring demonstrates that the actual impact is greater than predicted;
- inclusion of trigger-action-response plans (TARPs) in management plans to provide a clear basis to decide whether or not the performance measures are being met and certainty in determining the appropriate management response to exceedances and breaches; and
- long-term future water outflows from mine adit(s) required to be mitigated, managed and funded via implementation of an Adit Water Discharge Management Plan.

4 Statutory Context

4.1 State Significant Development

51. The original UEP application submitted in August 2009 was lodged as a Part 3A project under the EP&A Act. Following the repeal of Part 3A of the EP&A Act in October 2011, the UEP became a 'transitional Part 3A project' under savings and transitional provisions within Schedule 6A of the Act. On 26 June 2020, the UEP project application (MP10_0046) was transitioned to a Part 4 State Significant Development under Division 4.7 of the EP&A Act. Assessment of the merits of the application must therefore now be completed under Part 4 of the EP&A Act.

4.2 Surrender of Development Consent

52. Section 4.63 of the EP&A Act (voluntary surrender of development consent) provides that if a development consent is surrendered as a condition of a new development consent and the new consent includes continuation of development that was authorised, then the consent authority:

- is not required to re-assess the likely impact of the continued development to the extent that it could have been carried out but for the surrender of the consent;
- is not required to re-determine whether to authorise that continued development under the new development consent (or the manner in which it is to be carried out); and
- may modify the manner in which that continued development is to be carried out for the purpose of the consolidation of the development consents applying to the land concerned.

53. If the Revised UEP is approved, WCL would surrender the Russell Vale Preliminary Works Project development consent and all mining operations on the site would be regulated under a single consolidated contemporary development consent. While the consent authority is not required to re-assess the impacts of the approved project, both the RPPR and the Department's assessment have considered worst-case cumulative impact scenarios to ensure the full range of impacts are considered, including in regard to:

- Water resources – the assessment incorporates the potential impacts pf the Revised UEP mining operations, previous mining at Russell Vale and other mining operations in the region;
- Amenity – noise and air assessment are based on maximum production rates and the visual assessment considered existing and proposed infrastructure at the surface facilities site; and
- Other matters – traffic, social, economic and land use impacts.

54. This approach has been reflected in the recommended conditions of consent which incorporate the relevant requirements of the Approved Project, including existing obligations to implement stormwater and flood mitigation works at the surface facilities site.

4.3 Consent Authority

55. In accordance with Section 4.5(a) of the EP&A Act and clause 8A of the *State Environmental Planning Policy (State and Regional Development) 2011* (the SRD SEPP), the Commission is the consent authority for the SSD application as more than 50 public submissions were duly made objecting to the project.

4.4 Integrated and Other NSW Approvals

56. Under Section 4.41 of the EP&A Act, several approvals are integrated into the SSD approval process and consequently are not required to be separately obtained for the proposal. These include:

- approvals relating to heritage required under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*; and
- certain water approvals under the *Water Management Act 2000* (WM Act).

57. Under Section 4.42 of the EP&A Act, a number of other approvals are required, but must be substantially consistent with any consent granted for the project. These include:

- a mining lease under the *Mining Act 1992;*
- approval under the *Coal Mine Subsidence Compensation Act 2017*;
- consents under the *Roads Act 1993;*
- an Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997*;
- notification under the *Work Health and Safety (Mines) Act 2013* for high risk activities, including emplacement of reject materials; and
- water access licences under the *Water Act 1912* and/or the WM Act.

58. WCL currently holds most relevant leases and licences under these Acts and is able to obtain any other licences required for the project where required. The Department has consulted with the relevant government authorities responsible for these other approvals (see Section 5), and considered the relevant issues relating to these approvals in its assessment of the development (see Section 7). None of the relevant authority's object to the development on grounds that relate to these other approvals.

4.5 Environmental Planning Instruments

59. Under Section 4.15 of the EP&A Act, the consent authority, when determining a development application, must take into consideration the provisions of any Environmental Planning Instrument (EPI) and draft EPI (that has been subject to public consultation and notified under the EP&A Act) that apply to the project. The Department has re-considered the Revised UEP against the relevant provisions of several key EPIs including:

- *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* (SEPP Sydney Drinking Water Catchment);
- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP);
- *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP);
- *State Environmental Planning Policy No 33 – Hazardous and Offensive Development*;
- *State Environmental Planning Policy No 44 (Koala Habitat Protection)*; and
- *State Environmental Planning Policy No 55 – Remediation of Land*.

60. The Department notes that on 1 March 2020, SEPP 44 was replaced by the *SEPP (Koala Habitat Protection) 2019*. Under savings and transitional provisions, a development application made, but

not finally determined, before the commencement of this Policy must be determined as if this Policy had not commenced

61. A large part of the proposed Revised UEP area is located within the boundary of the Sydney Drinking Water Catchment managed by WaterNSW. The SEPP Sydney Drinking Water Catchment requires that a consent authority must not grant consent to a proposed development unless it is satisfied that the proposed development would have a neutral or beneficial effect (NorBE) on water quality. As discussed in Section 7.3 below, the Department and WaterNSW are satisfied that the development would have a neutral impact on water quality within the catchment and that the development would not contravene the aims of this SEPP.

62. The Mining SEPP requires consent authorities to consider the significance of the resource when considering the merits any mining proposal, as well as the economic benefits to the State and region of any such proposal. The Department has considered these matters in its assessment of the merits of the Revised UEP and considers that, despite the lower production rates and resource recovery from the proposed bord and pillar mining method, the Revised UEP coal resource remains significant based on:

- its high-quality hard coking coal used for the production of steel;
- its strategic location in the Southern Coalfields and its close proximity to key regional infrastructure, in particular PKCT;
- the relationship of the resource to the existing PWP, and the synergies this presents for utilising existing infrastructure and reducing the capital costs;
- the socio-economic benefits of the development including:
  - employment of 205 people during operation and 22 during construction;
  - $35.3 million in capital investment;
  - a net economic benefit of $174 million (net present value) for the NSW community and $17 million to the Wollongong local area through employment and expenditure; and
  - royalty revenue to the State.

63. Detailed consideration of the provisions of all other EPIs that apply to the project is provided in **Appendix D**. The Department considers that the development generally complies with the relevant provisions of these EPIs.

4.6 Objects of the Act

64. The consent authority must consider the objects of the EP&A Act when making decisions under the Act. The Department has updated its consideration of the relevant provision of the objects of the EP&A Act (see section 1.3 of the Act). **Appendix D – Table D1** summarises how the Department considers that the project can be undertaken in a manner that is consistent with these objectives, including Ecologically Sustainable Development (ESD).

4.7 Commonwealth matters

65. The original referral (EPBC Ref: 2014/7268) to the Commonwealth Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Russell Vale UEP was formally withdrawn by WCL on 19 June 2020.

66. On 5 August 2020, WCL referred the Revised UEP to the Commonwealth Minister for the Environment under the EPBC Act (EPBC Ref: 2020/8702). On 2 September 2020, the Commonwealth declared the Revised UEP a 'controlled action' due to its potential impacts on Matters of National Significance (MNES), specifically listed threatened species and communities (sections 18 & 18A of the EPBC Act) and a water resource (section 24D & 24E of the EPBC Act).

67. Given the late stage in the NSW assessment process that the Revised UEP was referred to the Commonwealth and deemed a 'controlled action', the project cannot be assessed under the *Bilateral Agreement* under section 45 of the EPBC Act between the Commonwealth and State (NSW). The Revised UEP will be assessed and determined separately by the Department of Agriculture, Water and the Environment (DAWE) and the Commonwealth Minister for the Environment using a "Public Environment Report" assessment approach.

5 Engagement

5.1 Department's Engagement

68. After receiving the RPPR, the Department advertised the public exhibition of the RPPR for the proposal in the Illawarra Mercury and Sydney Morning Herald, publicly exhibited the RPPR from 1 August 2019 until 29 August 2019 and notified relevant State government authorities.

5.2 Summary of Submissions

69. Details of the submissions received during the exhibition of previous UEP assessments are provided in **Appendix A**. During the exhibition period for the Revised UEP, the Department received an additional 202 public submissions and additional advice from 11 government authorities (see **Table 5** and **Appendix E**).

Table 5 | Summary of Submissions/ Public Authority advice

Area	Submissions	Support	Object	Comment
Public authority	**11**			11
Special Interest Groups	**15**	8	7	
General Public	**187**	70	117	
< 8 km	**78**	18	40	
50-100 km	**108**	44	70	
>100 km	**16**	8	7	
Total	**213**	**78**	**124**	**11**

5.3 Agency Advice

70. While none of the agencies objected to the Revised UEP, several commented on particular aspects and proposed recommended conditions. These comments and recommendations are summarised in **Table 6** below and considered in more detail in Section 7 of the report.

Table 6 | Agency Advice

Agency	Advice	Consideration and Conditions
Department of Planning, Industry and Environment		
Water Group	• Requested further refinement of the groundwater model including calibration, sensitivity/uncertainty analysis and consideration of historic mining influences, information on water licensing, and proposed groundwater monitoring program. • The groundwater assessment was revised and independently peer reviewed by Dr Noel Merrick, a highly experienced hydrogeologist and groundwater modeller. • WCL also commissioned HydroAlgorithmics Pty Ltd to prepare an uncertainty analysis for the revised Groundwater Assessment report, which was also independently peer reviewed. • DPIE-Water provided no further comment on the groundwater assessment, however reiterated that WCL must obtain surface Water Access Licences (WALs) through trade or controlled allocation. • Surface water licencing arrangements are discussed in detail in Section 7.3. • Recommended that the proponent should monitor perched swamp features prior to mining to enable the development of trigger action response criteria for these swamps and provide an updated Water Management Plan for review prior to commencement of activities.	• The Department has recommended that WCL prepare a Water Management Plan incorporating a comprehensive Upland Swamp Monitoring Plan, in consultation with BCD, WaterNSW and DPIE-Water. • The Department has recommended a condition requiring WCL to obtain all necessary water licences for the project under the Water Act 1912 and/or the WM Act, or an alternative mechanism agreed by the Planning Secretary and DPIE Water. • DPIE Water supports the recommended conditions.
Biodiversity Conservation Division	• The proposed bord and pillar mining method addresses concerns about subsidence impacts on the Coastal Upland Swamp threatened endangered ecological community (EEC) and significant streams. • Supports the subsidence monitoring program proposed in the RPPR. • In relation to Aboriginal heritage, advised that baseline archaeological recording should occur for rock art, rock shelter and grinding groove sites in consultation with the Aboriginal community. • Recommended conditions that no harm to Aboriginal objects should be permitted; and an Aboriginal Heritage Management Plan (AHMP) be prepared in consultation with the Aboriginal community. • WCL has committed to undertaking baseline archaeological recording and updated Aboriginal community consultation during the preparation of the AHMP • Concerns about downstream flooding in Bellambi Creek associated with the surface infrastructure area.	• The Department has recommended subsidence impact performance measures requiring negligible subsidence impacts and environmental consequences to watercourses, swamps and Aboriginal heritage sites. • The Department has recommended a condition requiring an AHMP be prepared in consultation with the Aboriginal community, and include updated baseline recording of Aboriginal heritage sites. • As discussed in detail in Section 7.5, WCL is required to complete a range of works to address flooding in Bellambi Creek under its existing PWP consent and an Order issued by the Department's compliance unit, and these works do not form part of the Revised UEP. • BCD supports the recommended conditions.

Agency	Advice	Consideration and Conditions
Environment Protection Authority	• The EPA requested additional information, clarification and justification on a range of noise and air quality assessment issues associated with the project. • Revised air and noise assessments were provided in the Response to Submissions on the Revised UEP • The EPA confirmed that it is satisfied with the revised noise and air impact assessments. • The EPA raised concerns regarding the underground emplacement and beneficial re-use of reject material. Additional testing and assessment were subsequently provided by WCL (refer to **Appendix G**) confirming that stockpiling and/or underground emplacement of reject material would have negligible impact on surface or groundwater quality and would meet the requirements for a NorBE on water quality. • The characteristics of the reject material is also considered to meet the EPA's requirements for beneficial use.	• The Department has recommended conditions requiring compliance with strict noise and air criteria. • The Department has recommended a condition requiring further testing and assessment of the reject material once the mine moves into production mode, and again every 6 months, to re-confirm its suitability for underground emplacement and beneficial use. • The EPA supports the recommended conditions.
Department of Regional NSW		
Mining, Exploration & Geoscience	• Considers that the proposed project satisfies section 3A objects of the *Mining Act 1992* and the requirements of clause 15 of the Mining SEPP. • Further, MEG considered that the project represents an efficient development and utilisation of coal resources which would foster significant social and economic benefits, including an estimated 800 additional indirect jobs in both mine and non-mine related services. • MEG requested that WCL consider potential resource sterilisation should any future biodiversity offsets areas be required.	• MEG supports the recommended conditions.
Resources Regulator	• Requested clarification about rehabilitation commitments for the Revised UEP. WCL provided additional information on the proposed rehabilitation strategy (see **Appendix G**). • Confirmed that it is now satisfied with the rehabilitation and mine closure strategy proposed by WCL. • Noted WCL's estimated rehabilitation liabilities and business closure costs in respect of Russell Vale of $215 million. Based on this estimate, the RR determined a Security Deposit Requirement of $12.3 million. WCL has subsequently confirmed that the company has provided this increased rehabilitation liability security deposit to MEG.	• The Department has recommended that the existing rehabilitation objectives and requirements, including the preparation and implementation of a Rehabilitation Management Plan, be conditioned for the Revised UEP approval. • The Resources Regulator supports the recommended conditions.
Water NSW	• Considered that the proposed bord and pillar mining method is safer than previous longwall proposals and is unlikely to cause significant subsidence or interaction with	• The Department agrees that the Extraction Plan process is vital to monitor and manage the potential subsidence effects, subsidence

Agency	Advice	Consideration and Conditions
	the overlying seams, minimise groundwater impacts and have negligible impacts on surface features. • Considered that the RPPR addressed issues raised in the Commission's Second Review Report, WaterNSW's Mining Principles and the recommendations of the IEPMC's Initial Report (Part 1). • Recommended that the subsidence assessment report be independently peer reviewed by a multi-seam expert. • WCL engaged Mr Bruce Hebblewhite, who is considered an expert in the field of geotechnical engineering, to undertake the peer review. Following a peer review process Mr Hebblewhite accepted the key outcomes and predictions of the updated subsidence assessment report. • WaterNSW also recommended that an Extraction Plan process be conditioned to allow expert stakeholders to provide ongoing advice on the mining development. • Further, WaterNSW requested additional information about the nature of reject materials proposed to be emplaced underground and the potential associated impacts on groundwater water quality. • This information was included as part of the additional information submitted by WCL (see Appendix G). As noted above and described in detail in Section 7.8 of this report, geochemical testing confirmed that underground emplacement of reject material would have negligible impact on groundwater quality and would meet the requirements for a NorBE on water quality. • Overall, WaterNSW considered that the development would not have any significant impacts on water quantity and has potential to achieve a NorBE on water quality, subject to the imposition of a range of performance measures for water, land and biodiversity and associated monitoring and management plans.	impacts and environmental consequences of the proposed mining, and has recommended a condition accordingly. • The recommended Extraction Plan requirements include the imposition of performance measures and a range of monitoring and management plans for subsidence, surface water, groundwater and upland swamps. • WaterNSW supports the recommended conditions.
Transport for NSW	• RMS (now Transport for NSW) did not object to the proposed development subject to a condition requiring WCL to review, update and implementation of the subsidence management plan/extraction plan to ensure mine subsidence does not compromise any RMS infrastructure.	• Incorporated in the recommended conditions.
NSW Rural Fire Service	• Noted that the proposed project has the potential to increase the level of bushfire risk within the landscape and that the project may be impacted during a bush fire event. As such, the NSW Rural Fire Service indicated that a Fire Management Plan should be prepared.	• Incorporated in the recommended conditions.
Heritage NSW	• Requested clarification on potential impacts of the proposed mining on Cataract Reservoir, which is listed on the State Heritage Register, and indicated that no extraction should occur beneath or within 1 km of the reservoir curtilage.	• The Department has recommended a condition requiring an extensive subsidence monitoring program, including monitoring of built features such as the Cataract Reservoir, be undertaken

Agency	Advice	Consideration and Conditions
	• Recommended that the reservoir should be monitored during mining operations to ensure it is not impacted. • In its response, WCL confirmed that no mining is proposed beneath the fully supply level of the reservoir, except the Wonga Mains development which are already approved under the PWP consent. • WCL noted the conclusions of the subsidence assessment and associated peer review, which indicate that the proposed first workings would not have any perceptible impact on Cataract Reservoir. • As discussed in Section 7.2, the Department accepts these conclusions and does not believe any further limitations on the extent of mining are warranted. • Heritage Council also requested clarification of potential impacts on the surface facilities, which is currently listed on the *Wollongong Local Environmental Plan 2009*. • WCL confirmed that the existing Conservation Management Plan prepared in 2013 for the colliery would be updated if the project is approved.	as part of the Extraction Plan process, and that the existing Conservation Management Plan be updated. • Incorporated in the recommended conditions.
Dam Safety NSW	• The proposed Revised UEP would involve mining inside the Dam Safety NSW (DS NSW) Notification Area for the Cataract Reservoir. Therefore, in accordance with Part 8 Section 48(4) of the *Dam Safety Act 2015*, the Department referred the Revised UEP application to DS NSW for consideration. • DS NSW confirmed that it has no concerns with the development of bord and pillar workings within the Notification Area for Cataract Reservoir.	
Council		
Wollongong City Council (WCC)	• WCC requested that the Revised UEP be considered by the IEPMC as a precautionary peer review measure. • The Department notes that this request was made prior to the release of IEPMC's Final Report (Part 2) in October 2018. As discussed in Section 3.3, IEPMC's Final Report (Part 2) includes a review of current coal mining in the Special Areas, including Russell Vale Colliery, and makes recommendations which are directed at informing mine design and approvals, monitoring and performance. These recommendations have been considered by WCL in its RTS – Part A report (refer to Section 5.3 and Appendix F) and are addressed by the Department throughout this FAR. A list of IEPMC's recommendations and a summary of how they have been considered by the Department is included at Appendix C. • Council also requested several conditions of approval, including conditions: o prohibiting the deposition of coal reject material on the former emplacement area;	• The Department accepts that coal transport along Bellambi Road during the evening should be limited to emergency situations and only be conducted following written approval from the Department. The Department has recommended a condition to this effect. The Department has also recommended a condition requiring WCL to pay road maintenance contributions to WCC for pavement upgrade and maintenance of Bellambi Road resulting from transport of product associated with the project. The payments are in-line with cost estimates provided by WCC.

Agency	Advice	Consideration and Conditions
	o requiring WCL to obtain one-off written clearances from the Department to undertake any coal transport between the hours of 6-8pm from Monday to Friday; and o requiring WCL to reach agreement within 12 months of the development consent for a road maintenance contribution for Bellambi Lane. • In its response, WCL committed to not depositing coal reject material on the emplacement area. The Department notes that the area is already being rehabilitated, so is confident that it would not be used for coal reject emplacement.	
WollondillyShire Council (WSC)	• WSC acknowledged that the proposed bord and pillar mining approach responds, at least in part, to its concerns and resolutions in relation to mining in the Drinking Water Catchment. However, WSC requested further expert consideration of the proposal by IESC and the Commission, as well as comment on the relevance and implications of the Hume Coal Project to the Revised UEP.	• The Department confirms that the IESC has provided independent, expert, scientific advice on the Revised UEP (see Section 5.5) and that the proposal would be determined by the Commission. • The Department notes that the Hume Coal Project is a substantially different underground mining proposal to that proposed as part of the Revised UEP, is located outside the Special Areas of the catchment near Berrima and there are no predicted cumulative water resource impacts associated with the two mines.

5.4 Key Issues – Special Interest Groups and Community

71. The key issues raised in public submissions objecting to the project are summarised in **Figure 7** below. The primary concerns related to:

- whether WCL is a fit and proper operator, including the history of non-compliances and concerns about the financial status of the company;
- mining in a water catchment area and impacts to water resources; and
- climate change and greenhouse gases.

72. The key issues raised in public submissions that supported to the Revised UEP are summarised in **Figure 8** below. The grounds for supporting the project were related to:

- continued employment and the generation of additional jobs;
- economic and social benefits; and
- reduced community impacts.

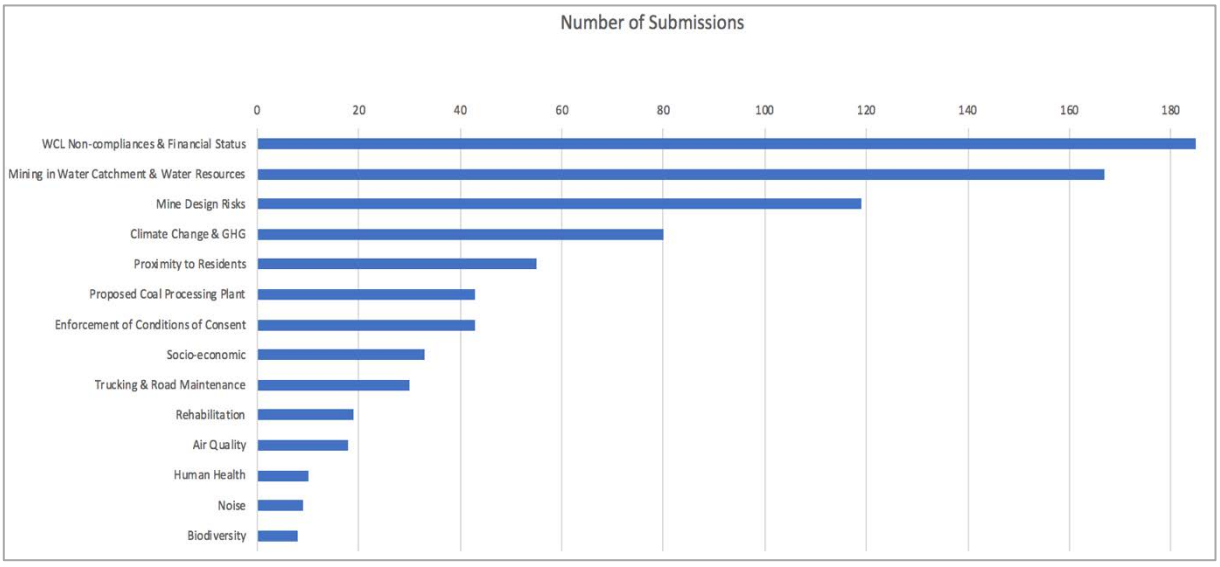

Figure 7 | Issues raised in community and special interest group submissions objecting to the project

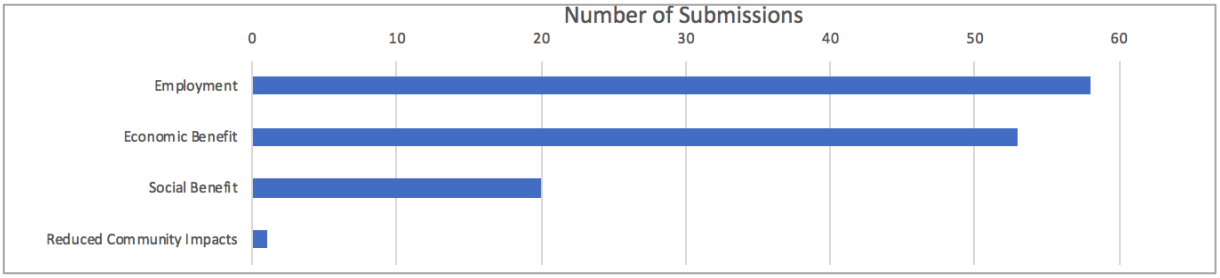

Figure 8 | Issues raised in community and special interest group submissions supporting to the project

5.5 IESC Advice

73. The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) previously provided advice on the UEP, including on:

- 11 September 2014 – in response to a joint request from the NSW Department and the (then) Commonwealth Department of the Environment and Energy; and
- 11 March 2015 – in response to a request from the Commission.

74. On 26 September 2019, the Department requested that the IESC provide advice on the Revised UEP, specifically in relation to:

- confidence in cumulative water loss predictions from current and proposed mining at Russell Vale;
- adequacy of predicted impacts of the Revised UEP on upland swamps;
- any significant impacts or risks to water resources which have not been identified or assessed; and
- additional monitoring or management measures to address residual impacts on water resources.

75. The IESC advice was received on 19 November 2019 (see **Appendix G**). The key advice was in relation to residual risks of pillar failure associated with the bord and pillar mining method and that a quantitative assessment be undertaken which considers both "negligible" and "worst case" risks to quantify the potential magnitude and extent of impacts to swamps and water resources. Other residual issues raised by IESC are summarised in **Table 7**, along with the relevant sections of this report.

76. WCL provided a detailed quantitative assessment of risk of pillar failure prepared by SCT Operations Pty Ltd (SCT) (see **Appendix H**).

77. On 28 January 2020, the Department requested that the IESC further consider and provide advice on WCLs additional quantitative assessment. The IESC provided updated advice on 5 March 2020. As summarised in **Table 7**, IESC's key recommendation was that the pillar failure risk assessment be peer reviewed by an expert in multi-seam geo-mechanical stability. As discussed in detail in Section 7.2 of this report, WCL subsequently engaged Dr Bruce Hebblewhite to undertake this review.

78. A summary of the advice received from the IESC and the sections of this report where the relevant issues are considered is provided in **Table 7** below.

Table 7 | Summary of IESC Advice

IESC Advice	Where Considered
Initial Advice dated 19 November 2019:	
Under a "negligible risk" scenario:	
An independent peer review be completed to ensure that pillar designs are conservative according to leading practices of mine design and that the implications for surface and hydrological systems are adequately considered.	Section 7.2 and Appendix G
Analysis of the uncertainty of the influence of the adits on long term groundwater levels, flow and quality.	Section 7.2
Updated ecological surveys of swamps (including appropriate unimpacted reference swamps) to understand their current biodiversity and condition.	Section 7.2
Water level and quality monitoring at groundwater and surface water sites during and after mining for comparison with pre-project conditions to determine whether additional impacts have occurred.	Section 7.3

IESC Advice	Where Considered
Under a "worst case" scenario, in addition to above:	
An ecohydrological conceptual model of the swamps which has been verified through field investigations and monitoring data.	Section 7.2
Quantification of the potential changes to groundwater and surface water resources, and groundwater-dependent ecosystems (GDEs) under this scenario. Feasible mitigation and management measures should be proposed to remediate the impacts of these changes.	Section 7.3
Final Advice dated 5 March 2020:	
The quantitative assessment of the risk of pillar failure presented by the proponent must be independently peer-reviewed by a recognised expert in multi-seam geomechanical stability.	Section 7.2 and Appendix G
Groundwater and surface water monitoring focusing on the multi-seam extraction areas should consider the drawdown response over the duration of mining and for a long enough period after mining ceases to confirm that no delayed significant impacts are occurring, or, if they do, until recovery is complete.	Section 7.3
Further monitoring of the adit water quality to address the potential risks associated with the discharge of either untreated or treated water entering Bellambi Gully Creek.	Section 7.3
A quantitative site-specific water balance is needed for Bellambi Gully Creek that accounts for the various sources of uncertainty.	Sections 7.3 and 7.8

5.6 Response to Submissions

79. On 29 November 2019, WCL provided a *Response to Submissions Report - Part A* (RTS – Part A) responding to the issues raised in all submissions, excluding the submission received from DPIE Water (see **Appendix H**). The RTS – Part A also includes a description of the actions undertaken by WCL following the exhibition, based on the submissions received. These include:

- refinements to noise mitigation measures to further reduce the duration of noise impact of construction operations, including replacing two proposed noise bunds with container noise walls and relocating and extending the access road noise barrier (refer to Section 7.4);
- re-assessment of the noise and visual impacts associated with the proposed revised noise mitigation measures;
- assessment of the air quality impact of a maximum daily production scenario;
- reject material characterisation to assess potential impacts on groundwater quality associated with the emplacement of waste rock underground;
- peer reviews of the subsidence and groundwater assessments; and
- consideration of IEPMC's *Final Report (Part 2)* (refer to Section 3.3 and **Appendix C**).

