Ravensworth Underground Mine – Longwalls 403 to 406

Narama Dam Asset Management Plan

July 2025

DOCUMENT CONTROL

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Originator	Jarrod Braybon	Position Registered Surveyor Ashton Coal Operations Pty Ltd	Signed	Date
Reviewed	Thomas Kaltschmidt	Position Technical Services Manager Ashton Coal Operations Pty Ltd	Signed	Date
Reviewer	Klay Marchant	Position Environment and Community Manager Ravensworth Operations (Glencore)	Signed	Date

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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 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 (Mtpa) of run of mine (ROM) 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.

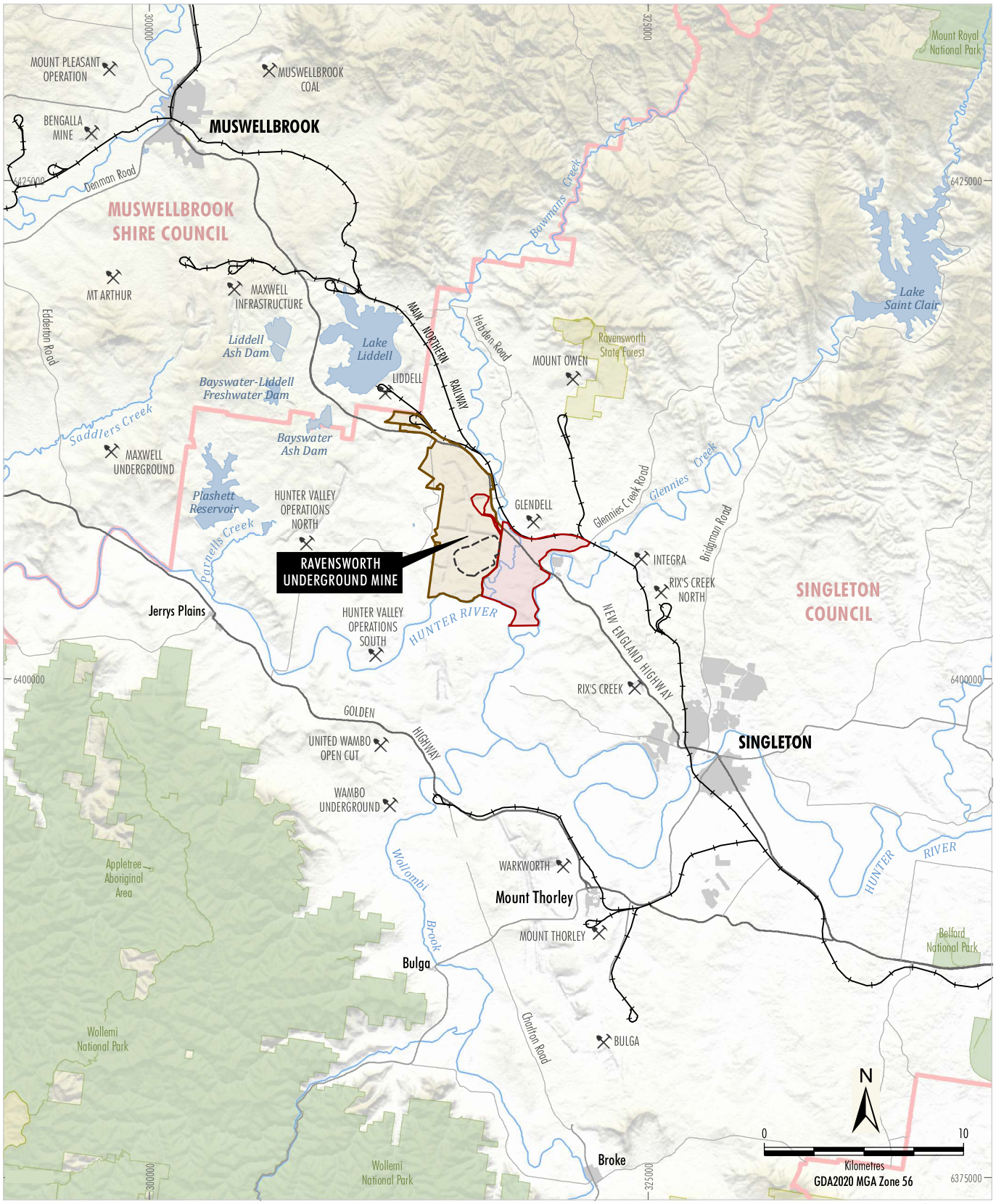
The **Study Area** (**Figure 3**) is generally determined as the area within a distance equal to an angle of draw measured form the outermost goaf edge of the planned longwall panel voids of:

