
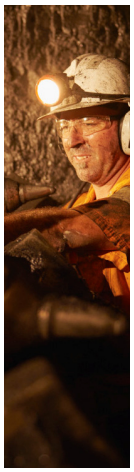
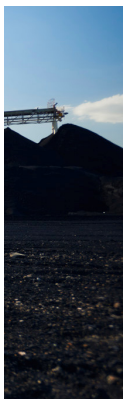


Ashton-Ravensworth Underground Mine Integration Modification

Ashton Coal Project

SUBMISSIONS REPORT

YANCOAL
兖煤澳大利亚有限公司

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1 INTRODUCTION

The Ashton Mine Complex and Ravensworth Mine Complex are neighbouring open cut and underground coal mining complexes, located in the Singleton Local Government Area (LGA), in the Hunter Valley region of New South Wales (NSW) (Figure 1).

The Ashton Mine Complex includes the Ashton Coal Project (including the completed North East Open Cut [NEOC] and the Ashton Underground Mine) and approved Ashton South East Open Cut (SEOC) Project. The Ashton Coal Project is approved under Development Consent DA 309-11-2001-i and operated by Ashton Coal Operations Pty Limited (ACOL), a wholly owned subsidiary of Yancoal Australia Limited (Yancoal). Development under Project Approval 08_0182 for the SEOC Project has not yet commenced.

The Ravensworth Mine Complex includes the Ravensworth Operations Project and the Ravensworth Underground Mine (RUM). The RUM is owned and operated by Resource Pacific Pty Limited while Glencore Coal Assets Australia Pty Limited oversees the management of RUM. The RUM is approved under Development Consent DA 104/96 and has been in care and maintenance since 2014.

The Ashton Underground Mine and the RUM share a common mining lease boundary and are approved to extract coal from similar coal seams.

ACOL is proposing to access and extract approved but unmined coal resources at the RUM and integrate part of the approved RUM with the Ashton Coal Project (hereafter referred to as the Modification). The coal would be accessed from the Ashton Underground Mine via new non-subsiding first workings developed between the two mining areas.

Modification applications to both Development Consent DA 309-11-2001-i (Ashton Coal Project) and Development Consent DA 104/96 (RUM) were lodged under section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to enable the receipt and transfer of run-of-mine (ROM) coal from the RUM to the existing Ashton Coal Project infrastructure.

Both Modification Reports were placed on public exhibition by the Department of Planning, Industry and Environment[1] (DPIE) from 25 November 2021 to 8 December 2021. During and following the exhibition period, a total of nine submissions on the Ashton Modification (Mod 11) were received from the public and NSW government agencies.

On 9 December 2021, the DPIE requested that Yancoal prepare and submit a Submissions Report for the Ashton Modification. Accordingly, this Submissions Report has been prepared to address comments raised in submissions on the Ashton Coal Project Modification Report. This Submissions Report has been prepared in consideration of the *State Significant Development Guidelines – Preparing a Submissions Report* (DPIE, 2021).

A separate Submissions Report has been prepared for the RUM Modification.

This Submissions Report is structured as follows:

Section 1 Provides an introduction and overview of the approved and modified projects.

Section 2 Provides an analysis of the submissions received during the public exhibition period.

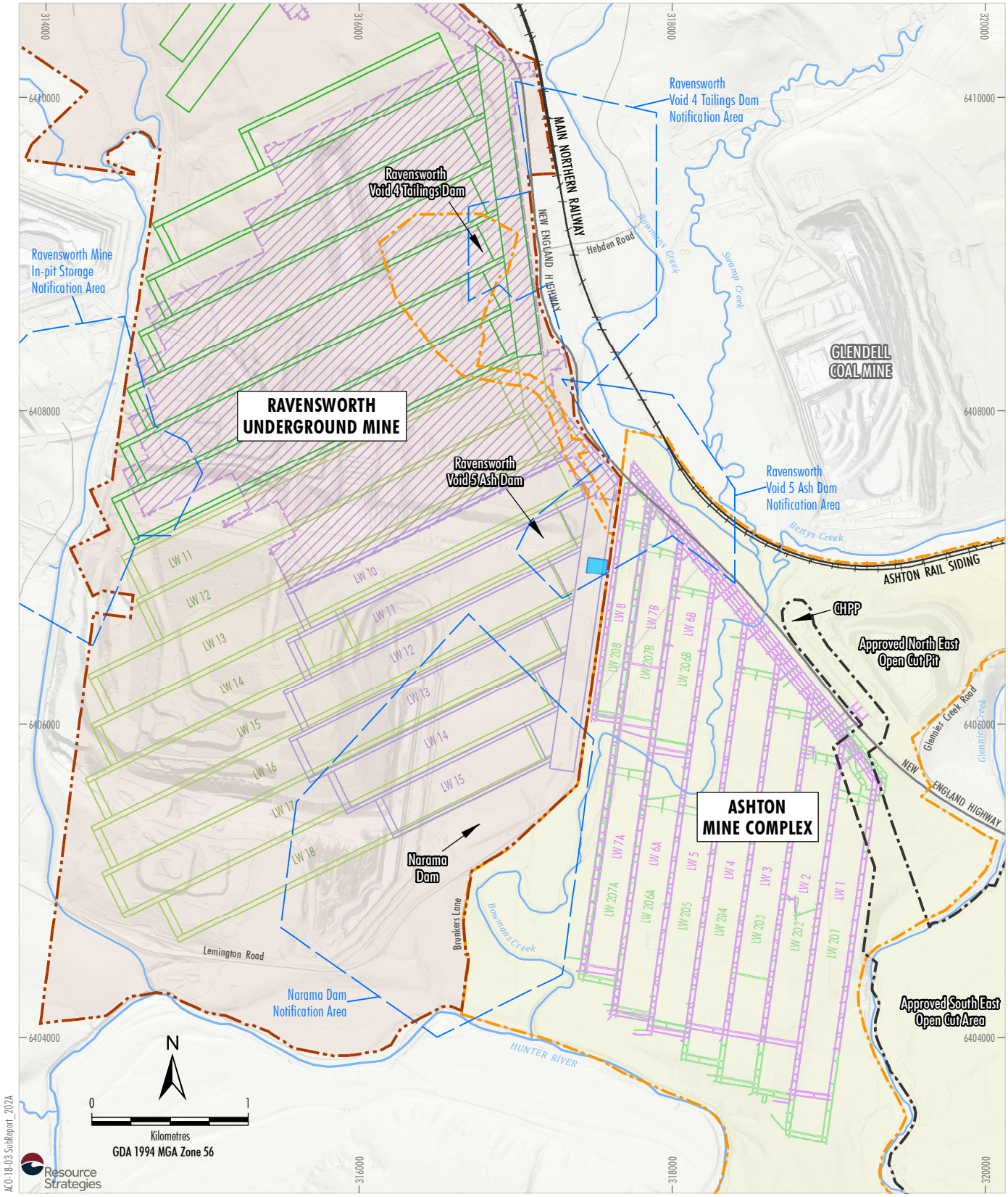
Section 3 Summarises the actions taken since exhibition of the Modification Report, including additional engagement activities and assessment of the Modification.