80. On 5 February 2020, WCL provided a *Response to Submissions Report - Part B* specifically responding to the issues raised by DPIE Water (see **Appendix H**). The RTS – Part B includes:

- a Revised Groundwater Assessment providing clarity around model set-up and additional context regarding the history of mining at Russell Vale and the various studies undertaken as part of the UEP;
- an independent expert peer review of the groundwater assessment undertaken by Dr Noel Merrick;
- an uncertainty analysis in relation to groundwater modelling predictions, including a peer review of the analysis undertaken by Dr Frans Kalf; and
- a detailed response to issues raised in by DPIE-Water.

81. The responses were forwarded to agencies that made submissions on the RPPR. Further agency responses are attached at **Appendix F**.

82. The Department has considered these responses in its assessment of the merits of the proposal.

5.7 Additional Information Requests

83. During the assessment process, the Department requested that WCL provide additional clarification and information, specifically in relation to:

- mine scheduling over the proposed 5-year mine life;
- rehabilitation and mine closure commitments, as requested by the RR;
- further geotechnical testing of reject material and assessment of its suitability for underground emplacement and/or beneficial reuse, as requested by the EPA and WaterNSW;
- swamp and groundwater monitoring programs;
- outcome of negotiations with WCC in relation to road maintenance contributions for pavement upgrade and maintenance of Bellambi Road resulting from transport of product associated with the project; and
- integration of the proposed Bellambi Creek surface water management and flood mitigation measures with the proposed Revised UEP surface facilities site layout, including additional flood mitigation, modelling and reporting for downstream areas (required following withdrawal of MOD 4 of the PWP).

84. This information was consolidated into an *Additional Information Response Report*, which was submitted to the Department on 16 June 2020 (see **Appendix H**). The Department has considered this information in its assessment of the merits of the Revised UEP.

6 Consideration of Commission's Second Review

85. The overall conclusions of the Commission's *Second Review Report* were that the social and economic benefits of the Preferred UEP were most likely outweighed by the magnitude of impacts to the environment. The Commission noted that the key considerations driving this finding included:

- uncertainty regarding the potential for and degree of loss of surface water flow due to subsidence and cracking, including associated risks to upland swamps;
- substantial reliance on mitigation strategies to deal with residual impacts, and uncertainty about the type and effectiveness of mitigation measures proposed;
- unresolved issues in relation to noise impacts on nearby residents; and
- short term nature of the social and economic benefits of the project and questions in relation to valuation of external costs.

86. WCL substantially revised the proposed mine extension to address the Commission's considerations. WCL's RPPR (Part B) provides detailed discussion of the key considerations and findings of the Commission's *Second Review Report* and how they have been addressed in the Revised UEP.

87. A summary of the Commission's key issues requiring further consideration and the sections of this FAR where the relevant issues have been considered by the Department is provided in **Table 8** below. A more detailed discussion is provided throughout Section 7 and in **Appendix I** of this FAR.

Table 8 | Commission's Second Review Report – Issues Requiring Further Consideration

Issue	Where Considered
Mining SEPP as amended: • Compatibility with other land uses • Noise impacts • Neutral or beneficial effect on water quality • Voluntary Land Acquisition and Mitigation policy • Significance of resource	Sections 7.2, 7.3 and Appendix I
Water and Subsidence: • Potential loss of surface water due to subsidence related cracking • Integrated Risk Assessment (IRA) • Sealing of mine adit to manage water inflow and long term treatment of water outflows • Barrier to stored waters of Cataract Reservoir • Trigger levels for responding to future subsidence • Uncertainty of potential cumulative impacts • Adaptive management measures and effectiveness in remediation • Financial compensation for water loss	Sections 7.1, 7.2 and Appendix I
Impact on Upland Swamps: • Uncertainty in predicting subsidence and the environmental outcomes for upland swamps • Mitigation measure to remediate swamps • Offsets within the catchment area	Sections 7.1, 7.2, 7.5 and Appendix I
Socio-economic benefits and impacts: • Balancing short-term economic benefits with uncertain long term costs and environmental consequences • Questions over the quantum of economic benefits • Requirement to update the economic assessment • Questions over the cost of water loss estimates • Long term management and operational cost of water treatment system • Timeframes for the costed on-going monitoring requirements	Section 7.5 and Appendix I
Noise: • Appropriate benchmark noise levels for the assessment of impact on residences • Adequacy of mitigation measures to reduce impact on residences	Section 7.3 and Appendix I
Air Quality: • Strong real-time monitoring and proactive management regime • Timeframes for implementation of mitigation measures • Coal emplacement areas and stockpiles	Section 7.5 and Appendix I
Bellambi Creek Flood Management: • Condition requiring implementation of flood mitigation measures	Section 7.4 and Appendix I
Traffic and Transport: • Questions over predicted traffic noise increases • Need for noise mitigation for the truck parking and queuing areas • Contribution to pavement upgrades along Bellambi Road	Section 7.3, 7.5 and Appendix I

7 Assessment

88. Given the substantive changes to the proposed mine expansion associated with the Revised UEP, the Department has re-assessed the merits of the project in accordance with the relevant objects and requirements of the EP&A Act and considered the:

- development application and accompanying RPPR;
- Commission's *Second Review Report* and WCL's response to this report (Part B of the RPPR);
- advice on the project received from the IESC;
- current conditions of the PWP Development Consent (as modified);
- community submissions;
- agency advice;
- response to submissions and additional information provided by WCL, including the peer reviews of the subsidence and groundwater assessments; and
- relevant environmental planning instruments, policies and guidelines.

89. The Department has assessed the full range of potential impacts of the project in accordance with the requirements of the EP&A Act, but considers the key issues associated with the Revised UEP are groundwater, surface water, subsidence and biodiversity impacts, as described in detail in Sections 7.1 to 7.4 below. A summary of the Department's assessment of other issues is provided in Table 12 in Section 7.5.

7.1 Subsidence

90. A description of the multi-seam mining environment and surface features present in the vicinity of the proposed mine expansion is provided in the Secretary's PAR, which should be read in conjunction with this FAR. The key issue in the subsidence assessment is how the proposed bord and pillar mining would contribute to further subsidence of mined coal seams above the Wongawilli seam targeted by the project.

Subsidence Assessment

91. SCT Operations Pty Ltd (SCT) prepared a Subsidence Assessment (July 2019 - Appendix 1 of the RPPR) to predict the subsidence effects and to assess potential subsidence impacts of the proposed bord and pillar mining.

92. In response to the WaterNSW's submission and in recognition of a recommendation made by the IEPMC in its *Final Report (Part 2)* (refer to Section 3.3), WCL commissioned an independent peer review of the Subsidence Assessment. The peer review was undertaken by Professor Bruce Hebblewhite, Professor of Mining Engineering at the School of Mining Engineering at UNSW, who is considered an expert in the fields of geotechnical engineering, subsidence and underground mining.

93. The Department notes that Professor Hebblewhite was the Chair of the Independent Expert Panel of Review for the 2008 *Southern Coalfield Inquiry (Impacts on Underground Coal Mining on Natural Features in the Southern Coalfield)*. He was also engaged by the Department to provide expert advice and review of the original UEP. Professor Hebblewhite is considered by the

Department to be an independent, highly qualified and experienced expert in his field and an acceptable person to undertake the peer review.

94. The peer review undertaken by Professor Hebblewhite involved an initial review report and preparation of an updated Subsidence Assessment by SCT (October 2019) and a final peer review report. A copy of the subsidence peer review reports and the updated Subsidence Assessment are included in Appendix 4 and 5 of the RTS – Part A report, respectively. Professor Hebblewhite's overall conclusion stated that:

> *"I am satisfied that the updated V2 SCT Report has adequately responded to my substantive comments from the original peer review and that the conclusions reached are therefore considered appropriate and valid, based on the information available*".

Quantitative Assessment of the Risk of Pillar Failure

95. The initial IESC advice on the Revised UEP stated that if the likelihood of pillar failure is "extremely rare" [less than 0.01% per year based on the *National Emergency Risk Assessment Guidelines* (NERAG)] and does not result in the catastrophic loss of a single swamp, then the IESC would not regard this proposal as being of material concern.

96. In response, WCL commissioned SCT to undertake a *Quantitative Assessment of the Risk of Pillar Failure* (January 2020). This assessment included an empirical analysis of mining failures since the 1880s, recognising the risks posed by mining a third seam under the already mined Bulli and Balgownie seams; quantification of the probability of pillar failure; and potential magnitude and extent of impacts to swamps and water resources should these pillars be destabilised by the project.

97. SCT assessed the probability of failure of the proposed pillars in the Wongawilli Seam using the UNSW pillar design approach (Galvin et al 1999). SCT then applied two different risk assessment approaches, including the NERAG (Australia Institute for Disaster Resilience, 2015) and the *Guidelines for Environmental Risk Assessment and Management* (GFERM) (Gormley et al, 2011). The later approach was developed to provide a structured decision-making process across the United Kingdom government and was considered by SCT to better assess one-off events, such as subsidence, than the former approach.

98. In response to final advice received from IESC, SCT's *Quantitative Assessment of the Risk of Pillar Failure* report was also peer-reviewed by Professor Hebblewhite. Overall, Professor Hebblewhite considered the approach and outcomes of the assessment valid and reasonable, however recommended additional explanation and greater clarity in relation to several aspects including:

- distinction between the risk of pillar failure and risk of consequential catastrophic loss of a swamp;
- status of Bulli Seam goaf areas (location relative to swamps);
- evidence of abutment loading in Wongawilli Seam roadways; and
- distinction between the different pillar systems under review in the Wongawilli Seam.

99. The Quantitative Assessment of the Risk of Pillar Failure report was subsequently revised to address these aspects. Professor Hebblewhite has confirmed that the updated report *"adequately responded to my substantive comments from the original peer review and that the conclusions reached are therefore considered appropriate and valid, based on the information available*". A

copy of the revised quantitative assessment (SCT, June 2020) and associated peer review reports are provided in **Appendix H**. The outcomes of the quantitative risk assessment are discussed in the following sections.

Predicted Subsidence Effects

Wongawilli Seam

100. The updated Subsidence Assessment indicated that some low-level ground deformation is expected as a result of the proposed mining in the Wongawilli seam due to elastic compression of the pillars and strata above and below the pillars. SCT indicated that compression has potential to result in low-level subsidence movements less than 100 mm and generally less than 30 mm, with corresponding very low levels of tilt and strain. SCT noted that these predicted ground movements would be generally at or below survey monitoring tolerance and generally imperceptible and insignificant for all practical purposes.

101. Using the UNSW pillar design approach, SCT confirmed that the 30 m wide pillars in the Wongawilli Seam at 380 m depth have a less than 1 in 100,000 (0.001%) probability of failure. On the scale used by the NERAG, this equates to less than an “extremely rare” likelihood level. Professor Hebblewhite considered such a probability of failure to be at least consistent with the IESC use of the terminology of “extremely rare” or “negligible risk”.

102. SCT identified a small area at the eastern margin of the proposed mining area (defined by the blue oval on **Figure 9**) which is not located below historical Balgownie Seam longwall panels, meaning the proposed Wongawilli Seam pillars would experience a greater vertical load. Using the UNSW pillar design approach, the 25 m wide pillars proposed in this area at 320 m depth have a less than 1 in 1,000 (0.1%) probability of failure. The potential for failure of these pillars is assessed as “rare” on the NERAG scale. SCT indicated that the maximum subsidence able to be generated by the collapse of these pillars is estimated to be 300-500 mm because of the limited extent of these panels relative to overburden depth, which is considered to be a low level of subsidence.

Balgownie and Bulli Seams

103. SCT assessed the risk of pillar failure in the overlying Balgownie and Bulli Seams as a result of the bord and pillar mining proposed in the Wongawilli seam. SCT indicated that for the overlying pillars to present a risk, the remnant pillars in these seams need to be still standing and be marginally stable so as to fail under the slightly modified stress generate by proposed mining in the Wongawilli Seam. If remnant pillars have already collapsed in these seams, the surface has already subsided and there is considered to be no potential for further pillar instability, further subsidence or further impact to surface features, irrespective of any proposed bord and pillar workings in the Wongawilli Seam.

104. Historical records of mining in the Balgownie Seam indicate the seam was fully collapsed at the completion of mining and there are no areas of uncertain pillar stability in the areas of this seam above proposed mining areas. It is therefore considered that there is no potential for further subsidence to occur from the Balgownie Seam.

SCT indicates that this is also the case for at least seven of the fourteen panels associated with the Bulli Seam, where available evidence indicates the goaf areas of these panels have already fully subsided. The status of the pillars in the other seven panels is not known definitively, however SCT considers that these panels are also “almost certainly already subsided” given the same or

similar mining systems were used in all the Bulli Seam goaf areas above the proposed mining areas. The location of the Bulli Seam goaf areas yet to be confirmed as subsided are defined by yellow shading in **Figure 9**.

105. SCT used several methods to further determine if there are large areas of standing pillars in old Bulli Seam goaf areas including:

- review of the mining systems and consideration of the abutment loading;
- observation of Bulli Seam goaf edges;
- review of subsidence monitoring from mining in other seams; and
- observation of abutment loading under the edges of barrier pillars when mining in lower seams.

106. SCT's analysis using all these methods implied that areas indicated on the mine plans and record tracings as goaf have already collapsed with no potential for future instability with or without the proposed mining in the Wongawilli Seam.

107. Nonetheless, SCT's quantitative risk assessment indicated that in the unlikely event that any pillars were still standing in the Bulli Seam, then the estimated probability of the proposed mining in the Wongawilli Seam to cause instability of these pillars would be less than 1 in 100 (1%). SCT predicted that the maximum subsidence resulting from instability of any remnant pillars in the Bulli Seam would be 850 mm.

108. To eliminate any uncertainty regarding the status of the Bulli Seam pillars, SCT recommended that confirmation of previous subsidence is determined through observation during the development of the Wongawilli Seam roadways driven below the edges of these extracted goaf areas. The presence of abutment loading would unequivocally demonstrate the goaf areas have already subsided and that there is no risk of further subsidence.

109. The Department accepts SCT's advice that it is highly unlikely that large areas of remnant pillars exist in the seven Bulli Seam panels. Further, the Department accepts that if the remnant pillars do exist, there is a very low probability that the proposed mining in the Wongawilli Seam would result in collapse of these pillars. However, as discussed in following sections of this FAR, SCT has taken a highly conservative approach to assess the potential subsidence impacts if this situation was to occur. As suggested by SCT, the Department has recommended a condition requiring the status of pillars be determined during roadway development. The Department notes that the recommended subsidence monitoring and management measures have been development based on worst-case scenarios.

Subsidence Associated with Previous Mining

110. SCT identified that several areas within the UEP area are currently in limiting equilibrium (on the verge of moving) because of previous mining, including Longwalls 4-6 in the Wongawilli Seam. Some ongoing low-level ground movement, mainly horizontal movement associated with previous mining including the Wongawilli Seam longwalls, may not yet have ceased completely. This low-level movement related to previous longwall mining operations has potential to continue to cause low-level impacts to Mount Ousley Road and valley closure across Cataract Creek that may be perceptible.

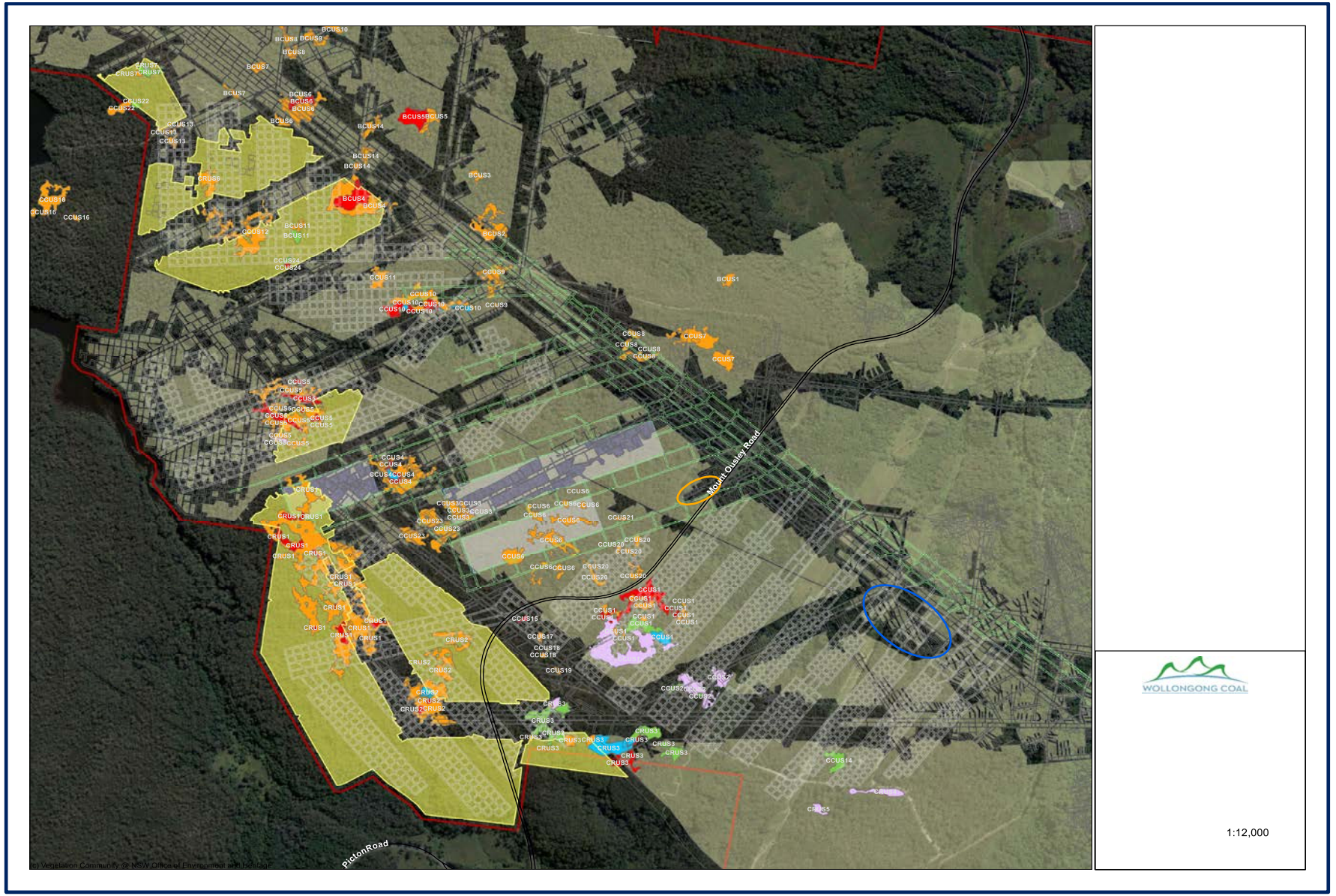

Figure 9 | Location of Bulli Seam goaf areas yet to be confirmed as subsided

111. The Department acknowledges and accepts that this movement is a legacy of previous mining and is not expected to be influenced by the proposed mining. Movement may continue irrespective of any further mining in the Wongawilli Seam.

Geological Structures

112. The Corrimal Fault and Dyke D8 are the only known significant geological structures located in the vicinity of the Revised UEP proposed mining areas. Extensive field investigations, research and reporting on these structures has meant they are now well understood and defined. Detailed descriptions of these structures are provided in both the Department's PAR and AR.

113. The updated Subsidence Assessment indicates that the proposed bord and pillar panels avoid interaction with these geological structures where possible and the limited interaction is not expected to extend beyond the immediate vicinity of individual roadways (refer to **Figure 10**). Based on past mining experience and mine water balance monitoring, SCT indicates that the fault and dyke are essentially dry and are not anticipated to provide enhanced permeability pathways in the proposed mining area. No other significant subsidence impacts or environmental consequences are expected from mining through or in the vicinity of the structures.

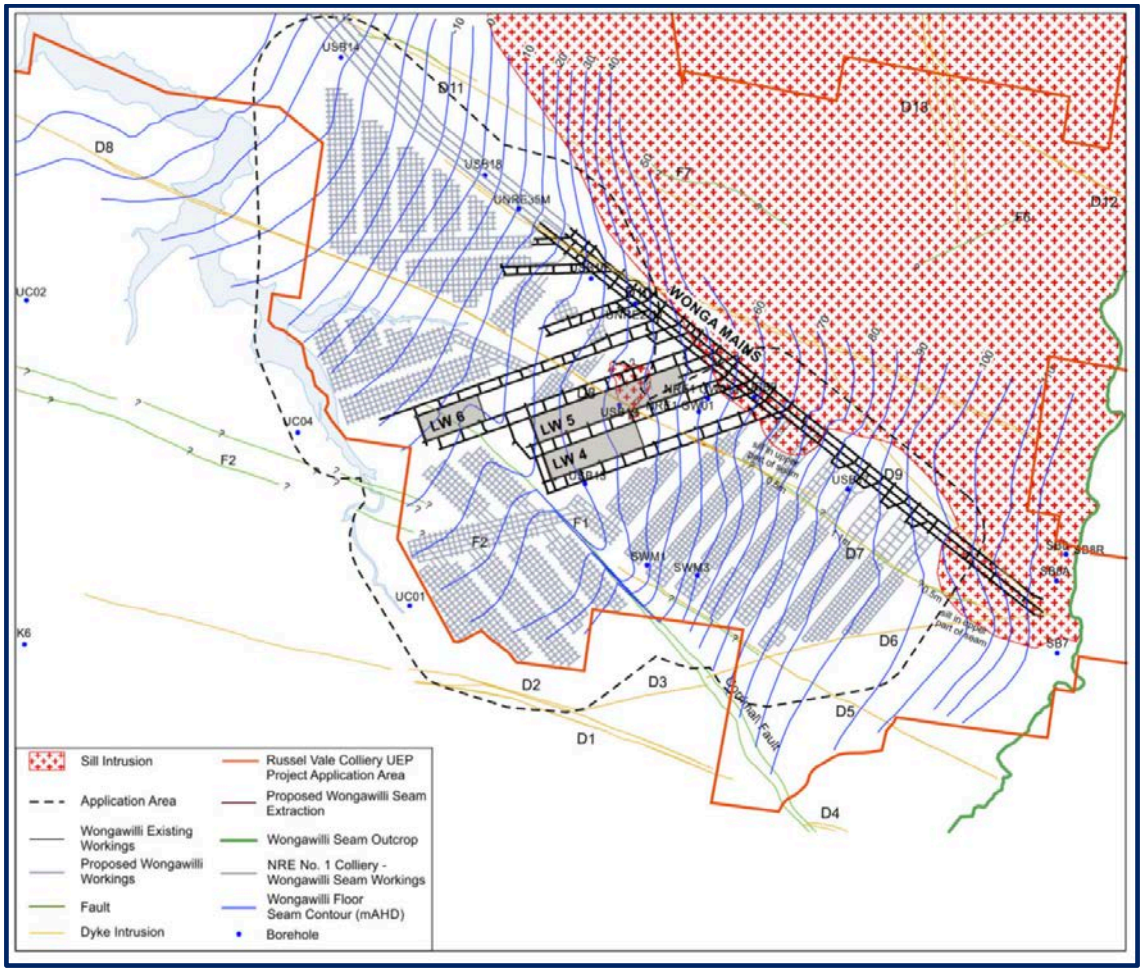

Figure 10 | Geological structures in the vicinity of the proposed first workings

114. Professor Hebblewhite, agrees that "the proposed mine workings in the Wongawilli Seam are not likely to unclamp or in any way mobilise any of these structures" and that "where any of the pillar

panels intersect any geological structures there may be localised poor ground conditions but this is not expected to have any regional ramifications".

115. Further, advice received from the IESC (see **Appendix G**) indicates that as the Corrimal Fault and Dyke D8 are stated to be dry, they are unlikely to have any effect on the cumulative water losses. IESC concluded that it "*is confident that these two geological features are unlikely to contribute to increased cumulative water losses*".

116. The Department accepts that the extent of existing information on geological structures in the vicinity of the proposed mining provides a high level of confidence in predictions, and accepts the conclusions of SCT, Professor Hebblewhite and the IESC.

Predicted Subsidence Impacts

117. SCT assessed the potential subsidence impacts on surface features as a result of the proposed mining associated with the Revised UEP. Potential subsidence impacts on built features, including the roads, transmission lines and the Cataract Reservoir and natural features, including swamps are also discussed below. Subsidence impacts on other natural features are discussed in detail in subsequent sections of this report, including groundwater (see Section 7.3), Cataract Creek and associated tributaries (see Section 7.3), cliffs and steep slopes (see Section 7.8), biodiversity (see Section 7.8) and Aboriginal heritage sites (see Section 7.8).

Built Features

118. The location of built features in the vicinity of the proposed mining are shown on **Figure 11**. In relation to built features, SCT reports that:

- *Mount Ousley Road* may experience some ongoing low-level ground movements, however this is associated with previous longwall mining in the Wongawilli Seam and not as a result of the proposed bord and pillar mining;
- *Picton Road Interchange* and the *telecommunications infrastructure* on Brokers Nose are remote from the proposed mining and there is no potential for mining induced ground movements to affect this infrastructure;
- *330kV and 132kV powerlines* to the east of Mount Ousley Road are supported on steel truss pylons which are sensitive to differential ground movements, but the ground movements associated with the proposed mining are so low as to be well within the tolerance of these structures. The only potential for these structures to be impacted would be from subsidence movements associated with localised instability of any marginally stable Bulli Seam pillars (see below). The potential for additional subsidence from destabilised pillars in the upper seams is low, however this potential cannot be eliminated; and
- *Two 33kV powerlines* further to the east are not expected to be impacted by the low-level subsidence movements, as they are supported on single and double pole structures that are generally tolerant to subsidence movements.

119. The Department accepts that the probability of additional subsidence and impacts on the 330kV and 132kV powerline pylons is low. However, the Department considers that the consequences to this critical infrastructure from greater subsidence than forecast is likely to pose an unacceptable risk to asset owners and regulators. SCT states that a strategy involving the use of cruciforms, relocating towers to areas where pillar stability can be confirmed or stabilising the mine voids using some form of cement stabilised fill material may be required.

120. The Department notes that the strategies suggested by SCT are common practice for protecting built features from subsidence impacts. The Department accepts that potential impact to these transmission pylons and other built features can be monitored and managed via updated Built Features Management Plans. The Department has recommended a condition requiring these plans be updated in consultation with the asset owners, as part of the Extraction Plan process.

Figure 11 | Location of built features in the vicinity of the proposed first workings

Cataract Reservoir

121. Numerous public and special interest group submissions raised concerns about the proximity of the proposed mining to the Cataract Reservoir and the risk to water supply in the reservoir from mining in the catchment. WCC and WSC also raised concerns about potential loss of water from the Cataract Reservoir (see **Figure 11**).

122. The Revised UEP would involve mining inside the Dam Safety NSW (DS NSW) Notification Area for the Cataract Reservoir. Notifications Areas are declared by DS NSW as 'investigation areas' where it is considered that assessment of potential mining impacts should be focused. Under the

provisions of Part 8 Section 48(4) of the *Dam Safety Act 2015*, a consent authority must, before granting consent for carrying out any mining operations, refer the application to DS NSW and take into consideration any matters that are raised by DS NSW.

123. Accordingly, the Revised UEP was referred to DS NSW for review. DS NSW confirmed that it has no concerns with the development of bord and pillar workings within the Notification Area for Cataract Reservoir.

124. SCT reports that the small subsidence movements that are forecast for the proposed mining layout are not expected to cause perceptible impacts on Cataract Reservoir. Any effects from mining roadways in the Wongawilli Seam are expected to be generally limited to a few metres around the proposed roadways. SCT also assessed the risks to the stored waters of Cataract Reservoir in relation to the Corrimal Fault and Dyke D8 (see above) and concluded that there is no credible risk of water flow along major structures from Cataract Reservoir as a result of the proposed mining in the Wongawilli Seam. These conclusions were supported by Professor Hebblewhite.