- 45 degrees (°) (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

This Asset Management Plan has been developed to manage risks associated with potential subsidence impacts to the Narama Dam (including the Narama Dam wall and associated dam discharge infrastructure) as a result of the secondary extraction of Longwalls 403 to 406 within the PG Seam.

This management plan provides a mechanism through which the potential subsidence impacts from longwall mining can be managed to maintain the safety and serviceability of the Narama Dam whilst mining is in progress. Impacts, predictions and management of the subsidence impacts on other Glencore Assets are included in the Longwalls 403 to 406 Glencore Asset Management Plan.



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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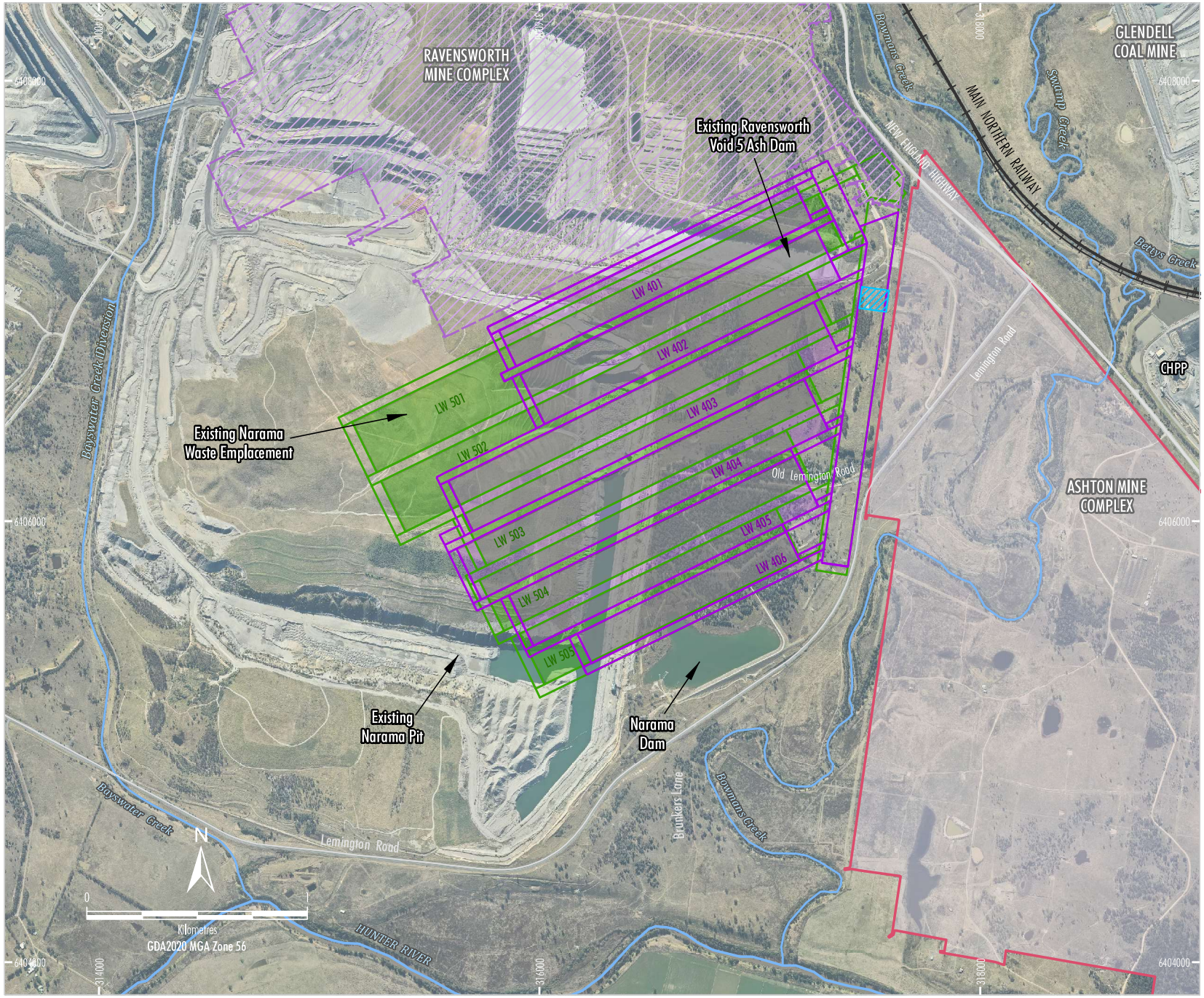
RAVENSWORTH UNDERGROUND MINE
LONGWALLS 403 TO 406 EXTRACTION PLAN

