Ashton Coal Mine

RUM Longwalls 403 to 406 Extraction Plan

Main Text

April 2025

TITLE BLOCK

DOCUMENT DETAILS	**Title**	ACOL-operated RUM Longwalls 403-406 Extraction Plan		
	Applicant	Ashton Coal Operations Pty Ltd		
	Name of Mine	Ravensworth Underground Mine (RUM)		
	Development Consent	DA104/96		
	Mining Leases	ML 1834, ML 1835, ML 1836, and ML 1837		
	Document Status	Final for Submission		
	Approval Date			
ORIGINATOR	Jarrod Braybon	Registered Surveyor	Signed	Date
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Version	**Date**	**Revision Details**		
1	April 2025	Final for Submission		

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APPENDICES

1 INTRODUCTION

Ashton Coal Operations Pty Ltd (ACOL), a subsidiary of Yancoal Australia Limited (Yancoal), owns the Ashton Coal Project (ACP), an underground coal mine located approximately 14 kilometres (km) north-west of Singleton in the Hunter Valley in New South Wales (NSW) (**Figure 1**). Development of the underground mine commenced in December 2005 and is accessed through the southern wall of the Arties Pit under the New England Highway.

The ACP was granted consent on 11 October 2002 by the Minister of Planning pursuant to the provisions of the *Environmental Planning and Assessment Act 1979* (DA 309-11-2001-i). The consolidated Development Consent has been modified on eleven occasions, with the most recent amendment approved on 6 July 2022. The most recent amendment allows ACOL to access and mine coal resources at the Ravensworth Underground Mine (RUM) that are approved to be mined under Development Consent DA 104/96. The RUM is approved to produce up to 7 million tonnes per annum of run of mine coal and operate until 2032.

The RUM is approved for multi-seam longwall extraction, targeting two coal seams in descending order (Pikes Gully [PG] and Middle Liddell [MLD]) (**Figure 2**). Development Consent DA 104/96 approved mining by ACOL of six panels in the PG Seam and five panels in the MLD Seam. Following further detailed studies on the extraction layout, ACOL has decided to not mine Longwalls 401 and 402 in the PG Seam at this stage.

ACOL has prepared an Extraction Plan for mining of Longwalls 403 to 406 in the PG Seam of the RUM (**Figure 3**), varying between 177 metres (m) and 312 m below the surface. Proposed mining of Longwalls 403 to 406 is due to commence approximately September 2025 and is planned to be completed by February 2028.

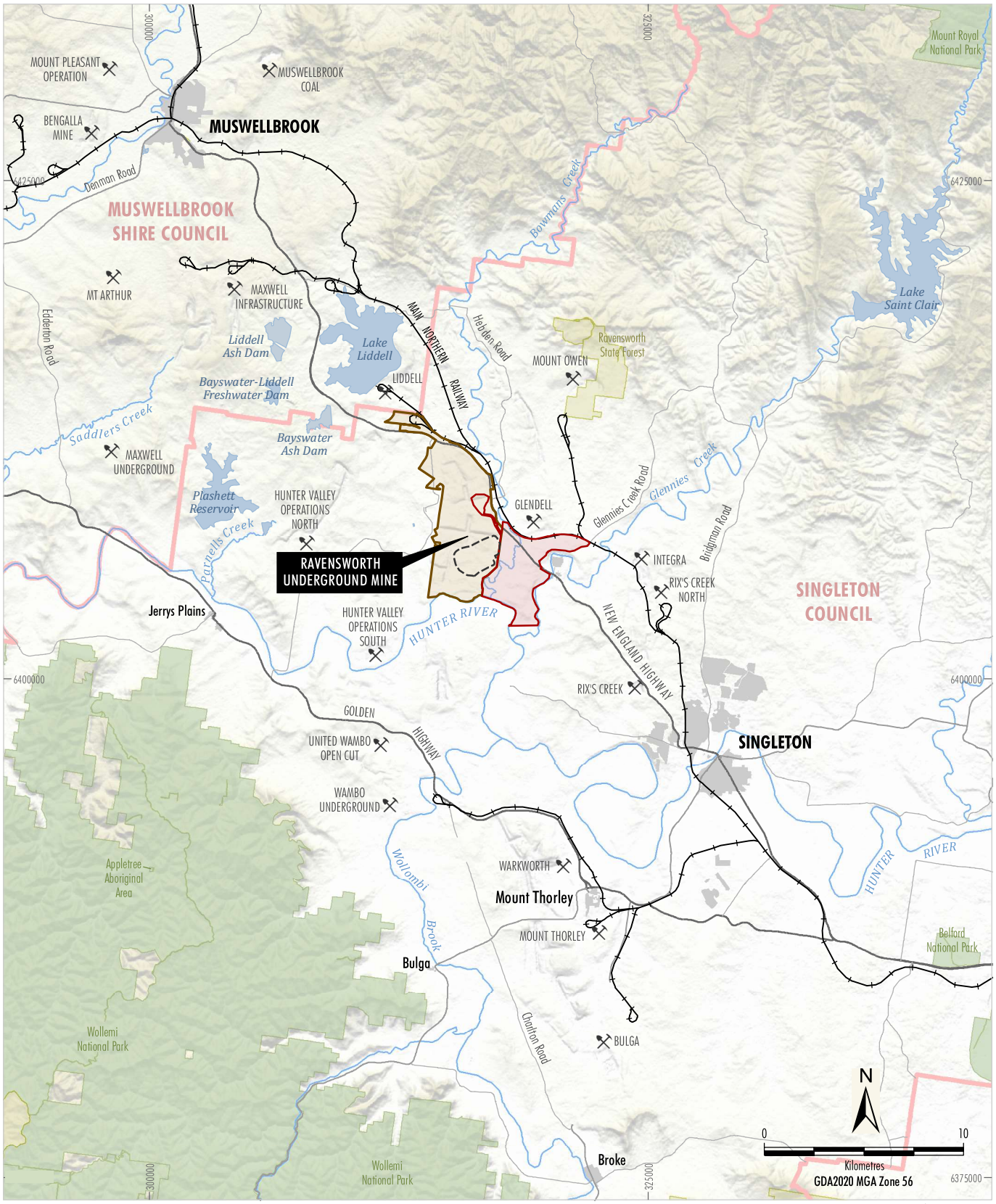
The **Study Area** (also shown as **Study Area** in **Graphical Plans**) (**Figure 3**) is generally determined as the area within a distance equal to an angle of draw measured form the outermost goaf edge of the planned longwall panel voids of:

- 45 degree (°) (1 times depth of cover) over waste rock fill material; or
- 26.5° (0.5 times depth of cover) over natural ground.

1.1 SCOPE & OBJECTIVE

The Extraction Plan for Longwalls 403 to 406 has been prepared in accordance with the requirements of Schedule 3, Condition 32 of DA 309-11-2001-i and Schedule 3, Condition 6 of DA 104/96 (MOD 10).

The objective of this Extraction Plan is to identify the framework for management of subsidence induced impacts on natural and built features within the Longwalls 403 to 406 Study Area as a result of the secondary extraction of the RUM Longwalls 403-406.



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Source: NSW Spatial Services (2023)

LEGEND

- Mining Operation
- Local Government Area
- State Forest
- National Parks and Wildlife Estate
- Ravensworth Underground Mine
- Ashton Mine Complex
- Longwalls 403 to 406 Study Area

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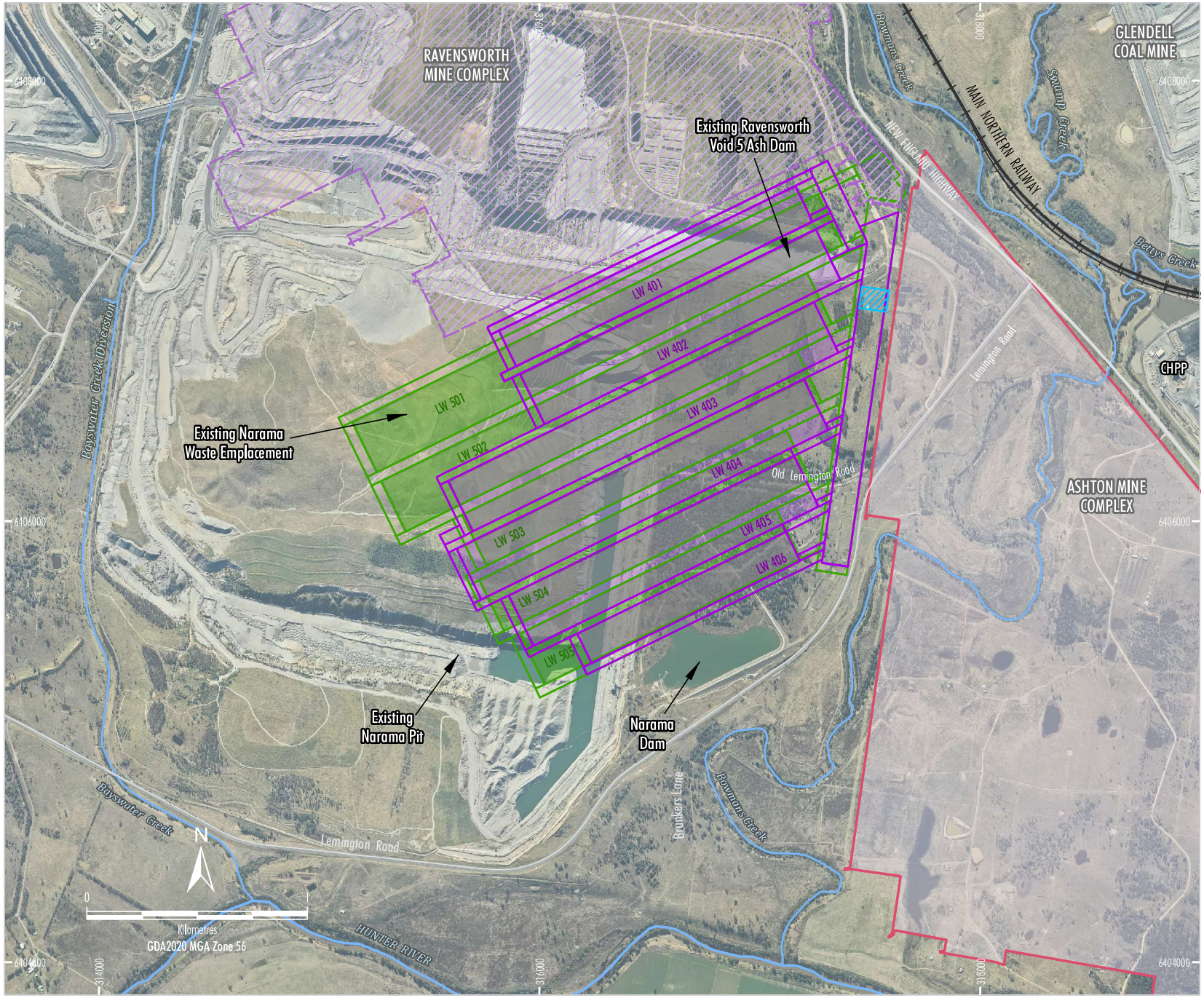
RAVENSWORTH UNDERGROUND MINE
LONGWALLS 403 TO 406 EXTRACTION PLAN

Regional Location

Figure 1



LEGEND

- Completed Pikes Gully Seam Workings
- Existing Shaft 5 Location
- Indicative Pikes Gully Seam Longwall Layout
- Indicative Middle Liddell Seam Longwall Layout
- Ashton Underground Mine

Source: SCT (2021); NSW Spatial Services (2023)
Orthophoto: Ravensworth Mine Complex (2021)

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RAVENSWORTH UNDERGROUND MINE
LONGWALLS 403 TO 406 EXTRACTION PLAN

Ravensworth Underground Mine
Approved General Arrangement

Figure 2

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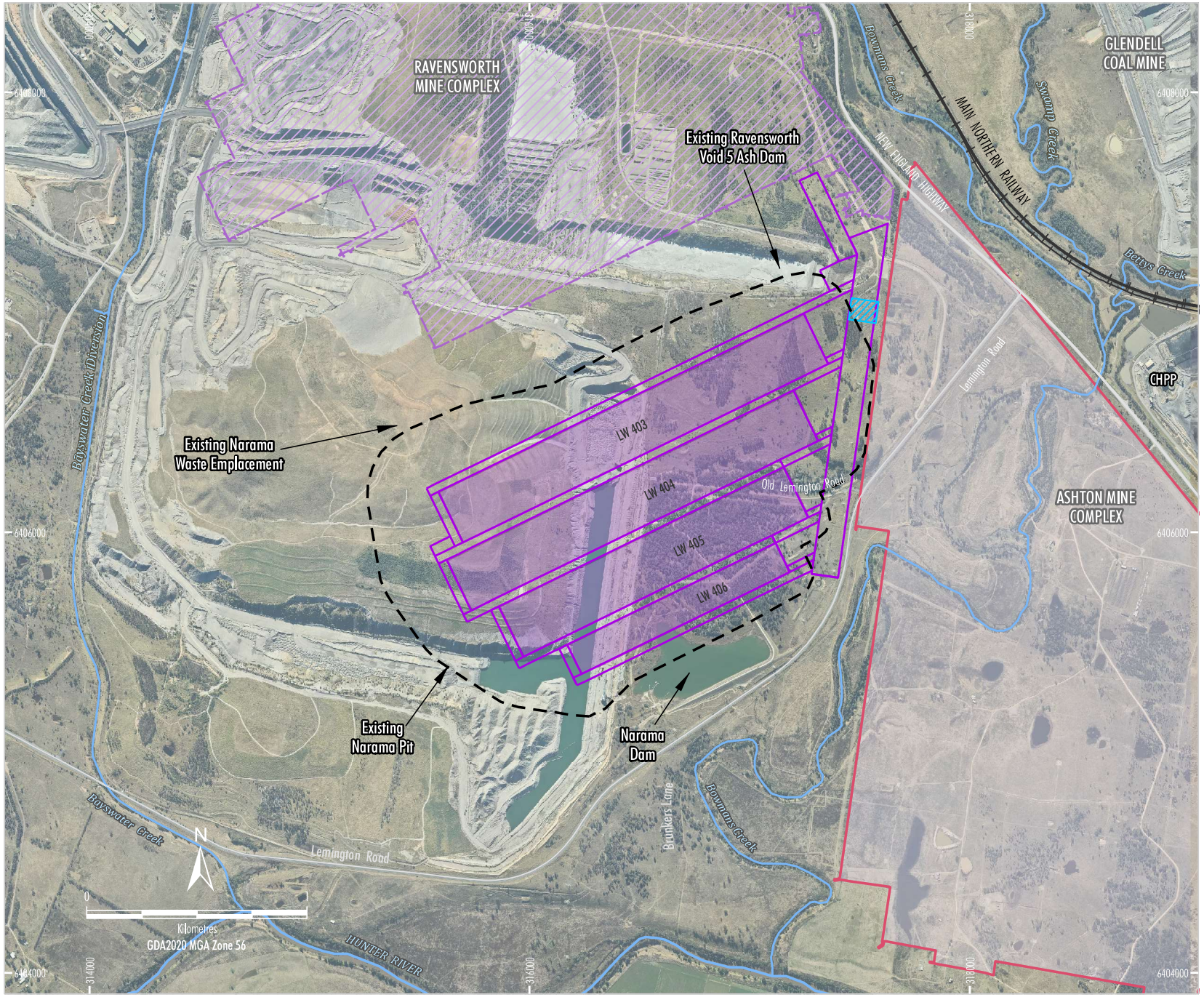

LEGEND

- Completed Pikes Gully Seam Workings
- Existing Shaft 5 Location
- Pikes Gully Seam Longwall Layout
- Ashton Underground Mine
- Longwalls 403 to 406 Study Area

Source: SCT (2021); NSW Spatial Services (2023)
Orthophoto: Ravensworth Mine Complex (2021)

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RAVENSWORTH UNDERGROUND MINE
LONGWALLS 403 TO 406 EXTRACTION PLAN

Pikes Gully Seam Longwall Layout

Figure 3

ACO-18-03A LW403-406_EP_MT_202A

The objective of the Extraction Plan will be achieved by:

- providing an overview of the planned coal resource recovery methods;
- identifying the natural and built features within the Study Area;
- identifying the predicted subsidence impacts and/or environmental consequences for the natural and built features within the Study Area;
- identifying the management activities (including consultation, monitoring and remediation methods) prepared to address the predicted subsidence impacts; and
- identifying the review and reporting activities to allow for assessment of the performance of subsidence management measures implemented by ACOL, and identification of areas where either continual improvement may be achieved, or management of unpredicted subsidence impacts can be managed.