125. The Department accepts these conclusions, however, considers that WCL should be required to implement a comprehensive monitoring program. The nature and extent of the recommended monitoring program is discussed below. The Department has also recommended that the existing performance measures for the Cataract Reservoir, requiring negligible leakage from the reservoir and negligible reduction in the water quality of the reservoir, are retained in any new consent.

126. To protect the stored waters of the reservoir, WCL has positioned the bord and pillar mine areas to avoid extraction within 0.7 times depth of cover (equivalent to 35° angle of draw) from the full supply level of the reservoir.

Upland Swamps

127. There are 39 upland headwater swamps recorded in Wonga East which cover an area of approximately 49 ha. The locations of these upland swamps are illustrated in **Figure 12**. Most of these swamps are located over or partly over extracted Bulli Seam goaf areas with most of these goaf areas confirmed as having already subsided. Therefore, most of the swamps have or are likely to have already experienced full subsidence of up to 1 m from mining in the Bulli Seam.

128. Six or more groups of swamps have also been mined under by longwall panels in the Balgownie and Wongawilli Seams, which resulted in subsidence of up to 1.7 m. Recent swamp monitoring results undertaken by Biosis for WCL identified some changes in ecological species composition of two upland swamps when compared to previous results and control sites, however no observable changes in shallow groundwater or surface water levels were detected, so the changes were considered likely to be due to natural environmental variations. The IEPMC acknowledge that "*despite decades of monitoring, mining-induced changes to upland swamp vegetation communities are still not able to be differentiated from natural changes*".

129. In July 2019, Biosis prepared an updated *Ecological Impact Assessment* for the Revised UEP (see Appendix 4 of the RPPR). Based on SCT's predictions that the proposed mine plan would not result in any perceptible surface subsidence, Biosis concluded that impacts to upland swamps are predicted to be negligible. Biosis also considered the proposed mining would result in negligible risk of impact to the three threatened species known to occupy coastal upland swamps, including the prickly bush-pea, giant burrowing frog and the giant dragonfly.

130. BCD accepted this conclusion. In its advice on the Revised UEP, BCD agreed that the proposed bord and pillar coal extraction method significantly reduces the risk of subsidence on sensitive environmental features, including swamps. BCD indicated that its original concerns regarding subsidence impacts upon Coastal Upland Swamp threatened ecological community and significant streams have been addressed based on negligible predicted impacts.

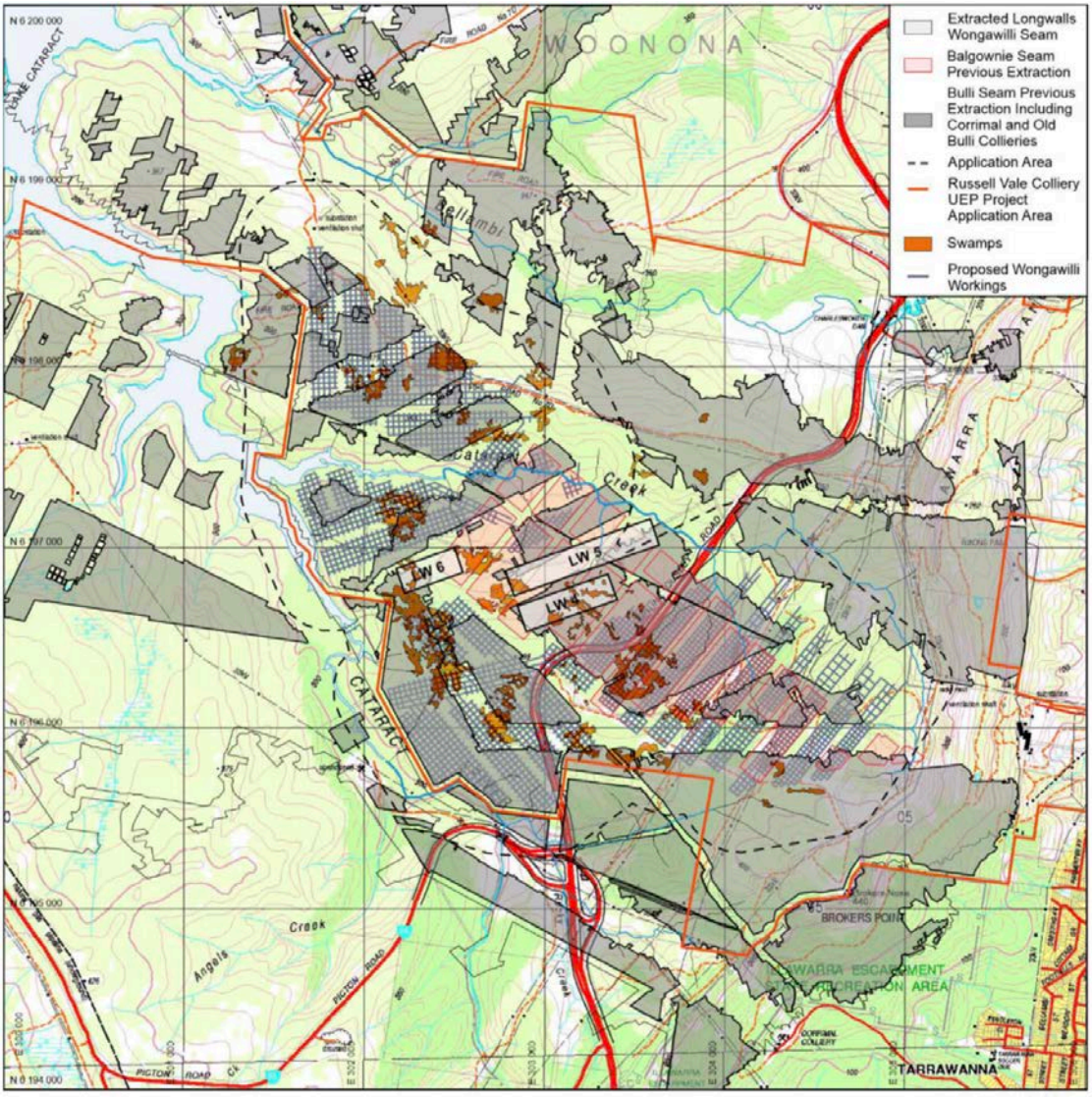

Figure 12 | Location of swamps in relation to proposed and historical mining areas

131. As noted above, the IESC advised that if the likelihood of pillar failure is "extremely rare" and does not result in the catastrophic loss of a single swamp, then the IESC would not regard this proposal as being of material concern. The quantitative risk assessment calculated the probability of pillar failure in the Wongawilli Seam using the UNSW pillar design approach as being less than 1 in 100,000 (0.001%), which equates to "extremely rare" on the NERAG scale. This probability of failure is considered to be consistent with the IESC use of the terminology of "extremely rare", posing "negligible risk".

132. SCT used the GFERM to further determine the probability of any upland swamp being impacted by the proposed mining and concluded that the estimated probability of impact is either zero if all the Bulli seam goaf areas can be confirmed as having subsided or 0.028% if not. The NERAG

assessment guidelines rate a likelihood of less than 0.1% as being “very rare” or less than 1 event in 10,000 years.

133. The Department notes that the quantitative risk assessment took a highly conservative approach. Firstly, it assumed that the pillars in the Bulli Seam where the status of the pillars is not definitively known to still be standing and capable of being destabilised. As discussed above, this is considered highly unlikely. Secondly, it assumed the probability for swamps to suffer “catastrophic loss” as a result of 850 mm of subsidence to be 10%. As discussed above, this has not been observed in any swamps in the Wonga East area despite experiencing greater levels of subsidence.

134. The Department accepts that WCL has employed all feasible and reasonable measures to avoid swamp impacts by adopting the bord and pillar mining method, and considers that this substantially reduces the risk of impact to swamps as a result of the proposal. Based on the subsidence predictions and outcome of the quantitative risk assessment, the Department considers that impacts to swamps as a result of the proposed mining would be negligible.

135. The *Addendum to NSW Biodiversity Offsets Policy for Major Projects: Upland swamps impacted by longwall mining subsidence* (Swamp Offset Policy) (OEH, 2016) states that negligible environmental consequences is considered to mean one or more of the following:

- negligible change to the shallow groundwater regime of a swamp compared with control swamps; and/or
- negligible change to the composition or distribution of swamp dependent vegetation communities and threatened species.

136. Greater than negligible environmental consequences include one or more of the following:

- a shallow groundwater level within swamp sediments lower than the baseline level at any monitoring site within a swamp (in comparison to control swamps);
- a rate of shallow groundwater level reduction post-mining that exceeds the rate of shallow groundwater level reduction during the baseline period at any monitoring site (measured as average millimetres per day during the recession curve).

137. Negligible environmental consequences focus on groundwater as the best and most certain indicator of whether there would be an impact on the ecological community, as swamps are water-dependent ecosystems.

138. In line with the NSW Government *Swamp Offset Policy 2016*, the Department has recommended a subsidence performance measure preventing greater than negligible environmental consequences to upland swamps in the vicinity of the proposed mining. The Department notes that where negligible environmental consequences for upland swamps are predicted, WCL is not required to quantify or demonstrate that they can legally secure an offset prior to approval of an Extraction Plan. However, WCL is required to conduct monitoring to detect impacts, to measure performance and to ensure compliance.

139. WCL currently manages and monitors impacts to swamps in accordance with their *Upland Swamp Management Plan* (USMP) (2015). WCL is currently monitoring surface and groundwater levels, soil moisture, and the terrestrial and aquatic ecology of numerous swamps. The location of the monitoring sites in relation to swamps and the proposed first workings mine panels is shown in **Figure 13**. WCL has committed to review and update its USMP to reflect the Revised UEP and associated management and monitoring measures.

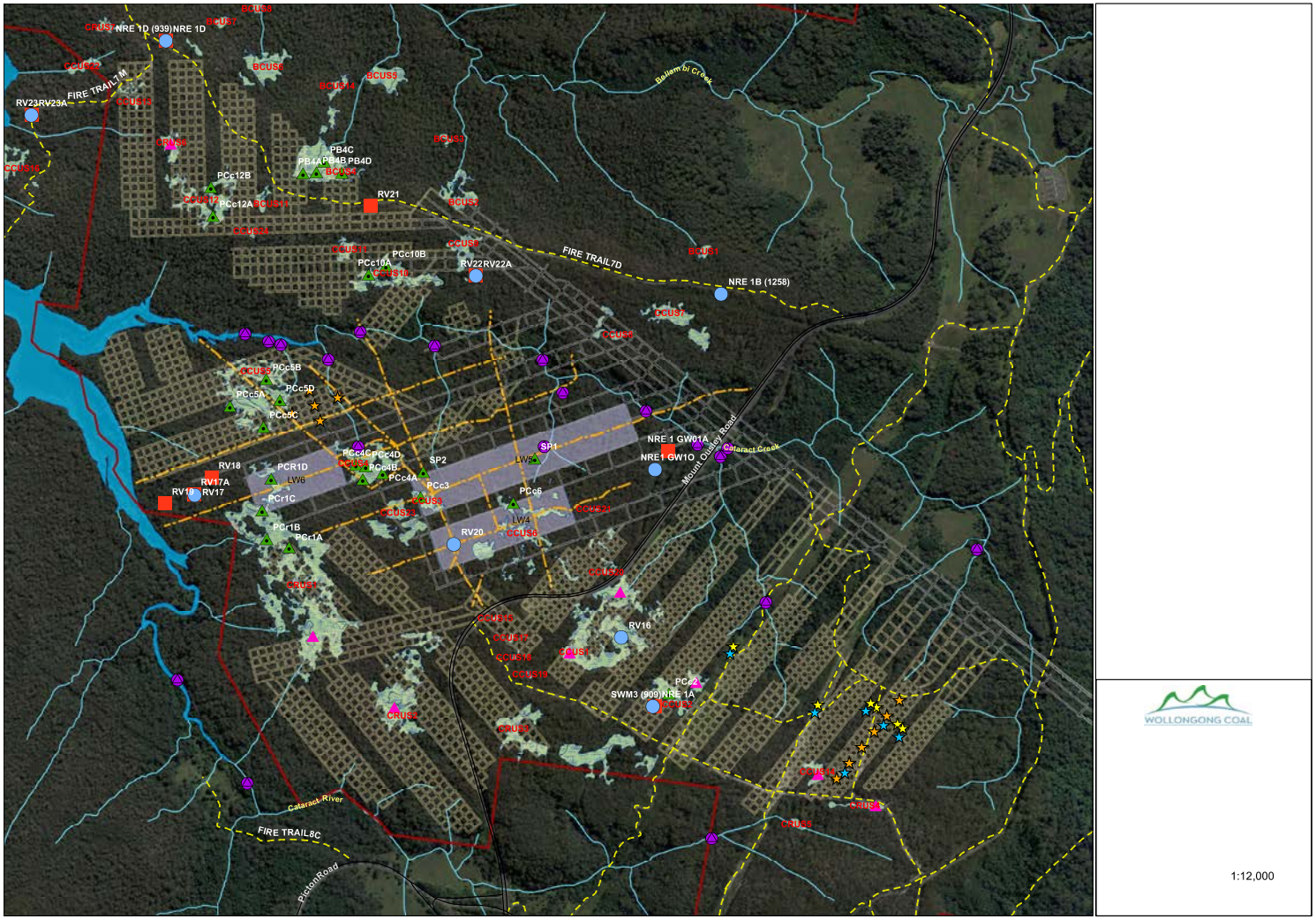

Figure 13 | Location of swamp, surface water and groundwater monitoring sites

140. The ongoing subsidence monitoring program is supported by BCD. In addition to the above, in its initial advice the IESC recommended the following monitoring to further assess whether any impacts on swamps have occurred or are possible due to the project:

- use of nested monitoring bores and environmental water tracers to identify whether a hydraulic connection exists between the perched aquifers upon which the swamps rely and the Upper Hawkesbury Sandstone aquifers;
- swamp-specific ecological monitoring, including updated surveys of current biodiversity, species distribution and swamp condition and records of seasonal variation in community composition to measure natural variation within and among swamps; and
- calculation of swamp-specific water balances based on monitoring data, including for control swamps, to differentiate changes caused by mining from those associated with natural and climatic variability.

141. In its response to IESC advice, WCL agreed to undertake this additional monitoring and analysis as part of the updated USMP. The Department notes this additional monitoring is in line with that recommended by the IEPMC in its *Final Report (Part 2)* in relation to hydrological balance monitoring and linkages to swamp vegetation and fauna changes (refer to Recommendation 16 of **Appendix C**).

142. As part of its final advice report, IESC indicated that ongoing monitoring of surface and shallow subsurface processes near potentially affected swamps and reference sites should continue after mining ceases to confirm that no delayed significant impacts are occurring, or if they do, until recovery is complete. The Department notes that the *Swamp Offset Policy* is clearly scoped on the understanding that it takes time and monitoring to ascertain whether subsidence impacts have occurred on swamps. The policy indicates that the shallow groundwater monitoring program should seek to identify any positive or negative trends in groundwater for a period of 12 months after mining, and use control sites to understand natural variability. The nature and duration of post-mining monitoring duration would need to be reconsidered if a significant variation in groundwater levels is detected (i.e. a shallow groundwater level lower than the baseline at any monitoring site).

143. In addition, in accordance with recommendations made by the IEPMC in its *Final Report (Part 2)* (see **Appendix C** – Recommendation 17), the Department considers longer-term monitoring of swamp hydrology and ecology should be required to add to the regional information and databases on swamps.

144. The Department has recommended that an updated USMP be prepared as part of the Extraction Plan (see below), in consultation with BCD, WaterNSW and DPIE-Water and to the satisfaction of the Secretary.

145. While considered unlikely, in accordance with the *Swamp Offset Policy*, where swamp monitoring demonstrates that the actual impact is more than negligible and where the shallow groundwater does not return to its natural regime within 12 months, the Department has also recommended a condition requiring WCL to identify and retire a swamp offset equivalent to the actual impact within six months.

Subsidence Monitoring and Management

146. While Extraction Plans are generally only required for second workings, given the concerns raised about potential subsidence in a multi-seam environment, the Department has recommended that

an Extraction Plan be prepared and implemented to monitor and manage the potential subsidence effects, subsidence impacts and environmental consequences of the Revised UEP. WaterNSW also recommended that an Extraction Plan process be conditioned to allow expert stakeholders to provide ongoing advice on the mining development.

147. The recommended Extraction Plan requirements include the imposition of performance measures and a range of monitoring and management plans for subsidence, surface water, groundwater, upland swamps, biodiversity, built features and public safety.

148. In accordance with current practice and recommendations made by the IEPMC in its *Final Report (Part 2)*, the Extraction Plan requires trigger-action-response plans (TARPs) to provide a clear basis to decide whether or not the performance measures are being met and certainty in determining the appropriate adaptive management response to exceedances and breaches. The Department agrees with the IEPMC that TARP triggers should be based on meaningful indicators, developed in consultation with relevant agencies and authorities.

149. The TARP 'triggers' contained within the existing Russell Vale Extraction Plan are typically based on baseline monitoring with thresholds relating to "normal", "within predictions" and "exceeding predictions". The Department accepts that the existing TARPs are comprehensive and based on meaningful and measurable indicators. However, the existing TARPs would need to be revised and updated to reflect predictions associated with the Revised UEP, and the Department has recommended that this process be undertaken in consultation with relevant agencies.

150. The most recent Extraction Plan prepared for the site is the *Russell Vale East – Longwall 6 (365m) Extraction Plan* which was approved in March 2015. This and previous longwall Extraction Plans for the site indicate that conventional subsidence effects are measured via 3D surveys along survey lines aligned parallel and perpendicular to the axis of each panel. The IESC recommended that WCL consider using more contemporary subsidence monitoring measures (e.g. InSAR (Interferometric Synthetic Aperture Radar) or LIDAR (Light Detection and Ranging)) in addition to conventional subsidence monitoring lines. IESC indicates that InSAR and LIDAR give greater spatial coverage and should identify localised areas of subsidence above destabilised pillars that are not on a conventional monitoring line.

151. The Department agrees that it is essential for WCL to conduct monitoring which is sensitive enough to demonstrate the effects of the proposed mining and has recommended that more contemporary subsidence monitoring techniques are considered as part of the Extraction Plan.

Conclusion

152. Overall, the Department considers that the proposed bord and pillar mining method significantly reduces subsidence-related risks and impacts when compared to the previously proposed long-wall mining methods. The Department accepts that the proposal is unlikely to cause any material surface subsidence, and that subsidence impacts associated with historical mining in the Bulli Seam and Balgownie Seam and settlement associated with the previous mining in the Wongawilli Seam were unlikely to be exacerbated by the Revised UEP.

153. These conclusions are supported by Professor Hebblewhite, the IESC and WaterNSW. The IESC (19 November 2019) advice states that:

> *"Bord-and-pillar (first workings only) extraction will greatly reduce the risk of subsidence compared with other subsurface mining approaches (e.g. longwall mining), and its use is strongly commended by the IESC"*.

154. Similarly, WaterNSW (29 August 2019) considered that:

- "*the first workings mining method is much safer than the previous proposal for longwall mining and is unlikely to cause significant surface subsidence or significant interaction with the overlying seams*
- *the mining method is likely to minimise the potential groundwater impacts by limiting depressurisation within and immediately above the mined coal seam, and*
- *the proposed first workings are likely to have negligible impacts on natural surface features including upland swamps, cliffs, steep slopes, drainage lines, creeks, Cataract Creek, Cataract River, and Cataract Reservoir".*

155. The Department accepts that it is highly unlikely that large areas of remnant pillars exist in the seven Bulli Seam panels and that the project would result in negligible impacts on built and/or natural features, including the Cataract Reservoir and upland swamps. The Department considers that the residual risk of low-level subsidence associated with localised instability of any marginally stable Bulli Seam pillars can be readily managed via the Extraction Plan process and has recommended a comprehensive condition accordingly.

7.2 Water Resources

156. A description of the surface and groundwater systems present in the vicinity of the proposed mine expansion is provided in the Secretary's PAR, which should be read in conjunction with this FAR.

Groundwater Assessment

157. GeoTerra Pty Ltd and Groundwater Exploration Services Pty Ltd (GeoTerra/GES) jointly prepared a Groundwater Assessment (July 2019) to predict the potential groundwater and base flow impacts for the Revised UEP (see Appendix 2 of the RPPR).

158. In response to DPIE-Water's advice, the Groundwater Assessment was further revised (see Appendix 1 of the RTS – Part B report) to provide clarity around the model and additional context regarding the history of mining at Russell Vale and the various studies undertaken as part of the UEP.

159. In accordance with recommendations made by DPIE-Water and the IEPMC in its *Final Report (Part 2)* (see **Appendix C** – Recommendation 11), WCL commissioned an independent peer review of the Revised Groundwater Assessment, focusing on the numerical groundwater modelling. The peer review was undertaken by Dr Noel Merrick who is a highly experienced hydrogeologist and groundwater expert with extensive experience conducting groundwater modelling in the Southern Coalfields.

160. The Department also notes that Dr Merrick prepared peer reviews for previous versions of the UEP groundwater assessment involving earlier longwall mine plans in both June 2014 and September 2015. A copy of Dr Merrick's peer review comments is included in Appendix 2 of the RTS – Part B report. In summary, Dr Merrick concluded that:

> *"…the Russell Vale Groundwater Model has been developed competently and is "fit for purpose" for addressing the potential environmental impacts from the proposed underground mining operations and for estimating indicative dewatering rates".*

Uncertainty Analysis

161. In response to the DPIE-Water submission, WCL also commissioned HydroAlgorithmics Pty Ltd to prepare an uncertainty analysis for the Revised Groundwater Assessment report (refer to **Appendix H**). In accordance with recommendations made by the IEPMC in its *Final Report (Part 2)* (see **Appendix C** – Recommendation 10), the analysis was conducted in accordance with the IESC uncertainty analysis guidelines[1] .

162. It addressed parameter uncertainty by undertaking stochastic modelling using the *Monte Carlo* method. Uncertainty was assessed on hydraulic conductivity, recharge, evapotranspiration, specific storage and specific yield properties throughout the model. Statistics on key predictive outputs were computed from the results of 141 model runs.

163. An independent peer review of the Uncertainty Analysis was conducted by Dr Frans Kalf of Kalf and Associates. A copy of Dr Kalf's peer review comments are included in Appendix 3 of the RTS – Part B report. Although Dr Kalf identified some discrepancies in the storage values used in the analysis, he did not believe these would substantially change the results. Overall, Dr Kalf indicated that "*the analysis presented by HydroAlgorithmics (HA) is considered to be suitable and valid*".

164. The key outcomes of the uncertainty analysis of the groundwater model indicated:

- *Groundwater drawdown* - there is expected to be negligible drawdown, even at the 90th percentile, of the water table in surficial layers in contact with local streams and the Cataract Reservoir;
- *Mine Inflow* – additional mine inflow caused by the Revised UEP only is expected to range from maximum inflows of 262 ML/year (*very likely* to be exceeded) to 326 ML/year (*very unlikely* to be exceeded);
- *Baseflow* – combined additional baseflow impact on Cataract Creek, Cataract River and Bellambi Creek caused by the Revised UEP only (incremental) is expected range from 2.3 ML/year (*very likely* to be exceeded) to 6 ML/year (*very unlikely* to be exceeded); and
- *Water Storage* - worst-case predicted impact on Cataract Reservoir (via a transfer of water from the storage to depressurised strata below the reservoir) is less than 1 ML/year.

165. Comparison of these water take predictions with those presented in the revised Groundwater Assessment indicates that they are generally in close agreement. The only differences were in relation to reductions in baseflows from the three major relevant streams. The uncertainty analysis predicted baseflow impacts that are higher than those modelled by GeoTerra/GES (about twice

[1] Middlemis, H. and Peeters, L.J.M., 2018. *Uncertainty analysis—Guidance for groundwater modelling within a risk management framework*. A report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy, Commonwealth of Australia 2018.

the volume of cumulative baseflow losses and about five times the volume of incremental baseflow losses).

166. GeoTerra/ GES confirmed that this is due to minor differences in the timing of drainage cells being turned on/off in the two models. Despite this difference, GeoTerra/ GES, Dr Merrick and Dr Kalf all agree that the predicted impacts on baseflows remained very small and unlikely to be measurable in all affected systems.

167. The Department accepts that the uncertainty analysis has been undertaken in accordance with the IESC guidelines and to the satisfaction of the peer reviewer, Dr Kalf. The Department considers that the outcomes of the uncertainty analysis provide greater confidence in the predictions made by GeoTerra/GES in the revised Groundwater Assessment. The outcome of this assessment is discussed further below.

Groundwater Predictions

Depressurisation

168. The GeoTerra/GES model indicated that the influence of the proposed bord and pillar mining would result in depressurisation of two separate regimes:
    - within the Wongawilli Seam; and
    - overburden above the Wongawilli Seam.

169. GeoTerra/GES predicted that the Wongawilli Seam and overburden immediately overhead would be depressurised to atmospheric pressure in the immediate footprint of the proposed workings, however there would be minimal depressurisation above the Bulli Seam at the end of the mining period due to the lack of goaf development and associated subsidence cracking and strata delamination associated with the bord and pillar extraction.

170. GeoTerra/GES indicated that the overlying Balgownie and Bulli seams have previously been mined and therefore significant depressurisation has already occurred. The shallower surficial strata groundwater levels and pressures in the vicinity of the project area are predicted to be unaffected by the proposed mining.

Baseflow Losses

171. Induced groundwater drawdown impacts are predicted to be limited to minor reductions in baseflow in Cataract Creek, Cataract River and Bellambi Creek. The maximum modelled streamflow losses because of the Revised UEP, as well as the cumulative impact of all mining at Russell Vale are summarised in **Table 9** below.

Table 9 | Predicted Stream Baseflow Reductions

Waterway	Cumulative Baseflow Loss ML/year	Incremental Baseflow Loss (Revised UEP only) ML/year
Cataract Creek (Upstream of Cataract Reservoir)	8.76	0.22 (in 2073)
Cataract River (Upstream of Cataract Reservoir)	1.09	0.07 (in 2083)
Bellambi Creek	0.051	0.18 (in 2072)
TOTAL Incremental	**9.91**	**0.47**

172. GeoTerra noted that the average daily stream flow from Cataract Creek to Cataract Reservoir is 13 ML/d of which 4.1 ML/day (ie. approximately 1,500 ML/year) is baseflow. The cumulative baseflow reductions predicted for the Revised UEP are therefore less than 0.7% of average existing annual baseflow. These baseflow reductions are therefore considered minor and unlikely to be observable for all practical purposes.

173. GeoTerra/GES noted that historic monitoring of stream flow in the multi-seam mined area has not detected any adverse effect on stream flows, and the headwater tributaries and main channel of Cataract Creek have had continuous flow throughout the monitoring periods.

Cataract Reservoir

174. The GeoTerra/GES modelled transfer of stored water within Cataract Reservoir to the underlying groundwater system due to depressurisation of the regional groundwater system in the vicinity of the reservoir is predicted to be so small as to be not measurable at the end of the proposed mining. Maximum cumulative leakage from Cataract Reservoir associated with all historical mining at Russell Vale is predicted to peak at 0.024 ML/year. This represents approximately 0.01% of the full operating storage of Cataract Reservoir of 97,190 ML which is a negligible loss of water.

Private Bores

175. GeoTerra/GES confirmed that there would be no loss of bore yield as a result of the proposed mining as there are no registered private bores or wells located within the modelled zone of drawdown.

Groundwater Inflows

176. The GeoTerra/GES model predicted the maximum total annual groundwater inflow to the workings, including all previous mining impacts from the Russell Vale lease workings, to be 288 ML/year, with the contribution from the proposed bord and pillar workings (and the continuing gradual increase from previous workings) being up to 36.5 ML/year. These predictions are within the uncertainty range modelled by HydroAlgorithmics.