Regional Location

Figure 1

ACO-18-03A LW403-406_EP_MT_203A



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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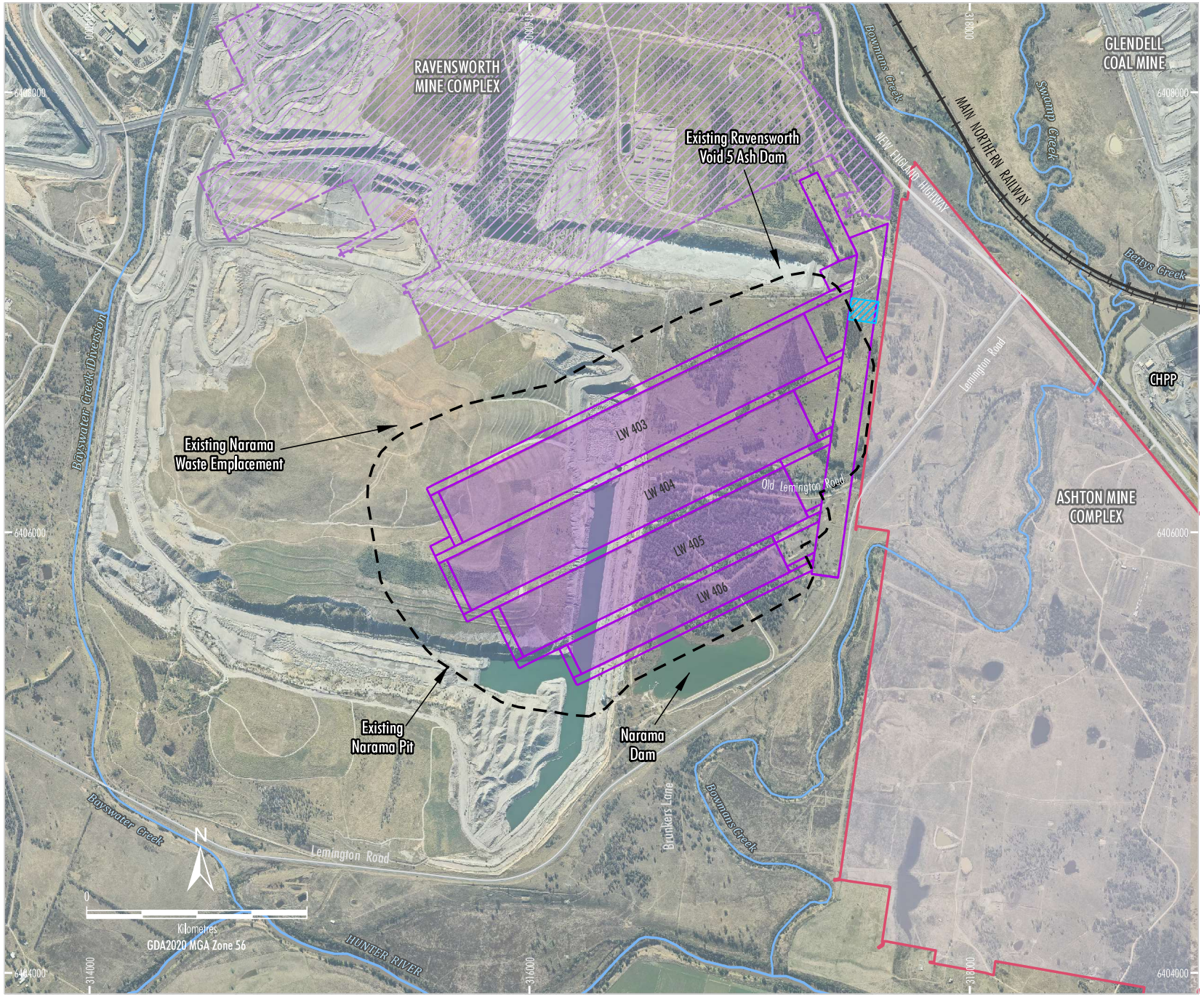
RAVENSWORTH UNDERGROUND MINE
LONGWALLS 403 TO 406 EXTRACTION PLAN