Section 4 Provides responses to aspects raised in submissions and provides information requested.

Section 5 Provides an updated evaluation of the Modification.

Section 6 Lists the documents referenced in the Submissions Report.

[1] The Department of Planning, Industry and Environment was renamed to the Department of Planning and Environment on 21 December 2021 (i.e. after the exhibition of the Modification applications and receipt of agency submissions).



LEGEND

- Dam Notification Area
- Ashton Mine Complex
  - Ashton Coal Project Development Consent Boundary
  - South East Open Cut Approval Boundary
  - Ashton Mine Complex
  - Pikes Gully Seam Longwall Layout
  - Upper Lower Liddell Seam Longwall Layout
- Ravensworth Underground Mine
  - Ravensworth Underground Mine Development Consent Boundary
  - Existing Shaft 5 Location
  - Completed Pikes Gully Seam Workings
  - Approved Pikes Gully Seam Longwall Layout
  - Approved Middle Liddell Seam Longwall Layout
  - Approved Upper Liddell Seam Longwall Layout

NOTE

The approved Upper Liddell and Lower Barrett Seams at the Ashton Coal Project and approved Lemington and Barrett Seams at the Ravensworth Underground Mine are not shown on this figure.

Source: NSW Spatial Services (2021); Dams Safety NSW (2020)

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ASHTON - RAVENSWORTH UNDERGROUND MINE INTEGRATION MODIFICATION

Approved Longwall Layouts

Figure 1

1.1 OVERVIEW OF THE MODIFICATION

The Modification would allow ACOL to access and mine coal resources at the RUM that are approved to be mined under Development Consent DA 104/96. The modifications to the Ashton Coal Project Development Consent DA 309-11-2001-i would involve the following (Figure 2):

- underground connection from the existing Ashton Underground Mine workings to the approved RUM Pikes Gully and Middle Liddell coal seams via first workings;
- receipt of ROM coal mined in the RUM Pikes Gully and Middle Liddell coal seams for handling, processing and transportation using the existing Ashton Coal Project infrastructure;
- management of RUM ROM coal coarse rejects and tailings by emplacement in the NEOC void and at the Ravensworth Void 4 Tailings Dam;
- receipt and management of water and gas from the ACOL-operated portion of the RUM;
- extension of mining operations until approximately December 2035; and
- other administrative changes to facilitate management of the ACOL-operated portion of the RUM and integration with the Ashton Coal Project, such as integrated environmental management plans (as appropriate).

The proposed Modification would provide the following benefits:

- would provide for continued operations and continued employment of the ACOL workforce at the Ashton Coal Project;
- utilises existing planning approvals to maximise economic recovery of approved coal resource;
- would avoid disturbance of additional areas (i.e. by limiting disturbance to previously cleared areas);
- provides better environmental and social outcomes than developing the approved SEOC Project; and
- is on land approved for mine development within current mining leases for the RUM.

A comparison of the key components of the approved and modified Ashton Coal Project is provided in Table 1.