Groundwater Recovery and Future Adit Discharge

177. In its initial advice on the Revised UEP, the IESC raised the issue of uncertainty of the influence of the adits on long term groundwater levels, flow and quality.

178. In its response, GeoTerra/GES advised that the existing mining adits into the Wongawilli Seam, Balgownie Seam and Bulli Seam prevent recovery of groundwater levels to pre-mining conditions. After the proposed mining is completed, the GeoTerra/GES model assumed the dewatering pumps would be turned off and the mine gradually fills up and re-pressurises the overburden until the recovery reaches the 117.5m AHD elevation of the existing mine entry adit for the Wongawilli Seam, at around 2057. From this time, GeoTerra/GES predict that a maximum of approximately 0.3 ML/day (110 ML/year) would discharge out of the adit.

179. GeoTerra/GES advised that a similar volume of mine water would discharge from the Wongawilli adit under existing approved operations, however the additional void space associated with the additional coal extracted from the project would delay the time in which the water levels would recover to the level of the adit.

180. In relation to the quality of mine water that would be discharged from the Wongawilli adit, GeoTerra/GES advised that mine water sampling conducted between 2014 and 2017 is indicative of the potential future discharge water quality (under both current and proposed operations). Existing mine water quality is alkaline pH (8.4 – 8.55); fresh to brackish (1,390 – 2,210 µS/cm); and has slightly elevated levels of sulfate and metals (copper, nickel and zinc).

181. In its response to the IESC advice, WCL acknowledged that future mine water discharge from the adit may require treatment prior to discharge into receiving waters or reuse. WCL has advised that it would consider a range of beneficial reuse options, including potable, recreational and industrial reuse. WCL proposes that the feasibility of these options would be subject of specific project review and analysis in consultation with relevant agencies, including WaterNSW. As discussed below, WCL has committed to a funding arrangement which would be sufficient for 10 years of monitoring and treatment of adit discharge water, noting that discharges are not predicted to occur following groundwater recovery post mining until around 2057. WCL estimates that (if required) the construction and ongoing operation of a reverse osmosis (RO) plant to treat 110 ML/year of water to a potable standard over a 10 period would cost around $2.4 million.

182. In its final advice on the Revised UEP, the IESC recommended further monitoring of the adit water quality to address the potential risks associated with the discharge of either untreated or treated water entering Bellambi Gully Creek. IESC further indicated that a site-specific water balance is needed for Bellambi Gully Creek that accounts for various sources of uncertainty in discharge water volumes and quality.

183. The Department acknowledges that the long term management of outflow water from adits is a regional issue that faces all historic and current mining operations in the Southern Coalfields.

184. The Department accepts that WCL is required to take direct responsibility for management and operational cost of the water treatment systems following mine closure for a reasonable period of time, but believes that further and ongoing studies are required in order to make informed decisions on a regional basis regarding longer term treatment, discharge and reuse options within the water catchment as a whole. This is consistent with the recommendations to the NSW Government made by the IEPMC in its *Final Report (Part 2)* (see **Appendix C** – Recommendation 23).

185. Accordingly, the Department has recommended that WCL prepare an Adit Water Discharge Management Plan, within 12 months of project approval, in consultation with WaterNSW and the EPA and to the satisfaction of the Secretary. The Plan would need to detail the:

- location of all mine related adits and other potential groundwater leakage points;
- predicted volumes and discharge water quality from each point;
- timelines for discharges;
- avoidance, mitigation and monitoring measures (including for impacts associated with discharges to Bellambi Creek);
- proposed short and long term treatment, discharge and beneficial reuse options, including associate environmental impacts and costs;
- outcome of consultation with other mines in the region and relevant agencies to ensure outcomes are based on strategic regional considerations; and
- short and long term funding or other suitable arrangements which consider appropriate water quality targets based on an agreed potential end use.

186. The Department has recommended that the Adit Water Discharge Management Plan be reviewed every 5 years and the outcomes used to inform regional policy and strategy on long-term management of adit discharge water within the water catchment.

187. The Department accepts that the Revised UEP would not significantly change either the rate of flow from the adit or the quality of this water, when compared to the existing approved operations. The Department considers that treatment of this adit outflow water for different uses, including potable uses, is reasonable and feasible and believes the preparation and ongoing review of an Adit Water Discharge Management Plan would guide appropriate site specific and regional treatment options and funding arrangements.

Cumulative Groundwater Impacts

188. In accordance with a recommendation made by the IEPMC in its *Final Report (Part 2)* (see **Appendix C** – Recommendation 2), the Revised Groundwater Assessment included consideration of regional impacts and consequences associated with groundwater depressurisation, including if and how far these impacts and consequences might extend beyond the mining footprint.

189. GeoTerra/GES identified that regionally, the closest mining operation to Russell Vale is Appin Mine (part of the Bulli Seam Operations operated by South32), which is located 13 km to the north-west and operates within the Bulli Seam. Dendrobium Colliery is located 12 km to the south-west and also operates within the Wongawilli Seam.

190. A review of the groundwater related studies undertaken for these projects indicates that regional drawdown at Appin and Dendrobium Colliery extends approximately 2-3 km from the southern margins of these operations. GeoTerra/GES conclude that there would not be any overlap of the groundwater drawdown between the Russell Vale and Appin / Dendrobium mining areas. Therefore, there is no cumulative depressurisation resulting from the proposed mine workings and other adjoining mines.

191. Further, GeoTerra/GES indicate that groundwater cumulative losses include the impacts from all of the adjoining historical, decommissioned mining areas as well as depressurisation due to the proposed Wongawilli Seam extraction. GeoTerra/GES advised that these impacts, however, do not expand into, or interact with, the current or proposed mining operations at Appin Mine and Dendrobium Colliery.

Water Resource Impacts from Pillar Failure

192. As discussed in Section 7.1, SCT (January 2020) completed a risk assessment to quantify the potential magnitude and extent of impacts to water resources (baseflows, stored water and groundwater) should any remnant pillars in the uppermost Bulli Seam be destabilised by the proposed mining in the Wongawilli Seam.

193. SCT confirmed that the potential for further subsidence impact to water resources is zero if, as expected, the pillars have already collapsed and there is no further significant subsidence. In the unlikely event that any of the seven goaf areas in the Bulli Seam has not previously subsided and does become destabilised and subside during the period of proposed mining in the Wongawilli Seam, SCT indicated that the incremental impact on water resources is expected to be less than 0.02 ML/day or 7 ML/year. The likelihood of this impact occurring is determined to be “unlikely” based on the NERAG risk scale. On this basis, SCT considers the risk of impact to water resources to be negligible.

194. As discussed previously, the Department accepts that the risks of additional subsidence impacting water resources is low and, if realised, the magnitude of incremental impacts are small enough to be considered negligible.

NSW Aquifer Interference Policy

195. In accordance with the *NSW Aquifer Interference Policy* (AIP), GeoTerra/GES completed an assessment of the minimal impact considerations for 'less productive porous rock water sources' and 'perched ephemeral aquifer water sources'. The assessment concluded that the criteria for minimal impact would not be exceeded and that the Revised UEP would meet the Level 1 impact thresholds of the AIP, which it considered to be acceptable.

Water Licensing

Groundwater Licensing

196. Under the WM Act, WCL is required to hold a water access licence (WAL) for groundwater take within the *Sydney Basin Nepean Groundwater Source* in accordance with the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011* (Groundwater WSP).

197. WCL has confirmed that it currently holds a WAL for 515 ML/year and that the company has been advised that it been successful in the bid for allocation for an additional 100 units (equates to 100 ML). Based on the predicted maximum groundwater inflow into the Russell Vale workings of 288 ML/year, for the period during and after the proposed mining, the Department accepts that WCL currently holds a sufficient quantity of units in the Groundwater WSP.

Surface Water Licensing

198. Under the WM Act, WCL is required to hold a surface WAL for predicted baseflow reductions within the Upper Nepean and Upstream Warragamba Water Source in accordance with the Water Sharing Plan for the Greater Metropolitan Region Unregulated Rivers Water Source 2011 (GMRUR WSP).

199. WCL does not currently hold any licences for surface water use for the region. Based on maximum predicted loss of stream baseflow and reservoir leakage from all mining at Russell Vale, including the proposed mining in the Wongawilli Seam, WCL may require a WAL for up to 10.04 ML/year.

200. WCL indicate that there are currently 54 ML of water entitlements in the GMRUR WSP, which are held by two water access licence holders. DPIE-Water indicated that this represents a risk to WCL due to the limited entitlement and small number of licence holders to trade with. WCL has indicated that it is currently investigating trade options to acquire sufficient surface water entitlements. In the event that sufficient entitlement cannot be acquired via trading options, WCL has indicated that it would negotiate a range of alternative mechanisms with the NRAR and WaterNSW, including:

- offset via apportionment from current groundwater entitlements;
- offset of surface water basic landholder right for harvestable rights from WCL Freehold land within the GMRUR WSP;
- direct controlled allocation by the Department/Minister of additional entitlement from the management zone under Section 65 of the WM Act; or
- other mechanism to be determined in consultation with NRAR.

201. The IEPMC recognises the need to update provisions for offsetting water loss from the catchment resulting from mining operations (see **Appendix C** – Recommendation 22). A key recommendation made by the IEMPC is that Government should ensure that sufficient water entitlements are retained by mines operating in the Special Areas to cover surface water losses resulting from mining- induced effects (Recommendation 15). The Department can confirm that Government is currently addressing the issue of surface water licensing in Special Areas.

202. While the Department notes that there may be a requirement to account for the induced surface water take through appropriate regulatory mechanisms, both the Department and WaterNSW consider that the induced surface water losses associated with the project are very minor and can be considered negligible in the context of the catchment and the applicable water source. The 10 ML/year is based on a maximum induced surface water take, is within the margin of error within the modelling and would not be able to practically measured against background fluctuations.

203. The Department has held discussions with relevant agencies in relation to the surface water licensing situation and notes that alternatives and options exist outside of the licensing regime under the WM Act (as outlined above) that can appropriately regulate this matter.

204. Accordingly, the Department has recommended a condition requiring WCL to obtain all necessary water licences for the project under the Water Act 1912 and/or the WM Act, or an alternative mechanism agreed by the Planning Secretary, DPIE Water and WaterNSW.

Water Resource Monitoring and Management

205. As part of the RPPR, WCL committed to utilising its existing surface and groundwater monitoring network to monitor any water resource impacts associated with the Revised UEP. The existing surface and groundwater monitoring networks and programs are described in the current approved Water Management Plan (May 2019). The location of the existing surface and groundwater monitoring sites is shown in **Figure 13**.

206. The IESC advice recommended additional monitoring to assess impacts against predictions and to inform ongoing groundwater modelling including:

- the pumping rates of mine inflows be regularly measured and compared to predicted inflow rates to identify potential changes in connectivity between aquifers and/or surface waters;
- installation of additional groundwater monitoring bores (including vibrating wire piezometers) to monitor the propagation of drawdown and to validate groundwater model predictions;
- developing a program for regular review of groundwater and surface water monitoring data and updating of relevant models; and
- monitoring of water level and water quality to establish a baseline and to track changes over time, including post-mining.

207. In response to the IESC advice and an additional request from the Department in relation to panel-specific monitoring, WCL subsequently committed to supplement the existing monitoring program with additional groundwater monitoring.

208. It is proposed that the monitoring would be installed in Bord and Pillar panels PC 2 and PC 18 (see **Figure 13**) prior to first mining commencement in Panel 1, which would allow monitoring results and observations from the commencement of mining under the new approval. The additional monitoring associated with Panel 2 is extensive and has been designed to provide

monitoring information from both the shallow groundwater system and the deeper groundwater as the bord and pillar mining develops within the panel.

209. WCL proposed that if, as expected, there are minimal observable groundwater impacts, the groundwater monitoring network for future panels could be customised accordingly. If on the other hand, groundwater impacts are observed, then WCL has committed to implement a similar monitoring program for future panels as that committed for Panel 2.

210. The Department notes that monitoring of groundwater in the Wonga East area has been undertaken since the 1990s and that the monitoring network has expanded progressively since then. A reasonable baseline of groundwater information has therefore been established to allow tracking of any changes to groundwater level and quality to be assessed over time.

211. The Department is satisfied that the current and proposed surface and groundwater monitoring programs are adequate to monitor and assess any impacts to water resources associated with the proposed project. The Department has recommended a condition requiring a comprehensive Water Management Plan be prepared for the project, in consultation with BCD, WaterNSW, DPIE-Water and WCC by suitably qualified and experienced experts, and include both Surface Water and Groundwater Monitoring Programs and a Surface and Groundwater Response Plan.

Conclusion

212. Overall, the Department considers that the proposed bord and pillar mining method significantly reduces potential impacts on groundwater resources and stream baseflow, when compared to the previously proposed longwall mining method.

213. The Department accepts that the surface and groundwater-related impacts associated with the proposed mining are largely limited to induced drawdown impacts from the triple seam mined areas and are limited to very minor reductions in baseflow in Cataract Creek, Cataract River and Bellambi Creek. The Department also accepts that leakage from the Cataract Reservoir due to depressurisation of the regional groundwater system would be negligible.

214. These conclusions are confirmed by the Uncertainty Analysis conducted by HydroAlgorithmics Pty Ltd and accepted by peer reviewer, Dr Kalf. Further, the groundwater peer reviewer, Dr Merrick, agrees that:

> "*due to the substantial depressurisation that has been caused by earlier mining at the subject mine, and at neighbouring historical mines, the additional effects of mining the Wongawilli Seam with non- caving first workings are considered minor*".

215. The Department accepts that there are a range of regulatory options to allow WCL to acquire sufficient surface water entitlements for the modelled minor baseflow and leakage volumes. Further, the Department accepts that predicted increases in groundwater inflow to the workings is minimal and that WCL currently holds sufficient WALs to account for this groundwater take.

216. The Department considers that the current and proposed surface and groundwater monitoring programs are adequate to monitor and assess any impacts to water resources associated with the proposed project, and has recommended a condition requiring a comprehensive Water Management Plan.

7.3 Noise

217. A description of the acoustic environment surrounding the Russell Vale surface facilities site is provided in the Secretary's PAR, which should be read in conjunction with this FAR.

Noise Assessment

218. Wilkinson Murray Pty Ltd (Wilkinson Murray) prepared a Noise Impact Assessment (NIA) (July, 2019) to re-evaluate operational and traffic noise impacts associated with the Revised UEP, with reference to the *Noise Policy for Industry* (NPfI) (EPA, 2017).

219. The assessment presented a re-designed surface facilities site layout and additional noise mitigation measures to reduce the acoustic impact of surface operations on the surrounding community. The Noise Impact Assessment is included in Appendix 5 of the RPPR.

220. In response to the submission received from the EPA, the NIA was further revised to provide additional justification for the new Rating Background Levels (RBLs), that defines the background noise level, and to present refinements to the noise barrier and bund arrangement to reduce the magnitude and duration of construction noise levels. The Revised NIA is included in Appendix 3 of the RTS – Part A report.

221. The issue of establishing reasonable background noise levels was also raised by the Commission in its *Second Review Report.* In response to the EPA and Commission's issues, Wilkinson Murray confirmed that the NIA utilised one full year of noise monitoring data collected from two monitors during 2016 when the Russell Vale site was in care and maintenance and not operating, and additional data obtained over a 12-day period in June 2014.

222. The previous RBLs which were used in the 2013 and 2014 noise assessments utilised one week of noise monitoring data which may have been influenced by small fluctuations in the local acoustic environment. Wilkinson Murray consider that the new RBLs are based on long term data which provides a better representation of the site's existing background noise environment.

223. The proposed amendments to the noise barrier and bund arrangement which address EPA's concerns regarding the duration of significant construction noise are described below.

224. The EPA has confirmed that it considers the revised NIA satisfactorily meets the relevant noise guidelines and can be used as a basis for determining of the project.

Noise Mitigation Measures

225. In its *Second Review Report*, the Commission considered that additional mitigation measures are required to reduce noise impacts from both the surface facilities site to private residences and truck traffic noise impact to residents along Bellambi Lane. In particular, the Commission raised concerns about noise impacts arising from truck queuing along the site access road.

226. In response, as part of the noise assessment process Wilkinson Murray investigated a range of additional feasible and reasonable noise control measures to minimise, control and/or manage the noise impacts from the proposed project. The noise mitigation measures identified through this process to be the most effective and now proposed to be adopted include:

- *Existing bunds* – extensions to five existing bunds and raising the height of three existing bunds;
- *Container walls* and *Noise barrier* – construction of two container walls and 5m barrier;

- *New infrastructure layout* - repositioning of secondary sizer;
- *Acoustic treatments* – installation of acoustic treatment to equipment and mobile fleet;
- *Operational time restrictions* – truck movements and the use of major plant and equipment typically restricted to daytime period only; and
- *Speed limits* – speed limits of 40 km/hr on site and 50 km/hr along Bellambi Lane.

227. The location of the existing and proposed bunds, container walls and noise barrier are shown in **Figure 6**. In order to address EPA's concerns, WCL has committed to install the noise barrier and container walls prior to the commencement of construction and extend and raise the existing noise bunds within the first three months of operations.

228. The Department supports WCL's investigations into a wide range of measures to minimise noise from the proposed operations and considers the proposed measures represent all feasible and reasonable mitigation and management measures.

Predicted Noise Impacts

229. Wilkinson Murray modelled two operational scenarios, including:

- *Phase-in Operations* – initial 6-12 months of operations when ROM coal is transported off-site without processing and construction of site infrastructure is ongoing; and
- *Full Operation* – coal processing plant is operational, and the site is operating at full production capacity.

230. **Table 10** provides the predicted noise levels compared to the noise criteria or Project Noise Trigger Levels (PNTLs) at representative locations around the surface infrastructure area. The locations of the representative receivers are shown in **Figure 14**.

Table 10 | Predicted $L_{Aeq, 15min}$ noise level exceedances

Representative Receiver ID	$L_{Aeq, 15min}$ Noise Level (dBA)							
	Day		Evening		Night		Early Morning Shoulder	
	Prediction	PNTL	Prediction	PNTL	Prediction	PNTL	Prediction	PNTL
Phase-in Operations								
R1	41	44	37	43	**43**	42	43	44
R2	41	44	37	43	**43**	42	43	44
R9	37	44	36	43	**41**	39	41	41
R10		44		43	**41**	39	41	41
Full Operations								
R2	42	44	39	43	**43**	42	43	44
R9	38	44	36	43	**41**	39	41	41
R10	37	44	35	43	**41**	39	41	41

231. Night-time noise levels are predicted to exceed the PNTLs by 1 dB to 2 dB at the identified representative receivers. These receivers represent 15 properties to the north and south of the surface facilities site. Wilkinson Murray indicate that these exceedances are only predicted to occur between 2 and 3% of the night-time period in winter. At all other locations modelled (see **Figure 14**) the phase-in and full operations noise level predictions are compliant with the day, evening, night and early morning shoulder periods.

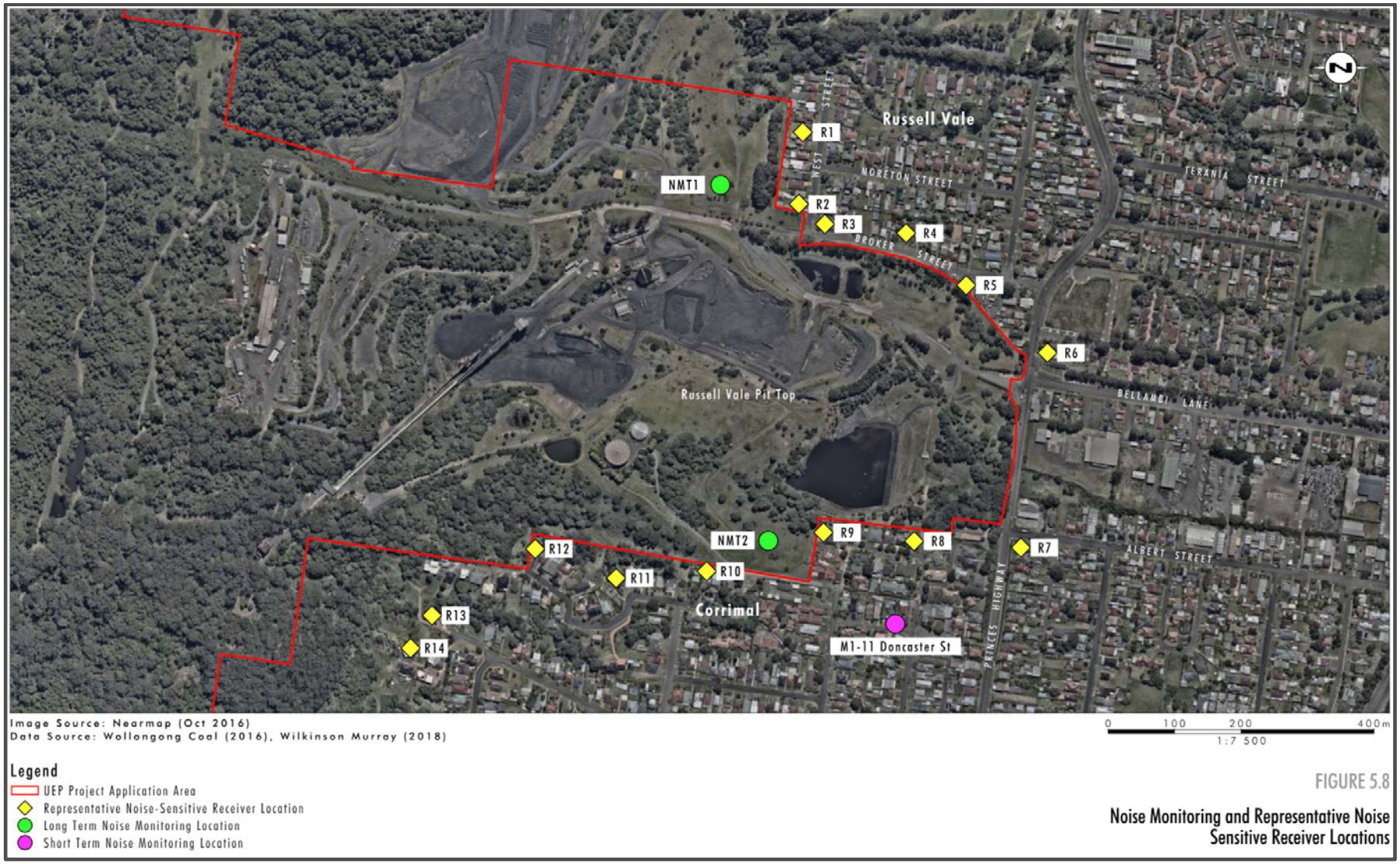

Figure 14 | Representative noise receiver location

232. According to the NPfI and the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) (NSW State Government, 2018), a 1 to 2 dB exceedance represents a negligible residual noise impact indiscernible by the average listener. Predicted noise levels indicate that no residence or privately-owned land would be subject to voluntary mitigation or land acquisition rights in accordance with the VLAMP.

Low Frequency Noise

233. In response to comments made by the EPA, Wilkinson Murray conducted a low-frequency noise assessment in accordance with the NPfI to ascertain whether any of the representative receivers should be subject to a modifying factor correction due to dominant low-frequency noise. The low frequency assessment indicates that the difference between overall 'C' weighted and 'A' weighted predicted levels are less than 15 dB at each of the representative receivers assessed, therefore it is unlikely that the receivers surrounding the site would be subject to dominant low- frequency noise. The assessment concluded that no modifying factor corrections are required to be applied.

Construction Noise

234. Wilkinson Murray predicted noise levels during the construction of the bunds, container walls and barriers (refer to Para 7.4.7) in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009). The ICNG 'noise affected' management criterion is RBL + 10 dBA and 'highly affected' management level is 75 dBA. The construction works are predicted to exceed the ICNG 'noise affected' management level at 10 representative receivers located immediately to the north (R1 to R6) and south (R7 to R10) of the surface facilities site, as well as at a local school (see **Figure 14**).

235. Exceedances range from 1 to 16 dBA above the 'noise affected' management criteria. This would occur for a short duration during the construction of the closest bunds. However, results indicate that construction noise levels would comply with the ICNG 'highly noise affected' management level at all receivers. In accordance with ICNG, WCL has committed to implement reasonable and feasible work practices to reduce these impacts, including completing the works within 3 months of the phase-in operations and consulting with affected properties about scheduling of the works.

236. The Department accepts that these construction works are necessary to minimise noise impacts for the remainder of the project, and would be would be undertaken over a very short duration (3 months) during standard construction hours (ie. no work during the evening or night periods and no work Sundays or public holidays). The Department has recommended that WCL be required to prepare a Construction Management Plan to detail the management practices that would be implemented to minimise construction noise impacts.

Traffic Noise

237. Coal from the surface facilities site has historically been delivered to the PKCT using trucks via Bellambi Lane and then onto Memorial Lane and this would continue for the Revised UEP. Under the existing approval, WCL was permitted to transport coal off site during the day and evening periods (ie. between 7am to 10pm). However, under the Revised UEP WCL committed to limiting the movement of laden outbound trucks to an average of 16 per hour between the hours of 7am to 6pm Monday to Friday and 8am to 6pm on Saturday. No coal would be transported during the evening period or on Sundays or Public Holidays.

238. In addition, WCL indicated that if coal transport is required during the evening to cater for unexpected port closures or interruptions, these movements would be further limited to an

average of 12 return trips per hour between 6pm and 10pm Mondays to Fridays only. WCL also committed to continue to enforce a voluntary speed limit along Bellambi Lane of 50 km/hr (sign posted speed limit is 60 km/hour).

239. In accordance with a recommendation made by the Commission in its *Second Review Report,* Wilkinson Murray reassessed the road traffic noise for the Revised UEP in accordance with the *NSW Road Noise Policy* (RNP) (EPA, 2011). The assessment considered the increase in noise levels from the existing traffic volumes and took into consideration an average 1.5% per year background traffic growth rate for Bellambi Lane.

240. The assessment predicted that the project would result in noise level increases above background levels of 2 dB during the day and 0.5 dB at night. Wilkinson Murray indicate that these increases meet the 2 dB increase identified in the RNP as acceptable and considered to be barely perceptible to the average person.

Conclusion

241. The Department and the EPA consider that the Revised Noise Impact Assessment has been prepared in accordance with the relevant government guidelines and policy, including the NPfI, VLAMP, ICNG and RNP.

242. The Department is aware that noise complaints have historically been made by residents near the surface facilities site and along Bellambi Lane, and notes that several submitters raised site and traffic noise from the Revised UEP as a concern.

243. The Department and the EPA support the use of container walls and noise barriers, particularity given they can be constructed quickly in the initial stages of the project. The Department accepts that these measures, in conjunction with the new site layout, acoustic treatments, enclosures and acoustic attenuation, would result in acceptable noise levels during all phases of the project in accordance with the NPfI. The Department has recommended that WCL be required to prepare and implement a comprehensive Construction Management Plan and a Noise Management Plan to ensure this is the case.

7.4 Surface Water and Flooding

244. A description of the water catchment and existing water management system at the Russell Vale surface facilities site is provided in the Secretary's PAR, which should be read in conjunction with this FAR.

245. As part of the Preferred UEP, WCL proposed to implement stormwater management and flood mitigation works at the surface facilities site. These works were based on designs presented in the *Bellambi Gully Flood Study* and associated *Bellambi Gully Flooding Approach* reports prepared by Cardno (2015). The proposed works are described in detail in the Department's AR and included measures to reduce clean runoff entering the surface facilities site stockpile area, while conveying site runoff in a controlled way to reduce flood risks to downstream areas.

246. As part of its *Second Review Report*, the Commission indicated its satisfaction with the Cardno (2015) designs and supported the inclusion of a condition requiring the implementation of the flood mitigation measures within 12 months of the date of approval.