1.2 DOCUMENT STRUCTURE

The Extraction Plan has been prepared to address conditions of DA104/96 (MOD 10), and structured in consideration of the *Extraction Plan Guideline* (Department of Planning and Environment [DPE], 2022). The document structure for this Extraction Plan is outlined below:

Extraction Plan	Asset Management Plans (AMP)	Specialist Assessments	Graphical Plans
• Main Document (this document). • Water Management Plan. • Land Management Plan. • Biodiversity Management Plan. • Heritage Management Plan. • Built Features Management Plan (including Asset Management Plans). • Public Safety Management Plan. • Subsidence Monitoring Program. • Coal Resource Recovery Plan.	• TransGrid. • Glencore. • AGL Macquarie.	• Subsidence Assessment (SCT Operations Pty Limited [SCT], 2024). • Groundwater Report (Australasian Groundwater and Environmental Consultants Pty Ltd [AGE], 2024). • Surface Water Assessment (ATC Williams Pty Ltd [ATCW], 2024). • Risk Assessment Workshop (STAC Consulting, 2024). • Archaeological Assessment (Stratum Archaeology Pty Ltd [Stratum Archaeology], 2024). • Flora and Fauna Assessment (Eco Logical Australia Pty Ltd [ELA], 2024).	• Prepared internally by ACOL Surveyors.

The complex-wide (i.e. ACP and ACOL-operated RUM) Water Management Plan, Biodiversity Management Plan and Heritage Management Plan have been updated as part of this Extraction Plan. A Land Management Plan has been prepared as an addendum to Biodiversity Management Plan.

The document structure includes the following elements:

- **Section 2** includes an overview of the mine planning and design, overall subsidence predictions, and performance objectives.
- **Section 3** includes details on the development of the Extraction Plan, including details of consultation with relevant agencies and other stakeholders within the Study Area.
- **Section 4** provides an overview of subsidence management measures including plans prepared to address impacts to relevant environmental and/or built features. The individual management plans are contained in Appendices to the Extraction Plan.
- **Section 5** addresses the key elements of how the Extraction Plan is implemented, including reporting, regular review and key responsibilities.

An important component of the Extraction Plan are the key component plans referred to in **Section 4**. These plans are described in **Table 1.**

Table 1. Extraction Plan Key Component Plans

Plan	Description	Location
Water Management Plan*	To manage the potential environmental consequences of second workings on surface and ground water.	Appendix C
Land Management Plan**	To manage the potential environmental consequences of second workings on steep slopes and land in general.	Appendix D
Biodiversity Management Plan*	To manage the potential environmental consequences of second workings on aquatic and terrestrial flora and fauna.	Appendix E
Heritage Management Plan*	To manage the potential environmental consequences of second workings on heritage sites and values.	Appendix F
Built Features Management Plan	To manage the potential environmental consequences of second workings on any built feature.	Appendix G
Public Safety Management Plan	To ensure public safety in the Study Area.	Appendix H
Coal Resource Recovery Plan	To demonstrate effective recovery of available resources obtained through underground mining activities.	Appendix I
Subsidence Monitoring Program	A program to collect actual measured subsidence data, and conduct inspections for environmental consequences of subsidence to compare against predicted impacts which may trigger a response, or set of responses.	Appendix J

** The complex-wide management plan has been updated as part of this Extraction Plan.*
*** A standalone document has not been prepared as the impacts associated with the Extraction Plan are addressed in the existing site wide management plans.*

Graphical Plans which are required by the Extraction Plan Guideline (DPE, 2022), and referred to in this Extraction Plan, are included as **Graphical Plans** at the end of the Main Extraction Plan text.

2 OVERVIEW

2.1 ENVIRONMENTAL CONTEXT

2.1.1 Environmental Setting

The Study Area surface expression is located in Camberwell, approximately 14 km north-west of Singleton in the Hunter Valley of NSW (**Figure 1**).

The surface topography within the Study Area consists primarily of previous open cut mining areas, water management infrastructure and remnant vegetation. The Narama Dam wall is located outside the Study Area (**Figure 3**) (SCT, 2024), however the water storage reservoir extends over Longwall 406 (**Figure 3**) (SCT, 2024).

Natural features within the Study Area are limited to the remaining surface and natural bushland overlying the eastern ends of Longwalls 404 to 406, immediately to the north of the Narama Dam (SCT, 2024). Two minor drainage lines flow to Bowmans Creek or into the Narama Dam within this section of natural ground (SCT, 2024).

Bowmans Creek flows from the foothills of the Mount Royal Range in a south south-westerly direction, to the east of the Study Area before joining the Hunter River to the south. This watercourse was previously diverted by ACOL in two locations to allow for more efficient recovery of the coal resource. The boundary of the alluvium associated with Bowmans Creek bounds the Study Area to the east.

The Hunter River, as defined by the edge of the Hunter River Alluvium, is located outside the southern edge of the Study Area.

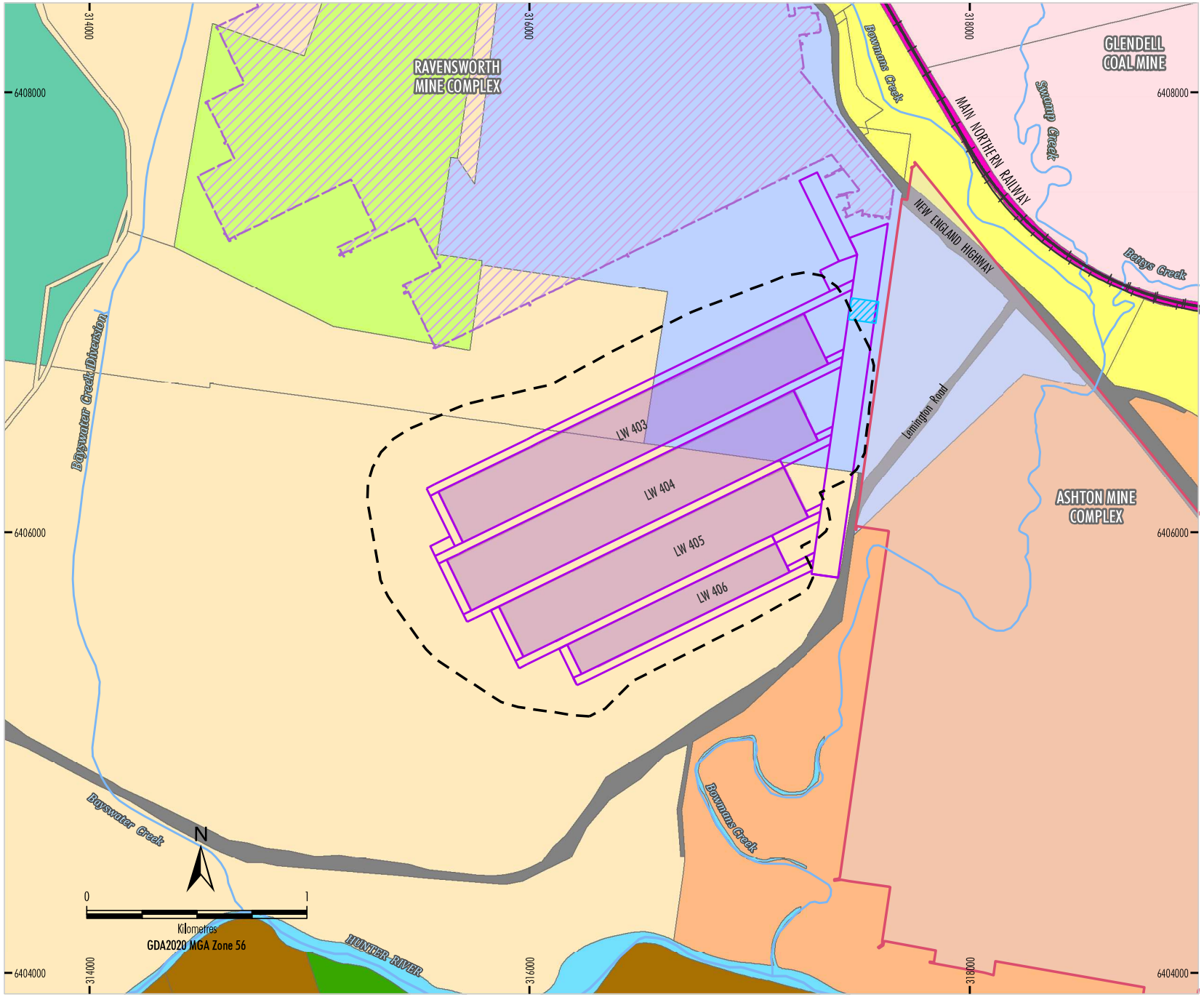
Other natural features in the vicinity of the Study Area include a remnant woodland area, that is directly undermined by Longwalls 404 to 406.

The climate of the region is classified as warm temperate, characterised by seasonal variations from hot wet summers to mild dry winters. Rainfall is summer dominant, often occurring as short duration high intensity storms, with an average of approximately 694 millimetres (mm) of rain falling in the region per annum at the ACP Weather Station.

2.1.2 Land Ownership and Tenure

Land ownership within and proximate to the Study Area is shown in **Figure 4**. The Study Area is located within Mining Lease (ML) 1834, ML 1835, ML 1836, and ML 1837 (refer to **Figure 4** and **Graphical Plan 5**).

Land use surrounding the Study Area is primarily rural to the south, with mining immediately to the north, east and west. The dominant land use within and surrounding the area is grazing and mining, however it also includes rural residential and vegetated land. The village of Camberwell is located approximately 2.5 km east of the Study Area.



LEGEND

- Completed Pikes Gully Seam Workings
- Existing Shaft 5 Location
- Pikes Gully Seam Longwall Layout
- Ashton Underground Mine
- Longwalls 403 to 406 Study Area
- Water Feature Corridor
- Public Road Corridor

Landholder

- AGL Macquarie Pty Ltd
- Ashton Coal Mines Ltd
- Azsa Pastoral Holdings Pty Ltd
- Coall & Allied Operations Pty Ltd and HVO Resources Pty Ltd
- Cumnock Management Pty Ltd
- Enex Foydell Pty Ltd
- Glendell Tenements Pty Ltd
- Ravensworth Operations Pty Ltd
- Resource Pacific Pty Ltd
- Transport for NSW

Source: SCT (2021); NSW Spatial Services (2024); Yancoal (2021)
Orthophoto: Ravensworth Mine Complex (2021)

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RAVENSWORTH UNDERGROUND MINE LONGWALLS 403 TO 406 EXTRACTION PLAN

Mining Titles and Land Ownership

Figure 4

ACO-18-03A LW403-406_EP_MT_204A

The surface within the Study Area is land owned by Ravensworth Operations (Glencore) and AGL Macquarie. The surface is used mainly for open cut mining purposes, and mining related activities. AGL Macquarie is currently emplacing fly ash from the nearby power stations into the Void 5 East Fly Ash Emplacement Area.

There are no public roads located within the Study Area. Lemington Road, which is a Singleton Council road is located directly to the east of the Study Area. The New England Highway, which is a Transport for NSW controlled road, is considered remote from the planned secondary extraction at the ACOL-operated RUM and is not likely to experience significant subsidence effects and impacts.

2.1.3 Natural and Built Features within the Study Area

A summary of natural features within the Study Area is provided below:

- A small mapped portion of low probability groundwater dependent ecosystems are located within the Study Area (ELA, 2024).
- Two threatened flora species have been recorded in the Study Area during previous ecological surveys. Three fauna species listed under the NSW *Biodiversity Conservation Act 2016* have been recorded within the Study Area (ELA, 2024).
- A number of extant historic and Aboriginal heritage sites are located within the Study Area, outlined within the specialist Archaeological Assessment (Stratum Archaeology, 2024).
- Two minor drainage lines within the Study Area and flow into Bowmans Creek or into the Narama Dam (SCT, 2024).
- Bowmans Creek and the Hunter River is located entirely outside the Study Area (ATCW, 2024).
- Vegetation communities within the Study Area include Narrow-leaved Ironbark – Bull Oak – Grey Box Shrub and Derived Grassland of NSW (ELA, 2024).

Built features within the Study Area are shown on **Graphical Plan 2** and include (SCT, 2024):

- Narama Open Cut Pit;
- Narama Rehabilitation Area;
- AGL Macquarie Void 5 and associated open cut operations;
- Water management installations, including:
  - pumping equipment;
  - water supply pipelines; and
  - access tracks.
- Fly ash pipelines.
- Sections of Void 5 East Fly Ash Emplacement Area, including:
  - internal walls;

  - seal wall/barriers;
  - fly ash disposal equipment; and
  - access tracks.
- A section of the Narama Dam water storage reservoir.
- Rural property infrastructure owned by Glencore and AGL Macquarie (private access tracks, sheds, tanks, farm dams and fence gates and posts).
- TransGrid 330 kilovolt (kV) above ground transmission lines.
- Glencore 33 kV above ground transmission lines.

2.2 MINE PLANNING, DESIGN AND RESOURCE RECOVERY

2.2.1 Mining Domains

Longwalls 403 to 406 are located within the PG Seam. ACOL has previously mined the PG Seam, and are currently mining the Longwall 208 in the Upper Lower Liddell Seam (ULLD) Seam at Ashton Coal Mine.

The Study Area is contained within ML 1834, ML 1835, ML 1836, and ML 1837. Retreat will be from the western end of each panel in an approximately easterly direction to the nominated finish position at which point the equipment will be relocated to the following panel.

2.2.2 Mining Method

ACOL intends to continue to mine the PG seam by conventional retreating longwall mining methods. Seam thickness varies between 1.6 m to 2.3 m within the Study Area. The mining height is assumed to be in the range 2.2 to 2.8 m.

Extraction will take place generally in an approximately west to east direction towards the Mains Headings.