Table 1
Comparison of the Approved Ashton Coal Project and the Modification

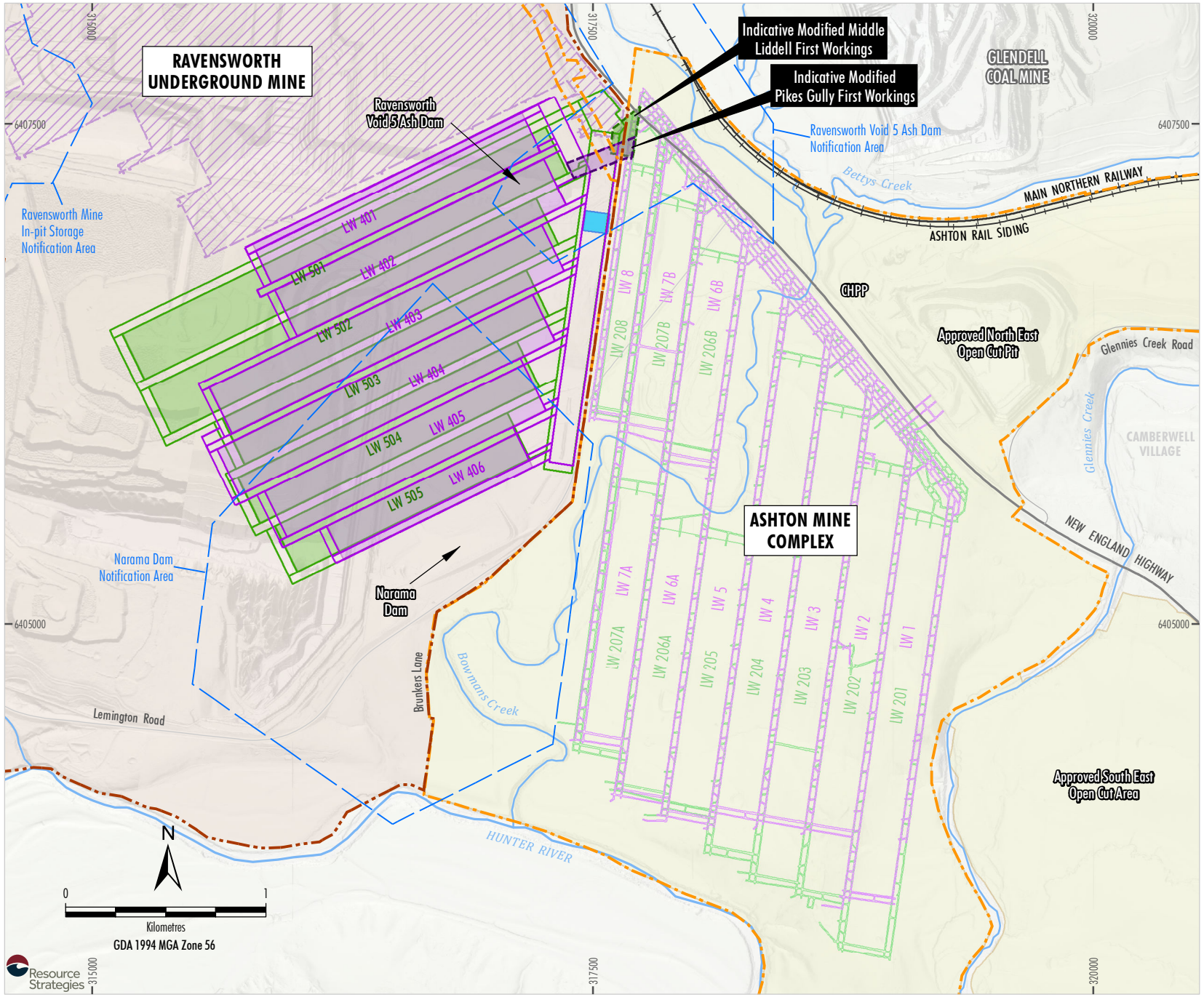
Project Component	Summary of Relevant Component of Existing/Approved Ashton Coal Project (DA 309-11-2001-i)	Summary of the Modification to the Ashton Coal Project
Mining Method	Underground longwall mining.	No change.
Underground Mine Resource	Mining of the Pikes Gully, Liddell (Upper and Upper Lower) and Lower Barrett coal seams in the Ashton Coal Project Development Consent area.	No change. Non-subsiding first workings developed between the Ashton Underground Mine and RUM in the Pikes Gully and Middle Liddell coal seams[1].
Annual Production	ROM coal production of up to approximately 5.45 Mtpa from the Ashton Coal Project and 8.6 Mtpa from the Ashton Mine Complex.	No change.
Consented Operational Mine Life	Until 26 February 2024, or a period of 12 years following recommencement of open cut mining operations (including overburden removal) at the Ashton Mine Complex, whichever is the longer.	Until 31 December 2035.

Table 1 (continued)
Comparison of the Approved Ashton Coal Project and the Modification

Project Component	Summary of Relevant Component of Existing/Approved Ashton Coal Project (DA 309-11-2001-i)	Summary of the Modification to the Ashton Coal Project
Coal Handling and Preparation	Processing of up to 8.6 Mtpa of ROM coal from the Ashton Mine Complex.	Processing of additional coal received from the RUM Pikes Gully and Middle Liddell coal seams. No change to processing rate.
Product Transport	Up to five train movements per day, averaged over a calendar month.	No change.
Coarse Rejects and Tailings Management	Coarse rejects are currently trucked to and emplaced within the NEOC void. Tailings are currently piped to and emplaced in the Ravensworth Void 4 Tailings Dam. Tailings will be emplaced within the NEOC void once the Ravensworth Void 4 Tailings Dam reaches capacity.	No change to rejects and tailings management strategy. Rejects and tailings generated from the processing of ROM coal from the RUM would be emplaced in the NEOC and Ravensworth Void 4 Tailings Dam.
Water Management	On-site management systems for clean water, sediment water and operational water. The Ashton Coal Project is operated on a nil-discharge basis under the PoEO Act, with opportunistic water sharing with neighbouring operations. (Dewatering bores for the ACOL-operated portion of the RUM would be constructed and operated under the Development Consent DA 104/96.)	Receipt of water from the ACOL-operated portion of the RUM and management of this water using existing Ashton Coal Project infrastructure.
Gas and Ventilation Management	Gas and ventilation infrastructure includes gas drainage boreholes, gas drainage plant, gas flaring facility, and ventilation and fans. (Surface gas and ventilation management infrastructure for the ACOL-operated portion of the RUM would be constructed and operated under the Development Consent DA 104/96.)	No change to approved infrastructure. Receipt of gas from the RUM and management of this gas using existing Ashton Coal Project infrastructure (including the central gas drainage plant and gas flaring facility).
General Infrastructure	Surface infrastructure including offices, workshops, stores, bathhouses, first aid rooms, muster and crib rooms, sewage treatment facility, fuel farm, helipad, car parks, workshop facilities, water supply infrastructure, power and telecommunications infrastructure and other associated facilities.	No change.
Hours of Operation	24 hours per day, seven days per week.	No change.
Operational Workforce	Workforce of up to approximately 386 (personnel and contractors).	No change.
Management Responsibilities	Operated and managed by ACOL.	No change.

Mtpa = Million tonnes per annum

[1] The Ashton Underground Mine Upper Lower Liddell Seam aligns with the RUM Middle Liddell Seam.



LEGEND

Dam Notification Area

Ashton Mine Complex
- Ashton Coal Project Development Consent Boundary
- Ashton Mine Complex
- Pikes Gully Seam Longwall Layout
- Upper Lower Liddell Seam Longwall Layout

Ravensworth Underground Mine
- Ravensworth Underground Mine Development Consent Boundary
- Completed Pikes Gully Seam Workings
- Existing Shaft 5 Location

Proposed Modification
- Indicative Pikes Gully Seam Longwall Layout
- Indicative Modified Pikes Gully First Workings
- Indicative Middle Liddell Seam Longwall Layout
- Indicative Middle Liddell Seam First Workings

NOTE
The approved Upper Liddell and Lower Barrett Seams at the Ashton Coal Project and approved Lemington and Barrett Seams at the Ravensworth Underground Mine are not shown on this figure.

Source: NSW Spatial Services (2021); Dams Safety NSW (2020)

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ASHTON - RAVENSWORTH UNDERGROUND MINE INTEGRATION MODIFICATION

Indicative Modification General Arrangement

Figure 2

2 ANALYSIS OF SUBMISSIONS

A total of nine submissions on the Modification were received as follows:

- six submissions in the form of comments from government agencies;
- one supporting submission from a member of the public; and
- two objecting submissions from members of the public.