247. Given the delay in the assessment of the Preferred UEP and ongoing regulatory action taken by the Department, in March 2018 WCL submitted a modification application to its existing PWP

consent seeking approval to implement the works identified in the Cardno (2015) reports. However, during assessment of this modification, WCL commissioned further investigations, including updated flood modelling and pipeline assessments by Engeny (2018), and proposed a different stormwater management strategy.

248. On 7 April 2020, WCL withdrew the modification application, claiming that the Engeny (2018) designs, which amongst other measures included a significant upstream levee, were challenging in terms of constructability and cost. WCL subsequently re-engaged Cardno to complete updated site surveys and flood modelling, and to provide new, more practical stormwater management and flood mitigation designs. The primary focus of these designs was to discard the use of the existing Bellambi Gully Diversion Pipeline and replace it with an open channel by-pass, consistent with the requirements of the PWP consent. The updated *Bellambi Gully Flood Assessment* (Cardno, 2020) was submitted to the Department on 5 June 2020.

249. The Cardno (2020) designs involve similar but refined stormwater and flood mitigation works to those currently approved (but not constructed) under the PWP consent (ie. designs by BECA, 2010). As described in **Table 11** and shown on **Figure 6**, the works would involve both "clean" and "dirty" stormwater designs.

Table 11 | Key stormwater and flood management components (Cardno 2020)

Component	Elements
Separation of clean and dirty water systems	• Upgrade of existing diversion channels and flow paths and construction of new diversion drains upstream of the stockpile area to ensure clean runoff is effectively captured and diverted into the new by-pass channel. • Abandonment of the Bellambi Gully Diversion Pipeline. Construction of a new open by-pass channel along the southern boundary of the surface facilities site to detain upslope catchment runoff and divert it to a reconfigured and enlarged on-site detention (OSD) basin, where flows would be attenuated before discharging into Bellambi Gully Creek. • Construction of a reconfigured and enlarged OSD basin at the east of the site, with a capacity of 27,300 m^3. • Open by-pass channel and OSD basin designed to capture runoff from a 100-year ARI flood event.
Control of flows through dirty water areas	• Construction of a new dry detention basin to capture dirty water surface runoff routed from the existing stockpile areas and upstream operational areas, reduce flow velocities of the runoff and provide course sediment removal prior to discharging into existing wet sediment basins (Dam 1 and 2). Basin designed to capture and treat runoff up to a 10-year ARI storm event, with excess stormwater overflow directed into OSD basin. • Reconfigure existing wet sediment basins to allow additional storage capacity and improve sediment removal efficiencies.
Maintenance	• Regular maintenance of the proposed and existing control structures.

250. Cardno (2020) confirmed that abandonment of the Bellambi Gully Diversion Pipeline and construction of a new open by-pass channel would significantly increase the capacity of the clean stormwater bypass and significantly reduce existing pipe blockage risks. The nature of the open channel would also allow for easy access of maintenance and visual inspection of the channel.

251. Department considered it important to conduct a comparative analysis of the new Cardno (2020) design to ensure it would perform as well or better that the currently approved BECA (2010) and previously assessed Cardno (2015) designs.

252. Cardno (2020) flood modelling utilised the TUFLOW 2D model to consider 5, 10, and 100-year Annual Recurrence Interval (ARI) and probable Maximum Flood (PMF) storm events. The modelling utilised key information contained in the *Collins Creek Flood Study* (Catchment Simulation Solutions, 2019), which is the most recent catchment wide flood modeling prepared on behalf of WCC.

253. The Cardno (2020) flood modelling confirms that the flood depths and flood velocities would be significantly improved when compared with previous designs in all flood events with the exception of the PMF, where velocities would remain more or less the same. The most significant improvements are modelled to be during a 100-year ARI when peak flow velocities would be between 57-89% reduced at key downstream locations, including Princess Highway culvert and overflow and the Bellambi Lane overflow.

254. Cardno (2020) states that the proposed design would still achieve greater separation of dirty and clean water catchment during the PMF event when compared to the previous designs, offering significant water quality benefits to downstream areas.

255. As shown on the flood impact map on **Figure 15**, a significant reduction in the extent of flooding would occur in residential areas downstream of the suite. The areas represented in yellow would no longer experience any flooding in a 100-year ARI storm event and the areas in green would experience a reduction in flood levels.

256. The Department considers that the proposed revised stormwater management strategy would provide a better outcome in regard to controlling flood waters and improving on-site water quality, when compared to the previous designs.

257. WCL indicated that the new Cardno (2020) designs are “generally in accordance with” the designs currently approved under the PWP consent (ie. designs by BECA 2010) and therefore do not require separate approval. The Department has conducted a thorough review of the Cardno (2020) designs and accepts that they are “generally in accordance with” the BECA (2010) designs.

258. The Department notes that from 21 December 2019, WCL has been in non-compliance with the terms of the Order issued on 16 December 2016 (and modified on 15 June 2018 and 15 July 2019) for failing to implement the Bellambi Gully diversion works required by its existing PWP consent. The Department takes non-compliance issues seriously and confirms that on the 23 July 2020 the Department’s Compliance Branch issued a Penalty Notice to WCL for breaching the Order. Further, a new Order was issued to conduct detailed designs and construct the works within 12 months.

Figure 15 | Extent of Reduced Flooding (1,000year ARI)

7.5 Other Issues

259. The Department has summarised its assessment of a range of other matters in **Table 12**.

Table 12 | Other Issues

Issue	Findings
Air Quality	• ERM Australia Pacific (ERM) prepared an Air Quality Assessment for the Revised UEP. The assessment included a particulate emission inventory and a modelling assessment for the both the in-phase and full operating scenarios which was undertaken in accordance EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2016). • EPA requested additional information on meteorological data, site-specific ambient air quality data and the air emissions inventory and requested a further assessment of the worst-case operating scenario. This information was included in a technical response included in Appendix 8 of the RTS – Part A report. The EPA was satisfied with this information and has confirmed that it now considers the project would meet the relevant air quality guidelines. • WCL has committed to implementing a range of best practice air quality mitigation measures including: - full enclosure of the new coal processing plant and all conveyors and material transfer points; - operation of water sprays and use of water carts on unsealed haul routes; - washing and covering of all trucks before leaving the site; - use of veneer coating on long term unworked stockpiles (>30 days) and unsealed haul routes; - revegetation/rehabilitation of exposed disturbed areas; and - proactive and reactive dust control measures, including continuing to operate the existing real-time monitoring system and modifying or suspending activities, if necessary, to minimise dust impacts. • The Department notes that historical operations at the colliery have generally complied with applicable air quality criteria and considers the proposed air quality mitigation measures represent current best management practice. • An assessment of the worst-case operating scenario, involving maximum daily ROM throughput and product transfer coinciding with worst case meteorological dispersion conditions, was undertaken at the request of the EPA. This assessment predicted that the $PM_{2.5}$ criterion would not be exceeded under worst-case conditions, however there are predicted to be exceedances of the 24-hour average PM_{10} criterion at three receptor locations to the north, when combined with the 95th percentile measured value for background. • ERM notes that the worst-case scenario is highly conservative and that it is unlikely that the maximum production levels would coincide with worst case dispersion conditions in practice. • WCL has installed additional air deposited dust monitoring stations around the site, including 3 located in local schools, and two Tapered Element Oscillating Microbalance instruments (TEOMs) capable of recording total suspended particulates (TSPs), PM_{10} and $PM_{2.5}$ emissions have been installed at the boundaries of the site, along with an automated weather station. This system allows the colliery operators to continuously monitor weather conditions and dust dispersion levels, and to modifying or suspending activities, if necessary, to minimise dust impacts. • In its Second Review Report, the Commission indicated that an effective real-time monitoring and pro-active management regime is of critical importance to minimise potential air quality impact on residents. The Department agrees and has recommended a condition requiring the existing air quality network, including real-time system, continue to operate during all stages of the Revised UEP. • The Department agrees that the predicted air quality impacts associated with the project are generally acceptable, and that the risks of adverse impacts are low and can be adequately managed through the implementation of best practice mitigation, monitoring and management measures. The Department has recommended conditions requiring WCL to: - comply with contemporary air quality criteria; - implement all reasonable and feasible 'source-based' measures to minimise dust emissions on site; - continue to implement a real-time dust monitoring program and an active air quality management system to identify and manage potential exceedances; and - develop a comprehensive Air Quality and Greenhouse Gas Management Plan.
Traffic	• Transport and Urban Planning Pty Ltd (TUP) prepared a Traffic and Transport Impact Assessment (TTIA) for the Revised UEP. The TTIA was undertaken in accordance with the requirement of *Roads and Traffic Authority's Guide to Traffic Generating Development* (2002).

Issue	Findings
	• Coal from the surface facilities site has historically been delivered to the PKCT using trucks which initially travel along Bellambi Lane and then onto Memorial Lane. This transport route is also proposed as part of the Revised UEP. • WCL has committed to limiting the movement of laden outbound trucks to an average of 16 per hour between the hours of 7am to 6pm Monday to Friday and 8am to 6pm on Saturday. An additional one truck per hour is required for transport of fuel supplies, deliveries and maintenance. No coal would be transported on Sundays or Public Holidays. • In addition, WCL indicated that if coal transport is required during the evening to cater for unexpected port closures or interruptions, these movements would be further limited to an average of 12 return trips per hour between 6pm and 10pm Mondays to Fridays only. • Speed limits along Bellambi Lane would be limited to 50 km/hr, which is 10km/hr less than the sign posted speed limit. • A designated truck parking area has been proposed on-site (see **Figure 6**) to avoid queuing of trucks onto the adjoining public road. WCL has indicated that all trucks waiting in this area would be required to switch their engines off. • The TTIA modelled the performance of the two principal intersections of the transport route between the Colliery and PKCT under existing peak hour (AM and PM) traffic conditions, as well as with the addition of average and maximum traffic to be generated by the Revised UEP. The modelling indicates that the Princes Motorway/Bellambi Lane/Colliery Access Road intersection would continue to operate at a good level of service (A/B operation) and the Memorial Drive/Bellambi Lane would continue to operate at a satisfactory Level of service (C/D operation). • WCL has committed to pay WCC a road maintenance contribution for pavement upgrade and maintenance of Bellambi Road resulting from transport of product associated with the project. WCC has estimated these costs to total $338,000 (in 2019/20 dollars). In accordance with a request from WCC, the Department has formalised this commitment via a recommended condition requiring WCL to pay the contribution costs to WCC in instalments on an annual basis over the 5-year life of the project, with payments indexed in accordance with the CPI. • The Department has also recommended that WCL be required to prepare and implement a Traffic Management Plan, in consultation with WCC and TfNSW, prior to the commencement of construction. • As requested by WCC, the Department has recommended that any coal transport required during the evening to cater for unexpected port closures or interruptions requires approval from the Planning Secretary. • The Department notes that the traffic volumes generated by the Revised UEP would generally be the same level as previously generated by the Colliery. Based on outcome of the TTIA and the recommended traffic-related conditions, the Department considers that the Revised UEP is unlikely to result in an adverse impact on road safety, the road network or road users.
Site Water Balance	• Umwelt prepared a Surface Water Impact Assessment (SWIA) for the Revised UEP (refer to Appendix 3 of the RPPR), which included a site water balance. • Water supply estimates for a 50th percentile rainfall year total 669 ML, the majority of which would be sourced from rainfall and runoff (352 ML) and groundwater inflows to the mine workings (288 ML). Site water demands for the same rainfall year are estimated at 268 ML, with the majority required for dust suppression (142 ML) and product coal (83 ML). The site would therefore have a surplus of around 400 ML/yr (maximum of 515 ML/yr for a 90th percentile rainfall year). These surplus water volumes are similar to those previously generated at the Colliery. • Surplus water would be required to be discharged from the existing licensed discharge points (LDPs) in accordance with WCLs existing EPL (12040). The current EPL allows discharge of up to 2.4 ML/day (912 ML/yr) of treated water from LDP 2 into Bellambi Gully under dry weather conditions, with exceedances allowed during wet weather provided measures are taken to minimise pollution. • The Department accepts that the current LDP discharge limits are sufficient for the predicted discharge requirements of the Revised UEP. The Department has recommended that WCL is required to prepare a Site Water Balance as part of the Water Management Plan.
Biodiversity	• Biosis prepared an updated Ecological Impact Assessment for the Revised UEP (see Appendix 4 of the RPPR). In addition to upland swamps, Biosis identified that the sensitive habitats in the study area include rocky outcrops and the aquatic environments of Cataract River, Cataract Creek and Bellambi Creek and their tributaries. • The Revised UEP does not require the direct removal of native vegetation or fauna habitat. The key concern relating to biodiversity impacts is the potential for habitat alteration due to subsidence. Biosis concluded that changes to the mining method have addressed the issue of subsidence related impacts to the biodiversity values of the study area, and that the first working mining method would not result in perceptible levels of subsidence and negligible impacts to rocky and aquatic environments. • WCL currently manages and monitors impacts to biodiversity in accordance with their Biodiversity Management Plan (2018). WCL has committed to review and update this plan to reflect the Revised UEP and associated management and monitoring measures.

Issue	Findings
	• The Department accepts that it is unlikely that there would be any significant impacts to biodiversity as a result of the Revised UEP. The Department has recommended a performance measure requiring not more than negligible environmental consequences on threatened species, populations or their habitats and endangered ecological communities (EECs). • The Department has also recommended the existing Biodiversity Management Plan be updated to reflect the proposed monitoring program within 3 months of commencing the development, in consultation with BCD and to the satisfaction of the Secretary.
Cliffs and Steep Slopes	• As discussed in detail in the Department's AR, there are numerous sandstone cliff formations located within the Hawkesbury Sandstone outcrop in the project area. Most of these are less than 5m high. Multiple rock falls are evident across the site. Some were caused by previous mining and others have occurred naturally. • SCT reported that the small subsidence movements that are forecast for the proposed mining layout are not expected to cause perceptible impacts to any cliffs or steep slopes in the vicinity of the project area. • The Department considers the bord and pillar mining method would result in substantially reduced risk of mining-induced rock fall compared to previously proposed longwall mining. As the vast majority of the land above the proposed mining area is owned and managed by WaterNSW for the purpose of maintaining Sydney's water supply, the public safety risks associated with rock falls are considered to be extremely low and manageable. Consequently, the Department believes that subsidence impacts on cliffs and steep slopes can be managed via a Land Management Plan required as part of the Extraction Plan.
Visual Amenity	• Umwelt completed a Visual Amenity Assessment for the Revised Project (refer to Section 5.10 of the RPPR). This assessment was updated in the RTS – Part A report to consider the visual impacts associated with the redesigned surface facilities site, particularly in relation to the rearrangement of the noise bunds and use of container noise walls (refer to Section 3.2.2 of the RTS- Part A report). • Residential properties border the north, east and southern boundaries of the surface facilities site. The visual assessment considered 9 viewpoints surrounding the site. Umwelt indicated that direct views to some of the existing site infrastructure, including the administration building disused surge bin, are possible from some residential locations, however a combination of topography, vegetated bunds and mature screening vegetation obscures most views of the active surface facilities areas. The site is generally not visible from publicly accessible areas or public roads. • The Revised UEP proposes changes to the surface facilities site layout to strategically relocate infrastructure to more shielded locations. For example, the old surge bin would be replaced and relocated to the toe of a batter and the proposed coal processing plant would be sited away from residences on the western side of the site. • The visual analysis indicated that the top of the proposed container noise wall would be visible to residents to the north and north-east of the site, however views would be filtered or obscured by existing established vegetation and topographic features. Umwelt proposed visual mitigation measures to reduce visual impacts of the noise walls, including planting of vegetation screening and painting the container wall in non-reflective natural grey/green tones to minimise contrast against the surrounding environment. • WCL also committed to other measures to minimise the visual impact of the site, including: - regular maintenance of existing vegetation screening surrounding the site; - progressive revegetation of earthen noise bunds; - painting all visual infrastructure in non-reflective natural grey/green tones; and - installation and operation of all outdoor lighting in accordance with the Australian Standard AS4282. (INT) 1995 – Control of the Obtrusive Effects of Outdoor Lighting. • The Department recognises that there are existing views of the surface facilities site and considers that the changes to the views would not present significant additional adverse visual impacts, particularly with implementation of the proposed visual mitigation measures. The Department considers that visual mitigation could be effectively managed through the preparation and implementation of a Visual Impact Management Plan and has recommended a condition accordingly. • On this basis, the Department considers the visual impacts of the Revised UEP acceptable.
Reject Material	• WCL estimated that the Revised UEP would generate approximately 200,000 tpa of course reject material. WCL proposed to either beneficially use the reject material by selling it for fill, using it on-site for rehabilitation and/or emplacing it underground within the former mine workings. • Both the EPA and WaterNSW requested additional information on the potential impacts associated with the beneficial reuse and underground emplacement of the reject material, including geochemical testing and a description of the proposed underground emplacement methods. This information was included as part of the additional information submitted by WCL (see **Appendix G**). • WCL confirmed that reject material that cannot be beneficially reused as fill material would be Initially emplaced within roadways for the former Wongawilli longwalls and then within the roadways generated by the first workings associated with the Revised UEP mining. These roadways are mostly dry, therefore in the short term, groundwater interaction with the emplaced reject material is expected to be limited. In the longer term, groundwater would drain into these roadways and they would fill with groundwater as the former workings re-pressurise.

Issue	Findings
	• WCL confirmed that geochemical testing of reject samples indicated that the material has negligible total sulphur and can be regarded as non-acid forming. The reject material has excess acid-neutralising capacity and a high factor of safety with respect to potential acid generation. The metal concentrations in the reject material are unlikely to present any environmental issues from heavy metals or the generation of saline run-off. • WCL confirmed that the reject material impact on the quality of surface water and groundwater is expected to be low and underground emplacement would meet the requirements of NorBE on water quality. Further, WCL confirmed that the reject material would meet the EPA's *Coal Washery Rejects Order 2014* and *Coal Washery Rejects Exemption 2014*, which govern the beneficial reuse of reject material. • WCL committed to conducting further testing of the reject material once the mine moves into production mode, and again every 6 months, to re-confirm its suitability for underground emplacement and beneficial use. • Both the EPA and WaterNSW did not object to the proposed approach, but recommended conditions requiring ongoing monitoring and prioritisation of beneficial use of reject materials. The Department accepts WCLs approach to ongoing monitoring and agrees that if the material meets the EPA's regulations, it should be prioritised for beneficial reuse. The Department has recommended specific waste management conditions to give this effect, as well as ensuring that reject material is only emplaced underground if it meets requirements of NorBE in regard to water quality.
Aboriginal Heritage	• The RPPR indicated that, as the proposed mining is predicted to result in imperceptible subsidence, the project is not expected to result in any impacts to Aboriginal heritage sites. Further, no additional disturbance is proposed at the surface facilities site beyond that currently disturbed and/or approved. The Revised UEP is therefore considered unlikely to result in any impacts to Aboriginal Heritage. • As described in the Department's PAR, numerous Aboriginal heritage sites have been previously identified in the UEP application area. Most sites are associated with rock shelters in sandstone cliff formations and grinding groove sites on sandstone outcrops. • To monitor and manage any impacts to Aboriginal heritage sites as a result of the Revised UEP, WCL proposes to update its existing Aboriginal Cultural Heritage Management Plan (ACHMP) in consultation with the Registered Aboriginal Parties, BCD and the Department. In accordance with BCD's recommendations, WCL has confirmed that the ACHMP would include updated baseline archaeological recording for Aboriginal heritage sites (including rock art, rock shelter and grinding groove sites) and updated Aboriginal community consultation records and outcomes. • In its submission on the RTS, BCD further recommended that the risk of heritage impacts from marginally stable pillars in the Bulli Seam be considered as part of the updated AHMP. The Department notes that this risk exists independent of the proposed mining The Department accepts that the revised mining method substantially reduces the risk of subsidence-related impacts to Aboriginal heritage sites when compared to the previous longwall mining proposal. • However, the Department agrees with BCD that WCL should be required to revise the existing ACHMP to include updated baseline, subsidence risk and consultation outcomes; and comply with a subsidence impact performance measure prohibiting harm to Aboriginal objects. The Department has recommended conditions accordingly.
Non-Aboriginal Heritage	• In its RTS – Part A report, WCL confirmed that the items of heritage significance in the application area include the: - Cataract Dam (Reservoir) listed on the State Heritage Register and the Wollondilly Local Environmental Plan (LEP) 2011; - Illawarra Escarpment listed on the Registers of the National Estate and NSW National Trust; and - Russell Vale Colliery (previously the South Bulli Colliery) listed in the Wollongong LEP 2009 and specific items in the Illawarra Regional Environmental Plan No. 1. • The Revised UEP would not impact on the listed heritage items, or items of potential heritage significance. • The Heritage Council recommended that no extraction should occur beneath or within 1 km of the reservoir curtilage. In its response, WCL confirmed that no mining is proposed beneath the fully supply level of the reservoir, except the Wonga Mains development which are already approved under the PWP consent. WCL noted the conclusions of the subsidence assessment, which indicated that the proposed bord and pillar mining would not have any perceptible impact on the Cataract Reservoir. • As discussed in Section 7.1 of this report, the Department accepts these conclusions and does not believe any further limitations on the extent of mining in the vicinity of the Reservoir are warranted. Similarly, the Department accepts that the proposed mining method would result in imperceptible impact on the Illawarra Escarpment. The Department also notes that the DS NSW has confirmed that it has no concerns with the development of bord and pillar workings within the Notification Area for Cataract Reservoir. • As requested by Heritage Council, the Department has recommended a condition requiring an extensive subsidence monitoring program, including monitoring of natural and built features such as the Illawarra Escarpment and Cataract Reservoir, be undertaken as part of the Extraction Plan process. • In relation to the management and protection of heritage items at the Colliery surface facilities site, WCL committed to updating the existing Conservation Management Plan (prepared in 2013) for the Colliery

Issue	Findings
	prior to implementing any site upgrades. The Department has recommended that this be undertaken as part of a Historic Heritage Management Plan process. • The Department accepts that any impacts to historic heritage sites as a result of the Revised UEP would be minor and manageable via the recommended Extraction Plan and Heritage Management Plan processes.
Greenhouse Gas Emissions	• Umwelt prepared a Greenhouse Gas and Energy Assessment (GHGEA) for the Revised UEP (refer to Appendix 8 of the RPPR). Greenhouse gas emissions and climate change were key issues raised in public and special interest group submission on the project. • The GHGEA predicted that the project would generate approximately 1,523,000 t CO2-e of Scope 1 and 2 emissions primarily from the combustion of diesel, release of fugitive emissions and the use of electricity over the 5-year mine life. The project is also forecast to be associated with approximately 9,624,000 t CO2-e of Scope 3 emissions, which would be generated by third parties who transport and consume the project's coal products. • The GHGEA indicated that the forecast project-related emissions would contribute to 0.0005% of annual global GHG emission estimates. Based on this estimate, Umwelt considered that the project, in isolation, is unlikely to influence global emissions and climate change trajectories. • Further, the GHGEA noted that for Australia to achieve its commitment under the Paris Agreement, it would need to achieve a 28% (ie. 762,000,000 t CO2-e) reduction in GHG emissions by 2030. The forecast project-related emissions would increase the required national mitigation effort by approximately 0.19%. This increase is unlikely to affect Australia achieving its national mitigation targets in any material way. • The Department notes that coal produced from the Revised UEP would most likely be used for steel-making in India which is a signatory of the Paris Agreement. • In accordance with the Mining SEPP, the Department considers that the coal resource associated with the Revised UEP is significant based on the high quality of the coal and the overall socio-economic benefits of the project. • The Department has recommended that WCL be required to prepare and implement an updated Air Quality and Greenhouse Gas Management Plan to detail measures to minimise GHG emissions during both the construction and operational phases of the project.
Remediation and Closure	• In response to a request from the RR, WCL provided updated rehabilitation and post-mine closure commitments associated with the Revised UEP (refer to **Appendix F**). • Rehabilitation objectives proposed by WCL included ensuring: - the site areas remain in a safe, stable, non-polluting and sustainable state; - preservation of heritage items; - socio-economic benefits of the rehabilitated sites are maximised; and - the long term maintenance of the sites is no greater than the surrounding landforms and land uses. • WCL proposed both short and long term rehabilitation activities to achieve these objectives, as well as indicative completion criteria, which WCL propose to refine to become site-specific and measurable when detailed closure plans are prepared. • Further, WCL proposed indicative post-mining land uses which are consistent with the current land zoning. These include urban development on the land which includes the surface facilities site, private environmental management/recreational lands at the escarpment face and inclusion in Metropolitan Special Areas the Woronora Plateau lands to the west of the escarpment. • RR confirmed that it is satisfied with the rehabilitation and mine closure commitments proposed. • The Department has recommended that these commitments be further refined and included into a Rehabilitation Management Plan, which is to be prepared in consultation with the Department, DPIE Water, BCD, WaterNSW and WCC, in accordance with conditions imposed on the Mining Lease in accordance with the *Mining Act 1992*, prior to the commencement of mining operations. • In accordance with a further request from the RR, WCL confirmed that it has recently provided an increased rehabilitation liabilities security deposit totalling $12,354,000 to MEG.
Economics	• Cadence Economics Pty Limited (Cadence Economics) prepared an Economic Impact Assessment (EIA) (July 2019) incorporating a Cost Benefit Analysis (CBA) and a Local Effects Analysis (LEA) to estimate the net benefits of the Revised UEP to the State and the local benefits to the Wollongong region. The EIA was undertaken in accordance with the Guidelines for the economic assessment of mining and coal seam gas proposals (NSW Government, 2015) (Economic Guideline) and the associated Technical Notes. • In relation to concerns raised in public submissions about the financial status of WCL and whether the company is "fit and proper", the Department takes the view of the Commission in its Second Review

Report. A fit and proper test is not a requirement under the EP&A Act and is an irrelevant consideration for a consent authority when making a determination on a development application

- Direct benefits of the Project are estimated to be $116.9 million (net present value or NPV), including royalties of $33.2 NPV. The project is also expected to generate total indirect benefits of $57.4 million in NPV terms, comprised of $43.6 million of worker benefits and $13.8 million of supplier benefits.
- The Revised UEP is expected to generate modest incremental indirect costs on the NSW community of about $19,158, which is the cost of water licences and greenhouse gas emissions attributable to NSW. Cadence Economics notes that the majority of mitigation and monitoring costs (ie. $4.3 million in NPV terms) associated with environmental impacts relating to the UEP are incorporated in the capital and operating costs of the project. This includes implementing the subsidence, air, noise, water, biodiversity (swamp), traffic and transport, and visual amenity mitigation measures and monitoring systems.
- In addition, Cadence Economics has confirmed that allowance has been made in the capital expenditure for the additional noise bunds and barriers, installation of a water treatment plant and the purchase of surface water licences.
- Numerous objectors questioned the quantum of economic benefits that would be generated by the Revised UEP. As required by the Economic Guidelines, Cadence Economics conducted a sensitivity analysis of the CBA in order to test the sensitivity of the estimate of net economic benefit by also considering upper and lower bound discount rates, and varying the size of a number of input parameters. The sensitivity analysis estimated the range of net benefit as $117.3 to $220.1 million in NPV terms.
- In its Second Review Report the Commission indicated the need to consider the potential long-term management and operational costs of the water treatment system that may be required to treat water outflows from the adit following mine closure as well as the long term on-going cost for monitoring water quality after mine closure.
- WCL committed to a funding arrangement which would be sufficient for 10-years of monitoring and treatment of adit discharge water. WCL estimate that construction and ongoing operation of a reverse osmosis (RO) plant to treat 110 ML/year of water to a potable standard over a 10 period would cost around $2.4 million. WCL has confirmed that these costs have been incorporated in the $215 million allocated for business discontinuity, closure and rehabilitation.
- As discussed in Section 7.3 of this report, the Department has recommended that WCL be required to prepare and conduct ongoing reviews of a Adit Water Discharge Management Plan to guide appropriate site specific and regional treatment options and funding arrangements for future water discharges from the adit, in consultation with WaterNSW and the EPA and to the satisfaction of the Secretary.
- The LEA focused on the net economic impacts of the Revised UEP to the local community in the Wollongong region of NSW. The project would directly employ over 200 workers and purchase goods and services from suppliers located in the region. The LEA indicated a total estimated net benefit of $14.3 million in NPV terms to local suppliers and employees in the Wollongong local area. This is driven largely by:
  - benefits to local workers of $8.7 million based assuming that 20% of the mine's direct employees are located in the local area; and
  - benefits to local suppliers of $5.5 million assuming that 20% of the inputs to production are suppled from the region.
- Cadence Economics conducted a sensitivity analysis of the LEA which indicated a lower bound net benefits estimate of $14.2 million in NPV terms and an upper bound estimate is $17.4 million in NPV terms.
- Of the public and special interest group submissions received in support of the project, 76% (53 submissions) cited local employment opportunities as a positive outcome of the project. The Revised UEP is expected to require an operational workforce of 205 employees and contractors during the 5-year operation, as well as an additional short-term construction workforce of 22 employees.
- The LEA conservatively assumes that only 20% of the additional workforce would be sourced from the local government area. The Department considers that, in reality, the number of directly employed local workers would be substantially higher. As stated in the PAR, when the colliery was previously operating at full production, 62% of the Russell Vale employees resided locally in the Wollongong LGA and 90% resided in the Illawarra region.
- Further, as part of the resource utilisation and economic benefits assessment of the Revised UEP completed by MEG, it was estimated that "*these direct mine jobs would result in approximately 800 additional indirect jobs in both mine and non-mine related services*".
- The Department accepts that the Revised UEP would generate a significant number of direct and indirect jobs, and that a significant percentage of the workers would likely reside in the local and regional area. Further, the Department expects that a large proportion of workers' salaries would be reinvested and circulated within the region.