Long-term mains development pillars are designed to be long-term stable and non-subsiding, thus rendering the roads serviceable for the life of the mine. Development roads are generally driven at a width up to 5.4 m by single pass continuous miners. Coal quality, geotechnical, geological and equipment considerations will be the main drivers for variation in development or longwall extraction heights.

2.2.3 Mining Parameters

The ACOL-operated RUM is approved as a multi-seam longwall operation. Following mining in the PG Seam, mining will progressively access the reserves within the MLD Seam as approved under the RUM Development Consent.

The mining plan for the Longwalls 403 to 406 Extraction is designed to keep the Ashton Underground Mine (AUM) and the RUM physically separated. The mining layout for these longwalls in the PG Seam leaves a barrier of solid coal, a minimum of 40 m wide, between the existing workings of RUM and planned workings of the AUM.

The estimated recovery of the resource within the Study Area is provided in **Table 2.**

Table 2. Study Area Estimated Resource Recovery

Total tonnes of coal (resource within Study Area)	10.19 Mt
Total tonnes extracted through development	1.13 Mt
Tonnes extracted by Longwall	9.13 Mt

Note: Mt = million tonnes

Individual longwall tonnages are described in **Table 3.** The longwall rate and mining sequence is described in **Table 4** and longwall geological attributes are described in **Table 5.**

Table 3. Individual Longwall Tonnages

Panel	Panel Length (m)	Panel Width (void m)	Average Extraction Height (m)	Panel Extraction Tonnes (Mt)
Longwall 403	1,852	260.8	2.5	2.07
Longwall 404	1,759	260.8	2.5	2.05
Longwall 405	1,445	260.8	2.5	1.73
Longwall 406	1062	169.2	2.5	0.79

Table 4. Longwall Mining Rate and Sequence

Panel	Start Date	End Date
Longwall 403	September 2025	March 2026
Longwall 404	May 2026	November 2026
Longwall 405	January 2027	June 2027
Longwall 406	August 2027	October 2027

Table 5. Longwall Geological Attributes

Panel	Depth of Cover (m)	Seam Thickness (m)	Roof and Floor Conditions	Geological Anomalies
Longwall 403	180m-320m	2.30m-3.50m	Roof is expected to be competent with some zones of potentially soft floor. Potential weak roof at eastern ends on MG403 and TG403 due to interburden thickness between Pikes Gully seam and Rider seam.	Bayswater Syncline running north-south along the western end of panel 403. Predicted fault to be intersected at western end of TG403 A and B headings as well as MG403 and MG end of 403 Install face. Predicted displacement to be <1m. Several Dykes have been intersected at Ravensworth and are predicted to continue into 403 panel at the western end.
Longwall 404	180m-300m	2.10m-2.90m	Roof is expected to be competent with some zones of potentially soft floor. Potential weak roof at eastern end of TG403 due to interburden thickness between Pikes Gully seam and Rider seam.	Bayswater Syncline running north-south along the western end of panel 404. Predicted fault to be intersected at western end of TG404 A and B. Predicted displacement to be <1m.
Longwall 405	180m-260m	2.10m-2.40m	The roof is expected to be competent with some zones of potentially soft floor.	Bayswater Syncline running north-south along the western end of panel 405.
Longwall 406	180m-220m	2.20m-2.40m	The roof is expected to be competent with some zones of potentially soft floor.	NIL geological anomalies.

2.2.4 Mine Design in Relation to Subsidence Management

Longwalls 401 and 402 have been previously approved for mining in the PG Seam. Following a review of the risks of subsidence impact on the AGL Void 5 Ash Dam and the Void 5 Ash Dam Barrier, ACOL has revised the mine design to only mine Longwalls 403 to 406 (i.e. Longwalls 401 and 402 will not be mined at this stage). An additional Extraction Plan or an addendum to this Extraction Plan will be developed if ACOL wishes to mine Longwalls 401 and 402.

The subsidence monitoring undertaken to date at the AUM indicates that the maximum subsidence can be estimated with reasonable confidence. The subsidence profile is also relatively predictable, although the specific mechanics of the interaction between the seams needs to be recognised.

Subsidence from mining Longwalls 403 to 406 in the PG Seam is expected to cause vertical subsidence of up to 3.3 m. Maximum subsidence is expected to occur within the mining footprint and diminish with distance from the outermost edge of mining. The angle of draw from the outermost goaf edge in a multi-seam mining environment is expected to be similar to the angle of draw in a single seam operation (SCT, 2024).

The subsidence behaviour observed indicates:

- Regular, repeatable form of incremental subsidence.
- General smoothing and reduction in peak values with increasing overburden depth.
- Maximum vertical and horizontal movements occur substantially within the footprint of the active panel.
- Movements over the previous panel are less than 200 mm and insignificant for all practical purposes.

The alignment of longwall orientation with the principal stress direction (being sub parallel) is favourable geotechnically, as this minimises the “stress notching” effect on longwall retreat.

Design of the panel width and chain pillar width thus has been a primary consideration and input into the subsidence and impact assessment whilst still allowing safe and productive mining. The parameters used for Longwall 403 are:

- Panel width (void) = 260.8 m.
- Chain Pillar width (solid) = 32.6 m.

Longwall 404 maintains the same panel width (260.8 m) but has a reduced Chain Pillar width (28.6 m). Longwall 405 maintains the same panel width (260.8 m) but has a reduced Chain Pillar width (22.6 m). Longwall 406 maintains the same minimum chain pillar width as Longwall 405 (22.6 m) but has a reduced panel width (169.2 m).

Chain pillar lengths are nominally 100 m, however a small number of pillars of shorter length will also be used.

Geological and geotechnical information across the Study Area has been drawn from a number of historical boreholes and mining information compiled during neighbouring PG and MLD Seam development and longwall mining.

It is also likely that some localised irregularities will occur in the subsidence profiles due to near surface geological features. The irregular movements are accompanied by elevated tilts and strains, which often exceed the conventional predictions.

2.3 SUBSIDENCE PREDICTIONS

2.3.1 Reliability and Accuracy of Subsidence Forecasts

The prediction methodology for Longwalls 403 to 406 was used for Longwalls 201 to 208 and has been validated by subsequent mining and monitoring of Longwalls 201 to 203. The method used to predict subsidence for the PG Seam longwalls was originally based on 80-85% of the combined seam mining thickness (after Li *et al*., 2010). These guidelines presented by Holla (1991) for the Western Coalfields were used to estimate tilts and strains. This methodology is considered suitable to inform environmental assessment (EA) processes and future subsidence impacts. Detailed description of the prediction technique used, factors that may affect the development of subsidence, and the relevance of input data are provided in the Subsidence Assessment for Longwalls 403 to 406 (SCT, 2024).

To date, ACOL has adopted a conservative approach by using a maximum subsidence of 85% of combined mining thickness. The practice of assessing the impacts of 100%, 200% and 300% maximum subsidence referred to in the Subsidence Management Plan Guidelines is not considered credible at the AUM given that maximum subsidence is already assessed as 85% of combined seam thickness.

Table 6 summaries the maximum predicted forecasted values for Longwalls 403 to 406 in the PG Seam. It is recognised that the original subsidence predictions in the Environmental Impact Statement (EIS) for the RUM were made in 2001 by G.E. Holt and Associates (GHA) (2001) prior to multi-seam subsidence studies by Li *et al*. (2007 and 2010). Incremental and cumulative vertical subsidence was predicted but no cumulative predictions of tilt and strains were presented in GHA (2001).

Table 6. Comparison of Previously Predicted Subsidence Parameters

Assessment	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
RUM EIS (GHA, 1996)	1.5	14.7	4.9
Extensions for Longwalls 6-10 and Mains Readjustment (SCT, 2010)	2.3	50	20
MOD 9 (SCT, 2012)	2.3	50	20
Mod 10 (SCT, 2022)	3.4	50	20
Forecasts in this assessment			
Longwall 403 to 406 EP (LW403, 404, 405, 406) PG	3.3	60	30

Note: mm/m = millimetres per metre

Changes to forecast maximum subsidence effects reflect the improved understanding of multi-seam subsidence behaviour at the Ashton Coal Mine since the RUM was approved, changes to the mining plan layout and variations in seam thickness or proposed mining heights. The improved understanding is based on monitoring of multi-seam subsidence at Ashton Coal Mine. Latent subsidence from overlying seams, differences in subsidence behaviour near stacked goaf edges and remote from panel edges and the influence of mining direction on subsidence behaviour are all processes that have been quantified as a result of monitoring experience.

2.3.2 Study Area Subsidence Predictions

The predicted subsidence, tilt and strains have been obtained using a review of subsidence data and prediction methodologies, as described in **Section 2.3.1**. The impacts predicted by SCT (2024) are expected to remain within the Subsidence Performance Measures of the Development Consent (DA 194/96).

2.3.2.1 Maximum Predicted Subsidence Impacts for Longwalls 403 – 406

Table 7 describes the maximum predicted subsidence estimates detailed in the subsidence assessment for Longwalls 403 to 406 in the PG Seam (SCT, 2024).

Further details and figures regarding subsidence impacts such as subsidence contours (after the completion of Longwalls 403 – 406) and incremental subsidence predictions are discussed in the SCT (2024) Subsidence Assessment.

Subsidence from mining Longwalls 403 to 406 in the PG Seam is expected to cause incremental vertical subsidence of up to 3.3 m. Maximum subsidence is expected to occur within the mining footprint and diminish with distance from the outermost edge of mining.

Table 7. Maximum Predicted Subsidence Parameters for PG Seam Longwall Panels

PG Seam Longwall Panels	Longwalls 403 to 406 Forecast		
	Maximum Subsidence (m)	Maximum Strain (mm/m)	Maximum Tilt (mm/m)
LW403	3.2	55	25
LW404	3.3	60	25
LW405	2.7	55	25
LW406	1.6	55	30

2.3.2.2 Unconventional Subsidence Movements

Unconventional subsidence movements considered include far field horizontal movements outside the mining area, horizontal movements associated with strata dilation in uneven topography, shear movements on low strength bedding planes leading to formation of ripples on the surface and stepping in the ground surface associated with geological structures.

All four of these mechanisms have been observed during mining at the ACP, however none of the occurrences of these unconventional movements caused significant impacts to the surface infrastructure.

Far field horizontal subsidence movements observed outside the mining area during mining at the ACP were small beyond the panel edges (<100 mm at 50 m) and changed so gradually that they are imperceptible for all practical purposes. The same low magnitudes of horizontal movement outside the mining area are expected during mining in the PG Seam at the ACOL-operated RUM.

There has been a consistent pattern of horizontal movement in an upslope direction over each of the mined panels. This pattern is associated with the same mechanism that causes valley closure. The magnitude of this uniform upslope component of horizontal movement is in the range 200-300 mm above Longwalls 201, 202 and 203 at the ACP. Similar strata dilation effects are expected above Longwalls 403 to 406.

Conventional horizontal movements do not directly impact on natural and built features, rather impacts occur as the result of differential horizontal movements. Strain is the rate of change of horizontal movement. The impacts of strain on the natural and built features are addressed in the impact assessments for each feature which have been summarised in the Land Management Plan Addendum (**Appendix D**) and the Built Features Management Plan (**Appendix G**).

Significant cracking occurring around stacked edges has been successfully remediated using a variety of techniques including ripping, excavation and backfilling. Photographs of the impacts of subsidence along the stacked goaf edge as well as impacts after remediation are provided in **Photo 1** and **Photo 2**.

Photo 1: Example of subsidence cracking along stacked goaf edge and after crack remediation at the AUM

Photo 2: Example of subsidence cracking along stacked goaf edge and after crack remediation at the AUM

2.4 SUMMARY OF SUBSIDENCE IMPACTS

A summary of potential subsidence impacts associated with mining Longwalls 403 to 406 is outlined within **Table 8** and **Table 9** below.

Table 8. Summary of Impacts to Surrounding Infrastructure

Feature	Owner/Manager	Brief Description	Impact
New England Highway	Transport for NSW	Remote from Study Area.	No perceptible subsidence impacts are expected from the mining of Longwalls 403 to 406.
330kV Transmission Line	TransGrid	Located west of Lemington Road traversing the eastern boundary of the Study Area. Two steel lattice towers (#38 and #39) that support the conductors are within the Study Area	Tower foundations are designed and built to accommodate the combined subsidence movements associated with both the Ashton Underground Coal Mine and RUM (SCT, 2024). No impacts to this transmission line that would interrupt the continued operation of the 330 kV powerline are expected from the planned mining of Longwalls 403 to 406 in the PG Seam (SCT, 2024).
AGL Macquarie Ravensworth Site Access Track	AGL Macquarie	An access road which extends from the intersection with Lemington Road (overlying Longwall 207B) to the north-western boundary of the Study Area.	Maximum incremental subsidence of 2.5 m and 2.2 m and maximum cumulative subsidence of 4.2 m and 3.1 m are expected over the centres of Longwalls 207B and 208, respectively. A maximum incremental strain of 26 mm/m is expected along the centre of Longwall 207B with strains over the western edges of Longwalls 207B and 208 of up to 46 mm/m and 37 mm/m, respectively. Maximum incremental tilts of 52 mm/m are expected over the centreline of Longwall 207B with permanent tilts over the western edges of Longwalls 207B and 208 of 92 mm/m and 73 mm/m, respectively. These strains and tilts are expected to cause surface cracking up to 200-300 mm wide and compression humps greater than 100 mm high as well as localised steep gradients along and across the road. Most of the surface cracks are expected to occur at the same locations as those that formed when Longwalls 7B and 8 were mined.
Fencing / Gates	AGL Macquarie	Fencing and gates owned by AGL Macquarie.	Minor impacts requiring visual inspection and regular maintenance. Any impacts to fences or gates are expected to be minor and repairable. Impacts could include broken or loosened wires to the extent that fences become ineffective.
Farm Dams and other water sources	AGL Macquarie	Farm Dams and other water sources owned by AGL Macquarie.	Impacts to farm dams are expected due to ground cracking with potential for water loss or seepage occurring.

Feature	Owner/Manager	Brief Description	Impact
Main Security Gate Entry/Exit Control	AGL Macquarie	Controlled source of entry/exit for operational activities.	Any impacts to the access road in the vicinity of electronic gate are expected to impact gate operations.
Ravensworth Void 5 East Ash Emplacement Area	AGL Macquarie	The Void 5 East Fly Ash Emplacement Area and associated infrastructure is 0.5 times depth of cover away from Longwall 403 (SCT, 2024).	Subsidence effects and impacts on the Void 5 East Fly Ash Emplacement Area are associated infrastructure from the mining of Longwalls 403 to 406 in the PG Seam are expected to be generally imperceptible and negligible (SCT, 2024). Any impacts are expected to be limited to a small area along the southern side of the Void 5 East Fly Ash Emplacement Area near the corner of Longwall 403.
Other Infrastructure on Ravensworth Site	AGL Macquarie	Infrastructure assets of 3rd party lessees on AGL Macquarie land.	Infrastructure assets of 3rd party lessees are expected to be impacted if located in subsidence areas. Impacts to paddocks with grazing stock are expected with cracking & other ground movements having the potential to impact stock safety and welfare.
33kV Transmission Line	Glencore	Two 33 kV transmission lines are located above Longwalls 404 to 406 on the section of undisturbed, natural ground within the Study Area.	The 33 kV transmission lines are expected to experience the reduced subsidence effects forecast in the area of natural ground (SCT, 2024). Impacts to the 33 kV transmission lines from the planned mining are expected to be similar to those already experienced from the mining at the ACP (SCT, 2024). Single pole structures have been found to be generally tolerant of vertical subsidence and tilting of the ground from longwall mining with maximum ground tilts and strains generated by the vertical subsidence not necessarily transferring fully to the poles (SCT, 2024). The 33 kV transmission lines are expected to remain safe and serviceable (SCT, 2024). The maximum vertical subsidence in the vicinity of the transmission line poles is estimated at approximately 1.7 m with maximum tilt and strain of 45 mm/m and 20 mm/m, respectively (SCT, 2024).