The supporting submission recognised that the Modification provides better environmental outcomes than developing the approved SEOC Project and would support employment in the region by extending the Ashton Coal Project mine life.

The two objecting submissions raised comments on potential greenhouse gas emissions and the management of these emissions.

Submissions were received from the following government agencies:

- DPIE – Water;
- NSW Environment Protection Authority (EPA);
- NSW Subsidence Advisory;
- NSW Resources Regulator (RR);
- NSW Division of Mining, Exploration and Geoscience (MEG) within the Department of Regional NSW; and
- Dams Safety NSW.

3 ACTIONS TAKEN SINCE EXHIBITION

Since exhibition of the Modification, Glencore and ACOL consulted with their respective Community Consultative Committees in November and December 2021.

In addition, ACOL engaged a groundwater expert, Australasian Groundwater & Environmental Consultants Pty Ltd (AGE), to address DPIE – Water's comment on post-mining groundwater take. AGE's assessment is summarised in Section 4.1 and provided in Attachment 1.

No other actions have been taken or changes made to the Modification.

4 RESPONSES TO SUBMISSIONS

Responses to submissions received from NSW government agencies and members of the public are provided in the sub-sections below.

4.1 DEPARTMENT OF PLANNING, INDUSTRY AND ENVIRONMENT – WATER

Groundwater Modelling

Issue

DPIE – Water noted that the contemporary groundwater model submitted was a summarised version of the inputs and outputs and does not satisfy the requirements of the Aquifer Interference Policy (AIP). The AIP states that for any mining or coal seam gas production activity not subject to the Gateway process, the impacts of the activity and predicted take of water are to be based on a complex modelling platform that is calibrated and validated, consistent with the Australian Groundwater Modelling Guidelines and independently reviewed.

DPIE – Water requested that Yancoal provide an independently reviewed contemporary groundwater model to confirm if there will be additional water take or groundwater interference from the proposed Modifications.

Response

The Groundwater Review (Appendix A of the Modification Report) and associated groundwater model was independently peer reviewed by Dr Noel Merrick (HydroAlgorithmics Pty Ltd), with the peer review provided in Attachment 3 of the Modification Report. The key conclusions of Dr Merrick's peer review are as follows:

> *The numerical groundwater model used and updated by AGE is a mature model. The major update for the Modification was the introduction of a fracture zone into the Ravensworth Underground Mine area. I provided feedback to AGE on the fracture model implementation during a teleconference on 7 September 2021. Following this meeting, AGE provided evidence showing that these comments were incorporated into the model satisfactorily and the resulting fracture zone parameters are considered to be reasonable, based on my experience.*
>
> *My comments on the draft Groundwater Review report have been incorporated in the final report. Given the Modification does not involve an increase in longwall mining extent and, in fact, proposes to reduce the longwall extent in some areas (e.g. shortened longwalls), the assessment methodology used by AGE and findings presented in the Groundwater Review report are considered to be appropriate.*
>
> *Based on the evidence presented, supporting information provided by AGE and the modelling conducted, I concur with the overarching report conclusion that the Modification would not result in any additional groundwater impacts compared to those already approved for Ravensworth Underground Mine and Ashton Underground Mine.*

The commissioning of a peer review for the Modification Groundwater Review is considered to be over and above the contemporary practices for a modification application where impacts are substantially the same or, in this case, lower than the approved project. There would be no change in groundwater impacts at the Ashton Coal Project as there is no change to the Ashton longwall layout. Further, the corresponding RUM Modification application seeks to shorten the length of some of the approved longwall panels in the Middle Liddell Seam, thus the Modification would have a reduced mining footprint compared to the approved RUM (refer to Figures 1 and 2). In addition, the Modification only seeks to mine two of the four approved (i.e. Lemington, Pikes Gully, Liddell and Barrett) coal seams (Figures 1 and 2)[2].

As noted in DPIE – Water's submission, the assessment against the AIP minimal impact considerations remains within Category 1 as there are no additional groundwater impacts predicted compared to those already approved for the RUM and Ashton Coal Project.

[2] Figure 1 does not show the approved mining areas for the RUM Lemington and Barrett Seams as the Modification does not propose to mine these seams.