Issue	Findings
	• The Department recognises that there is inherent uncertainty in estimating costs and benefits over the life of a mine. However, when considering conservative assumptions, the Department is confident that the project would result in significant economic benefits to the local and regional areas and to the State of NSW, and is therefore considered desirable and justified from an economic efficiency perspective
Social	• Umwelt prepared a Social Impact and Opportunities Assessment (SIOA) (July 2019) to assess the social impacts of the Revised UEP and to develop options and opportunities to improve social outcomes. The SIOA was undertaken generally in-line with the *Social Impact Assessment: Guidelines for State Significant Mining Petroleum Production and Extractive Industry Development* (DPIE, 2017) (SIA Guideline). • Key issues raised in consultation on the SIOA included reduced amenity from dust and noise impacts; road safety from heavy vehicles; impacts on the water catchment and water quality; limited perceived economic benefits; inadequate mine management and financial viability of WCL; potential decreases in property values and GHG emission impacts. The broader community also identified positive social perceptions related to local employment and increased opportunities for community investment. • The Department has carefully considered the Revised UEP's environmental impacts in its above assessment. Generally, these impacts are within the relevant criteria, or else mitigation and management strategies are proposed to reduce the impact to acceptable levels set under NSW Government policy. The Department acknowledges that people may experience these impacts differently and that there would likely be some residual amenity impacts to the community. However, the Department considers that the specialist assessments and additional information provided by WCL satisfactorily address the environmental social impacts of the project. • The Department considers that the project would provide positive economic benefits to the local and regional areas, even when the most conservative costing assumptions are considered. • A key perceived social issue identified in the SOIA was that the Revised UEP could potentially de-value properties surrounding the pit top site. Umwelt provided an historical analysis of property values in the Russell Vale and Corrimal area dated back to 2009. The analysis demonstrated that property values in the areas surrounding the pit top site have increased steadily and in line with the broader market since 2009. Given the historical presence of the Russell Vale operation in the community during this time, Umwelt considered the likelihood of property prices decreasing as a result of the Revised UEP to be low. • Further, Umwelt noted that key elements of the Revised UEP have been designed to minimise impacts on surrounding land uses, including additional noise and dust mitigation works around the pit top to reduce amenity impacts and control on the speed and timing of trucks entering and leaving the site. • In this context, the Department notes that the Russell Vale surface facilities site predates the development of the existing residential areas that surround it. Given the long history of mining in the area and the acceptable predicted amenity impacts associated with the Revised UEP, the Department accepts that adverse effects on property values are unlikely. • The Department notes that the Russell Vale Colliery has been operating in the community for many years and that the Revised UEP is an extension to existing operations, as opposed to a new development. The Department considers that with the implementation of the extensive additional mitigation measures proposed at the surface facilities site, the Revised UEP would not substantially change the extent of impacts on social amenity that were experienced during operations prior to 2015, and may result in reduced impacts. It also acknowledges that the project would result in social and economic benefits, particularly for local and regional employment and benefits to local suppliers. • Although some residual social impacts may be experienced as a result of the Revised UEP, the Department has recommended conditions to manage and minimise these impacts. The Department considers that conditions requiring a range of other management plans, continued operation of a CCC, making documents available on WCL's website, operation of a community hotline and maintaining a complaints register would enhance WCL's social accountability and transparency.

8 Evaluation

260. The Department has carried out a detailed assessment of the merits of the Revised UEP, having regard to the Commission's *Second Review Report*, relevant statutory obligations, all information provided by WCL, NSW government agencies, and members of the public and special interest groups. The Department has also considered advice on the Revised UEP from the IESC and independent experts.

261. The Department considers that the Revised UEP bord and pillar mining method has addressed key issues raised by the Commission, particularly in relation to the uncertainty associated with subsidence and groundwater impacts as a result of proposed longwall mining in the multi-seam mining environment present at Russell Vale. The proposed mining has been designed to be long term stable with negligible risk of pillar failure and is predicted to result in very minor to negligible subsidence-related impacts on built and natural features, including Cataract Reservoir and upland swamps.

262. The Department considers that the new surface facilities site layout, significant infrastructure upgrades and operational restrictions would minimise amenity impacts on neighbouring residences to acceptable levels.

263. The Department recognises the relationship of the coal resource to the existing approved operations, and the synergies this presents for utilising existing infrastructure and reducing the capital costs.

264. The Department also considers that the Revised UEP would result in economic benefits to the local and regional areas and to the State of NSW and is therefore justified from an economic efficiency perspective.

265. The Department has recommended a range of detailed conditions to address the residual impacts and risks of the Revised UEP (see **Appendix J**). The conditions were developed in conjunction with government agencies and WCC. WCL has reviewed and accepted the recommended conditions.

266. Overall, the Department considers that the benefits of the Revised UEP outweigh its residual costs, that the project is in the public interest and is approvable, subject to the strict conditions of consent.

267. The Minister for Planning and Public Spaces has formally requested that the Commission conduct a further hearing for the project, prior to determination.

268. This FAR is hereby presented to the Commission to determine the application.

14/9/2020

Steve O'Donoghue
Director
Resource Assessments

14/9/2020

Mike Young
Executive Director
Energy, Resources and Compliance

Appendices

Appendix A – Summary of Previous UEP Assessments and Commission Reviews

Original UEP (2009)

The original UEP application was submitted by the former owner of the mine, Gujarat NRE Coking Coal Ltd, to the then Department of Planning in August 2009. The application proposed a significant expansion of longwall mining in the Wongawilli Seam across the Wonga East area (11 longwall panels) and Wonga West area (7 longwall panels) to extract 31 Mt of ROM coal over a project life of 18 years.

The Department considered the original environmental assessment for this application inadequate for public exhibition. However, the environmental assessment was subsequently revised and was exhibited by the Department between February to April 2013. During the exhibition, the Department received 840 submissions on the original UEP. Of the submissions received from the general public, 44% objected and 56% supported the project.

Preferred UEP (2013)

In response to substantial issues raised in agency and public submissions and independent expert reviews undertaken for the Department, WCL made significant changes to the original UEP. The key changes included removing all proposed longwall mining in the Wonga West area and one panel from the Wonga East area; reducing the total ROM coal production from 31 Mt to 4.7 Mt; and reducing the proposed project life from 18 years to 5 years. The changes were outlined in WCL's Preferred Project Report (PPR), which was submitted in conjunction with the Response to Submissions (RTS) in September 2013. These reports were publicly exhibited by the Department between October to November 2013. During the exhibition, the Department received an additional 21 submissions, with all submissions from the general public (13) objecting to the Preferred UEP.

The Department completed a preliminary assessment of the merits of the preferred UEP which concluded:

> "that the preferred UEP would generate a number of positive benefits and that the predicted impacts can be effectively managed through the implementation of strict conditions. Consequently, the Department considers that the project is in the public interest and should be approved, subject to stringent conditions".

The Planning Secretary's PAR for the Preferred UEP was referred to the Commission in December 2014 for review, with public hearings.

Commission's First Review (early 2015)

The Commission's First Review Report was submitted to the then Minister for Planning in April 2015. The report concluded that:

> "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 water quality and quantity in the Sydney Catchment Area and satisfies all the other issues identified in this review".

The Commission made 15 recommendations regarding additional work and assessment that was required to be carried out prior to a determination being made.

WCL's Response to Commission's First Review (late 2015)

WCL completed a significant amount of additional work and assessment in response to the recommendations made by the Commission, including:

- establishment of an Integrated Risk Assessment Panel and completion of an Integrated Risk Assessment;

- implementation of extensive additional technical studies, including re-running the groundwater model;
- expansion of the existing network of piezometers within and surrounding the upland swamps;
- preparation of a revised economic assessment; and
- additional noise, dust and flooding assessments associate with the surface facilities site.

This work and assessment were presented in WCL's *Response to Planning Assessment Commission Review Report – Parts 1 and 2*, which were submitted to the Department in July 2015 and September 2015, respectively.

In November 2015, following consideration of the Commission's First Review Report and WCL's response, the Department prepared an Addendum Report (AR) which concluded that the Department was *"satisfied that the project is, on balance, in the public interest, and recommends that it be approved, subject to the recommended conditions of approval"*. The AR was referred to the Commission in October 2015 for a second review of the Preferred UEP, including a further public hearing.

Commission's Second Review (2016)

The Commission's *Second Review Report* was submitted to the then Minister for Planning in March 2016. The review included expert advices on subsidence and groundwater provided by Professor Jim Galvin and Dr Colin Mackie, respectively. The Commission concluded that the social and economic benefits of the Preferred UEP were most likely outweighed by the magnitude of impacts to the environment. The key considerations driving this finding included:

- uncertainty regarding the potential for and degree of loss of surface water flow due to subsidence and cracking, including associated risks to upland swamps;
- substantial reliance on mitigation strategies to deal with residual impacts, and uncertainty about the type and effectiveness of mitigation measures proposed;
- unresolved issues in relation to noise impacts on nearby residents; and
- short term nature of the social and economic benefits of the project and questions in relation to valuation of external costs.

The Commission recommended that any further consideration of the Preferred UEP should have regard to these issues.

Appendix B – Revised Preferred Project Report and Response to Second PAC Review

See Departments website at:
https://www.planningportal.nsw.gov.au/major-projects/project/39666

Appendix C – Consideration of the IEPMC Final Report (Part 2) Recommendations

	Recommendation	Consideration
Subsidence effects, impacts and consequences on water supply		
1	The concept of subsidence effects, subsidence impacts and subsidence consequences should continue to be embedded in mining assessment processes.	• The revised Subsidence Assessment includes consideration of subsidence effects, impacts and consequences of the proposed bord and pillar mining method. • As discussed in Section 7.2, the Revised UEP mine plan has been specifically designed to address uncertainty regarding potential subsidence effects, subsidence impacts and subsidence consequences on natural and built features. The predicted low level of subsidence would result in negligible risks to such features, including water resources and swamps.
2	There is a need for a higher focus on the assessment of regional impacts and consequences associated with groundwater depressurisation, including if and how far these impacts and consequences might extend beyond the mining footprint.	• The revised Groundwater Assessment included consideration of regional impacts and consequences associated with groundwater depressurisation, including if and how far these impacts and consequences might extend beyond the mining footprint. • As discussed in Section 7.3, GeoTerra/GES identified that regionally, the closest mining operation to Russell Vale is Appin Mine, which is located 13 km to the north-west and operates within the Bulli Seam. Dendrobium Colliery is located 12 km to the south-west and also operates within the Wongawilli Seam. • There is no cumulative depressurisation resulting from the proposed mine workings and other adjoining mines. • Further, GeoTerra/GES confirmed that groundwater cumulative losses include the impacts from all of the adjoining historical, decommissioned mining areas as well as depressurisation due to the proposed Wongawilli Seam extraction. • GeoTerra/GES confirmed that these impacts, however, do not expand into, or interact with, the current or proposed mining operations at Appin Mine and Dendrobium Colliery.
3	Research is required into: - quantifying the height of complete drainage above mine workings - the reliability of geomechanical modelling of rock fracturing and fluid flow for informing the calibration of groundwater models and, thus, also replacing the use of the Tammetta and/or Ditton equations - establishing the potential for regional movement on bedding planes and the potential consequences that this may have, especially in the vicinity of water storages.	• As discussed in Section 7.3, GeoTerra/GES indicated that, as the proposed mining would result in no perceptible subsidence impacts, stream and groundwater system connectivity impacts associated with the proposed mining are largely limited to induced drawdown impacts from the triple seam mined areas. Induced groundwater drawdown impacts are predicted to be limited to minor reductions in baseflow in Cataract Creek, Cataract River and Bellambi Creek. • Similarly, the modelled transfer of stored water within Cataract Reservoir to the underlying groundwater system is predicted to be so small as to be not measurable at the end of the proposed mining. SCT also assessed the risks to the stored waters of Cataract Reservoir in relation to the Corrimal Fault and Dyke D8 and concluded that there is no credible risk of water flow along major structures from Cataract Reservoir as a result of the proposed mining in the Wongawilli Seam.

	Recommendation	Consideration
		• The Department considers that the geomechanics associated with bord and pillar mining are well understood and that the models used to assess subsidence and groundwater impacts associated with the Revised UEP are adequate.
4	Management plans need to make provision for the early detection and control of the elevated risk that variance between predicted and measured subsidence effects, both conventional and non-conventional, when mining in areas sensitive to subsidence impacts, such as the Greater Sydney Water Catchment. This is especially the case when utilising longwall mining since the method is inflexible to immediate changes in mine layout to address of deviations from predictions.	• The Revised UEP does not propose to use longwall mining methods. The revised project involves mining by means of non-caving bord and pillar mining technique only, with workings designed to be long term stable with minimal subsidence impacts. • As discussed in Section 7.2, the Department has recommended a condition requiring the preparation and implementation of a comprehensive Extraction Plan to monitor and manage the potential subsidence effects, subsidence impacts and environmental consequences of the proposed mining in the multi-seam environment. • To ensure early detection and control of any elevated risks of variance between predicted and measured subsidence effects, the Extraction Plan would be required to continue to include trigger-action-response plans (TARPs). TARPs would provide a clear basis to decide whether the performance measures are being met and certainty in determining the appropriate adaptive management response to exceedances and breaches. Triggers would need to be based on meaningful indicators, developed in consultation with relevant agencies and authorities.
5	Impact assessments for watercourses should consider not only rockbars and the pools behind them, but all features along the full lengths of watercourses.	• The Revised UEP bord and pillar mining is predicted to have no perceptible subsidence impacts on surface features or watercourses, including rockbars or pools. However, the Department has recommended that stream and riparian vegetation health and channel stability (geomorphology) continue to be monitored along watercourses as part of the Water Management Plan required as part of the Extraction Plan process.
6	The Department should review the practicality of specifying water quality and iron staining as components of performance measure for only a proportion (or percentage) of the length of a watercourse.	• The Department notes that iron staining has typically arisen as a result of fracturing of the Hawkesbury Sandstone strata either naturally or as a result of longwall mining related subsidence. However, very little evidence of staining has been found as a result of previous longwall mining at Russell Vale. • The Revised UEP mine design is not expected to result in cracking of the Hawkesbury Sandstone strata or perceptibly increase the iron staining impacts associated with previous mining. The Department has recommended performance measures requiring negligible subsidence impacts and environmental consequences along all watercourses, including Cataract River, Cataract Creek and associated tributaries.
Groundwater and surface water		
7	All future mine approvals should include performance measures that are objective and can more precisely determine the cumulative impacts and consequences of a mine project progression. Performance measures should include changes in pressure and/or pressure gradients where these have the potential to impact on surface water losses.	• As discussed in Section 7.3, baseflow (surface water) impacts associate with the Revised UEP are predicted to be limited to minor reductions in baseflow in Cataract Creek, Cataract River and Bellambi Creek. These baseflow reductions are so minor that they are unlikely to be observable for all practical purposes. • The Department has recommended suite of performance measures requiring negligible subsidence impact and environmental consequences for all watercourses, water supply (Cataract Reservoir)

Recommendation		Consideration
		and swamps. The height of groundwater depressurization is required to be monitored via the groundwater monitoring program required as part of the Extraction Plan.
8	When consent conditions make provision for meeting the requirements of performance measures by avoidance, mitigation or remediation, they need to be quite specific about the scope of attributes that have to be avoided, mitigated or remediated and the verification standards that avoidance, mitigation and remediation measures have to satisfy.	• The Department accepts that the Revised UEP proposed bord and pillar mining technique, which has been designed to be a long term stable mine plan, would avoid the range of potential subsidence related impacts that would otherwise typically be associated with longwall mining.
9	TARP triggers for surface and groundwater should be based on meaningful indicators developed in consultation with relevant agencies and authorities with oversight and regulatory responsibilities for mining.	• As discussed in Section 7.3, the Extraction Plans would be required to continue to include trigger-action-response plans (TARPs) to provide a clear basis to decide whether or not the performance measures are being met and certainty in determining the appropriate management response to exceedances and breaches. The TARP triggers would be required to be based on meaningful indicators, developed in consultation with relevant agencies and authorities.
10	Uncertainty analysis of groundwater and surface water models should follow the uncertainty analysis workflow recommended by the IESC.	• As discussed in Section 7.3, HydroAlgorithmics Pty Ltd prepared an Uncertainty Analysis for the revised Groundwater Assessment report (refer to Appendix C). The analysis was conducted in accordance with the IESC uncertainty analysis guidelines: *Uncertainty analysis—Guidance for groundwater modelling within a risk management framework (Middlemis, H. and Peeters, L.J.M., 2018*). An independent peer review of the Uncertainty Analysis was conducted by Dr Frans Kalf of Kalf and Associates. Dr Kalf indicated that "*the analysis presented by HydroAlgorithmics (HA) is considered to be suitable and valid*".
11	Independent expert peer review should become a more regular part of the groundwater and surface water model assessment process.	• As discussed in Section 7.3, an independent peer review of the revised Groundwater Assessment was undertaken by Dr Noel Merrick who is a highly experienced hydrogeologist and groundwater modeller with extensive experience conducting groundwater assessment and reviews in the Southern Coalfields (refer to Appendix 2 of the RTS – Part B report). Dr Merrick concluded that "…*the Russell Vale Groundwater Model has been developed competently and is "fit for purpose" for addressing the potential environmental impacts from the proposed underground mining operations and for estimating indicative dewatering rates*".
12	An inter-agency working group should be set up with the task of identifying acceptable levels of surface water loss due to mining.	• The Department accepts this recommendation but notes that it is a government level consideration and is outside of assessment of merits associated with the Revised UEP. • However, the Department accepts that predicted surface water losses associated with the Revised UEP would be limited to very minor reductions in baseflow in Cataract Creek, Cataract River and Bellambi Creek. These baseflow reductions are considered to be so minor that they are unlikely to be observable for all practical purposes.
13	Additional flow gauges and improvements to existing flow gauges should continue to be undertaken selectively by mining companies in consultation with WaterNSW, or by WaterNSW (with potential financing from the companies) including aiming for at least 4 years of baseline flow data at sites that are important for quantifying water supplies including future performance measure sites and control sites.	• As discussed in Section 7.3, monitoring of surface and groundwater in the Wonga East area has been undertaken since the 1990s and the monitoring network has expanded progressively since this time. A reasonable baseline of surface and groundwater information has therefore been established to allow tracking of any changes to surface and groundwater levels and quality to be assessed over time.

Recommendation		Consideration
		• WCL currently undertakes stream monitoring at 16 sites along Cataract Creek and 3 sites along Cataract River involving bi-monthly monitoring of stream water quality, water levels, water flow; visual and photographic recording; and changes in channel stability and erosion. • The Department has recommended a condition requiring a comprehensive review of the current Water Management Plan (including surface water monitoring program) be undertaken for the Revised UEP, in consultation with BCD, WaterNSW, DPIE-Water and WCC by suitably qualified and experienced persons. This would provide WaterNSW with the opportunity to request additional flow gauging sites, if considered necessary.
14	Monitoring of contaminant concentrations should be integrated with flow monitoring at operational mines to support calculation of contaminant loads at the main inputs to reservoirs and other key locations and to improve understanding of future contaminant loading risks. Relevant contaminants should be agreed between primary stakeholders.	• It is understood that this recommendation was referring to potential water quality impacts in watercourses affected by fracturing of bedrock from mining. The IEPMC noted that monitoring of surface water quality in the areas of the Dendrobium and Metropolitan mines has confirmed the widespread presence in some watercourses of iron, resulting in iron staining and other geologically sourced contaminants associated with fracturing. • The Revised UEP mine design is not expected to result in surface fracturing or adverse surface water quality impacts. The Department has recommended performance measures requiring negligible subsidence impacts and environmental consequences along all watercourses, including Cataract River, Cataract Creek and associated tributaries. The Department has also recommended the existing extensive surface water monitoring program continue and be updated as part of the Water Management Plan.
15	Government should ensure that sufficient water entitlements are retained by mines operating in the Special Areas to cover surface water losses resulting from mining- induced effects.	• Under the WM Act, WCL is likely to be required to hold a surface WAL for up to a maximum of 10.04 ML/yr baseflow reductions within the Upper Nepean and Upstream Warragamba Water Source in accordance with the *Water Sharing Plan for the Greater Metropolitan Region Unregulated Rivers Water Source 2011* (Surface Water WSP). • The Department understands that there are currently limited water entitlements in the Surface Water WSP. WCL has indicated that it is currently investigating trade options to acquire sufficient surface water entitlements. If sufficient entitlement cannot be acquired via trading options, WCL has indicated that it would consider a range of alternative mechanisms in consultation with the NRAR, including: - offset via apportionment from current groundwater entitlements; - offset of surface water basic landholder right for harvestable rights from WCL Freehold land within the Surface Water WSP; - direct controlled allocation by the Department/Minister of additional entitlement from the management zone under Section 65 of the WM Act; or - other mechanism to be determined in consultation with NRAR. • The Department can confirm that Government is currently addressing the issue of surface water licensing in Special Areas. However, the Department notes that the required surface water entitlements associated with the Revised UEP are very minor and may be considered negligible.

Recommendation		Consideration
		• The Department has held discussions with relevant agencies in relation to the surface water licensing situation and notes that alternatives and options exist outside of the licensing regime under the WM Act. Accordingly, the Department has recommended a condition requiring WCL to obtain all necessary water licences for the project under the *Water Act 1912* and/or the WM Act, or an alternative mechanism agreed by the Planning Secretary, DPIE Water and WaterNSW.
Swamps		
16	Future swamp monitoring and modelling programs should be designed to: - provide a hydrological balance for representative swamps, sufficient to identify any mining-induced changes in soil moisture and in baseflow down the exit stream; and to provide vertical leakage rates as inputs to groundwater models, in order to quantify how much of the leakage is diverted back into the catchment or elsewhere. - link any changes in swamp vegetation to changes in water table position, soil moisture content and soil organic carbon content. - identify the presence of and any changes in obligate swamp fauna such as the giant dragonfly (Petalura gigantea).	• As discussed in Section 7.2, WCL has committed to review and update its existing Upland Swamp Monitoring Program (USMP) to reflect the Revised UEP and associated management and monitoring measures. WCL has confirmed that monitoring of potential biodiversity impacts would continue to focus on subsidence impacts as well as primary impacts to groundwater systems associated with upland swamps, and surface water flow and quality in creeks. It is proposed that this would include: - continued existing surface water (water levels, water quality and stream flows), groundwater (levels and quality) and soil moisture monitoring regime and increase the frequency of monitoring during the active mining period; - installation of an additional 8 shallow piezometers within 6 swamps (CCUS14, CRUS4, CCUS1, CCUS2, CRUS1 and CRUS6) located above proposed mining areas and monitor groundwater levels (continuously and monthly manual) and groundwater quality and soil moisture (monthly and weekly during active mining period); - continued subsidence monitoring along existing subsidence monitoring lines, and extension of the program to include relevant monitoring for areas within the Revised UEP mine plan; - visual inspection of the rock formation that forms the base of upland swamps CCUS4, CCUS5, CCUS10, BCUS4 and BCUS6 during routine monitoring; - monitoring of groundwater levels and water quality in upland swamps using the existing network of shallow groundwater piezometers; and - continued monitoring of surface outflow monitoring in upland swamp CCUS4 using the existing box weir. - use of nested monitoring bores and environmental water tracers to identify whether a hydraulic connection exists between the perched aquifers upon which the swamps rely and the Upper Hawkesbury Sandstone aquifers; - swamp-specific ecological monitoring, including updated surveys of current biodiversity, species distribution and swamp condition and records of seasonal variation in community composition to measure natural variation within and among swamps; and

	Recommendation	Consideration
		- calculation of swamp-specific water balances based on monitoring data, including for control swamps, to differentiate changes caused by mining from those associated with natural and climatic variability. • BCD and the Department consider that the existing and proposed monitoring within and around upland swamps would be sufficient to determine if the performance measures and other conditions of approval are being met and would provide valuable information on the magnitude of any mining-related impacts to swamps. • The Department has recommended that an USMP be prepared as part of the Extraction Plan, in consultation with BCD, NSW Water and DPIE-Water.
17	Government organisations, especially WaterNSW, should support and/or carry out independent research (possibly on a cost recovery basis from the mining sector) to provide regional information on swamp hydrology and ecology. In particular, continuation of monitoring at sites where there is a substantial basis of data should be a priority.	• The Department accepts that the comprehensive upland swamp monitoring program (as described above) would provide valuable regional information on swamp hydrology and ecology. • As discussed in Section 7.2, in accordance with the Swamp Offset Policy, the swamp monitoring program would be required to continue for a period of 12 months after mining, and use control sites to understand natural variability. The nature and duration of post-mining monitoring duration would be required to be reconsidered if a significant variation in groundwater levels is detected (i.e. a shallow groundwater level lower than the baseline at any monitoring site). • In addition, the Department believes longer-term monitoring of swamp hydrology and ecology should be required to add to the regional information and databases on swamps. The Department has recommended that the nature and duration of this monitoring program be prepared in consultation WaterNSW and BCD as part of the updated USMP.
18	Annual performance reports, end-of-panel reports and reports on studies required by development consent conditions, should: - integrate hydrological and ecological impact and consequence assessments to include discussion of the inter-related changes in hydrological and ecological consequences for swamps, rather than having only discrete chapters on each - include results for the entire period of monitoring, rather than just the previous year, that should be assessed, not only for the current mining area but for previous mining domains.	• As discussed in Section 7.2, the Department has recommended that the updated USMP; - integrates hydrological and ecological monitoring which fully satisfies Before After Control Impact (BACI) design principles; - includes a program for consideration of long term monitoring data for swamp hydrology and swamp vegetation (including baseline, during and post mining) to identify any statically significant changes and compliance with performance measures; and - incorporates any relevant findings from swamp research projects into the swamp monitoring program. • The USMP would form part of the Extraction Plan process, which is required to be reviewed at the end of each block of mine panels.
Reverse onus of proof		
19	The concept of Reverse Onus of Proof should be discarded.	• Noted. The Department accepts the IEPMC conclusion that the "concept of Reverse Onus of Proof has been superseded in practice by the requirement for a Proponent to demonstrate the reasonableness (or overall merit) of its proposals in relation to the significant natural features that may be exposed to subsidence impacts, thereby enabling the decision-maker to assess

Recommendation		Consideration
		reasonableness (or merit) in the context of the importance of the features, the predicted risks and any management options for those risks" (pg. 59).
Cumulative impacts		
20	Environmental data from mine companies should be housed in a centralised data portal, such as the SEED portal, prioritised according to its value in assessing cumulative impacts of concern.	• The Department notes that contemporary mining approvals require all key information, reports and monitoring results associated with mining operations to be made publicly available on the mining company website. Amongst other information, this includes approved strategies, plans and programs; reporting on the environmental performance of the projects; and comprehensive summaries of the monitoring results of the project. This requirement has been recommended by the Department for the Revised UEP.
Remediation		
21	Remediation should not be relied upon for features, including watercourses and swamps, that are highly significant or of special significance (as per the guidance provided by the Planning Assessment Commission Panels for the Metropolitan Coal Project and the Bulli Seam Operations Project).	• The Department accepts that the Revised UEP mining method is not predicted to impact on any surface features, including watercourses and swamps, that are highly significant or of special significance. Remediation of such features is therefore not expected to be required. • Consequently, the Department has recommended subsidence impact performance measures requiring negligible subsidence impacts and environmental consequences to watercourses and swamps. If these performance measures are exceeded, and it is not reasonable or feasible to remediate the subsidence impact or environmental consequence; (or remediation measures implemented fail) then WCL must provide a suitable offset to compensate for the subsidence impact or environmental consequence. • In recognition of the fact that currently there is no proven method to rehabilitate swamps or evidence that swamps can be remediated, the Department has required swamp offsets in accordance with the Swamp Offset Policy. Where swamp monitoring demonstrates that the actual impact is greater than predicted, more than negligible and that the shallow groundwater does not return to its natural regime within 12 months, the Department has recommended a condition requiring WCL to identify and retire a swamp offset equivalent to the actual impact within six months.
Offsets		
22	There is a need to update provisions for offsetting water loss from the catchment resulting from all mining operations.	• Refer to consideration under Recommendation 15 above.
23	Provisions for offsetting impacts on water quantify and water quality associated with mining operations in the catchment need to give careful consideration to long term impacts, post-mine closure.	• The Department notes that baseflow losses associated with the Revised UEP are predicted to be minor and unlikely to be observable for all practical purposes. • The Department accepts that there is an issue of uncertainty of the influence of the long term water outflows and quality from the Russell Vale mine adit, post mine closure. As discussed in Section 7.3, GeoTerra/GES predict that a maximum of approximately 0.3 ML/day (110 ML/year) would discharge out of the adit from around 2057. The adit discharge water is likely to require treatment prior to discharge into receiving waters or reuse.