Feature	Owner/Manager	Brief Description	Impact
Narama Dam	Glencore	The Narama Dam wall is located outside Longwalls 403 to 406, and substantially outside the Study Area. The water storage reservoir extends into the Study Area and Longwall 406. The dam wall, reservoir and associated equipment is approximately 225 m above the mining horizon in the PG Seam on the area of undisturbed natural ground in the southeast of the Study Area.	Only low magnitude subsidence effects are expected at the majority of the dam wall from the planned mining with vertical subsidence of generally less than 20 mm although horizontal movements may range up the 200 to 250 mm. No significant impacts are expected on the Narama Dam wall and associated equipment from the low-level vertical subsidence and far-field movements from stress relief (SCT, 2024). The northern extent of the Full Supply Level (FSL) of the reservoir storage extends over the edge and to the centre of Longwall 406. Maximum vertical subsidence in the centre of Longwall 406 is estimated at 1.2 m. Estimates for maximum tilt and strain are less than 30 mm/m and less than 15 mm/m, respectively. Subsidence impacts to the dam wall, associated equipment, reservoir and landform are expected to be minor and manageable (SCT, 2024). Narama Dam is expected to remain safe and serviceable (SCT, 2024).
Narama Open Cut Pit	Glencore	Sections of Longwalls 403 to 406 are below parts of the Narama Pit. The surface terrain is characterised by various stages of backfilling and rehabilitation with the final open void of the pit currently used for water storage.	Impacts to the landform are expected to include tension cracks, potentially with steps, and surface distortions from compression of the ground (SCT, 2024). Impacts are expected to be more noticeable on hard surfaces such as access roads and on steeper slopes where cracks and minor instability is possible (SCT, 2024). The potential for spontaneous combustion in the surface fill material is expected (SCT, 2024). Given mining activities are now complete and the current usage of the Narama pit the consequences of any cracking of, and rockfalls from, the highwall are expected to be low and manageable (SCT, 2024).
Pipeline from Narama Dam to Mt Owen Mine	Glencore	Sections of water pipelines are located above or in the vicinity of Longwall 406 around the Narama Dam reservoir within the Study Area. These pipelines are owned by Glencore and used for water management at Ravensworth Operations and at the Mt Owen Mine Complex to the north.	Maximum vertical subsidence in the centre of Longwall 406 is estimated at 1.2 m (SCT, 2024). Estimates for maximum tilt and strain of the ground are less than 30 mm/m and less than 15 mm/m, respectively (SCT, 2024). Impacts to these water pipelines from the planned mining of Longwalls 403 to 406 are expected to be minor and manageable (SCT, 2024). Water pipelines are expected to remain safe and serviceable (SCT, 2024).

Feature	Owner/Manager	Brief Description	Impact
Narama Open Cut Pit Rehabilitation Area	Glencore	Sections of Longwalls 403 to 406 are located below the Narama Open Cut Pit Rehabilitation Area. The surface terrain is characterised by various stages of back-filling and rehabilitation with the final open void of the pit currently used for water storage. Above Longwalls 403 to 406, the maximum thickness of fill material within the boundary of the Narama Pit is approximately 160 m.	Impacts to the landform are expected to include tension cracks, potentially with steps, and surface distortions from compression of the ground (SCT, 2024). Impacts are expected to be more noticeable on hard surfaces such as access roads and on steeper slopes where cracks and minor instability is possible (SCT, 2024). The potential for spontaneous combustion in the surface fill material is expected (SCT, 2024).
Access Roads	Glencore	Several unsealed access roads traverse the surface above the longwall mining area within the Study Area.	Access roads above the longwall mining area on the back-filled parts of the Narama Pit are expected to experience greater magnitudes of subsidence effects compared to the roads over the section of undisturbed, natural ground. Maximum vertical subsidence is expected to be approximately 2.6 m in the back-filled areas and up to approximately 1.7 m in the areas of natural ground. Timely remediation of impacts to reduce hazards and the potential for erosion to further impact the road surface is also recommended.

Table 9. Summary of Impacts of Natural Features and Heritage

Feature	Brief Description	Impact
Bowmans Creek and Diversions	Main channel of Bowmans Creek located to the east of the Study Area. The creek has been diverted in two diversion channels.	No additional impacts expected (ATCW, 2024).
Bowmans Creek Alluvium	The boundary of the Bowmans Creek Alluvium covers a small section of the Study Area.	Predicted drawdown in the alluvial aquifers is lower than the approved level (ATCW, 2024).
Hunter River and Alluvium	Located a minimum of 1.2 km to the south of the Study Area.	No additional impacts expected.
Groundwater Quantity	Groundwater system within the Study Area as outlined within the Groundwater Impact Assessment (AGE, 2024).	Total mine inflows ranging from approximately 4.37 megalitres per year (ML/yr) to 134 ML/yr. See Section 4.2.3 of the Groundwater Impact Assessment (AGE, 2024) for details.
Groundwater Quality		No mining-related impacts on groundwater quality have been observed to date. Based on the conceptual understanding of the groundwater system and the modelled flow directions, future impacts to groundwater quality are not expected, and salinity is likely to decrease. See Section 4.2.6 of the Groundwater Impact Assessment (AGE, 2024) for details.
Groundwater Baseflow Impacts		The reduction in baseflow for the Hunter River, Glennies Creek, and Bowmans Creek was minimal during mining. See Section 4.2.3 of the Groundwater Impact Assessment (AGE, 2024) for details.
Landform Drainage	-	Changes to ponding overlying LW 403 are expected to be minor with a net reduction in overall ponding area. The predicted ponded areas would drain to either the backfilled Narama open cut pit or the Narama Dam. As such, there is expected to be negligible impact to Bowmans Creek associated with changes in drainage and ponding.
Remnant Woodlands	Located over Longwalls 404 to 406 and the south of the Study Area.	Mining of Longwalls 403 to 406 is considered unlikely to have a significant impact on any known or potentially occurring threatened species, threatened ecological communities, endangered populations or migratory species listed under the NSW *Biodiversity Conservation Act 2016* or the Commonwealth *Environmental Protection and Biodiversity Act 1999* (Eco Logical Australia, 2024).

Aboriginal Heritage	Several sites within Study Area including artefact scatters and grinding grooves.	Some of the archaeological sites overlying the Study Area will be partially impacted, to varying degrees, by subsidence (cracking, knick points and rilling, ponding or by the development of surface infrastructure) (Stratum Archaeology, 2024). ACOL will obtain AHIPs prior to subsidence impacts on relevant sites.
Historic Heritage	Four European heritage sites identified in proximity to the ACOL-operated RUM. Two additional sites of historic occupation in the ACP outside the RUM Study Area.	The four European heritage sites are located outside of the Longwall 403 to 406 Study Area and will not be impacted by underground mining at the ACOL-operated RUM. The two additional sites of historic occupation identified overlying the ACP will be not impacted by mining of the ACOL-operated RUM.

2.5 PERFORMANCE OBJECTIVES

Performance objectives in relation to subsidence impacts at Ashton are presented in **Table 10**. These objectives have been used when developing management strategies of this Extraction Plan.

Table 10. Performance Objectives from DA 104/96

<table>
<tr><th>Condition No.</th><th>Condition Requirement</th></tr>
<tr><td>Schedule 3, Condition 1</td><td>
Performance Measures – Natural and Heritage Features
The Applicant must ensure that the development does not cause any exceedances of the performance measures in Table 1, to the satisfaction of the Planning Secretary.

Table 1: Subsidence Performance Measures
<table>
<tr><td colspan="2">Watercourses</td></tr>
<tr><td>Bowmans Creek and Bayswater Creek</td><td>No greater subsidence impact or environmental consequences than predicted in the EAs</td></tr>
<tr><td>Bowmans Creek and Bayswater Creek alluvium</td><td>No greater subsidence impact or environmental consequences than predicted in the EAs</td></tr>
<tr><td>Hunter River and its alluvium</td><td>Negligible environmental consequences</td></tr>
<tr><td colspan="2">Biodiversity</td></tr>
<tr><td>Threatened species, threatened populations, or endangered ecological communities</td><td>Negligible environmental consequences</td></tr>
<tr><td colspan="2">Aboriginal Heritage Features</td></tr>
<tr><td>Aboriginal heritage sites</td><td>No greater subsidence impact or environmental consequences than approved under a permit issued under section 90 of the National Parks and Wildlife Act 1974.</td></tr>
</table>
Notes:

The Applicant will be required to define more detailed performance indicators for each of these performance measures in the various management plans that are required under this consent (see condition 6 below).
The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of approval of modification 9.
Any breach of this condition is taken to be breach of this consent, and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation, notwithstanding that offsets may be agreed or implemented under condition 2 below.

</td></tr>
</table>

<table>
<tr><th>Condition No.</th><th>Condition Requirement</th></tr>
<tr><td>Schedule 3,
Condition 3</td><td>

Performance Measures – Built Features

The Applicant must ensure that the development does not cause any exceedances of the performance measures in Table 2, to the satisfaction of the Planning Secretary.

Table 2: Subsidence Impact Performance Measures

<table>
<tr><th colspan="2">Built Features</th></tr>
<tr><td>Key public infrastructure:
• New England Highway
• Main Northern Railway</td><td>Always safe and serviceable.
Any damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.</td></tr>
<tr><td>Lemington Road and Brunkers Lane</td><td>Always safe.
Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.
Damage must be fully repaired or replaced, or else fully compensated.</td></tr>
<tr><td>Other public infrastructure (including dams and voids; roads and tracks; active mining areas and infrastructure; electricity transmission lines; gas pipelines; telecommunications networks and fibre optic cables; water supply pipelines, etc.)

Houses, industrial premises, swimming pools, farm dams and other built features or improvements</td><td>Always safe
Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.
Damage must be fully repaired or replaced, or else fully compensated.</td></tr>
<tr><th colspan="2">Public Safety</th></tr>
<tr><td>Public safety</td><td>Negligible additional risk</td></tr>
</table>

Notes:

- *The Applicant will be required to define more detailed performance indicators for each of these performance measures in the Built Features Management Plan (see condition 6 below).*
- *The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of approval of modification 9.*
- *Requirements regarding "safe" or "serviceable" do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.*
- *Any breach of this condition is taken to be breach of this consent, and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.*
- *Compensation required under this condition includes any compensation payable under the Mine Subsidence Compensation Act 1961 and/or the Mining Act 1992.*

</td></tr>
</table>

<table>
<tr><th>Condition No.</th><th>Condition Requirement</th></tr>
<tr><td>Schedule 3,
Condition 27</td><td>

Rehabilitation Objectives

The Applicant must rehabilitate the site in accordance with the provisions under the Mining Act 1992 and must be generally consistent with the proposed rehabilitation activities described in the documents listed in condition 2 of Schedule 2. This rehabilitation must comply with the objectives in Table 3.

Table 3: Rehabilitation Objectives

<table>
<tr><th>Feature</th><th>Objective</th></tr>
<tr><td>Mine site (as a whole)</td><td>Safe, stable & non-polluting</td></tr>
<tr><td>Surface infrastructure</td><td>To be decommissioned and removed, unless the Resources Regulator agrees otherwise</td></tr>
<tr><td>Portals and vent shafts</td><td>To be decommissioned and made safe and stable. Retain habitat for threatened species (eg bats), where practicable</td></tr>
<tr><td>Watercourses subject to subsidence impacts</td><td>Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than prior to mining</td></tr>
<tr><td>Land to be restored or maintained for agricultural purposes</td><td>Restored and maintained to:
• the same or higher land capability and agricultural suitability than prior to mining; and
• a landform consistent with the surrounding environment, including no greater than minor changes to flooding characteristics or ponding.</td></tr>
<tr><td>Other land</td><td>Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of:
• local native plant species (unless the Resources Regulator agrees otherwise); and
• a landform consistent with the surrounding environment, including no greater than minor changes to flooding characteristics or ponding.</td></tr>
<tr><td>Built features damaged by mining operations</td><td>Repair to pre-mining condition or equivalent unless:
• the owner agrees otherwise; or
• the damage is fully restored, repaired or compensated for under the Mine Subsidence Compensation Act 1961.</td></tr>
<tr><td>Community</td><td>Ensure public safety
Minimise the adverse socio-economic effects associated with mine closure</td></tr>
</table>

Notes:

- *These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by mining taking place after the date of approval of modification 9; and to all surface infrastructure part of the development, whether constructed prior to or following the date of this approval.*
- *Rehabilitation of subsidence impacts and environmental consequences caused by mining which took place prior to the date of approval of modification 9 may be subject to the requirements of other approvals (eg under a mining lease or an Subsidence Management Plan approval) or the Applicant's commitments.*
- *The Rehabilitation Management Plan, required under the approval for the Ravensworth Operations Project, must be prepared in a manner that is consistent with the rehabilitation objectives in Table 3.*
- *Some aspects of the surface infrastructure associated with the development are used as shared infrastructure across the Ravensworth mine complex. As such, those items of surface infrastructure may be rehabilitated at closure of the Ravensworth Operations Project. This will be reflected in the relevant Rehabilitation Management Plans.*

</td></tr>
</table>

2.5.1 Performance Measures and Indicators

Table 11 below has been developed to address Schedule 3 Condition 6 (d) of the DA 104/96

The detailed performance indicators are monitored through a combination of management plans proposed under this Extraction Plan and existing approved management plans for the site.