Ravensworth Underground Mine
Approved General Arrangement

Figure 2

ACO-18-03A LW403-406_EP_MT_201A



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

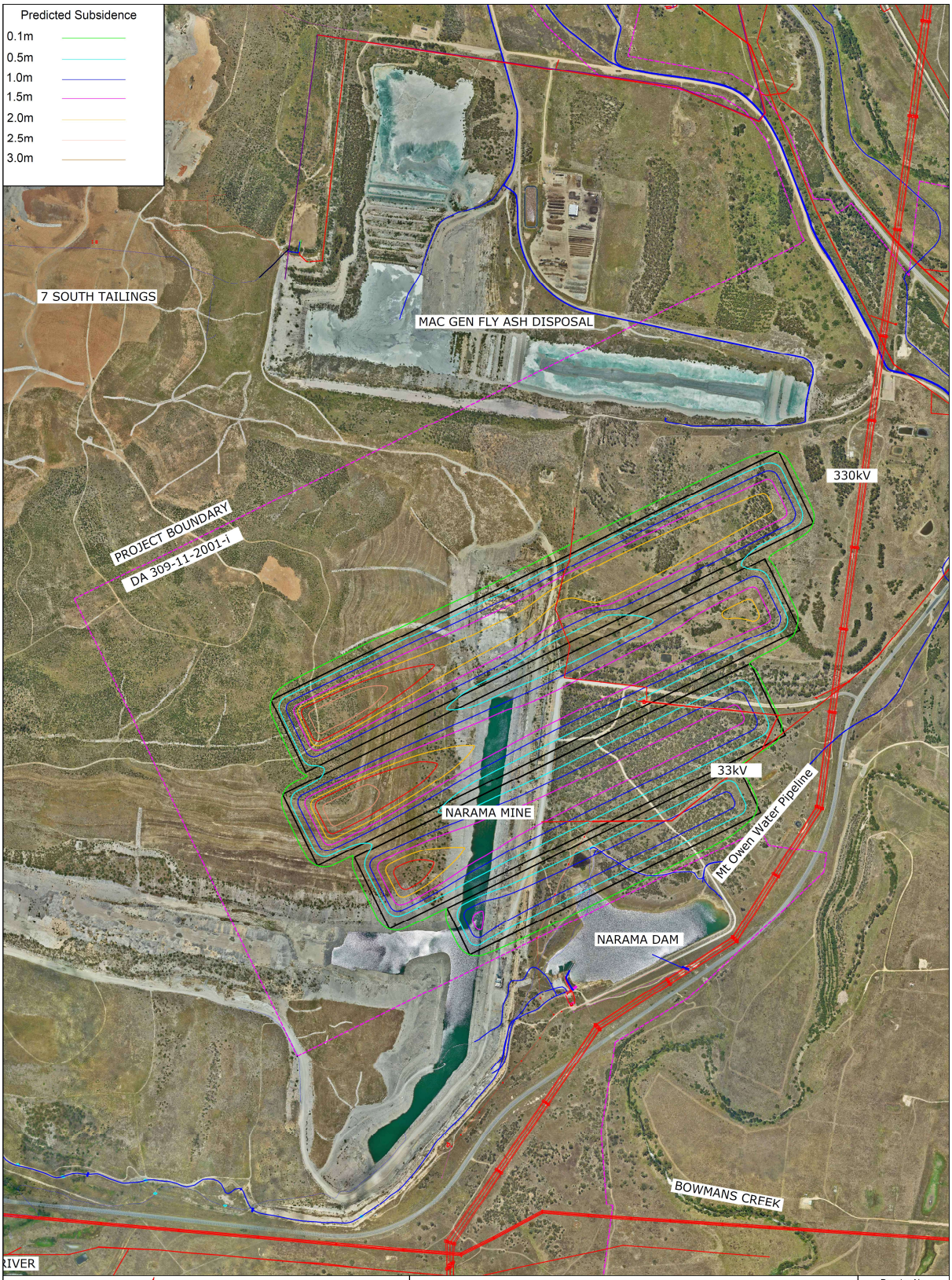

Figure 4: Rumex Area with Predicted Subsidence and Glencore Assets

This Asset Management Plan forms part of the Ashton Longwalls 403 to 403 Extraction Plan and should not be read in isolation. The location of the Narama Dam is provided on Figure 4.

2 ASSETS AND IMPACTS

2.1 SUBSIDENCE PARAMETER DEFINITIONS

Subsidence, tilt and strain are the subsidence parameters commonly used to define the extent of surface movements that will occur as mining proceeds.

Subsidence is the vertical distance (usually measured in millimetres) that the ground surface lowers as a result of mining, and depends on the depth of the coal seam, the thickness of the seam, the width of the extraction area and the characteristics of the overburden.

Tilt is calculated as the change in subsidence between two points divided by the distance between those points (i.e. change in slope of the surface landform as a result of mining). The maximum tilt, or the steepest portion of the subsidence profile, occurs approximately 50 m from the edge of the longwall panel. Tilt is usually expressed in millimetres per metre (mm/m).

Strain results from horizontal movements in the strata. Strain is determined from monitoring survey data by calculating the change in the horizontal length of a section of a subsidence profile and dividing this by the initial horizontal length of that