Groundwater Inflows and Licensing

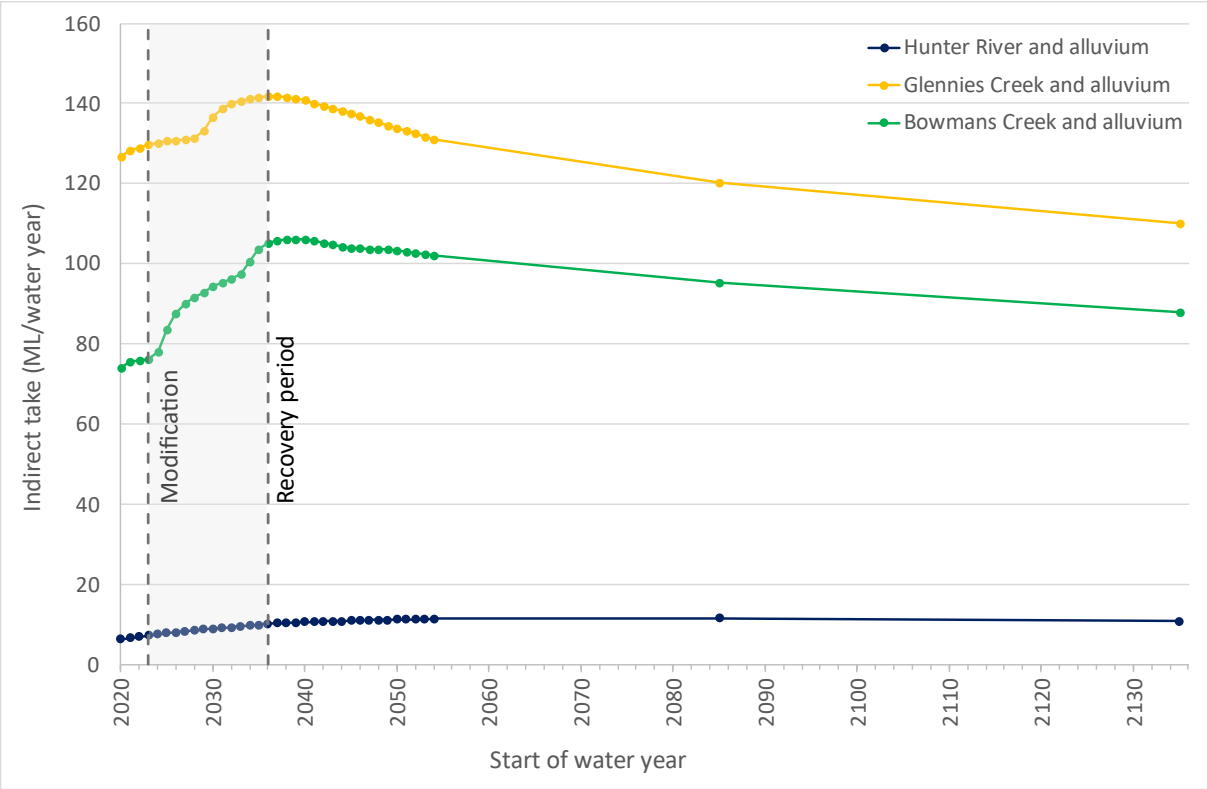
Issue

DPIE – Water noted that ACOL has not outlined a strategy to account for any water taken beyond the life of operation of the projects. Relevant water access licence entitlements would need to be retired at the completion of the Projects to account for groundwater take during the recovery of the groundwater system, post-mining. DPIE – Water requested that Yancoal provide the details on the predicted peak take post-mining and reconcile this take against the water access licences (WALs) held.

Response

Predicted post-mining water take has been modelled by AGE using the same groundwater model peer reviewed by Dr Noel Merrick for the Modification, and is provided in Attachment 1. Chart 1 summarises the predicted post-mining groundwater take. A tabulation of the predicted indirect take from the surface water and alluvial sources for the modelled post-mining years is presented in Attachment 1.

Chart 1
Predicted Post-mining Indirect Take from Surface Water and Alluvial Sources



During the post-mining period, inflows from the North Coast Fractured and Porous Groundwater Source into the completed workings would be less than the predicted peak take of 649.5 megalitres per year during mining (Attachment 1). While there is a minor increase in take during the early post-mining period for the surface water and alluvial sources (Attachment 1), ACOL holds relevant WALs with sufficient entitlements (as summarised in Table 4.1 of the Groundwater Review) to account for the predicted post-mining water take. Where required, ACOL would retire relevant licence entitlements in consultation with DPIE – Water following the completion of mining at the Ashton Coal Project.

Subsidence Impacts

Issue

DPIE – Water requested clarification relating to potential stream baseflow impacts and subsidence impacts resulting from the Modifications.

DPIE – Water requested that Yancoal provide details of any subsidence impacts on watercourses in terms of bank stability and riparian vegetation changes due to the loss of baseflows and possible cracking.

Response

The Site Water Balance (Appendix B of Ashton Modification Report) considered the water balance at the Ashton Coal Project only, as water generated in the RUM workings would be transferred to the Ashton Coal Project water management system. There would be no change in subsidence impacts at the Ashton Coal Project as the longwall layout would remain the same as the approved layout. The Hunter River, Bowmans Creek and Glennies Creek are outside of the area predicted to be impacted by subsidence from the RUM. Accordingly, there would be no additional direct subsidence impacts on the Hunter River, Bowmans Creek or Glennies Creek as a result of the Modification.

Table 4.5 of the Groundwater Review provides a comparison between the Modification baseflow impacts and the 2009 Environmental Assessment (EA) (Aquaterra, 2009) and 2001 Environmental Impact Statement (EIS) (HLA Envirosciences, 2001) for Ashton Underground Mine. The 2009 EA and 2001 EIS results are for the Ashton Underground Mine only and do not include the impacts of the RUM, whereas the modelling completed for the Modification includes the combined Ashton Underground Mine and RUM impacts. Table 4.5 of the Groundwater Review (Appendix A) was provided to show that the Modification stream baseflow predictions would be similar to those for the approved Ashton Underground Mine only. The Modification would not result in a reduction in stream baseflow compared to the approved RUM and Ashton Underground Mine.

The baseflow impacts due to the Modification would be the same or less than those for the approved Ashton Coal Project and RUM as the proposed RUM mining footprint is smaller than the approved and there is no proposed change to the approved Ashton Underground Mine.

Given the above, there would be no new bank stability and riparian vegetation impacts due to the Modification.

4.2 NSW RESOURCES REGULATOR

Mine Rehabilitation Strategy

Issue

The Resources Regulator requested that Yancoal provide a revised life of mine rehabilitation strategy that includes an indicative project schedule and expected timeframes of rehabilitation progression and associated key assumptions (with a focus on rehabilitation of tailings/rejects storage facilities).

Response

The emplacement of tailings in the Ravensworth Void 4 Tailings Dam and the emplacement of tailings and coarse rejects in the NEOC are approved under Development Consent DA 309-11-2001-i. The Modification application does not seek to change final landform, disturbance areas or rehabilitation requirements at the Ravensworth Void 4 Tailings Dam.

ACOL is currently preparing a Rehabilitation Management Plan (RMP) in accordance with the requirements of the *Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2020* (the Regulation), the Resources Regulator's Form and Way documents and supplementary Guidelines to incorporate the ACOL-operated portion of the RUM. The RMP will include the information requested by the Resource Regulator and it is anticipated that ACOL will submit the RMP prior to 1 July 2022.

Tailings Emplacement Operations Management Plan

Issue

The Resources Regulator noted that the timing of emplacement of the Void 4 Tailings Storage Facility and the North Eastern Open Cut as described in the proposed activity is not consistent with the Tailings Emplacement Operations Management Plan. The Resources Regulator requested that Yancoal update the Tailings Emplacement Operations Management Plan accordingly.

Response

Yancoal acknowledges and accepts this request. The Tailings Emplacement Operations Management Plan will be updated during the preparation of the RMP.