Recommendation		Consideration
		• WCL has confirmed that it is currently exploring a range of beneficial reuse options, ranging from potable, recreational and industrial reuse. WCL propose that the feasibility of these options would be subject of specific project review and analysis in consultation with relevant agencies, including WaterNSW. In the interim, WCL has committed to a funding arrangement which would be sufficient for 10-years of monitoring and treatment of adit discharge water. • The Department acknowledges that the long term management of outflow water from adits is a regional issue that faces all historic and current mining operations in the Southern Coalfields. The Department accepts that WCL is required to take responsibility for management and operational cost of the water treatment systems following mine closure, but believes that further and ongoing studies are required in order to make informed decisions on a regional basis regarding longer-term treatment, discharge and reuse options within the water catchment as a whole. Accordingly, the Department has recommended that WCL prepare an Adit Water Discharge Management Plan, within 12 months of project approval, in consultation with WaterNSW and the EPA and to the satisfaction of the Secretary. The Plan would need to detail the: - location of all mine related adits and other potential groundwater leakage points; - predicted volumes and discharge water quality from each point; - timelines for discharges; - avoidance, mitigation and monitoring measures; - proposed short and long term treatment, discharge and beneficial reuse options, including associate environmental impacts and costs; - outcome of consultation with other mines in the region and relevant agencies to ensure outcomes are based on strategic regional considerations; and - short and long term funding arrangements which consider appropriate water quality targets based on an agreed potential end use. • The Department has recommended that the Adit Water Discharge Management Plan be reviewed every 5 years and the outcomes used to inform regional policy and strategy on long term management of adit discharge water within the water catchment. • The Department notes that water is not predicted to discharge from the Russell Vale adit(s) until around 2057. Therefore, there is a sufficient period of time following mine closure and before water is predicted to discharge from the adit(s) in which to develop and implement appropriate outcomes.
Rehabilitation and mine closure planning		
24	A study be undertaken to better understand and quantify the potential impacts of historic and current mining for long-term cumulative impacts on water quantity and quality in the Greater Sydney Water Catchment, for the purpose of properly informing mine design, mine rehabilitation and closure planning, planning assessments, offsets and rehabilitation bonds.	• Incremental impacts on water resources associated with the Revised UEP are predicted to be very minor. Long term cumulative groundwater losses from Russell Vale are also minor and do not expand into, or interact with, the current or proposed mining operations at Appin Mine and Dendrobium Colliery.

	Recommendation	Consideration
		• The Department notes that monitoring of surface and groundwater in the Wonga East area has been undertaken since the 1990s and the monitoring network has expanded progressively since this time. A reasonable baseline of surface and groundwater information has therefore been established to allow tracking of any changes to surface and groundwater levels and quality to be assessed over time. The Department therefore accepts that there is, and would continue to be, sufficient water quantity and quality data available in the Russell Vale vicinity to inform a regional study, if required. • As described in response to Recommendation 23 above, long term future water outflows from the Russell Vale mine adit are proposed to be mitigated, managed and funded via implementation of the Adit Water Discharge Management Plan.
25	SEARs and any conditions of consent should include a focus on the long term implications of mining proposals for rehabilitation and mine closure planning.	• The NSW Resource Regulator (RR) is responsible for rehabilitation and mine closure under the provision of the Mining Act 1992. RR has confirmed that it is satisfied with the rehabilitation and mine closure commitments proposed by WCL for the Revised UEP. • The Department has recommended that these commitments be further refined and included into a Rehabilitation Management Plan, which is to be prepared in consultation with the Department, DPIE Water, BCD, WaterNSW and WCC, to the Satisfaction of the RR, prior to the commencement of mining operations.
26	Impact assessments associated with proposals for mining in the Special Areas need to include detailed consideration of rehabilitation and mine closure planning that extends beyond management of the landscape.	• Refer to responses to Recommendations 23-25 above, noting key plans relating to rehabilitation and mine closure planning would be required to be prepared in consultation with WaterNSW.
Government access to expertise		
27	Government needs to establish a sustainable mechanism for accessing objective and timely expert advice when assessing mining applications and performance outcomes and this mechanism needs to be supported by probity guidelines that have regard to experts having worked in the mining industry in order to gain their expertise.	• The Department agrees that accessing objective expert advice is critical for complex mining proposals such as at Russell Vale where mining is proposed in a multi-seam environment. As part of the Revised UEP assessment, the following independent peer reviewers were commissioned: - Professor Bruce Hebblewhite – review of the Subsidence Assessment and Quantitative Assessment of the Risk of Pillar Failure report; - Dr Noel Merrick – review of the revised Groundwater Assessment • Both reviewers are considered by the Department to be independent, highly qualified and experienced experts their fields and acceptable persons to undertake the peer reviews.

Appendix D – Consideration of EPIs and Objects of the EP&A Act

Consideration of the provisions of any Environmental Planning Instrument (EPI) that applied to the Preferred UEP was provided in Section 4 and Appendix C of the Secretary's PAR. Further consideration is provided below, due to changes in the Revised UEP or revisions to the EPIs.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

- *Non-discretionary development standards for mining (Clause 12B)*

The Department has reconsidered the cumulative noise, cumulative air quality, air blast overpressure, ground vibration and aquifer interference associated with the Revised UEP proposal. The Department is satisfied that a range of additional noise and air quality mitigation measures would be implemented and that the development would comply with the relevant noise and air quality standards. No blasting is proposed therefore no air blast overpressure or ground vibration is predicted. Groundwater impacts associated with the Revised UEP bord and pillar mining method have been assessed against the *Aquifer Interference Policy* and the development is predicted to satisfy the minimal impact considerations for less productive porous rock water sources and perched, ephemeral aquifers.

- *Compatibility of propose mine, petroleum production or extractive industry with other land uses (Clause 12)*

The Department is aware that mining at Russell Vale has been undertaken since 1887 and that since this time urban development has encroached on the surface facilities site. The Surface facilities site is now bordered along three sides by residential land uses.

The Revised UEP represents a continuation of historic and existing land use. The Revised UEP proposes significant improvements to the layout and operation of the surface facilities to minimise impacts to the surrounding community. This includes range of additional noise and air quality mitigation measures. With these measures in place, combined with a comprehensive monitoring program, the Department considers that the Revised UEP can operate within acceptable environmental standards and be compatible with existing land use.

- *Consideration of voluntary land acquisition and mitigation policy (Clause 12A)*

The noise and air quality impact assessments for the Revised UEP have considered the applicable provisions of the *Voluntary Land Acquisition and Mitigation Policy.* With the range of additional noise and air quality mitigation measures proposed, the development would not trigger the voluntary mitigation or acquisition rights established under the policy.

- *Compatibility of proposed development with mining, petroleum production or extractive industry (Clause 13)*

The Department considers that the Revised UEP has been designed to be long term stable and that it is compatible with, and would not adversely affect, adjacent or future mining-related activities.

- *Natural resource management and environmental management (clause 14)*

The Department considers that the Revised UEP bord and pillar mining method reduces the potential for subsidence-related mining impacts on groundwater, surface water and biodiversity (including swamps) within the Cataract Reservoir catchment. The Revised UEP is not precited to have any perceptible impact on natural surface features including upland swamps, cliffs, steep slopes, drainage lines, creeks, Cataract Creek or the Cataract Reservoir. The Department has recommended conditions aimed at ensuring the development is undertaken in an environmentally responsible manner, including but not limited to, conditions in relation to water resources, threatened species and biodiversity and greenhouse gas emissions.

- *Resource Recovery (Clause 15)*

While there would be a reduction in resource recovery as a result of the bord and pillar mining technique proposed, the Department and MEG are satisfied that the development can be carried out in an efficient manner that optimises resource recovery within the complex environmental constraints present at Russell Vale. The Revise UEP coal resource is considered to be significant based on:

- its high-quality hard coking coal used for the production of steel and other metallurgical purposes;

- its strategic location in the Southern Coalfields and its close proximity to key regional infrastructure, in particular PKCT;
- the relationship of the resource to the existing PWP, and the synergies this presents for utilising existing infrastructure and reducing the capital costs;
- the socio-economic benefits of the development including:
  - employment of 205 people during operation and 22 during construction;
  - $35.3 million in capital investment;
  - A net economic benefit of $174 million (net present value) for the NSW community and $17 million to the Wollongong local area through employment and expenditure; and
  - significant royalty revenue to the State.

- *Transport (clause 16)*

Coal from the surface facilities site has historically been transported by truck to the PKCT. This is not proposed to change under the Revised UEP. Given the lack of available alternative transport infrastructure, the Department accepts this transport method. The Department has recommended conditions restricting transportation hours and requiring WCL to make road maintenance contributions to Wollongong City Council.

- *Rehabilitation (Clause 17)*

The Department has recommended that the existing rehabilitation requirements for the PWP continue to apply for the Revised UEP. This includes conditions requiring WCL to prepare and implement a Rehabilitation Management Plan and to meet a number of rehabilitation objectives, including ensuring public safety, decommissioning of surface infrastructure and restoring ecosystem functions. The post mining land use would be subject to detailed closure planning in consultation with the relevant authorities.

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

This SEPP applies to land within Sydney's drinking water catchment and aims to provide healthy water catchments whilst permitting development compatible with this goal. The SEPP also limits a consent authority from granting consent to proposed development under Part 4 unless it would have a neutral or beneficial effect on water quality.

A large part of the proposed Revised UEP area is located within the boundary of the Sydney Drinking Water Catchment. A detailed assessment of the impacts of the development on surface and groundwater together with a consideration of submissions received from relevant agencies including WaterNSW and relevant peer reviews and reports in the RPPR and RTS is provided in this report. From this detailed assessment, the Department is satisfied that:

- the potential for loss of surface water base flows as a result of mining would be minor and not result in any significant environmental consequences on Cataract Creek or any negative impacts on the water quality of the stored waters within Cataract Reservoir (which is part of Sydney's drinking water supply);
- proposed bord and pillar mining can be managed to avoid significant impacts on groundwater resources;
- monitoring and management of water quality and potential for groundwater depressurisation would occur in accordance with a comprehensive Water Management Plan prepared in consultation with relevant government agencies; and
- short and long term water discharge from the adit(s) would be managed via the development and implementation of an Adit Water Discharge Management Plan.

The Department is therefore satisfied that the development would have a neutral impact on water quality within the catchment and that the development would not contravene the aims of this SEPP.

State Environmental Planning Policy (Infrastructure) 2007

The Infrastructure SEPP requires the consent authority to notify relevant public authorities about development that may affect public infrastructure or land. The Department notified all relevant public authorities, including RMS (now

Transport for NSW) and Wollongong City Council, particularly in relation to the project's proposed traffic generation on the road network. The Department carefully considered the advice from these authorities in its assessment of this application.

State Environmental Planning Policy No 33 – Hazardous and Offensive Development (SEPP 33)

The preliminary risk screening completed for the Revised UEP indicates that hazardous materials to be stored at the site are below the SEPP 33 screening threshold. The Department therefore accepts that the proposed Revised UEP operations are not potentially hazardous and a preliminary hazard analysis is not required. Hazardous materials would continue to be managed in accordance with the mine's existing management practices and updated where new procedures do not exist for a work activity.

State Environmental Planning Policy No 44 (Koala Habitat Protection) (SEPP 44)

This SEPP requires the consideration of the presence of any core or potential Koala habitat. Wollongong and Wollondilly LGAs are listed as an area to which this SEPP applies. The subsidence impact assessment and ecological impact assessment prepared for the Revised UEP conclude that the revised mine plan would not result in any perceptible surface subsidence and is not considered to have any potential to perceptibly impact on natural surface features, therefore the propose development is considered to have negligible risk of impacting any potential Koala habitat. The Department accepts that the proposal would have a negligible impact to potential Koala habitat, and consequently the project is consistent with the aims, objectives and requirements of SEPP 44.

State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55)

The Department accepts that there are currently no recorded contamination sites within the Revised UEP application area and that there is limited risk of any significant material contamination of the land. Any minor areas of the surface facilities site which may require the management for the presence of contaminants such as hydrocarbons from fuel storage could be easily managed and/or remediated under conditions of consent and/or an EPL for the site. The development is therefore considered generally consistent with the aims, objectives, and provisions of SEPP 55.

Objects of the EP&A Act

Table C1 | Consideration of the proposal against relevant objects of the EP&A Act

Objects of the EP&A Act		Consideration
(a)	*to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources*;	The Revised UEP meets this object because it: • represents a continuation of a long-standing historical land use which is permissible on the subject land; • would involve substantial improvements to the surface facilities operations to minimise noise and air impacts on the community; • would provide substantial royalties of up to $33.2 million (present value); and • would provide considerable employment and economic benefits to the region.
(b)	*to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment*;	The Revised UEP is consistent with ecologically sustainable development principles as it would: • result in negligible subsidence-related risks and impacts to built or natural features, including the Cataract Reservoir or upland swamps; • not require clearing of any native vegetation; • provide employment and business opportunity in the local/ regional area using an existing/ upgraded infrastructure area; • provide a high quality metallurgical coal resource for steel making while contributing to royalties to the NSW Government; • have no impact on Aboriginal cultural heritage or historic heritage.
(c)	*to promote the orderly and economic use and development of land*;	The Revised UEP represents a continuation of a long-standing historical land use which is permissible on the subject land. The proposed surface facilities would be constructed and operated within the current surface facilities boundary, and would not require clearing of native vegetation. The proposed underground operations would result in negligible subsidence-related risks or impacts to built or natural features within the drinking-water catchment.
(e)	*to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats*;	The Revised UEP meets this objective as it would result in improvements to the surface facilities operations to minimise noise and air impacts on the community. The Revised UEP would result in negligible environmental consequences to native plants and animals, ecological communities or their habitats, including upland swamps.
(f)	*to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage)*; and	The Revised UEP would not directly impact Aboriginal cultural heritage or historic heritage.
(i)	*to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State;*	The Department has assessed the Revised UEP application in consultation with Wollongong City Council, Wollondilly Shire Council and other relevant NSW government authorities, and given consideration to the issues raised by these agencies in its assessment.
(j)	*to provide increased opportunity for community participation in environmental planning and assessment*.	The Department publicly exhibited the Revised UEP application and considered all submissions in its assessment.

Appendix E – Submissions

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/39666

Appendix F – Agency Advice

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/39666

Appendix G – IESC Advice and Applicant's Response

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/39666

Appendix H – Response to Submissions and Additional Information Reports

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/39666

Appendix I – Consideration of Commission's Second Review Report Findings

Commission's *Second Review Report* Findings	Department's Consideration
Mining SEPP as Amended	
Compatibility with Other Land Uses (Clause 12): • The Commission is not convinced that "*the project is not likely to result in unacceptable impacts to surrounding land uses in general*".	• Refer to Section 7 of Department's Final Assessment Report (FAR). • The Revised UEP proposes a new site layout and significant upgrades of the surface facilities which would minimise amenity impacts on neighbouring residences to acceptable levels. In summary, these include: - use of bunds, container walls and noise barriers; acoustic treatments of key infrastructure; conveyor and plant enclosures; equipment attenuation; and operational time restrictions to minimise noise generation and impacts; - operation of water sprays; use of water carts; enclosure of conveyors and plant; truck washing; and rehabilitation of exposed disturbed areas to minimise dust generation and impacts; - implementation of surface water management system to improve the quality of water flowing off site and reduce downstream flood impacts; and - controls of speed and timing of trucks entering and leaving the site.
• Potential noise impacts on adjacent residences would not be negligible or beneficial, if reasonable benchmarks for existing noise were used for the assessment instead of using the "modelled maximum noise levels for 1Mtpa".	• Refer to Section 7.4 of Department's FAR. • Wilkinson Murray Pty Ltd (Wilkinson Murray) prepared a Noise Impact Assessment (NIA) (July, 2019) to re-evaluate operational and traffic noise impacts associated with the Revised UEP, with reference to the Noise Policy for Industry (NPfI) (EPA, 2017) (refer to Appendix 5 of the RPPR). • Wilkinson Murray confirmed that the NIA utilised one full year of noise monitoring data collected from two monitors during 2016 when the Russell Vale site was in care and maintenance and not operating, and additional data obtained over a 12-day period in June 2014. The previous RBLs which were used in the 2013 and 2014 noise assessments utilised one week of noise monitoring data which may have been influenced by small fluctuations in the local acoustic environment. Wilkinson Murray consider that the new RBLs are based on long term data which provides a better representation of the site's existing background noise environment. • The EPA has confirmed that it considers the revised NIA satisfactorily meets the relevant noise guidelines and can be used in determination of the project.
• Traffic noise impact on residences along Bellambi Lane requires reassessment.	• Refer to Section 7.8 of Department's FAR. • Traffic noise impact on residents along Bellambi Lane was re-assessed as part of the Revised UEP NIA. The assessment predicted that the Revised UEP would result in noise level increases above background levels of 2.0 dB during the day and 0.5 at night. Wilkinson Murray indicates that these increases are within the 2 dB increase margin recognised by the *NSW Road Noise Policy* as acceptable and considered to be barely perceptible to the average person.

Commission's *Second Review Report* Findings	Department's Consideration
• The Commission is not satisfied that the project will have a neutral or beneficial effect on water quality, as is required for consent to be granted under the objectives of the Sydney Drinking Water Catchment SEPP.	• Refer to Section 7.3 of Department's FAR. • A large part of the proposed Revised UEP area is located within the boundary of the Sydney Drinking Water Catchment. A detailed assessment of the impacts of the development on surface and groundwater together with a consideration of submissions received from relevant agencies including WaterNSW and relevant peer reviews and reports in the RPPR and RTS is provided in the Department's FAR. From this detailed assessment, the Department is satisfied that: - the potential for loss of surface water base flows as a result of mining would be minor and not result in any significant environmental consequences on Cataract Creek or any negative impacts on the water quality of the stored waters within Cataract Reservoir (which is part of Sydney's drinking water supply); - proposed bord and pillar mining can be managed to avoid significant impacts on groundwater resources; - monitoring and management of water quality and potential for groundwater depressurisation would occur in accordance with a comprehensive Water Management Plan prepared in consultation with relevant government agencies; and - short and long term water discharge from the adit(s) would be managed via the development and implementation of an Adit Water Discharge Management Plan. • The Department considers that the development would have a neutral impact on water quality within the catchment and that the development would not contravene the aims of this SEPP.
Voluntary Land Acquisition and Mitigation Policy (Clause 12A): • The Commission considers the potential noise increase on nearby residences would be significant, not beneficial or negligible, if assessment is based on criteria derived from the *Industrial Noise Policy*.	• Refer to Sections 7.4 and 7.8 of Department's FAR. • The NIA for the Revised UEP was prepared with reference to the *Noise Policy for Industry* (NPfI) (EPA, 2017). The NIA predicted that the project noise levels would not exceed the Project Trigger Noise Levels (PTNLs) by more than 1-2 dB(A) at any residences under worst case noise scenarios. According to the NPfI and the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) (NSW State Government, 2018), a 1 to 2 dB exceedance represents a negligible residual noise impact indiscernible by the average listener. Predicted noise levels indicate that no residence or privately-owned land would be subject to voluntary mitigation or land acquisition rights in accordance with the VLAMP. • The Department has recommended that WCL be required to prepare and implement a comprehensive Noise Monitoring and Management Plan for the project.
Significance of the Resource (Clause 12AA): • Significance of the Project's coal resource lies mainly in its ability to maintain coal production from the Southern coalfield and utilisation of the PKCT, which is currently underutilised.	• Refer to Section 3 of Department's FAR. • Approval of the Revised UEP would allow up to 3.7 million tonnes (Mt) of run-of-mine to be extracted from Russell Vale over a period of 5 years. This coal would be transported to the PKCT for export. • In its submission on the Revised UEP, MEG considered that the project represents an efficient development and utilisation of coal resources which would foster significant social and economic benefits, including an estimated 800 additional indirect jobs in both mine and non-mine related services.

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Water and Subsidence:	
Potential loss of surface water due to subsidence related cracking: • Experts remain concerned about the potential loss of surface water flow in Cataract Creek via subsidence related cracking.	• Refer to Sections 7.3 of Department's FAR. • WCL has substantially revised the proposed mine extension to address these concerns. Longwall mining is no longer proposed. The Revised UEP involves mining by means of non-caving bord and pillar mining technique only, with workings designed to be long term stable with minimal subsidence impacts. • SCT Operations Pty Ltd (SCT) completed an updated Subsidence Assessment (October, 2019) for the Revised UEP (refer to Appendix 5 of the RTS – Part A report). The assessment predicted that the proposed mining would not result in any strata deformation or cracking impacts which would affect surface flow and groundwater interactions. • GeoTerra Pty Ltd and Groundwater Exploration Services Pty Ltd (GeoTerra/GES) jointly prepared a revised Groundwater Assessment (February 2020) to predict the potential groundwater and stream base flow impacts relating to the Revised UEP (refer to Appendix 1 of the RTS – Part B report). GeoTerra/GES indicated that, as the proposed mining would result in no perceptible subsidence impacts, stream and groundwater system connectivity impacts associated with the proposed mining are largely limited to induced drawdown impacts from the triple seam mined areas. Induced groundwater drawdown impacts are predicted to be limited to minor reductions in baseflow in Cataract Creek, Cataract River and Bellambi Creek. These baseflow reductions are considered to be so minor that they are unlikely to be observable for all practical purposes.
• A reasonable degree of uncertainty still surrounds the potential for fracturing to extend all the way to the surface over portions of the application area and, if it did how it could be responded to by adaptive management or be remediated.	• Refer to Section 7.2 of Department's FAR. • The Revised UEP mine has been specifically designed to be long term stable with minimal subsidence impacts, including negligible risk of surface cracking or stream and groundwater system connectivity. • SCT prepared a Quantitative Assessment of the Risk of Pillar Failure quantify the probability of pillar failure and potential magnitude and extent of impacts to swamps and water resources should pillars be destabilised by the Revised UEP (refer to Appendix G of the FAR). The assessment was peer reviewed by Professor Bruce Hebblewhite. Using the UNSW pillar design approach, SCT confirmed that the 30 m wide pillars in the Wongawilli Seam at 380 m deep have a less than 1 in 100,000 (0.001%) probability of failure. • On the scale used by the National Emergency Risk Assessment Guidelines (NERAG) scale, this equates to less than an "extremely rare" likelihood level. SCT concluded that the probability of impact to swamps is either zero if all the goaf areas in the Bullii Seam can be confirmed as having subsided (which is considered highly likely) or 0.028% if not. The NERAG rate a likelihood of less than 0.1% as being "very rare" or less than 1 event in 10,000 years. SCT concluded in the unlikely event any goaf areas in the Bulli Seam have not previously subsided and does become destabilised the incremental impact on water resources is expected to be less than 0.02 ML/day or 7 ML/year. The likelihood of this impact occurring is determined to be "unlikely" based on the NERAG risk scale. On this basis, SCT considers the risk of impact to water resources to be negligible. • Overall, the Department considers that the proposed bord and pillar mining method significantly reduces subsidence-related risks and impacts when compared to the previously proposed long-wall mining methods. Risk of impact to swamps and water resources is considered negligible. These conclusions are supported by Professor Hebblewhite, the IESC and WaterNSW.
Integrated Risk Assessment (IRA):	

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• Independence of the IRA is questioned. A risk assessment by oneself of one's own work, even if a recognised expert in the field, does not constitute a truly independent or high level risk assessment. • The context of the IRA did not extend to the effects of water quantity and quality on fauna and on water dependent species along watercourses. • Levels of consequences were defined in qualitative terms, as opposed to quantitative, hence the risk outcomes lack objectivity for those not involved in the risk assessment process.	• The IRA assessed risks associated with the previously proposed Preferred UEP. Risks of impact to water resources and biodiversity (particularly swamps) associated with the Revised UEP have been re-assessed and predicted to be significantly reduced when compared to the Preferred UEP. Longwall mining is no longer proposed. The Revised UEP proposed bord and pillar mining method has been specifically designed to be long term stable with minimal subsidence impacts. The outcomes of the Quantitative Assessment of the Risk of Pillar Failure associated with the Revised UEP are discussed above.
Sealing of Mine Adit to Management Water Inflow: • If sealing of an adit constitutes a control for managing water inflow, then this control should be risk assessed to determine its likely practicality and effectiveness and hence residual risk. • Consideration of sealing is inconsistent with earlier documentation which indicated that the adits would remain open with water outflows being managed by a water treatment system. If this is the case then the ongoing costs of management and maintenance of the treatment system should be included as part of the mine closure plan. • The flow loss pathway appears to have been considered only in the context of adaptive management in the risk assessment. Experts questioned how the adaptive management regime would be invoked and considered that this raised significant concerns based on experiences at other locations in the Southern Coalfields which suggest that remediation would prove difficult if not impossible.	• Refer to Section 7.4 of Department's FAR • Sealing of the Russell Vale adit is not proposed. GeoTerra/GES predict that a maximum of approximately 0.3 ML/day (110 ML/year) would discharge out of the adit from around 2057. The adit discharge water is likely to require treatment prior to discharge into receiving waters or reuse. • WCL has confirmed that it is currently exploring a range of beneficial reuse options, ranging from potable, recreational and industrial reuse. WCL propose that the feasibility of these options would be subject of specific project review and analysis in consultation with relevant agencies, including WaterNSW. In the interim, WCL has committed to a funding arrangement which would be sufficient for 10-years of monitoring and treatment of adit discharge water. • The Department acknowledges that the long term management of outflow water from adits is a regional issue that faces all historic and current mining operations in the Southern Coalfields. The Department accepts that WCL is required to take responsibility for management and operational cost of the water treatment systems following mine closure, but believes that further and ongoing studies are required in order to make informed decisions on a regional basis regarding longer-term treatment, discharge and reuse options within the water catchment as a whole. Accordingly, the Department has recommended that WCL prepare an Adit Water Discharge Management Plan, within 12 months of project approval, in consultation with WaterNSW and the EPA and to the satisfaction of the Secretary. The Plan would need to detail the: - location of all mine related adits and other potential groundwater leakage points; - predicted volumes and discharge water quality from each point; - timelines for discharges; - avoidance, mitigation and monitoring measures; - proposed short and long term treatment, discharge and beneficial reuse options, including associate environmental impacts and costs; - outcome of consultation with other mines in the region and relevant agencies to ensure outcomes are based on strategic regional considerations; and - short and long term funding arrangements which consider appropriate water quality targets based on an agreed potential end use.