section. If the section has been extended, the ground is in tension and the change in length and resulting strain are both positive. If the section has been shortened, the ground is in compression and the change in length and strain are both negative. Strain is usually expressed in mm/m.

2.2 MAXIMUM PREDICTED SUBSIDENCE

Table 1 below describes the predicted subsidence estimates detailed in the subsidence assessment for Longwalls 403-406 (SCT Operations, 2024).

Table 1. 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 PREDICTED SUBSIDENCE IMPACTS TO THE NARAMA DAM

The Narama Dam wall is located outside Longwalls 403 to 406, and substantially outside the Study Area (**Figure 4**). The water storage reservoir extends into the Study Area and Longwall 406 (**Figure 4**). 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.

The Narama Dam is used by Glencore for water storage and as a licensed discharge point as part of the regional Greater Ravensworth Water and Tailings Strategy initiative. Narama Dam is a declared dam under the Dams Safety Regulation 2019 administered by Dams Safety NSW (DSNSW). Mining of the PG Seam at RUM within the notification area around this dam was previously approved by the Chief Inspector of Coal Mines after consent from DSNSW.

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. This level of strain is expected to result in minor surface cracks along the edges and across the panel width which are likely to intersect the base of the reservoir and drainage line that feeds the small dam upstream of the FSL.