Table 11. Performance Measures and Indicators

Aspect	Performance Measure	Indicator
Water		
Bowmans Creek and Bayswater Creek	*No greater subsidence impact or environmental consequences than predicted in the EAs*	Water Management Plan (WMP) Section 4.5 (Bowmans Creek Diversion Management Plan) outlines performance and completion criteria. Surface Water Impact Assessment Criteria – Section 6.2 of the WMP. Table 17 of the WMP outlines trigger levels for surface water. Indicators include water quality and streamflow.
Bowmans Creek and Bayswater Creek alluvium	*No greater subsidence impact or environmental consequences than predicted in the EAs*	Groundwater Impact Assessment Criteria – Section 7.2 of the WMP. Table 23 in the WMP outlines trigger levels for groundwater. Indicators including water level, pressure, field parameters and comprehensive analysis.
Hunter River and its alluvium	*Negligible environmental consequences*	Groundwater Impact Assessment Criteria – Section 7.2 of the WMP. Table 23 in the WMP outlines trigger levels for groundwater. Indicators including water level, pressure, field parameters and comprehensive analysis.
Biodiversity		
Threatened species, threatened populations, or ecological communities	*Negligible environmental consequences*	ACOL Biodiversity Management Plan (**Appendix E**) Section 4.2. Commitment for monitoring is covered in Section 4 of the Biodiversity Management Plan. Indicator of monitoring is negligible impacts to threatened species, populations, habitat or ecological communities. ELA (2024) Ravensworth Underground Mine LW403 – 406 Biodiversity Review.
Aboriginal Heritage Features		
Aboriginal heritage sites	No great subsidence impact or environmental consequences than approved under a permit issued under section 90 of the *National Parks and Wildlife Act 1974*.	Complex-wide Heritage Management Plan Section 3.2 outlines performance measures and indicators. Section 3 of the Heritage Assessment (Stratum Archaeology, 2024) outlines predicted subsidence impacts to aboriginal heritage. See the Subsidence Monitoring Program (**Appendix J**) for details of subsidence monitoring and inspections.

Aspect	Performance Measure	Indicator
Built Features		
Key public infrastructure: • **New England Highway** • **Main Northern Railway**	Always safe and serviceable. Any damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.	Both New England Highway and the Main Northern Railway are remote from the RUM Longwalls 403 to 406 and are not likely to experience significant subsidence effects and impacts (SCT, 2024).
Lemington Road and Brunkers Lane	Always safe. Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repaired or replaced, or else fully compensated.	Both Lemington Road and Brunkers Lane are remote from the RUM Longwalls 403 to 406 and are not likely to experience significant subsidence effects and impacts (SCT, 2024).
Other public infrastructure (including dams and voids; roads and tracks; active mining areas and infrastructure; electricity transmission lines; gas pipelines; telecommunications networks and fibre optic cables; water supply pipelines, etc.) **Houses, industrial premises, swimming pools, farm dams and other built features or improvements**	Always safe. Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repaired or replaced, or else fully compensated.	Covered under the Built Features Management Plan (**Appendix G**). See the Subsidence Monitoring Program (**Appendix J**) for details of subsidence monitoring and inspections.
Public Safety		
Public safety	Negligible additional risk	Covered under Public Safety Management Plan.

3 DEVELOPMENT

3.1 EXTRACTION PLAN TEAM

In accordance with Schedule 3 Section 32(a) of the Development Consent, the team that has prepared the Extraction Plan was endorsed by the Director, Resource Assessments of the Department of Planning, Infrastructure and Environment (DPIE) on 20 May 2020. The Extraction Plan Team is presented in **Table 12**.

Table 12. Extraction Plan Team

Extraction Plan Component	Team Members
Extraction Plan Coordination and Preparation	Ashton/Yancoal: • Thomas Kaltschmidt – Technical Services Manager. • Phillip Brown - Environment and Community Superintendent. • Jarrod Braybon – Mine Surveyor. Resource Strategies (document preparation): • Jamie Warwick.
Built Features Management Plan	Ashton/Yancoal – Thomas Kaltschmidt/Phillip Brown
Public Safety Management Plan	Ashton/Yancoal – Thomas Kaltschmidt/Phillip Brown
Land Management Plan	Ashton/Yancoal – Thomas Kaltschmidt/Phillip Brown
Coal Resource Recovery Plan	Ashton/Yancoal – Thomas Kaltschmidt/Phillip Brown
Biodiversity Management Plan Flora and Fauna Assessment for Longwall 403 to 406	Existing complex-wide Ashton Coal approved Management Plan EcoLogical – Kayla Abbey/Rebecca Croake
Water Management Plan Surface Water Assessment for Longwall 403 to 406 Groundwater Assessment for Longwall 403 to 406	Existing complex-wide Ashton Coal approved Management Plan ATC Williams Pty Ltd – Tony Marszalek, Camilla West and Makaela McGrath. Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) – Andrew Durick.
Heritage Management Plan Heritage Assessment for Longwall 403 to 406	Existing complex-wide Ashton Coal approved Management Plan Stratum Archaeology Pty Ltd –Elizabeth Wyatt
Subsidence Predictions	Strata Control Technology (SCT) – Ken Mills and Stephen Wilson

3.2 AGENCY CONSULTATION

3.2.1 Department of Planning, Housing and Infrastructure

The Extraction Plan is required to be completed to the satisfaction of and approved by the Secretary of the DPHI. Extensive consultation has taken place with DPHI during the preparation, assessment and approvals processes for the ACP, including the Bowmans Creek Diversion Modification Environmental Assessment.

3.2.2 NSW Resources Regulator

There are several components of the Extraction Plan that are required to be completed in consultation with and to the satisfaction of the Resource Regulator (RR). These components include:

- Coal Resource Recovery Plan;
- Subsidence Monitoring Program;
- Built Features Management Plan; and
- Public Safety Management Plan.

A copy of the Extraction Plan (including the documentation listed above) will be provided to the NSW Resources Regulator. The satisfaction of the NSW RR will be sought prior to commencement of mining.

ACOL has resubmitted an updated Rehabilitation Management Plan (RMP) to the NSW RR in October 2024 to incorporate the ACOL-operated RUM. The RMP was prepared in consideration of Condition 41, Schedule 3 of DA 309-11-2001-i and Condition 27, Schedule 3 of DA 104/96 (ACOL, 2024).

In addition, ACOL has developed an Asset Management Plan in consultation with Glencore for any impacts on Glencore's Assets. The Asset Management Plan will address the requirements for managing impacts to rehabilitation associated with the Ravensworth Operations Project.

In accordance with Condition 5, Schedule 3 of DA 104/96, correspondence was provided to the NSW RR in April 2023 outlining the design specifications of the first workings for Longwalls 403 to 406 including the main headings, TG and MG panels. The NSW RR provided a response in May 2023 stating that it was satisfied the workings would remain long term stable and non-subsidising.

3.2.3 Biodiversity Conservation Division

The Biodiversity Conservation Division of DPHI has received a copy of the updated complex-wide Biodiversity Management Plan for comments. The updated complex-wide Biodiversity Management Plan has been amended to incorporated the comments from Biodiversity Conservation Division of DPHI.

3.2.4 DCCEEW-Water

The Department of Climate Change, Energy, the Environment and Water – Water (DCCEEW-Water) has received a copy of the updated complex-wide WMP for comments. The updated complex-wide Water Management Plan has been amended to incorporated the comments from DCCEEW-Water.

3.2.5 Heritage NSW and Registered Aboriginal Parties

Heritage NSW and the Registered Aboriginal Parties for the ACOL-operated RUM has received a copy of the updated complex-wide Heritage Management Plan for comments. The updated complex-wide Heritage Management Plan has been amended to incorporate comments from Heritage NSW. There were no comments received from the ACOL-operated RUM comments.

3.3 LANDHOLDER CONSULTATION

The land above the Study Area is owned by Glencore and AGL Macquarie. ACOL has prepared separate Asset Management Plans for the management of Glencore and AGL Macquarie assets in consultation with Glencore and AGL Macquarie. Both Glencore and AGL Macquarie will continue to be consulted in accordance with the Built Features Management Plan.

3.3.1 Community

ACOL holds regular Community Consultative Committee (CCC) meetings with a number of community representatives. ACOL has provided an update on the ACOL-operated RUM at CCC meetings since 2022. ACOL will provide an update on the progress of the Longwalls 403 to 406 Extraction Plan application at the next CCC meeting currently scheduled for early 2025

3.3.2 Private Landholders

There are no private landholders located within the Study Area.

Regular updates on the status of mining progression and environmental performance, including results of subsidence monitoring, and timing for mining will be presented to the Ashton CCC, with minutes of these meetings uploaded to the Ashton website (https://www.yancoal.com.au/our-sites/ashton/).

3.4 INFRASTRUCTURE OWNER CONSULTATION

The BFMP was developed in consultation with infrastructure owners and stakeholders to manage potential subsidence effects. Owners include:

- TransGrid;
- Glencore; and

- AGL Macquarie.

3.5 RISK ASSESSMENT

A risk assessment was conducted on 11 July 2023 to review and identify subsidence-related hazards that may affect the environment and community as a result of resource extraction from Longwalls 401 – 406. After a review of the risks of subsidence impact on the AGL Void 5 Ash Dam and the Void 5 Ash Dam Barrier, ACOL plans to only mine Longwalls 403 – 406 (i.e. Longwalls 401 and 402 will not be mined at this stage). A review of the risks was undertaken in consideration of the reduction in secondary extraction area, and it was concluded that there would be no new or increased risks.

A copy of the risk assessment is included as **Technical Report 4**.

Risks were identified and assessed through the review of known surface and sub-surface features within the Study Area. For each specific risk/hazard identified in the risk assessment, controls that are already in place were identified. The risk assessment team assigned a risk ranking to each hazard using the risk matrix. The risk ranking (low, moderate, high or extreme) assigned to each risk/hazard was determined on the basis of group consensus. Where appropriate, additional controls were identified and recorded on the risk register. The outcome of the risk assessment forms the basis for this Extraction Plan.

Risks were identified and assessed through the review of known surface and sub-surface features within the Study Area. This risk assessment was facilitated by Kylie Hannigan (STAC Consulting) with contribution by the following Ashton workforce representatives and external content/technical experts:

- Tony Sutherland (ACOL – Technical Services Manager);
- Phil Brown (ACOL – Environment and Community Relations Superintendent);
- Cameron Eckersley (ACOL – Environment and Community Coordinator);
- Michael Bartlett (ACOL – Mining Engineering Manager/ Acting Operations Manager);
- Klay Marchant (Ravensworth Underground Mine – Environment and Community Manager);
- Jarrod Braybon (ACOL – Mining Surveyor);
- Rebecca Smith (ACOL – Health, Safety and Training Advisor);
- Brendon Longbottom (ACOL – Step-Up Supervisor / SSHR – CHPP);
- Brad Radnidge (ACOL – Development Engineer);
- David Jones (ACOL – Electrical Engineering Manager);
- Chad Murdoch (ACOL – Mining Manager);
- Spencer Brien (ACOL – CHPP Process Engineer);

- Jamie Warwick (Resource Strategies Pty Ltd – Senior Environmental Manager);
- Harper Mulloy (Resource Strategies Pty Ltd – Environmental Project Manager);
- Andrew Durick (Australasian Groundwater and Environmental Consultants Pty Ltd – Director/Principal Modeller);
- Kalya Abbey (Eco Logical Australia Pty Ltd– Principal Environmental Consultant);
- Rachel Firmer (Eco Logical Australia Pty Ltd – Environmental Consultant);
- Dr Ken Mills (SCT Operations Pty Ltd – Principal Geotechnical Engineer/Director);
- Elizabeth Wyatt (Stratum Archaeology Pty Ltd– Principal Archaeologist);
- Tony Marszalek (ATC Williams Pty Ltd – Surface Water Resources Engineer);
- Makaela McGrath (ATC Williams Pty Ltd – Environmental Scientist);
- Tim Shaw (AGL – Business Development Manager – Ash Recycle); and
- Hamish Kerr (BBE Group – Senior Ventilation Engineer).

The risk assessment identified a total of:

- Low Risks – 18;
- Moderate Risks – 6;
- High Risks – 5; and
- Extreme Risks – 0.

A total of five built features were classified as having a potentially high risk of subsidence impacts with the consequences relating to damage to infrastructure resulting in impacts to the environment or potential safety concerns. The infrastructure identified with potentially high risks included:

- AGL Void 5 Ash Dam;
- AGL Void 5 Ash Dam Barrier; and
- ACOL dewatering bores.

Since the completion of the original risk assessment (based on Longwalls 401-406), the longwall layout has been reduced by removing Longwalls 401 and 402. This significantly reduce subsidence effects on the AGL Void 5 Ash Dam and associated infrastructure. All dewatering bores except one have also been removed from the ACOL-operated RUM.

Specific controls and management measures for these built features (and all other relevant assets) are detailed in the Built Features Management Plan (**Appendix G**).

The two remaining high risks identified are related to groundwater impacts and heritage impacts. The heritage impacts relate to impacts to archaeological heritage sites not approved under an Aboriginal Heritage Impact Permit (AHIP). The Groundwater Assessment (AGE, 2024) and Heritage Assessment (Stratum Archaeology, 2024) have been prepared in consideration of these risks. An AHIP application will be prepared for relevant sites in consultation with the RAPs.

The second-high risk is related to alluvial groundwater quality changes due to mine subsidence being greater than predicted. Groundwater management controls for the site are outlined in the Water Management Plan (**Appendix C**) which covers the entire ACOL operations. The Groundwater Assessment (AGE, 2024) have been prepared in consideration of these risks.

The full risk assessment report including a full list of risks in assessment order, risk rank order and consequence order respectively is provided in **Technical Report 4**.

4 SUBSIDENCE MONITORING AND MANAGEMENT

4.1 FRAMEWORK

The overall framework for subsidence monitoring and management of impacts of this Extraction Plan may be described as:

- A **Subsidence Monitoring Program** (actual measured subsidence, and inspections for environmental consequences of subsidence to compare against predicted impacts) which may trigger a response or set of responses.

The response is commensurate with the nature of the measurement or the impact which has been identified. The Extraction Plan relies on a set of individual management plans which are intended to address impacts to particular environmental or built features within the Study Area. These plans include:

- **Water Management Plan** – to manage the potential environmental consequences of second workings on surface and groundwater;
- **Land Management Plan Addendum** – to manage the potential environmental consequences of second workings on steep slopes and land in general;
- **Biodiversity Management Plan** – to manage the potential environmental consequences of second workings on aquatic and terrestrial flora and fauna (additional monitoring specific to Biodiversity is also collected to assess impact);
- **Heritage Management Plan** – to manage the potential environmental consequences of second workings on heritage sites or values (additional monitoring specific to Aboriginal Cultural Heritage is also collected to assess impact);
- **Built Features Management Plan** – to manage the potential environmental consequences of second workings on any built feature; and
- **Public Safety Management Plan** – to ensure public safety in the Study Area.