4.3 NSW DIVISION OF MINING, EXPLORATION AND GEOSCIENCE

Biodiversity Offset Assessment

Issue

MEG requested that Yancoal consider potential resource sterilisation should any future biodiversity offset areas be considered. MEG noted that Yancoal must consult with MEG and any (third party) holders of existing mining or exploration authorities that could be potentially affected by the creation of any such biodiversity offsets, prior to creation of offset areas occurring.

Response

The Modification does not require additional surface disturbance or infrastructure beyond that already approved or previously cleared. There would be no change in subsidence impacts (including to vegetation) at the Ashton Coal Project under the Modification, as there is no change proposed to the approved Lower Barrett longwall layout. The Modification would not increase previously approved subsidence impacts at the RUM.

Accordingly, the Modification applications do not propose a biodiversity offset area.

4.4 NSW ENVIRONMENT PROTECTION AUTHORITY

The EPA stated the following in its submission:

> *The EPA does not have any recommended conditions to provide in response to this application. If approved both Ravensworth Operations and Ashton Coal Operations will be required to submit licence variation applications to the EPA for Environment Protection Licences 2652 (Ravensworth Operations) and 11879 (Ashton Coal Operations) respectively. The EPA believes that appropriate limits, controls, and monitoring measures can be implemented through the licence variation process, and does not have any specific conditions to provide at this time.*

Accordingly, no further response to the EPA submission is required.

4.5 NSW SUBSIDENCE ADVISORY

The NSW Subsidence Advisory stated the following in its submission:

> *It is understood that the proposal will reduce surface subsidence impacts in relation to existing approvals, and that it will not impact privately owned surface improvements.*
>
> *Given the above, Subsidence Advisory has no objection to the proposal.*

Accordingly, no further response to the NSW Subsidence Advisory submission is required.

4.6 DAMS SAFETY NSW

Dams Safety NSW stated the following in its submission:

> *DSNSW has no concerns with the proposed mining. DSNSW currently regulates Ashtons mining within the Notification Area around Ravensworth Void 5 Ash Dam and will regulate the proposed mining with the Notification Area. Ashton should notify DSNSW prior to undertaking mining within the Notification Area.*

Yancoal acknowledges and accepts this request.

4.7 PUBLIC SUBMISSIONS

A total of three submissions on the Modification were received from members of the public including one supporting submission and two objecting submissions.

Key comments made by members of the public relate to:

- Positive socio-economic impacts relating to the continuation of employment opportunities in the region.
- Avoidance of greater environmental impacts by proceeding with the Modification rather than the SEOC Project.
- Potential for new or additional greenhouse gas emissions associated with the Modification.
- Implementation of appropriate management measures to reduce greenhouse gas emissions.

Responses to the issues raised are provided below.

Modification Greenhouse Gas Emissions

The claims that the proposed Modification is a new project and would result in new or increased greenhouse gas emissions that are not already approved is incorrect. Approval of the RUM (formally Nardell Underground Coal Mine) was originally granted under NSW EP&A Act on 20 November 1996 (Development Consent DA 104/96) and was last modified (Modification 9) on 20 June 2013. This Development Consent remains valid. Relevantly, the proposed Modification seeks to reduce the footprint of the RUM longwall panels in the ACOL-operated portion of the RUM as shown by comparing the layouts on Figures 1 and 2. Accordingly, the RUM Modification would reduce the approved greenhouse gas emissions compared to the approved RUM.

Further, under Yancoal's preferred pathway for continued operations at the Ashton Mine Complex, ACOL would utilise the existing Ashton Coal Project infrastructure, equipment and workforce to mine the approved RUM and would not proceed with the SEOC Project. Therefore, 35.1 million tonnes of carbon dioxide-equivalent emissions associated with the approved SEOC Project would be avoided (Todoroski Air Sciences, 2021).

Greenhouse Gas Emissions Management

The area of the RUM relevant to the Modification applications is shown on Figure 4 of the Modification Report as the 'ACOL-operated portion of the RUM'. The existing RUM working (completed Longwalls 1-9) would continue to be managed by Glencore and do not change as a result of the Modification applications.

Gas from the ACOL-operated portion of the RUM would either be transferred via a combination of surface and underground pipelines (in the underground workings) to the Ashton Coal Project for management within ACOL's gas drainage network or treated using portable gas flares (as approved under Development Consent DA 104/96). The existing and proposed infrastructure would be used to reduce greenhouse gas emissions associated with mining the ACOL-operated portion of the RUM.

One of the core objectives of the Ashton Air Quality and Greenhouse Gas Management Plan is to minimise greenhouse gas emissions from the Ashton Coal Project. This plan would be updated upon approval of the Modification to incorporate the RUM and would include the same core objective for the ACOL-operated portion of the RUM.

The existing Development Consents for the Ashton Coal Project and the RUM include a condition requiring *"The Applicant shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the Secretary."* This condition addresses the concerns raised in the submissions and will be adhered to by ACOL under the Modification.

5 PROJECT EVALUATION

This Submissions Report provides responses to issues raised in submissions from government agencies and members of the public during the exhibition period for the Modification Report. These responses do not change the scope of the Modification and therefore the justification previously provided in Section 8 of the Modification Report remains relevant.

6 REFERENCES

Aquaterra (2009) *Bowmans Creek Diversion: Groundwater Impact Assessment Report.*

Barnett et al (2012) *Australian Groundwater Modelling Guidelines, Waterlines Report, National Water Commission, Canberra.*

Department of Planning, Industry and Environment (2021) *State Significant Development Guidelines – Preparing a Submissions Report.*

HLA Envirosciences (2001) *Ashton Coal Project: Groundwater Hydrology and Impact Assessment*.

Todoroski Air Sciences (2021) *Air Quality Review – Ashton Ravensworth Underground Integration Modification*.

ATTACHMENT 1

POST-MINING GROUNDWATER MODELLING RESULTS

Australasian Groundwater & Environmental Consultants

31 January 2022

Ashton Coal Operations Pty Ltd
Glennies Creek Road
Camberwell NSW 2330

Attention: Phillip Brown
via email: Phillip.Brown@yancoal.com.au

Dear Phillip,

Ashton-Ravensworth Underground Mine Integration Modification Groundwater Review Post-mining Modelling Predictions

1 Introduction

We refer to NSW Department of Planning, Industry and Environment – Water's (DPIE – Water) recommendations (OUT21/17357 / OUT21/17356) regarding post-mining water take for the Ashton-Ravensworth Underground Mine Integration Modification (the Modification).