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	• The Department has recommended that the Adit Water Discharge Management Plan be reviewed every 5 years and the outcomes used to inform regional policy and strategy on long term management of adit discharge water within the water catchment. • The Department notes that water is not predicted to discharge from the Russell Vale adit(s) until around 2057. Therefore, there is a sufficient period of time following mine closure and before water is predicted to discharge from the adit(s) in which to negotiate appropriate outcomes.
Barrier to stored waters of Cataract Reservoir: • LW 7 bord and pillar workings and limited pillar extraction workings occur within the protective pillar. The stability assessment did not address the angle of draw associated with this subsidence event, which is likely to result in some (minor) subsidence of the base of the reservoir.	• Refer to Section 7.2 of Department's FAR • The proposed mining involves bord and pillar workings inside the Dam Safety NSW (DS NSW) (previously known as the Dam Safety Committee) Notification Area for the Cataract Reservoir. The proposed mining plan has minimum width/height pillars within the 1.2 times depth Restricted Zone, the 0.7 times depth (35° angle of draw) Marginal Zone and up to the full supply level of the reservoir. Any mining within the Notification Area requires consent from DS NSW. DS NSW would closely examine the mining proposal prior to approval to ensure the reliability of the water supply and that the structural integrity of the reservoir is protected. • SCT report that the small subsidence movements that are forecast for the proposed mining layout are not expected to cause perceptible impacts to Cataract Reservoir. Any effects from mining roadways in the Wongawilli Seam are expected to be generally limited to a few metres around the proposed roadways. SCT also assessed the risks to the stored waters of Cataract Reservoir in relation to the Corrimal Fault and Dyke D8 and concluded that there is no credible risk of water flow along major structures from Cataract Reservoir as a result of the proposed mining in the Wongawilli Seam. These conclusions were supported by Professor Hebblewhite.
Trigger Levels for Responding to Future Subsidence: • Cumulative effects and impacts of subsidence in the area are not known with certainty and present a challenge to setting trigger levels for responding to future subsidence. • The proposal by Water NSW that any consent should only permit mining up to a point where the valley closure is predicted to be 200mm needs to be assessed with caution as predictions of valley closure can be unreliable; and it is not known how much valley closure has already occurred and therefore what tolerance there is to further valley closure without resulting in unacceptable impacts • More emphasis may need to be given to trigger levels based on observed and measured impacts of valley closure such as surface cracking and horizontal shear planes.	• Refer to Section 7.2 of Department's FAR • The proposed bord and pillar mining has large width to height ratio pillars that are designed to be long term stable. SCT report that there is the potential for low-level subsidence movements (less than 100mm and generally less than 30mm) associated with strata compression above pillars to occur, however these movements are expected to be generally imperceptible and at, or below, survey monitoring tolerance. The low-level subsidence movements are not expected to cause perceptible impacts to any natural surface features including upland swamps, cliffs, steep slopes, drainage lines, creeks, Cataract Creek and Cataract Reservoir. • SCT identified that a number of areas within the UEP area are currently in limiting equilibrium (on the verge of moving) because of previous mining, including Longwalls 4-6 in the Wongawilli Seam. Some ongoing low-level ground movement, mainly horizontal movement associated with previous mining including the Wongawilli Seam longwalls, may not yet have ceased completely. This low-level movement related to previous longwall mining operations has potential to continue to cause low-level impacts to Mount Ousley Road and valley closure across Cataract Creek that may be perceptible. The Department acknowledges and accepts that this movement is a legacy of previous mining and is not expected to be influenced by the proposed mining. Movement may continue irrespective of any further mining in the Wongawilli Seam. • The Department has recommended that the Extraction Plans required for the Revised UEP continue to include trigger-action-response plans (TARPs) to provide a clear basis to decide whether or not the performance measures are being met and certainty in determining the appropriate adaptive management response to exceedances and breaches. The TARPs would be required to have regard to existing impacts from previous mining and potential for low-level

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	subsidence and impacts from the proposed mining. The TARP triggers would be required to be based on meaningful indicators, developed in consultation with relevant agencies and authorities.
Uncertainty and Cumulative Impacts: • Uncertainty of potential impact to the catchment area remains unresolved, particularly when the cumulative impacts are considered.	• Refer to Section 7.3 of Department's FAR • HydroAlgorithmics Pty Ltd prepared an Uncertainty Analysis for the revised Groundwater Assessment report (refer to Appendix C). The analysis was conducted in accordance with the IESC uncertainty analysis guidelines: Uncertainty analysis—Guidance for groundwater modelling within a risk management framework (Middlemis, H. and Peeters, L.J.M., 2018) and peer reviewed by Dr Frans Kalf of Kalf and Associates. • The key outcomes of the Uncertainty Analysis of the groundwater model indicated: - Groundwater drawdown - there is expected to be negligible drawdown, even at the 90th percentile, of the water table in surficial layers in contact with local streams and the Cataract Reservoir; - Mine Inflow – additional mine inflow caused by the Revised UEP only is expected to range from maximum inflows of 262 ML/year (very likely to be exceeded) to 326 ML/year (very unlikely to be exceeded); - Baseflow – combined additional baseflow impact to Cataract Creek, Cataract River and Bellambi Creek caused by the Revised UEP only is expected range from 2.3 ML/year (very likely to be exceeded) to 6 ML/year (very unlikely to be exceeded); and - Water Storage - worst-case predicted impact on Cataract Reservoir (via a transfer of water from the storage to depressurised strata below the reservoir) is less than 1 ML/year. • Comparison of these water take predictions with those presented in the revised Groundwater Assessment indicates that they are generally in close agreement. The only differences were in relation to reductions in baseflows from the three major relevant streams. The Uncertainty Analysis predicted baseflow impacts that are higher than those modelled by GeoTerra/ GES (about twice the volume of cumulative baseflow losses and about five times the volume of incremental baseflow losses). GeoTerra/ GES confirmed that this is due to minor differences in the timing of drain cells being turned on/off in the two models. Despite this difference, GeoTerra/ GES , Dr Merrick and Dr Kalf all agree that the predicted impacts on baseflows remained very small and unlikely to be measurable in all affected systems. • Overall, the Department considers that the proposed bord and pillar mining method significantly reduces potential impacts on groundwater resources and stream baseflow, when compared to the previously proposed longwall mining method. The Department accepts that the surface and groundwater-related impacts associated with the proposed mining are largely limited to induced drawdown impacts from the triple seam mined areas and are limited to very minor reductions in baseflow in Cataract Creek, Cataract River and Bellambi Creek. The Department also accepts that leakage from the Cataract Reservoir due to depressurisation of the regional groundwater system would be negligible.
• If flow loss does occur, there is no clear indication of what the adaptive management measures are, how they could be implemented or their effectiveness in remediation.	• The Department notes that baseflow losses associated with the Revised UEP are predicted to be very minor and unlikely to be observable for all practical purposes. • However, the Department has recommended that adaptive management procedures continue to be implemented via the Extraction Plan process.

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	• If performance measures are exceeded and impacts realised - and it is not reasonable or feasible to remediate the subsidence impact or environmental consequence or remediation measures implemented fail - then WCL must provide a suitable offset to compensate for the subsidence impact or environmental consequence. • In recognition of the fact that currently there is no proven method to rehabilitate swamps or evidence that swamps can be remediated, the Department has required swamp offsets in accordance with the *Swamp Offset Policy*. Where swamp monitoring demonstrates that the actual impact is greater than predicted (ie. more than negligible) and that the shallow groundwater does not return to its natural regime within 12 months, the Department has recommended a condition requiring WCL to identify and retire a swamp offset equivalent to the actual impact within six months.
• Financial compensation for water loss – payment could be one-off but loss will be permanent and irreversible and will also have an associated impact on water quality due to the damage to upland swamps and other vegetation that relies on surface and shallow groundwater.	• The Revised UEP mine has been specifically designed to be long term stable with minimal subsidence impacts, including water losses and associated impacts to upland swamps and other vegetation that relies on surface and shallow groundwater. As discussed above, in accordance with the Swamp Offset Policy, if swamp monitoring demonstrates that the actual impact is greater than predicted (ie. more than negligible), the Department has recommended a condition requiring WCL to identify and retire a swamp offset.
• If water loss is negligible, the water licence system could be employed to compensate the loss, however the estimated potential loss ranges between 15 ML/year and 2.6 GL/year, so at what point does a water licence as a compensatory mechanism become unacceptable?	• Predicted surface water take (10.04ML/yr) and groundwater take (288ML/yr) associated with the Revised UEP are proposed to be licenced in accordance with the provisions of under the *Water Act 1912* and/or the *Water Management Act 2000*, or an alternative mechanism agreed by the Planning Secretary, DPIE Water and WaterNSW. These water take predictions are considered negligible in relation to baseflows and relatively minor in relation to groundwater inflows. WCL has confirmed that it currently holds a sufficient quantity of units in the Groundwater WSP to account for the predicted groundwater take and that it is currently investigating options to acquire the minor surface water entitlements.
• Ongoing costs of management and maintenance of the water treatment system, if required, to treat water outflows from the adit after the mine closes. Not clear whether the proponent or community will bear long term management and operational cost of the treatment system as it will have significant impact on economic assessment of the project.	• Refer to Section 7.3 of Department's FAR. • WCL has confirmed that it is currently exploring a range of beneficial reuse options, ranging from potable, recreational and industrial reuse. WCL propose that the feasibility of these options would be subject of specific project review and analysis in consultation with relevant agencies, including WaterNSW. In the interim, WCL has committed to a funding arrangement which would be sufficient for 10-years of monitoring and treatment of adit discharge water. • The Department acknowledges that the long term management of outflow water from adits is a regional issue that faces all historic and current mining operations in the Southern Coalfields. The Department accepts that WCL is required to take responsibility for management and operational cost of the water treatment systems following mine closure, but believes that further and ongoing studies are required in order to make informed decisions on a regional basis regarding longer-term treatment, discharge and reuse options within the water catchment as a whole. • Accordingly, the Department has recommended that WCL prepare an Adit Water Discharge Management Plan, within 12 months of project approval, in consultation with WaterNSW and the EPA and to the satisfaction of the Secretary. The Department notes that water is not predicted to discharge from the Russell Vale adit(s) until around 2057. Therefore, there is a sufficient period of time following mine closure and before water is predicted to discharge from the adit(s) in which to develop and implement appropriate outcomes.
Impact on Upland Swamps:	
The uncertainty in predicting subsidence and the environmental outcomes for upland swamps and the sensitive nature of the area warrants a cautious approach.	• Refer to Section 7.2 of Department's FAR

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	• The Revised UEP mine has been specifically designed to be long term stable with minimal subsidence impacts, including impacts to upland swamps. • SCT prepared a Quantitative Assessment of the Risk of Pillar Failure quantify the probability of pillar failure and potential magnitude and extent of impacts to swamps should pillars be destabilised by the Revised UEP (refer to Appendix G of the FAR). SCT concluded that the probability of impact to swamps is either zero if all the goaf areas in the Bulli Seam can be confirmed as having subsided (which is considered highly likely) or 0.028% if not. The NERAG rate a likelihood of less than 0.1% as being "very rare" or less than 1 event in 10,000 years. This Department accepts that the proposed bord and pillar mining method represents cautious approach which significantly reduces subsidence-related risks and impacts when compared to the previously proposed long-wall mining methods. Risk of impact to swamps from the Revised UEP are now considered negligible.
There is significant doubt as to what mitigation measures could be applied to remedy the cracking of bedrock beneath the swamps, apart from offset.	• Refer to Section 7.2 of Department's FAR • In recognition of the fact that currently there is no proven method to rehabilitate swamps or evidence that swamps can be remediated, the Department has required swamp offsets in accordance with the Swamp Offset Policy. Where swamp monitoring demonstrates that the actual impact is greater than predicted (ie. more than negligible) and that the shallow groundwater does not return to its natural regime within 12 months, the Department has recommended a condition requiring WCL to identify and retire a swamp offset equivalent to the actual impact within six months.
The potential damage of 14 swamps with uncertain environmental consequences in a drinking water catchment area is a significant concern, if offset could not be found within the catchment area.	• Refer to Section 7.2 of Department's FAR • The Revised UEP mine has been specifically designed to be long term stable with minimal subsidence impacts, including impacts to upland swamps.
Socio-economic benefits and impacts:	
Question over the quantum of economic benefits that would be generated from the project and the proponent's capacity to deliver the claimed benefits including employment, expected production rates and associated royalty payment.	• Refer to Section 7.6 of Department's FAR • Cadence Economics Pty Limited (Cadence Economics) prepared an Economic Impact Assessment (EIA) (July, 2019) which was based on a Cost Benefit Analysis (CBA) and a Local Effects Analysis (LEA) to estimate the net benefits of the Revised UEP to the State and the local benefits to the Wollongong region. The EIA was undertaken in accordance with the Guidelines for the economic assessment of mining and coal seam gas proposals (NSW Government, 2015) (Economic Guideline) and the associated Technical Notes. The EIA is included in Appendix 10 of the RPPR. • Candace Economics indicated that the Revised UEP is expected to generate an accounting profit of $257.6 million in NPV terms. The estimated net benefit to NSW is $174.28 million in NPV terms. The project is expected to require an operational workforce of 205 employees and contractors during the 5-year operation, as well as an additional short-term construction workforce of 22 employees. Production rates are 1 Mtpa of product coal. Royalties would be around $33.2m. • Cadence Economics conducted a sensitivity analysis of the CBA in order to test the sensitivity of the estimate of net economic benefit by also considering upper and lower bound discount rates, and varying the size of a number of input parameters. The sensitivity analysis indicated that the lower bound, or worst-case, estimate of net benefits, which takes the most pessimistic assumptions around coal prices, capital expenditure, operational expenditure as well as worker and supplier benefits, yields an estimated net benefit of $117.3 million in NPV terms. The upper bound, or best-case, estimate, based on the most optimistic assumptions, is $220.1 million in NPV terms.

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	• The Department recognises that there is inherent uncertainty in estimating costs and benefits over the life of a mine. However, when considering conservative assumptions, the Department is confident that the project would result in significant economic benefits to the local and regional areas and to the State of NSW, and is therefore considered desirable and justified from an economic efficiency perspective. • In relation to concerns about the financial capacity of WCL, the Department notes that these issues are regulated under the Mining Act 1992 and are not relevant issues for consideration under the EP&A Act, to which the Department must have regard.
The economic assessment requires updating to take into consideration that additional mitigation measures are required to reduce noise impact from the pit top site to private residences and truck traffic noise impact to residents along Bellambi Lane when the benchmark existing noise levels are updated to reflect actual noise.	• Refer to Section 7.6 of Department's FAR • A new EIA has been prepared for the Revised UEP. Candance and WCL have confirmed that the EIA reflects the additional mitigation measures associated with the Revised UEP, including those in relation to noise attenuation measures from the surface facilities site and traffic noise controls along Bellambi Lane.
How does the $22m cost of water loss estimated by WaterNSW compare with the CIE estimate of $430,000 present value?	• These cost estimates applied to the previous economic assessment prepared for the Preferred Project and do not apply to the new Revised UEP. The Revised UEP proposes to use bord and pillar mining which is predicted to result in significantly less water losses than other predicted for the Preferred UEP longwall mining. • WCL has confirmed that it currently holds a sufficient quantity of units in the Groundwater WSP to account for the predicted groundwater take. No additional cost for this water loss licencing is therefore required. In relation to surface water losses, Cadence Economics indicated that the licence entitlements within the Surface Water WSP for the 10.04ML/yr baseflow loss would cost around $36.66/yr or $515.20 in NPV terms in total. These very minor costs have been included in the CBA.
Who should bear the potential long term management and operational cost of the water treatment system, if require to control water outflows from the adit following mine closure assuming it is part of the operating cost while the mine is in operation?	• Funding arrangements for the future outflows from adits at Russell Vale have been discussed above.
Timeframe factored in the estimated $62,000 (present value) to WaterNSW for on-going monitoring requirements as monitoring will continue to be required after mine closure.	• It is noted that this comment was made in relation to long term monitoring of adit outflows. Funding and monitoring arrangements for the future outflows from adits at Russell Vale have been discussed above.
The key issue is balancing the short-term immediate economic benefits with the uncertain long term costs and environmental consequences.	• Refer to Section 7.6 of Department's FAR • The EIA indicates that direct benefits of the Revised UEP to NSW are estimated to be $116.9 million in NPV terms. The project is also expected to generate total indirect benefits to NSW of $57.4 million in NPV terms, comprised of $43.6 million of worker benefits and $13.8 million of supplier benefits. • The Revised UEP is expected to generate modest incremental indirect costs on the NSW community of about $19,158, which is the cost of water licenses and greenhouse gas emissions attributable to NSW. Cadence Economics notes that the majority of mitigation and monitoring costs (ie. $4.3 million in NPV terms) associated with environmental impacts relating to the UEP are incorporated in the capital and operating costs of the project, including long term monitoring costs. • The Department recognises that there is inherent uncertainty in estimating costs and benefits over the life of a mine. However, when considering conservative assumptions, the Department is confident that the project would result in

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	significant economic benefits to the local and regional areas and to the State of NSW, and is therefore considered desirable and justified from an economic efficiency perspective.
Noise:	
The setting of benchmarks should have regard to the 2011 approved noise limits, the 2012 noise audit results and the Industrial Noise Policy.	• Refer to Section 7.4 of Department's FAR • As discussed above, a revised NIA has been prepared to re-evaluate operational and traffic noise impacts associated with the Revised UEP, with reference to the NPfI. • Wilkinson Murray confirmed that the NIA utilised one full year of noise monitoring data collected from two monitors during 2016 when the Russell Vale site was in care and maintenance and not operating, and additional data obtained over a 12-day period in June 2014 to set benchmarks. The previous RBLs which were used in the 2013 and 2014 noise assessments utilised one week of noise monitoring data which may have been influenced by small fluctuations in the local acoustic environment. Wilkinson Murray consider that the new RBLs are based on long term data which provides a better representation of the site's existing background noise environment. • The EPA has confirmed that it considers the revised NIA satisfactorily meets the relevant noise guidelines and can be used in determination of the project.
If the PSNLs are accepted as the benchmark for assessment of impact, the proposed project would have significant residual noise impact on certain nearby residences, notwithstanding the already implemented and proposed on site mitigation measures.	• Refer to Section 7.4 of Department's FAR • The Revised UEP proposes a new site layout and significant upgrades of the surface facilities which would minimise noise impacts on neighbouring residences to acceptable levels. In summary, these include use of bunds, container walls and noise barriers; acoustic treatments of key infrastructure; conveyor and plant enclosures; equipment attenuation; and operational time restrictions to minimise noise generation and impacts. • The NIA predicted that the project noise levels would not exceed the PTNLs by more than 1-2 dB(A) at any residences under worst case noise scenarios. According to the NPfI and the VLAMP, a 1 to 2 dB exceedance represents a negligible residual noise impact indiscernible by the average listener. Predicted noise levels indicate that no residence or privately-owned land would be subject to voluntary mitigation or land acquisition rights in accordance with the VLAMP. • The Department has recommended that WCL be required to prepare and implement a comprehensive Noise Monitoring and Management Plan for the project.
The draft recommended noise criteria for the identified receivers are not reasonable, particularly the criteria for "all other privately-owned land" especially to those who are neighbours to the identified receivers.	• Refer to Section 7.4 of Department's FAR • The NIA for the Revised UEP has appropriately derived PTNLs in accordance with the NPfI. The EPA has confirmed that it considers the revised NIA satisfactorily meets the relevant noise guidelines and can be used in determination of the project.
Additional mitigation measures are required to reduce noise impact from the pit top site to private residences and truck traffic noise impact to residents along Bellambi Lane when the benchmark existing noise levels are updated to reflect actual noise	• Refer to Section 7.4 of Department's FAR • The Revised UEP proposes a new site layout and significant upgrades of the surface facilities which would minimise noise impacts on neighbouring residences to acceptable levels. In summary, these include use of bunds, container walls and noise barriers; acoustic treatments of key infrastructure; conveyor and plant enclosures; equipment attenuation; and operational time restrictions to minimise noise generation and impacts.

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Air Quality:	
A strong real time monitoring and pro-active management regime is of critical importance to minimise potential impact on residents and annual reporting should be available on the proponent's website.	• Refer to Section 7.8 of Department's FAR • WCL currently operates 11 DDGs (including 3 located in local schools), two real-time high HVASs capable of recording TSPs, PM10 and PM2.5 emissions and an automated weather station. This system allows the colliery operators to continuously monitor weather conditions and dust dispersion levels, and to modifying or suspending activities, if necessary, to minimise dust impacts. • The Department has recommended a condition requiring the existing air quality network, including real-time system, continue to operate during all stages of the Revised UEP.
A review of the draft conditions of approval in relation to timeframes for implementation of the various proposed mitigation measures is required, particularly when production rate is unlikely to reach 2.7mtpa	• The proposed production rate for the Revised UEP would not exceed 1 Mt of product coal per year. • The Revised UEP proposes a new site layout and significant upgrades of the surface facilities which would minimise air quality impacts on neighbouring residences to acceptable levels. Additional mitigation measures include operation of water sprays; use of water carts; enclosure of conveyors and plant; truck washing; and rehabilitation of exposed disturbed areas to minimise dust generation and impacts.
A prohibition condition may be required to disallow the transport of materials from the site to the RVEA without the agreement of the Wollongong City Council.	• Refer to Section 7.8 of Department's FAR • As part of the Revised UEP, no reject material would be emplaced on the RVEA. Reject material generated by the Revised UEP is proposed to be sold for use as fill inert material or used in site rehabilitation or hauled back to the mine portal for emplacement underground.
A clear description of the stockpiles' dimensions (height, length and width) would assist the understanding of the visual relationship of the stockpiles and the surrounding land uses.	• Refer to Section 7.8 of Department's FAR • Umwelt completed a Visual Amenity Assessment for the Revised Project (refer to Section 5.10 of the RPPR). This assessment was updated in the RTS – Part A report to consider the visual impacts associated with the redesigned surface facilities site. The highest stockpile to be developed at the surface facilities site is the ROM stockpiled, which would have a maximum height of 7 m. Umwelt confirmed that a combination of topography, vegetated bunds and mature screening vegetation obscures the views of the majority of the active surface facilities areas, including stockpiles, from surrounding residential areas. The site is also generally not visible from publicly accessible areas or public roads. • The Department considers that any visual mitigation would be effectively managed through the preparation and implementation of a Visual Impact Management Plan and has recommended a condition accordingly.
Bellambi Creek Flood Management:	

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If project were to be approved, PAC supports the inclusion of a condition of consent that requires the implementation of flood mitigation measures recommended in the Cardno 2015 Report within 12 months of date of approval.	• Refer to Section 7.5 of Department's FAR • WCL has re-engaged Cardno to complete updated site surveys and flood modelling, and to provide updated stormwater management and flood mitigation designs. The primary focus of these designs was to discard the use of the existing Bellambi Gully Diversion Pipeline, which has experienced gradual strength loss due to corrosion and ongoing leakage issues, and replace it with an open channel by-pass. The updated designs and flood modelling is included in the Bellambi Gully Flood Assessment (Cardno, 2020). • The new designs include upgrade of existing diversion channels and flow upstream of the stockpile area; construction of a new open by-pass channel along the southern boundary of the surface facilities site; construction of a reconfigured and enlarged on-site detention (OSD) and a new dry detention basin; and reconfigure existing wet sediment basins. • The Cardno (2020) flood modelling confirms that the flood depths and flood velocities would be significantly improved when compared with previous designs in all flood events with the exception of the PMF, where velocities would remain more or less the same. The most significant improvements are modelled to be during a 100-year ARI when peak flow velocities would be between 57-89% reduced at key downstream locations, including Princess Highway culvert and overflow and the Bellambi Lane overflow. Cardno (2020) states that the proposed design would still achieve greater separation of dirty and clean water catchment during the PMF event when compared to the previous designs, offering significant water quality benefits to downstream areas. • The Department considers that the proposed revised stormwater management strategy would provide a better outcome in regard to controlling flood waters and improving on-site water quality, when compared to the previous designs. • The new Cardno (2020) designs are "generally in accordance with" the designs currently approved under the PWP consent (ie. designs by BECA , 2010) and therefore do not require separate approval. WCL has indicated its intention to commence construction of the Cardno (2020) flood mitigation and management works as soon as possible. • The Department's Compliance Branch issued a Penalty Notice to WCL for breaching the Order issued in December 2016 for failing to implement the Bellambi Gully diversion works required by its existing PWP consent. Further, on 23 July 2020 the Compliance Branch issued a new Order to conduct the works detailed in the Cardno (2020) report within 12 months.
PAC supports the draft recommended condition requiring the installation of a swale alongside the stockpile access road, which should improve water management on the site.	• Refer to Section 7.5 of Department's FAR • Refer to response above.
Traffic and Transport:	
The predicted traffic noise increase of 1.7dBA is not credible and should be reassessed having regard to the then existing truck movements not modelled movements.	• Refer to Section 7.8 of Department's FAR • Wilkinson Murray reassessed the road traffic noise for the Revised UEP in accordance with the NSW Road Noise Policy (RNP) (EPA, 2011). The assessment considered the increase in noise levels from the existing traffic volumes and took into consideration an average 1.5% per year background traffic growth rate for Bellambi Lane. Based on reduced truck movements and times proposed for the Revised UEP, the assessment predicted that the project would result in noise level increases above background levels of 2.0 dB during the day and 0.5 at night. Wilkinson Murray

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	indicate that these increases are within the 2 dB increase margin recognised by the RNP as acceptable and considered to be barely perceptible to the average person. • The Department has recommended that WCL be required to prepare and implement a comprehensive Noise Monitoring and Management Plan which includes traffic noise monitoring and mitigation measures, to ensure traffic noise is within applicable RNP limits.
The proposed truck parking area is in close proximity to a number of residences near the entrance to the pit top site. The review of the need for the construction of a noise barrier and/or mitigation measures on private residences should have regard to the noise impact arising from truck queuing.	• Refer to Section 7.8 of Department's FAR • A new designated truck parking area has been proposed on-site to avoid queuing of trucks onto the adjoining public road. WCL has indicated that all trucks waiting in this area would be required to switch their engines off. In addition, a 5 m high noise barrier is proposed to be constructed along the northern boundary of the site access road between the site entrance and turn off to the truck parking area.
The proponent's offer to make a contribution to Transport for NSW for pavement upgrade along Bellambi Lane is reasonable and should be accepted as a condition of approval, if the project were to be approved. However, the contribution should be made to the relevant roads authority. There is insufficient justification to increase production level to 3Mtpa based on the predicted production levels provided by the proponent.	• Refer to Section 7.8 of Department's FAR • WCL has committed to pay WCC a road maintenance contribution for pavement upgrade and maintenance of Bellambi Road resulting from transport of product associated with the project. WCC has estimated these costs to total $338,000 (in 2019/20 dollars). In accordance with a request from WCC, the Department has formalised this commitment via a recommended condition requiring WCL to pay the contribution costs to WCC in instalments on an annual basis over the 5-year life of the project, with payments indexed in accordance with the CPI.

Appendix J – Recommended Instrument of Consent

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/39666