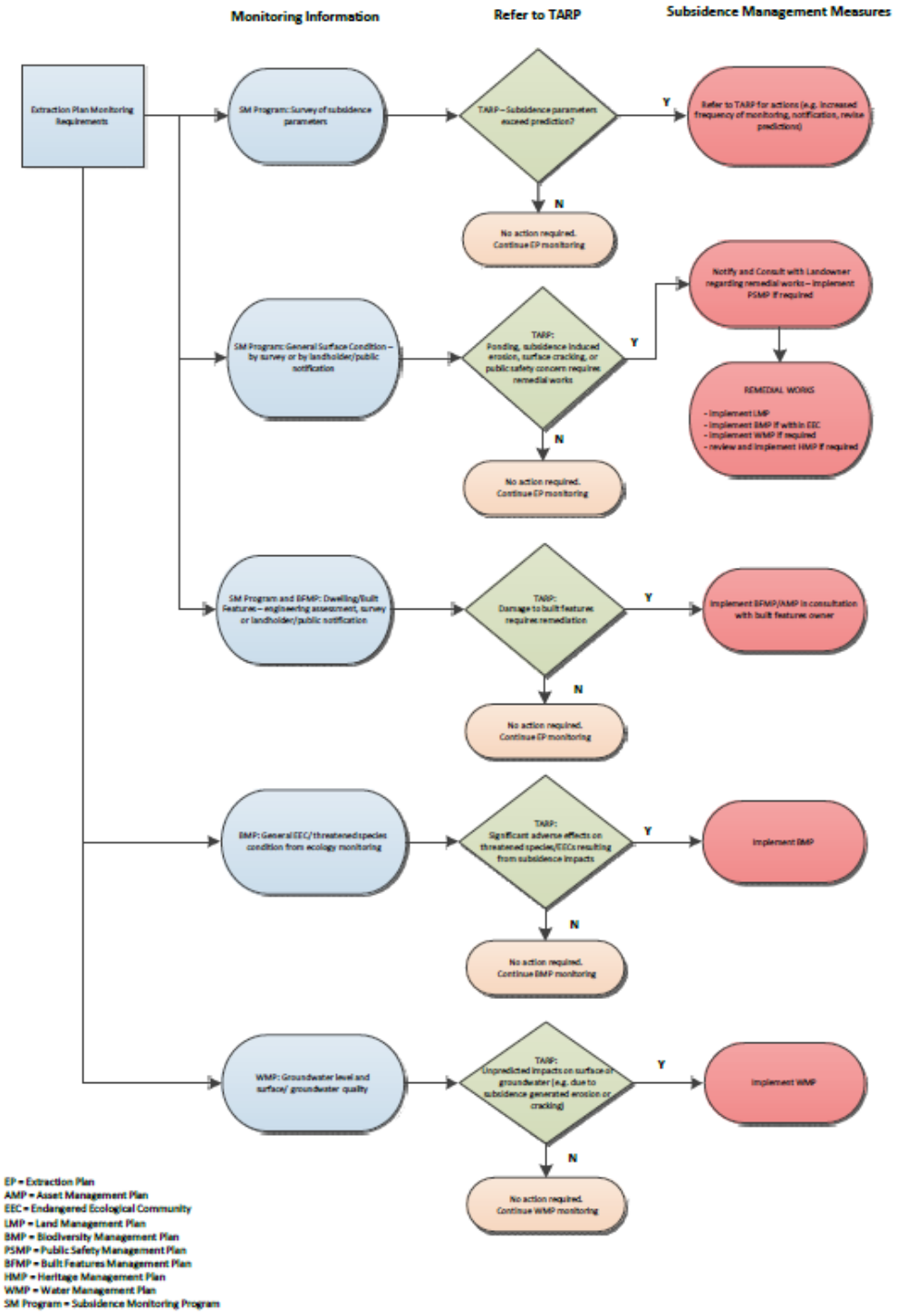
4.2 EXTRACTION PLAN TARP

ACOL has developed an overall subsidence management **LW403 to LW406 Extraction Plan Trigger Action Response Plan** (TARP) to manage subsidence within the Study Area. This TARP is included in **Appendix B** and includes individual triggers to instigate actions, including public safety activities, remedial works or review of subsidence predictions. The TARP also specifically includes both adaptive and contingency management based on results of monitoring.

4.3 EXTRACTION PLAN SUBSIDENCE MONITORING AND MANAGEMENT FLOWCHART

ACOL has developed a **flowchart** to illustrate the mechanics of how the relevant Subsidence Monitoring Program, sub-management plans, and the TARP are used at Ashton to manage subsidence impacts. The flowchart is provided below and is included in **Appendix B** with the TARP.

EXTRACTION PLAN SUBSIDENCE MONITORING AND MANAGEMENT FLOWCHART – LONGWALLS 403 to 406



5 PLAN IMPLEMENTATION

5.1 REPORTING FRAMEWORK

5.1.1 Annual Review

The Annual Review details ACOL's environmental performance for the reporting year and is prepared in accordance with Schedule 5, Condition 10 of DA309-11-2001-i, and Schedule 4, Condition 2 of DA104/96 and to satisfy ML conditions.

5.1.2 Regular Stakeholder Extraction Plan Update Reporting

The Ashton Coal Mine CCC is given regular updates on the status of the progress and activities of the operations.

Landholders and stakeholders within the affected Study Area will be provided with regular updates on the progress of mining, results of subsidence monitoring, results of any particular subsidence induced consequences, and the remediation measures employed. The frequency of reporting will occur nominally on a bi – monthly (every two months) basis. More regular reporting may be provided during active subsidence of key assets, and this will be detailed in the relevant Asset Management Plans.

5.1.3 Incident Reporting

In accordance with Schedule 4, Condition 5 of DA104/96, ACOL will notify the DPHI and any other relevant agencies, of any incident that has caused, or threatens to cause, material harm to the environment or any other incident associated with the ACOL-operated RUM, as soon as practicable after ACOL becomes aware of the incident.

5.2 REVIEW OF THE EXTRACTION PLAN

Review of the Extraction Plan and/or any of the sub-plans, and revision, if necessary, shall occur within three months of:

- the submission of an annual review;
- the submission of an incident report;
- the submission of an audit; and
- any modification to the conditions of DA104/96.

Any revision to the Extraction Plan including component sub-plans must be completed to the satisfaction of the Secretary of DPHI where required.

5.3 COMPLAINTS HANDLING

Complaints in relation to the management of subsidence will be managed using the established protocols in the Ashton Environmental Management System.

5.4 EXTRACTION PLAN ROLES AND ACCOUNTABILITIES

Detailed below in **Table 13** are key personnel involved with implementing this Extraction Plan to manage subsidence, their roles and responsibilities.

Table 13. Roles and Responsibilities

Role	Responsibilities
Mining Engineering Manager	• Ensure sufficient resources are available to implement the requirements of this plan.
Technical Services Manager	• Facilitate the Extraction Plan. • Coordinate with the Mining Surveyor to ensure subsidence monitoring is undertaken in accordance with the Extraction Plan and sub environmental management plans. • Manage / implement subsidence management actions required by the Extraction Plan in relation to built features and general landforms. • Manage / implement subsidence management actions required by the Extraction Plan in relation to Infrastructure. • Liaise with Subsidence Advisory NSW in relation to built features. • Provide support and guidance in relation to subsidence effects to Environment & Community Superintendent. • Ensure visual monitoring requirements are completed by a trained and competent person. • Coordinate Mine Surveyor and facilitate subsidence monitoring undertaken in accordance with the Extraction Plan. • Review subsidence monitoring data against predictions and TARPs in order to trigger any actions required on the basis of subsidence results. • Review subsidence predictions based on monitoring information and the TARPs.
Environment and Community Superintendent	• Liaise with Government Agencies and Community members in relation to subsidence matters and the Extraction Plan subsidence predictions and monitoring program. • Liaise with Landholders in relation to environmental consequences of subsidence and in relation to access for the Extraction Plan monitoring program and any remediation works.
Registered Mining Surveyor	• Ensure that all subsidence monitoring is completed to the requirements of the Subsidence Monitoring Program and provided to the Technical Services Manager for review. • Provide training for subsidence impact measurements and observations in accordance with Subsidence Monitoring Program.

6 REFERENCES

Ashton Coal Operations Pty Ltd (2024) *Ashton Coal Project – Rehabilitation Management Plan*. Revision 3, October 2024.

ATC Williams Pty Ltd (2024) *Longwalls 403-406 Extraction Plan – Surface Water Technical Report*. Report prepared for Ashton Coal Operations Pty Ltd.

Australasian Groundwater and Environmental Consultants Pty Ltd (2024) *Ashton Ravensworth LW403-406 Extraction Plan.* Report prepared for Ashton Coal Operations Pty Ltd.

Department of Planning and Environment (2022) *Extraction Plan Guideline*.

Eco Logical Australia (2024) *Ravensworth Underground Mine LW403-406 Biodiversity Review*. Report prepared for Ashton Coal Operations Pty Ltd

G E Holt, and Associates Pty Ltd (1996) *Assessment of Impact of Subsidence from the Proposed Nardell Underground Mine Ravensworth, New South Wales*.

HLA Envirosciences (2001) *Environmental Impact Statement – Ashton Coal Project*. Project reference U842.

Holla, L (1991) *Mining subsidence in New South Wales 3. Surface subsidence prediction in the Western Coalfield*. Department of Mineral Resources, Sydney.

Li G., Steuart P., Paquet R., and Ramage R. (2010) *A Cast Study on Mine Subsidence Due to Multi-Seam Longwall Extraction.* Proceedings of Second Australasian Ground Control in Mining Conference - Sydney N.S.W. 23-24 November 2010 pp 191-200.

STAC Consulting (2024) *RUMEx Pike's Gully Longwalls 401 – 406 Extraction Plan Subsidence Risk Assessment.* Report prepared for Ashton Coal Operations Pty Ltd.

SCT Operations Pty Limited (2010) *Subsidence Assessment for Extensions to Longwalls 6-10 and Mains Realignment at Ravensworth Underground Mine,* Report Number RAV3576.

SCT Operations Pty Limited (2012) *Subsidence Assessment for Liddell Seam Project Mod 9 Environmental Assessment*, Report Number RAV3737.

SCT Operations Pty Limited (2024) S*ubsidence Assessment for the Extraction Plan for Longwalls 403 – 406 in the Pikes Gully Seam*, Report Number ASH5749.

Stratum Archaeology (2024). *Aboriginal Archaeological Assessment Ashton Underground Mine Ravensworth Underground Mine Longwalls 403-406 Pikes Gully Seam Extraction Plan*. Report prepared for Ashton Coal Operations Pty Ltd.

Graphical Plans

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett
Mining Engineering Manager

18/12/2024
Date

Legend

- Extraction Plan Area - Proposed
- Proposed Longwall Extraction - LW403 to LW406
- Existing PG Workings
- Proposed PG Workings
- Lease Boundary
- Development Consent Boundary
- Upper Liddell Seam Workings
- Upper Liddell Seam - LW Extraction
- Upper Lower Liddell Seam Workings
- Upper Lower Liddell Seam - LW Extraction
- Ravensworth No. 2 & Narama Opencut (Bayswater Seam)
- Ravensworth No.2 Opencut (Ravensworth Seam)
- Ravensworth No.2 Opencut (Vaux Seam)

- Pillar Dimensions are Centre-line distances
- Void Dimensions are from ribline of goaf edge

NOTE: Application area lies wholly within Patrick Plains Mine Subsidence District

AshtonCoal
PO Box 699 Singleton NSW 2330
Phone 61+ 02 6576 1111 Fax 61+ 02 6576 1122

ASHTON UNDERGROUND
PROPOSED LW403 to LW406 - PIKES GULLY SEAM
PLAN No.1A - Extraction Area Boundary

Date	Scale:	Drawn	Checked	Approved	Drawing No.	Revision No.	Sheet Size
07/08/24	1:4000	Survey	TK	MB	E−3002	A	A0

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett — 18/12/2024

Mining Engineering Manager — Date

Legend

- Extraction Plan Area - Proposed
- Proposed Longwall Extraction - LW403 to LW406
- Existing PG Workings
- Proposed PG Workings
- Lease Boundary
- Development Consent Boundary
- Upper Liddell Seam Workings
- Upper Liddell Seam - LW Extraction
- Upper Lower Liddell Seam Workings
- Upper Lower Liddell Seam - LW Extraction
- Ravensworth No. 2 & Narama Opencut (Bayswater Seam)
- Ravensworth No.2 Opencut (Ravensworth Seam)
- Ravensworth No.2 Opencut (Vaux Seam)

- Pillar Dimensions are Centre-line distances
- Void Dimensions are from ribline of goaf edge

NOTE: Application area lies wholly within Patrick Plains Mine Subsidence District

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ASHTON UNDERGROUND
PROPOSED LW403 to LW406 - PIKES GULLY SEAM
PLAN No.1B - Extraction Area Boundary - Aerial

Date	Scale:	Drawn	Checked	Approved	Drawing No.	Revision No.	Sheet Size
07/08/24	1:4000	Survey	TK	MB	E-3002	A	A0

ML 1837

ML 1836

ML 1835

ML 1834

ML 1623

ML 1533

RAVENSWORTH No 2
REHABILITATION

Ravensworth Underground
Pikes Gully Seam Workings
for More Information Refer to
Record Tracing No RT804

Ravensworth No. 2 Opencut
Mined Extent - Bayswater Seam
For More Information Refer to
Record Tracing No RT722 &
RT722A

Narama Opencut
Mined Extent - Bayswater Seam
For More Information Refer to
Record Tracing No RT793

LW 403
LW 404
LW 405
LW 406

LW 208B
LW 207B
LW 106B
LW 206B
LW 207A
LW 106A
LW 206A
LW 105
LW 205
LW 104A
LW 204
LW 4
LW 104B
LW 3

200 MAINS

NEW ENGLAND HIGHWAY

NW Mains

BOWMANS CREEK DIVERSION

BOWMANS CREEK

Lemington Rd

N 6 407 500
N 6 407 000
N 6 406 500
N 6 406 000
N 6 405 500
N 6 405 000
E 315 500
E 316 000
E 316 500
E 317 000

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett — Mining Engineering Manager

18/12/2024 — Date

Legend

- Extraction Plan Area - Proposed
- Proposed Longwall Extraction - LW403 to LW406
- Existing PG Workings
- Proposed PG Workings
- Upper Liddell Seam Workings
- Upper Liddell Seam - LW Extraction
- Upper Lower Liddell Seam Workings
- Upper Lower Liddell Seam - LW Extraction
- Lease Boundary
- 0.1m Predicted Subsidence Limit
- Power Pole
- Prescribed Dam Notification Area
- 11kV Transmission Line
- 11kV Transmission Line - Private ACOL
- 33kV Transmission Line
- 66kV Transmission Line
- 132kV Transmission Line
- 330kV Transmission Line
- Telstra Cable
- Optic Fibre Cable
- Water Pipeline - Private ACOL
- Gas Drainage Pipelines
- Fence
- Surface Contour (10m)
- Dam
- Water Course
- Unsealed Track
- Building

Application area lies wholly within
Patrick Plains Mine Subsidence District

200 160 120 80 40 0 200 400 600 800 1000

All measurements are in metres

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ASHTON UNDERGROUND
PROPOSED LW403 to LW406 - PIKES GULLY SEAM
PLAN No.2 - Surface Features

Drawing No.	Revision No.	Date	Scale:	Drawn	Checked	Approved	Sheet Size
E-3003	A	07/08/24	1:4000	Survey	TK	MB	A0

ML 1837

ML 1836

ML 1623

ML 1835

ML 1834

ML 1533

LW 403

LW 404

LW 405

LW 406

LW 8

LW 7B (Short)

LW 6B

LW 7A

LW 6A

LW 5

LW 4

LW 3

NW Mains

400 SW

400 SE

400 South

2.1m

2.0m

1.8m

1.9m

2.1m

2.0m

2.2m

2.3m

2.4m

1.7m

1.6m

Diatreme
As mined 3.8m
Maranna OC

N 6 407 500

N 6 407 000

N 6 406 500

N 6 406 000

N 6 405 500

N 6 405 000

E 316 500

E 316 600

E 316 500

E 317 000

E 317 500

N

S

E

W

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett — Mining Engineering Manager