AGE Consultants (AGE) prepared a groundwater review (AGE 2021) which reconciled the predicted take against Ashton Coal Operations Limited's (ACOL) Water Access Licences (WALs) for the life of the Modification. The modelling was undertaken using a mature groundwater model, which was subject to peer review by Dr Noel Merrick of HydroAlgorithmics Pty Ltd, to predict the impacts of the Modification through calendar year 2036. A period of one year and three months was simulated between the completion of the final panel in the Lower Barrett Seam at Ashton Underground Mine (September 2035) and the end of simulation (December 2036).

In response to the Modification submission, DPIE – Water detailed three recommendations, the second of which will be addressed in this letter. DPIE commented that:

> '*The proponent has not outlined their strategy to account for any water taken beyond the life of the operation of the projects. Relevant water access licence entitlement would need to be retired at the completion of the Projects to account for groundwater take during the recovery of the groundwater system, post-mining. The peak take for the alluvial systems is presented in Figure 4.8 of the Groundwater Review and shows an increasing trend up to 5 years post-mining modelled period. The predicted peak take post-mining should be reported and reconciled against WALs held.'*

and recommended that the proponent:

> '*…provide the details on the predicted peak take post-mining and reconcile this take against the WALs held.*'

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To address this recommendation, AGE has extended the groundwater model to 100 years post-mining to predict post-mining water take (Section 3).

2 Methodology

AGE extended the groundwater model to predict impacts to the end of 2135, i.e. to 100 years post-Modification. The model outputs were collated annually for 20 years from 2036, then at 50 years and 100 years post-mining.

Following active mining, the Permian groundwater system enters a 'recovery phase', during which the groundwater level in the depressurised zone can recover over time. The rate of recovery depends on many factors, such as the continuation of surrounding mining and the rate at which the groundwater system is recharged. For consistency with AGE (2021), the long term annual average groundwater recharge rate was maintained during the recovery period.

As with AGE (2021), two models were run to compare the impacts of the Modification on the groundwater system and surrounding surface water sources from that previously assessed and approved. This included an initial null or 'no mining' model scenario to provide a baseline against which the Modification could be compared. The no mining model included surrounding historical and approved future mining, but no mining at Ashton Underground Mine or in any of the Modification workings at Ravensworth Underground Mine. The second model scenario included surrounding mining plus the Modification including the Lower Barrett seam at the Ashton Underground Mine. The MODFLOW drain cells, which were used to simulate active mining and the subsequent direct take, were removed from the Modification six months after completion of the final longwall panel in the Lower Barrett seam at Ashton Underground Mine.

The total indirect take component was calculated by summing the respective indirect take components (from the MODFLOW river package, and from the MODFLOW alluvial zone) per river system per water year.

3 Post-mining Water Take Predictions

The Aquifer Interference Policy requires that all groundwater taken, either directly or indirectly, is accounted for via water licences. A summary of WALs held by or available to Ashton Coal Operations Limited (ACOL) is provided in Table 3.1.

Groundwater intercepted from the mining area is considered a direct take from the Permian groundwater system, whilst the changes in flow occurring within the Quaternary alluvium and rivers resulting from depressurisation of the underlying Permian is considered an indirect take. The direct and indirect take to the end of the 2035-2036 water year is documented during the Modification in AGE (2021; Table 4.2).

Post-mining, dewatering activities in the Permian strata cease. Water will continue to flow into the mined panels though the rate is less than the predicted peak take of 649.5 ML/year during mining.

The indirect take per river system, reported to peak by the end of simulation (December 2036) in AGE (2021), increased slightly early in the recovery period, before decreasing with time (Figure 3.1). The peak indirect take per water year occurred during the 2038-2039 water year for Glennies Creek and during 2039-2040 for Bowmans Creek (Figure 3.1; Table 3.2). The indirect take from the Hunter River system was stable, increasing annually by less than 0.1 megalitres per year (ML/year) from 2037-2038 through to the peak at 2085-2086, before declining thereafter.

ACOL holds WALs with sufficient entitlements to account for the peak predicted indirect take during the active mining and recovery periods.

Table 3.1 ACOL water licences summary

Licence No.	Water Source / Category	Entitlement (ML/year)
WAL 984	Hunter Regulated River - Glennies Creek (General Security)	9
WAL 15583	Hunter Regulated River - Glennies Creek (General Security)	354
WAL 997	Hunter Regulated River - Glennies Creek (High Security)	11
WAL 8404	Hunter Regulated River - Glennies Creek (High Security)	80
WAL 1358	Hunter Regulated River - Glennies Creek (Supplementary)	4
WAL 1121	Hunter Regulated River - Zone 1B (General Security)	335
WAL 6346	Hunter Regulated River - Zone 1B (Supplementary)	15.5
WAL 1120	Hunter Regulated River - Zone 1B (High Security)	3
WAL 19510	Hunter Regulated River - Zone 1B (High Security)	130
WAL 23912	Jerrys Water Source (Unregulated River)	14
WAL 36702	Jerrys Water Source (Unregulated River)	116
WAL 36703	Jerrys Water Source (Unregulated River)	150
WAL 29566	Jerrys Water Source (Aquifer)	358
WAL 41501	Sydney Basin-North Coast Groundwater Source (Aquifer)	100
WAL 41552	Sydney Basin-North Coast Groundwater Source (Aquifer)	511
WAL 41553	Sydney Basin-North Coast Groundwater Source (Aquifer)	81
WAL 41529*	Sydney Basin-North Coast Groundwater Source (Aquifer)	400

Note: * WAL 41529 to be transferred to ACOL on completion of the sale agreement between Yancoal and Glencore.