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). Glencore will engage a suitably qualified person to undertake a geotechnical assessment for the Narama Dam. ACOL will reimburse all reasonable expenses borne by Glencore with regard to undertaking the geotechnical assessment for the Narama Dam.

3 PERFORMANCE MEASURES

ACOL will ensure that the Narama Dam will be maintained as safe and serviceable. Any subsidence damage from ACOL's mining activities will be repaired as necessary, or else replaced and/or fully compensated or dealt with under the terms of an access or compensation agreement.

The subsidence impact performance measures relevant to Glencore assets under Condition 3, Schedule 3 of DA 104/96 are summarised in **Table 2**, while more specific objectives and performance measures developed by ACOL are listed in **Table 3**.

Table 2. Subsidence Impact Performance Measures

Built Features	
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.
Public Safety	
Public safety.	Negligible additional risk.

Table 3. Glencore Asset Management Objectives

Objective	**Performance Measure**
General.	• All infrastructure is assessed in consultation with Glencore and any required mitigation / relocation works are carried out prior to undermining.
Narama Dam: • Prevent Narama Dam wall failures. • Prevent water loss.	• Always safe. • Serviceability should be maintained wherever practicable. Loss of serviceability and operation must be fully compensated. • Prevent damage to Narama Dam discharge infrastructure. • Damage must be fully repaired.

4 MONITORING AND MANAGEMENT

The management actions that ACOL undertakes to satisfy the performance measures outlined in Section 3 are outlined in Table 4. These actions include monitoring, management and incident reporting.

Table 4. Narama Dam Monitoring and Management

Item	Feature	Action/Response	Trigger/Timing
1.0	**Monitoring**		
1.01	Narama Dam	• Assets to be monitored in accordance with the Subsidence Monitoring Program. • Baseline visual inspection noting condition of the dam wall and FSL.	• Baseline visual inspection undertaken prior to mining Longwall 406; • Daily (seven days a week) when directly undermining the Narama Dam and its infrastructure; and • Final inspection and survey following completion of mining.
2.0	**Management**		
2.01	Narama Dam	• Assets to be managed in consultation with Glencore if any subsidence impacts identified and repaired once effective subsidence has occurred.	• ACOL to consult Glencore if subsidence impacts have been identified.
2.02	Subsidence Cracks	• Temporary remediation of subsidence cracks. • Permanent remediated of subsidence cracks.	• Cracks will be temporarily remediated if required in case of a public safety risk. • Cracks will be permanently remediated after completion of mining within the ACOL-operated RUM. • ACOL will consult with Glencore if subsidence impacts have been identified.
3.0	**Incident Response**		
3.01	Narama Dam	• Repairs to Narama Dam to be made immediately in consultation with Glencore. • Notify Glencore immediately of any impacts to the Narama Dam Wall or infrastructure.	• If required due to subsidence impacts.

Item	Feature	Action/Response	Trigger/Timing

Item	Feature	Action/Response	Trigger/Timing
4.0	**Reporting**		
4.01	Item 1.01	Notify Glencore and provide copies of monitoring results.	If subsidence monitoring results are greater than predicted or if potential impacts are identified.
4.02	Item 2.01	In accordance with DSC Approval.	In accordance with DSC Approval.
4.03	Item 3.01	Notify Glencore	If required due to subsidence impacts.

4.1 SUBSIDENCE INSPECTIONS

Subsidence inspections will be carried out as per the Subsidence Monitoring Program by mine staff pre-mining and regularly as required until the completion of subsidence. Observed impacts on the ground surface may indicate an impact on infrastructure. The inspection checklist used for this task is shown in **Appendix B**.