18/12/2024 — Date

Legend

- Extraction Plan Area - Proposed - PKY Seam
- Proposed Longwall Extraction - LW403 to LW406
- Existing Workings
- Proposed Workings
- Lease Boundary
- Projected Dyke Zones
- Projected Fault Zones
- Faults
- 2.1 Pikes Gully Seam Thickness Contours
- 160 Pikes Gully Depth of Cover contours

NOTE: Application area lies wholly within Patrick Plains Mine Subsidence District

200 160 120 80 40 0 200 400 600 800 1000

All measurements are in metres

AshtonCoal
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ASHTON UNDERGROUND
PROPOSED LW403 to LW406 - PIKES GULLY SEAM
Plan No.3 - Seam Thickness & Depth of Cover Contours

Drawing No.	Revision No.	Date	Scale:	Drawn	Checked	Approved	Sheet Size
E-3004	A	07/08/24	1:4000	Survey	TK	MB	A0

ML 1837

ML 1836

ML 1623

ML 1835

ML 1834

ML 1533

200 MAINS

LW 502

LW 503

LW 504

LW 505

LW 208

LW 207B

LW 206B

LW 207A

LW 206A

LW 205

LW 204

LW 203

Diatreme
As mined
Bayswater Seam
Metarna O/C

N 6 407 500

N 6 407 000

N 6 406 500

N 6 406 000

N 6 405 500

N 6 405 000

E 317 600

E 318 000

E 318 400

E 318 800

N

W

E

S

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett — 18/12/2024

Mining Engineering Manager — Date

Legend

- Extraction Plan Area - Proposed - PKY Seam
- Proposed Working Middle Liddell (MLD) Seam
- Existing Workings MLD / ULLD Seam
- Proposed Workings
- Lease Boundary
- Projected Dyke Zones
- Projected Fault Zones
- Faults
- 2.1 Middle Liddel Seam Thickness Contours
- 160 Middle Liddell Depth of Cover contours

NOTE: Application area lies wholly within Patrick Plains Mine Subsidence District

200 160 120 80 40 0 200 400 600 800 1000

All measurements are in metres

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ASHTON UNDERGROUND

PROPOSED LW403 to LW406 - MIDDLE LIDDELL SEAM

Plan No.4A - Middle Liddell Seam Thickness & Depth of Cover Contours

Date	Scale:	Drawn	Checked	Approved	Sheet Size
07/08/24	1:4000	Survey	TK	MB	A0

Drawing No. E–3005 A

Revision No. A

ML 1837

ML 1836

ML 1623

ML 1835

ML 1834

ML 1533

N 6 407 500
N 6 407 000
N 6 406 500
N 6 406 000
N 6 405 500
N 6 405 000
E 315 500
E 316 000
E 316 500
E 317 000
E 317 500
E 318 000
E 318 500

N
W
E
S

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett — 18/12/2024

Mining Engineering Manager — Date

Legend

- Extraction Plan Area - Proposed - PKY Seam
- Existing Opencut Workings Bayswater Seam
- Lease Boundary
- 160 Bayswater Depth of Cover contours

NOTE: Application area lies wholly within Patrick Plains Mine Subsidence District

200 160 120 80 40 0 200 400 600 800 1000

All measurements are in metres

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ASHTON UNDERGROUND
PROPOSED LW403 to LW406 - BAYSWATER SEAM
Plan No.4B - Bayswater Seam Depth of Cover Contours

Drawing No.	Revision No.	Sheet Size
E-3005 B	A	A0

Date	Scale:	Drawn	Checked	Approved
07/08/24	1:4000	Survey	TK	MB

ML 1837

ML 1836

ML 1623

ML 1835

ML 1834

ML 1533

LW 403

LW 404

LW 405

LW 406

LW 8

LW 7B (Short)

LW 6B

LW 7A

LW 6A

LW 5

LW 4

LW 3

Mine Roads

Main Headings

400 SW

N 6 406 500

N 6 406 000

N 6 405 500

N 6 405 000

E 315 500

E 316 000

E 316 500

E 317 000

E 317 500

N

W

E

S

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett — Mining Engineering Manager

18/12/2024 — Date

Legend

- Extraction Plan Area - Proposed - PKY Seam
- Proposed Longwall Extraction - LW403 to LW406
- Existing Workings - PKY Seam
- Proposed Workings
- Development Consent Boundary
- Lease Boundary
- Land with Residence
- Glendell Land Leased to ACML
- Coal & Allied Operations Pty Limited
- Crown Land
- Freehold Land
- Glendell Tenements Pty Limited
- Savage Mineral Limited & Enex Foydell Limited
- AGL Macquarie
- Renison Limited - Ravensworth Operations Pty Limited
- Ravensworth Operations Pty Limited
- Resource Pacific Limited
- Singleton Council
- Ashton Coal Operations Pty Ltd

Application area lies wholly within Patrick Plains Mine Subsidence District

200 160 120 80 40 0 200 400 600 800 1000

All measurements are in metres

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ASHTON UNDERGROUND
PROPOSED LW403 to LW406 - PIKES GULLY SEAM
PLAN No.5 - Mining Titles and Land Ownership

Drawing No.	Revision No.	Date	Scale:	Drawn	Checked	Approved	Sheet Size
E-3006	A	07/08/24	1:4000	Survey	TK	MB	A0

ML 1837

ML 1836

ML 1835

ML 1834

ML 1623

ML 1533

Ravensworth Underground
Pikes Gully Seam Workings
for More Information Refer to
Record Tracing No RT804

Ravensworth No. 2 Opencut
Mined Extent - Bayswater Seam
For More Information Refer to
Record Tracing No RT722 &
RT722A

Narama Opencut
Mined Extent - Bayswater Seam
For More Information Refer to
Record Tracing No RT793

LW 403

LW 404

LW 405

LW 406

LW 8

LW 7B (Short)

LW 6B

LW 4

LW 3

LW 5

400 SW

400 South

NW Mains

GOULD SHAFT

RAM No.5 Shaft

1852.3

260.8

1759.3

1445.0

1061.7

169.2

100.0

28.0

N 6 407 500

N 6 407 000

N 6 406 000

N 6 405 500

N 6 405 000

E 315 500

E 316 000

E 316 500

E 317 000

N2055 N2066 N2065 N2034 N2031 N2059 N2063 N2062 N2028 N2024 N2032 N2022 N2021 N2019

RUD029 RUD008 RUD012 RUD030 RUD025 RUD023 RUD008 RUD026 RUD024 RUD007 RUD013 RUD019 RUD031

RUR109 RUR107 RUR102 RUR103 RUR104 RUR106 RUR105 RUR110

RVW2 RVW4

NCC08 NCC09 NCC009 NCC10 NCC010 NCC2019 NCC2021

DU118 CGG118 DU66 CGH066 DU97 GDN097

ELRS007 ELRS008

WML115C WMLC259 WMLC212 WMLC207 WMLC236 WMLC206 WMLC239 WMLC237 WMLC337 WMLC306 WMLC235 WMLC234 WMLC338 WMLC205 WMLC339 WMLC098 WMLC210A WMLC210

YAC-042 PG YAC-024 YAC-023 YAC-026 YAC-027

DRM63 DRM64 DRM65 DRM66 DRM67 DRM68

EL11A

CGG113 CGH065 GDN098 DU98 R01 R02 WML263 LWM01

Strata Legend

- NO SAMPLE
- SANDSTONE
- SILTSTONE
- SHALE
- COAL Undifferentiated
- CLAYSTONE
- COAL Dull and bright
- CARB MUDSTONE
- COAL Bright banded
- MUDSTONE
- COAL Bright
- CORE LOSS
- COAL Dull banded
- CONGLOMERATE
- COAL Stony
- SIDERITE
- COAL Dull

Legend

- Extraction Plan Area - Proposed
- Proposed Longwall Extraction - LW403 to LW406
- Existing PG Workings - PKY Seam
- Proposed PG Workings
- Lease Boundary
- Borehole
- Projected Dyke zone - overlying seams
- Projected Fault zone - overlying seams
- Development Consent Boundary
- Upper Liddell Seam Workings
- Upper Liddell Seam - LW Extraction
- Upper Lower Liddell Seam Workings
- Upper Lower Liddell Seam - LW Extraction
- Proposed MLD Workings
- Ravensworth No. 2 & Narama Opencut (Bayswater Seam)
- Ravensworth No.2 Opencut (Ravensworth Seam)
- Ravensworth No.2 Opencut (Vaux Seam)
- Pillar Dimensions are Centre-line distances
- Void Dimensions are from ribline of goaf edge

NOTE: Application area lies wholly within Patrick Plains Mine Subsidence District

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett — 18/12/2024

Mining Engineering Manager — Date

200 160 120 80 40 0 200 400 600 800 1000

All measurements are in metres

AshtonCoal
PO Box 699 Singleton NSW 2330
Phone 61+ 02 6576 1111 Fax 61+ 02 6576 1122

ASHTON UNDERGROUND
PROPOSED LW403 to LW406 - PIKES GULLY SEAM
PLAN No.6 - Geological Strata Sections

Drawing No.	Revision No.
E-3007	A

Date	Scale:	Drawn	Checked	Approved	Sheet Size
07/08/24	1:4000	Survey	TK	MB	A0

I, Michael Bartlett, certify that the information shown on this plan is a true indication of the proposed development.

M Bartlett — Mining Engineering Manager — 18/12/2024 — Date

I, Jarrod Braybon, certify that to the best of my knowledge this plan conforms to the accuracy standards required by the Department of Planning and Environment, NSW

Jarrod Braybon — Mine Surveyor — 18/12/2024 — Date

Legend

- Extraction Plan Area - Proposed
- Proposed Longwall Extraction - LW403 to LW406
- Existing PG Workings
- Proposed PG Workings
- Lease Boundary
- Development Consent Boundary
- Upper Liddell Seam Workings
- Upper Liddell Seam - LW Extraction
- Upper Lower Liddell Seam Workings
- Upper Lower Liddell Seam - LW Extraction
- Ravensworth No. 2 & Narama Opencut (Bayswater Seam)
- Ravensworth No.2 Opencut (Ravensworth Seam)
- Ravensworth No.2 Opencut (Vaux Seam)
- LW8CL2000 Subsidence Line (Installed)
- Subsidence Line (Proposed)
- Subsidence Monitoring Point (Proposed)
- Prescribed Dam Notification Area
- 11kV Transmission Line
- 11kV-OCAL 11kV transmission Line - Private ACOL
- 33kV 33kV Transmission Line
- 66kv 66kV Transmission Line
- 132kv 132kV Transmission Line
- 330kV 330kV Transmission Line
- Telstra Telstra Cable
- OF Optic Fibre Cable
- PIPE Water Pipeline - Private ACOL
- Fence
- Surface Contour (10m)
- Dam
- Water Course
- Unsealed Track
- Building

NOTE: Application area lies wholly within Patrick Plains Mine Subsidence District

ML 1837
ML 1836
ML 1835
ML 1834
ML 1623
ML 1533

Ravensworth Underground Pikes Gully Seam Workings for More Information Refer to Record Tracing No RT804

Ravensworth No. 2 Opencut Mined Extent - Bayswater Seam For More Information Refer to Record Tracing No RT722 & RT722A

Narama Opencut Mined Extent - Bayswater Seam For More Information Refer to Record Tracing No RT793

LW 403 LW 404 LW 405 LW 406

LW 208B LW 207B LW 206B LW 205B LW 204B LW 203B LW 202B LW 201B

LW 208A LW 207A LW 206A LW 205A LW 204A LW 203A LW 202A LW 201A

LW 4 LW 3

200 MAINS

AIW Mains

BOWMANS CREEK DIVERSION

BOWMANS CREEK

XL 01 XL 02 XL 03 XL 04 XL 05 XL 06 XL 10 XL 12

N 6 407 500 N 6 407 000 N 6 406 500 N 6 406 000 N 6 405 500 N 6 405 000

E 316 500 E 317 000 E 317 500

200 160 120 80 40 0 200 400 600 800 1000

All measurements are in metres

AshtonCoal
PO Box 699 Singleton NSW 2330
Phone 61+ 02 6576 1111 Fax 61+ 02 6576 1122

ASHTON UNDERGROUND
PROPOSED LW403 to LW406 - PIKES GULLY SEAM
PLAN No.7 - Subsidence Monitoring

Drawing No.	Revision No.
E-3008	A

Date	Scale:	Drawn	Checked	Approved	Sheet Size
07/08/24	1:4000	Survey	TK	MB	A0

Appendices

Appendix A

Key Project Approval Conditions

Table A1: Development Consent (DA 104/39 MOD 10) Conditions Extraction Plan Document Reference

Condition No.	Condition Requirement	Addressed in EP
Schedule 3, Condition 6	***Extraction Plan*** *The Applicant must prepare and implement an Extraction Plan for any second workings on site, to the satisfaction of the Planning Secretary. The plan must:*	*This document*
	(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary;	*Section 3.1*
	(b) be approved by the Planning Secretary before the Applicant carries out any of the second workings covered by the plan;	*This application*
	(c) include detailed plans of existing and proposed first and second workings and any associated surface development;	***Graphical Plans***
	(d) include detailed performance indicators for each of the performance measures in Tables 1 and 2;	*Specific management plans*
	(e) provide revised predictions of the conventional and non-conventional subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since the approval of modification 9;	*Subsidence Assessment and Technical Reports*
	(f) describe the measures that would be implemented to:	*BFMPs and Site Environmental Management Plans*
	• *ensure compliance with the performance measures in Tables 1 and 2; and*	
	• *manage or remediate subsidence impacts and/or environmental consequences;*	
	(g) include a contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Tables 1 and 2, or where any such exceedance appears likely;	
	(h) include the following in consultation with the Resources Regulator:	
	• *a Subsidence Monitoring Program to:* - *provide data to assist in the management of the risks associated with subsidence;* - *validate the subsidence predictions;* - *analyse the relationship between the predicted and resulting subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences; and* - *inform the contingency plan and adaptive management process;*	*Appendix J*
	• *a Coal Resource Recovery Plan that demonstrates effective recovery of the available resource;*	*Appendix I*