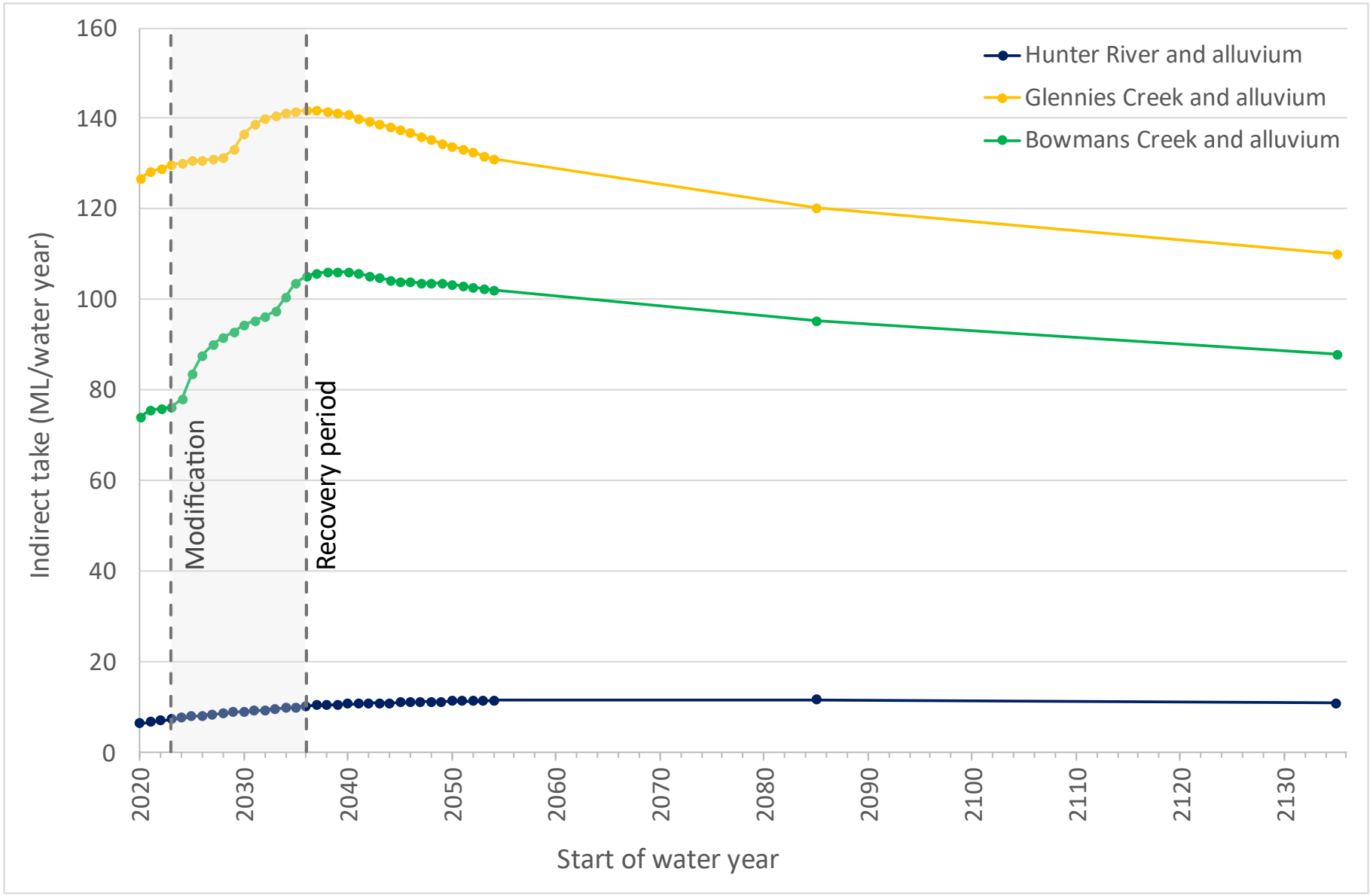

Figure 3.1 Total predicted indirect take for each water source over the life of modification

Table 3.2 Predicted post-mining water take by groundwater model zone (ML/water year)

Water Year	From Hunter Alluvium	From Hunter River	From Glennies Creek Alluvium	From Glennies Creek	From Bowmans Creek Alluvium	From Bowmans Creek
2036-2037	8.2	1.9	116.9	24.9	83.2	22.1
2037-2038	8.3	1.9	116.8	24.9	83.6	22.2
2038-2039	8.4	2.0	116.7	24.9	83.7	22.2
2039-2040	8.5	2.0	116.5	24.8	83.8	22.3
2040-2041	8.5	2.0	116.1	24.7	83.7	22.3
2041-2042	8.6	2.1	115.5	24.6	83.5	22.2
2042-2043	8.6	2.1	114.9	24.5	83.1	22.1
2043-2044	8.7	2.1	114.4	24.4	82.7	22.0
2044-2045	8.7	2.1	113.8	24.2	82.4	21.9
2045-2046	8.8	2.2	113.3	24.1	82.2	21.9
2046-2047	8.8	2.2	112.7	24.0	82.0	21.8
2047-2048	8.8	2.2	112.2	23.9	81.9	21.8
2048-2049	8.9	2.2	111.6	23.8	81.8	21.8
2049-2050	8.9	2.2	110.9	23.6	81.7	21.8
2050-2051	8.9	2.3	110.3	23.5	81.6	21.7
2051-2052	9.0	2.3	109.8	23.4	81.4	21.7
2052-2053	9.0	2.3	109.2	23.3	81.2	21.6
2053-2054	9.0	2.3	108.7	23.2	80.9	21.6
2054-2055	9.0	2.3	108.2	23.0	80.7	21.5
2085-2086	9.1	2.4	99.2	21.2	75.2	20.0
2135-2136	8.5	2.2	90.6	19.3	69.4	18.4

4 Conclusions

The groundwater model used in AGE (2021) was extended post-Modification to predict water take from surface water sources.

The peak predicted direct take occurred during the mining period. The peak predicted indirect take for each of the Hunter River, Glennies Creek and Bowmans Creek systems followed active mining. The maximum difference between the mining period and recovery period indirect take was 1.6 ML/year for the Hunter River, 0.1 ML/year for Glennies Creek and 2.6 ML/year for Bowmans Creek.

ACOL holds WALs with sufficient entitlements to account for the peak predicted indirect take during the active mining and recovery periods.

Yours faithfully,

Amy White
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Andrew Durick
Director / Principal Groundwater Modeller

Australasian Groundwater and Environmental Consultants Pty Ltd

5 References

Australasian Groundwater and Environmental Consultants (2021), *Ashton-Ravensworth Integration Modification Groundwater Review*, 9th November 2021, Brisbane, Australia.