4.1.1 Scope of Inspections

Regular surface inspections will cover a zone defined as being 200 m behind and 100 m in front of the current face position. The inspections will cover the full subsidence bowl out to the 45° angle of draw. Inspections will be carried out by trained persons and will follow the inspection checklist. Inspections will identify the following subsidence impacts:

- surface cracking – edges of extraction void and start and travelling abutments particularly in rock outcrop areas;
- surface humps (compression) - near centre of extracted panels and travelling abutment;
- step change in land surface – associated with cracking;
- damage to towers, power poles, conductors, powerlines, pipelines and cables;
- reduce ground clearances of conductors;
- tilting of towers/poles, increased/decreased tension in conductors; and
- bent crossarms or insulators.

4.1.2 Public and/or Infrastructure Safety Issues Identified During Inspections

If any public safety issue is identified during inspections the person conducting the inspection shall:

- immediately notify the Technical Services Manager and/or Environment & Community Superintendent; and
- the Mine Engineering Manager shall immediately notify the NSW Resources Regulator, landholder and Glencore (contact details in Appendix A).

4.1.3 Remediation of Infrastructure Safety Issues

If any public safety issue is identified during inspections or other public safety issue is identified during assessment of monitoring or inspection results that person shall:

- immediately contact Glencore and advise the identified impact;
- arrange for inducted independent contractors to implement immediate remediation works if necessary at ACOL's cost; and
- liaise with Mine Management and Subsidence Advisory NSW to arrange long term repairs.

4.2 CONTINGENCY PLANS

Should interruption of power supply to a user occur as a result of or suspected to be related to subsidence impact to the network, ACOL will attempt to provide an auxiliary power supply or an alternative means to dewater to affected users where the interruption cannot be immediately repaired or if there is a medical or safety reason the user needs continued power supply.

Further mitigation works that may be required to ensure immediate management of impacts to power and water pipelines will be conducted following inspection by an engineer.

4.3 REPORTING

The results of inspections will be recorded and filed. Monitoring results will be reported annually in the Annual Review (AR) where relevant. Other communications will be as detailed in the Public Safety Management Plan.

5 RESPONSIBILITIES

5.1 ASHTON MINE ENGINEERING MANAGER

The Mine Engineering Manager must:

- promptly notify the Resources Regulator of any identified public safety issue via telephone to the central reporting number 1300 814 609; and
- complete a written notification using the online incident notification form via the Regulator Portal at https://www.resourcesregulator.nsw.gov.au/safety-and-health/notifications/incident-or-injury.

5.2 TECHNICAL SERVICES MANAGER

The Technical Services Manager must:

- authorise the Plan and any amendments;
- ensure that the required personnel and equipment are provided to enable this Plan to be implemented effectively;
- inform the Mine Engineering Manager of impacts requiring notification to Division of the NSW Resources Regulator and/or Glencore; and
- liaise with officers of Glencore and remediation consultants and contractors as required.

5.3 ASHTON ENVIRONMENT & COMMUNITY SUPERINTENDENT

The Environment & Community Superintendent must:

- inform the landholders of impacts requiring remediation; and
- report monitoring results in the AR.

5.4 ASHTON REGISTERED MINING SURVEYOR

The Registered Mining Surveyor must:

- ensure that subsidence inspections are conducted to the required schedule and that the persons conducting the inspection are trained in the requirements of this plan and understand their obligations;
- review and assess subsidence monitoring results and inspection checklists; and
- promptly notify Technical Services Manager and/or the Environment and Community Superintendent of any identified public safety issue.

5.5 ASHTON TECHNICAL SERVICES TEAM

The Ashton Technical Services Team members must:

- conduct the subsidence inspection within the applicable subsidence zone to the standard required and using the subsidence inspection checklist;
- take actions to remediate any public safety issue identified during inspections; and
- where actions are beyond their capabilities immediately attempt to notify the landowner or infrastructure owner and Technical Services Manager.

5.6 GLENCORE

ACOL will arrange for inducted independent contractors to conduct repairs as necessary through consultation between Glencore and ACOL.

Glencore must communicate with ACOL on when mining operations are occurring within the Narama void and when works/inspections are being completed in the impacted area, to enable controls appropriate for risks are enacted.