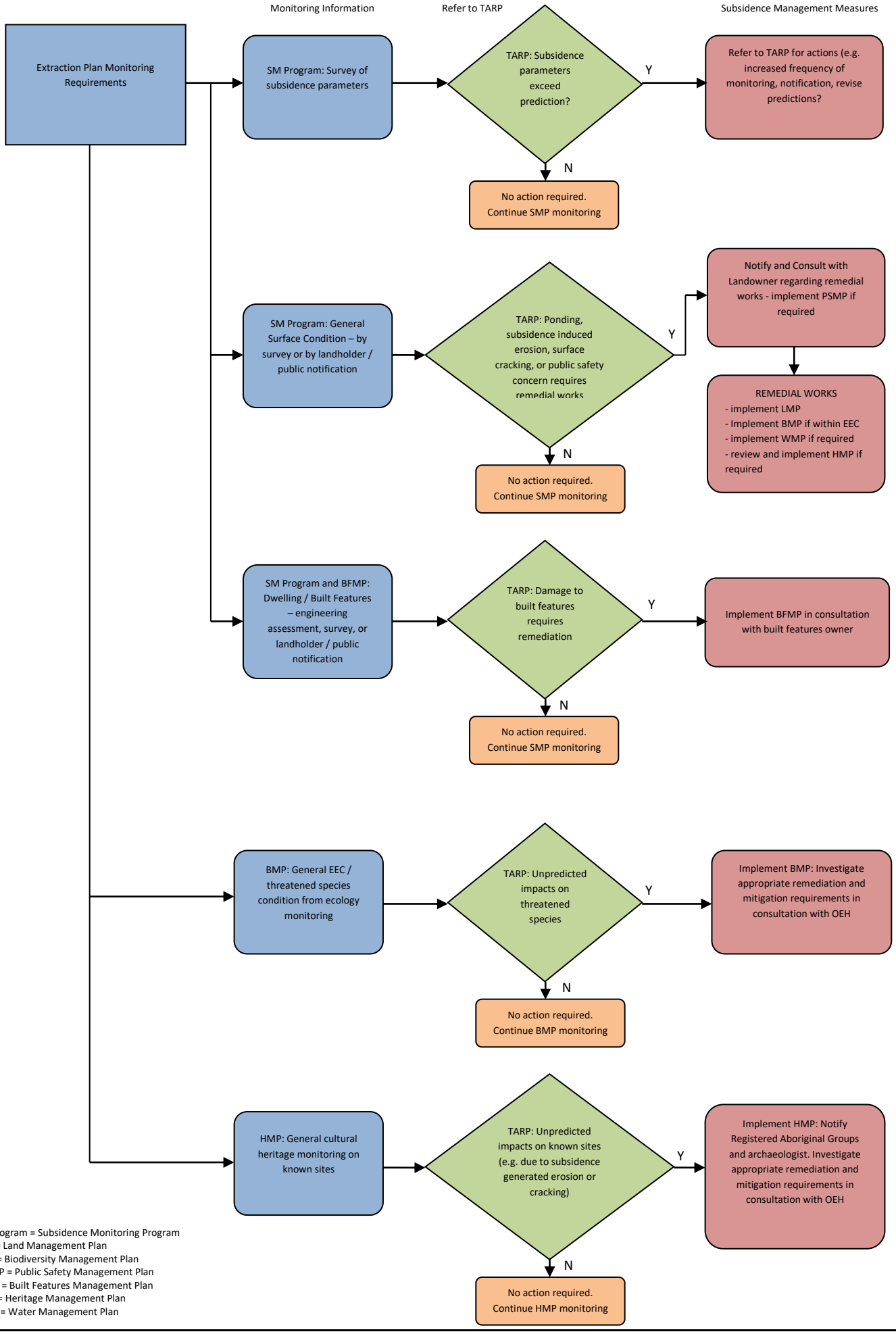
Condition No.	Condition Requirement	Addressed in EP
	• *a Built Features Management Plan, which has been prepared in consultation with Dams Safety NSW, TfNSW and the owners of potentially affected features, which:* - *includes measures to manage the potential impacts and consequences of subsidence on any built features; and* - *includes provisions for reviewing the final terminating position of longwalls close to the New England Highway in response to subsidence monitoring;*	*Appendix G*
	• *a Public Safety Management Plan to ensure public safety in the mining area; and*	*Appendix H*
	• *appropriate revisions to the Rehabilitation Management Plan required under the project approval for the Ravensworth Operations Project (MP 09_0176);*	
	(i) include a: • *Water Management Plan, which has been prepared in consultation with DPE Water, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on surface water resources, groundwater resources and flooding, and which includes:* - *surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality;* - *a program to monitor and report groundwater inflows to underground workings;* - *a program to predict, manage and monitor impacts on groundwater bores on privately-owned land;*	*Appendix C*
	• *Biodiversity Management Plan, which has been prepared in consultation with BCD and the Resources Regulator, which:* - *includes a program of works to ensure that overall terrestrial and aquatic biodiversity values are the same or better than existed in the locality prior to longwall mining;* - *provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on aquatic and terrestrial flora and fauna;*	*Appendix E*
	• *Land Management Plan, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general;*	*Appendix D*

Condition No.	Condition Requirement	Addressed in EP
	• *Heritage Management Plan, which has been prepared in consultation with Heritage NSW and relevant Aboriginal stakeholders, which includes a program/procedures for;* - *minimising disturbance to Aboriginal sites as far as is reasonable and feasible, particularly in relation to the RUM-OS1 site;* - *salvage, excavation and/or management of Aboriginal sites and potential archaeological deposits within the project disturbance area, including the RUM-OS1 site;* - *protection and monitoring of Aboriginal sites outside the project disturbance area, including provisions to protect the undisturbed portion of the RUM-OS1 site from activities associated with the development;* - *managing the discovery of any new Aboriginal objects or skeletal remains during the development; and*	*Appendix F*
	(j) include a program to collect sufficient baseline data for future Extraction Plans.	*Appendix B*

Appendix B

Extraction Plan Flowchart & TARP

EXTRACTION PLAN SUBSIDENCE MONITORING & MANAGEMENT FLOWCHART – LW403 to LW406



SM Program = Subsidence Monitoring Program
LMP = Land Management Plan
BMP = Biodiversity Management Plan
PuSMP = Public Safety Management Plan
BFMP = Built Features Management Plan
HMP = Heritage Management Plan
WMP = Water Management Plan

ASHTON COAL MINE – TRIGGER ACTION RESPONSE PLAN (TARP)

SUBSIDENCE MANAGEMENT Longwalls 403 to 406

			CONTAINMENT / REMEDIATION MEASURES	ADAPTIVE MANAGEMENT MEASURES & CONTINGENCY PLANS
TRIGGERS	SUBSIDENCE PARAMETERS	**NORMAL** Less than predicted	Monitoring as per SM Program	
		TRIGGER LEVEL 1 Exceeds Max Predicted Total Subsidence Parameters for Each Panel (by less than 20%)	Monitoring as per SM Program Notify OM, TSM and ECS	Review subsidence predictions based on monitoring data
		TRIGGER LEVEL 2 Exceeds Max Predicted Total Subsidence Parameters for Each Panel (by more than 20%)	Notify DPHI and RR Notify affected landholders and/or infrastructure owners	Increase frequency of subsidence parameter monitoring Update subsidence predictions based on monitoring data Update impact assessment on natural and built features Review and update Extraction Plan
	BUILT FEATURES (PRIVATE PROPERTY)	**NORMAL** No damage requiring remediation	Monitoring as per Individual AMP	
		TRIGGER LEVEL 1 Built Feature experience damage below Safe Serviceable Repairable (SSR) criteria	Notify landholder Monitoring as per Individual AMPs Implement measures as per the relevant AMP	Review impact assessment based on observed damage Review landholder AMP
		TRIGGER LEVEL 2 Built Feature experiences damage above Safe Serviceable Repairable (SSR) criteria	Notify landholder Notify DPHI and RR Implement measures as per the relevant AMP	Update impact assessment based on observed damage Review landholder AMP
	BUILT FEATURES (INFRASTRUCTURE) (POWERLINES, TELECOMMUNICATIONS & PUBLIC ROADS)	**NORMAL** No damage requiring remediation	Monitoring as per Individual AMPs	
		TRIGGER LEVEL 1 Built Feature experience damage below Safe Serviceable Repairable (SSR) criteria	Notify infrastructure owner Monitoring as per Individual AMPs Implement measures as per the relevant AMP	Review impact assessment based on observed damage Review individual AMP for services in conjunction with Infrastructure owner to ensure these remain safe and serviceable
		TRIGGER LEVEL 2 Built Feature experience damage above Safe Serviceable Repairable (SSR) criteria	Notify infrastructure owner Notify RR Monitoring as per Individual AMPs Implement measures as per the relevant AMP	Update impact assessment based on observed damage Review individual AMP for services in conjunction with Infrastructure owner to ensure these remain safe and serviceable
	SURFACE IMPACTS THAT RESULTS IN PUBLIC SAFETY ISSUES	**NORMAL** Minor cracking (<100mm)	Monitoring as per SM Program, LMP and Public Safety MP	
		TRIGGER LEVEL 1 Moderate cracking (>100 - <300mm), surface irregularities (i.e. humps), unstable trees	Notify landowner in accordance with Public Safety MP Rehabilitate landform, land use and ecosystem function in accordance with LMP in consultation with landowner	Review impact assessment based on observed damage
		TRIGGER LEVEL 2 Major cracking (>300mm), surface irregularities (i.e. humps), erosion Mass movement of steep slope	Notify landowner in accordance with Public Safety MP Rehabilitate landform, land use and ecosystem function in accordance with LMP in consultation with landowner Notify RR Implement public safety risk mitigation in accordance with Public Safety MP (notification, warning signs, traffic control)	Update impact assessment based on observed damage Provide ongoing resources to prevent access to the affected area until remediation plan can be enacted Remediate in accordance with LMP, BMP and WMP
	SURFACE WATERCOURSES (WATER QUALITY, CHANNEL/BANK STABILITY)	**NORMAL** No change to water quality or channel/bank stability from mining related impacts identified through routine water quality monitoring or BCD geomorphic assessments	Monitoring as per SM Program and WMP	
		TRIGGER LEVEL 1 Deterioration trend in stream water quality or impacts to channel stability outside of predictions identified through routine water quality monitoring or BCD geomorphic assessments	Follow the Surface and Groundwater Response Plan as per the WMP Establish whether water quality / channel stability is being impacted by underground mining impacts or environmental consequences Remediate in accordance with LMP where works are not on "Waterfront Land"	Consult with DCCEEW-Water - where works are required on "Waterfront Land" Remediate in accordance with LMP and any requirements of DCCEEW-Water
		TRIGGER LEVEL 2 Subsidence remediation works required in watercourse	Consult with DCCEEW-Water - where works are required on "Waterfront Land" Remediate in accordance with LMP (RMP) and any requirements of DCCEEW-Water	Review subsidence assessment
	GROUNDWATER RESOURCES	**NORMAL** No adverse impact on groundwater	Monitoring as per WMP	
		TRIGGER LEVEL 1 Impacts outside predictions but significantly benign to cause no immediate adverse impact	Follow the Surface and Groundwater Response Plan as per the WMP	
		TRIGGER LEVEL 2 Continual exceedance outside the range of impact predictions and/or immediate adverse impact	Conduct investigation to determine the extent of the impacts and identify contributing factors as per the WMP	Review monitoring program and the WMP Review groundwater or subsidence assessment and update monitoring and management plans
	FLOOD AND PONDING	**NORMAL** No significant change in drainage or ponding as shown in WMP	Monitoring as per SM Program and LMP (RMP)	
		TRIGGER LEVEL 1 Drainage or ponding impacts outside of predictions	Remediate in accordance with LMP (RMP) in consultation with relevant land owner	Remediate in accordance with LMP (RMP)
		TRIGGER LEVEL 2 Ponding prevents access to private property	Correct drainage to allow temporary access	Correct drainage flow to prevent future access issues
	CULTURAL HERITAGE	**NORMAL** No impact to identified sites	Monitoring as per HMP	
		TRIGGER LEVEL 1 Impacts identified outside of predictions	Follow protocols in the HMP and approved Aboriginal Heritage Impact Permit (AHIP)	Review subsidence assessment
		TRIGGER LEVEL 2 Remediation encounters new Cultural Heritage site	Cease work immediately, notify Registered Aboriginal Parties and Heritage NSW, follow protocol in HMP and AHIP to assess the extent, nature and significance of the Aboriginal object(s)	Follow outcomes of the AHIP process and the HMP including (where agreed)
	ECOLOGICAL VALUES	**NORMAL** No significant adverse impact to threatened species, populations, habitats and/or ecological communities	Monitoring as per BMP	
		TRIGGER LEVEL 1 Subsidence induced impact outside of predictions on terrestrial flora and fauna identified by Ecologist or SM Program	Continue monitoring as per BMP Assess whether significant adverse impact to threatened species, populations, habitats and/or ecological communities has occurred	Develop remediation plan as appropriate in consultation with relevant land owner Remediate in accordance with the LMP (RMP)
		TRIGGER LEVEL 2 Remediation works to threatened species, populations, habitats and/or ecological communities have failed to successfully remediate the impact in accordance with LMP (RMP)	Continue monitoring as per BMP Review rehabilitation process and procedure and implement alternative method if feasible	Review BMP and subsidence assessment
RESPONSIBILITIES	OPERATIONS MANAGER (OM)	Ensure adequate resources are available to implement the Extraction Plan		
	TECHNICAL SERVICES MANAGER (TSM)	Arrange monitoring as per Public Safety MP Owner of the Public Safety MP Owner of the Coal Resources Recovery Plan Owner of the SM Program	Notify RR and PSE of identified public safety issues Notify PSE and RR of subsidence exceedance	Update subsidence prediction and impact assessment as required Increase frequency of subsidence monitoring in consultation with PSE Stabilise unstable structures Reduce safety hazards to that of pre mining Update subsidence predictions based on monitoring data Participate in review and update of Extraction Plan
	ENVIRONMENT & COMMUNITY SUPERINTENDENT (ECS)	Arrange monitoring as per BMP Arrange monitoring as per the BFMP and AMPs Arrange monitoring as per LMP Arrange monitoring as per HMP Arrange monitoring as per the WMP Owner of the BMP, BFMP, AMPs, LMP, HMP & WMP Seek access for monitoring programs	Conduct further assessments investigations where required by BMP, HMP, WMP Rehabilitate land in accordance with LMP, WMP, BMP and HMP Develop remediation plan in consultation with land owner and Heritage NSW (where required) Notify landholder of exceedances of performance criteria Arrange pre mining subsidence building inspections as per AMP Arrange temporary water replacement as required	Provide ongoing resources to prevent access to the affected area until remediation plan can be enacted Develop remediation strategy with landowner and Heritage NSW Correct drainage to prevent future access issues Signage and access restriction as per Public Safety MP Consult with DCCEEW-Water - where remediation works are required on "Waterfront Land" Consult with and seek endorsement from Secretary of DPHI for biodiversity offsets required by BMP Review and update Extraction Plan
	REGISTERED MINE SURVEYOR	Arrange monitoring as per SM Program Undertake subsidence monitoring as per SM Program, LMP, BFMP and Public Safety MP		

EP = Extraction Plan, SM Program = Subsidence Monitoring Program, LMP = Land Management Plan, BMP = Biodiversity Management Plan, Public Safety MP = Public Safety Management Plan, BFMP = Built Features Management Plan, AMP = Asset Management Plan HMP = Heritage Management Plan, WMP = Water Management Plan, DPHI = Department of Planning, Housing and Infrastructure, RR = NSW Resources Regulator, DCCEEW-Water = Department of Climate Change, Energy, the Environment and Water – Water, PSE = Principal Subsidence Engineer of RR.

Appendices C – K

(Provided Separately)

Appendix C	Water Management Plan Addendum
Appendix D	Land Management Plan Addendum
Appendix E	Biodiversity Management Plan Addendum
Appendix F	Heritage Management Plan Addendum
Appendix G	Built Features Management Plan (including Asset Management Plans)
Appendix H	Public Safety Management Plan
Appendix I	Coal Resource Recovery Plan
Appendix J	Subsidence Monitoring Program
Appendix K	Mining Operations Plan