5.7 PAYMENT OF COSTS IN RELATION TO REPAIRS

Payment of costs in relation to subsidence impacts due to ACOL's operation will be as per the Access and Interface Agreement between ACOL and Resources Pacific Pty Limited and Ravensworth Operations Pty Limited.

6 TRAINING

All personnel who conduct inspections will be trained in the requirements of the RUM Longwall 403 to 406 Built Features Management Plan, Longwalls 403 to 406 Subsidence Monitoring Program and the Longwalls 403 to 406 Glencore Asset Management Plan.

Training will be conducted on the identification of the various subsidence impacts detailed in the Public Safety Management Plan and will include any safety aspects of those inspections.

7 AUDIT AND REVIEW

7.1 AUDIT

The requirements of the Longwalls 403 to 406 Glencore Asset Management Plan are to be audited as required.

7.2 REVIEW

A review of this plan will be undertaken:

- if the mine design criteria are changed;
- if subsidence impacts are greater than predicted;
- if required by Glencore; and
- following each audit.

8 REFERENCES

Ashton Coal Operations Pty Ltd (2025) *RUMEx Pikes Gully Longwalls 403 - 406 Extraction Ravensworth Impacts Review May 2025.*

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

Appendices

Appendix A
Stakeholder Contact Details

Longwall 403 to 406 Extraction Plan Stakeholder List

Position	Name	Phone
ASHTON		
Mine Engineering Manager	Justin Peterkin	65709212
Technical Services Manager	Thomas Kaltschmidt	6570 9110
Environment and Community Superintendent	Phillip Brown	6570 9219
Mine Surveyor	Jarrod Braybon	6570 9125
Senior Mining Engineer	Ben Tockuss	6570 9124
After Hours	Ashton Control Room	6570 9166
GOVERNMENT		
Subsidence Advisory NSW	Newcastle Office	4908 4300
Dams Safety NSW	Heather Middleton	02 9842 8076
Resources Regulator		1300 814 609
GLENCORE		
Environment and Community Manager (RO)	Klay Marchant	6570 0684
LANDHOLDERS		
Refer to Ashton internal contact register.		

Appendix B

Subsidence Inspection Checklist

SUBSIDENCE INSPECTION CHECKLIST		
Longwall Panel		
Date		
Face Position		
Subsided Inspection Zone		
Pre-Subsidence Inspection Zone		
Area Inspected by (Print Name and sign)		
INSPECTION ITEM	**CHECKED**	**COMMENTS**
Surface cracking		
Surface humps (compression)		
Hunter River, Mine Water and Gas drainage pipelines		
Access roads and tracks		
Fences, gates, cattle grids		
Damage to Power-poles, Cross-arms, Insulators and Conductors e.g. leaning poles, increased sag in conductors, reduced ground clearance		
Dams		
Structures (houses, outbuildings)		
Other (den and/or nest trees)		

SUBSIDENCE INSPECTION CHECKLIST

Where to Inspect

200 metres behind and 100 metres in front of the current face position.

Cover the full subsidence bowl out to the 45 degree angle of draw.

What to look for

- surface cracking – edges of extraction void and start and travelling abutments particularly in rock outcrop areas and topographic high;
- surface humps (compression) – near centre of extracted panels, the travelling abutment and topographic lows if adjacent to steep terrain;
- step change in land surface – associated with cracking;
- slope, boulder and tree instability;
- surface slumping, erosion;
- serviceability of access tracks;
- changes to creeks, ponding, sediment load;
- general vegetation condition (in particular dieback of vegetation);
- change in conditions of 'right-of-way' access track or surrounding verges including drainage culverts and water flows as well as road cutting stability; and
- power poles and wires – adverse tilts on poles and ground clearances for wires, especially when crossing access tracks.

Actions if there is damage to non-ACOL infrastructure

Immediately notify the:

- Mine Engineering Manager;
- Technical Services Manager and/or Environment & Community Superintendent; and
- relevant infrastructure owner/operator.

If repairs or remediation work is required these will be undertaken or organised by Glencore.