



Longwalls 205 to 208

TransGrid

Asset Management Plan

October 2020



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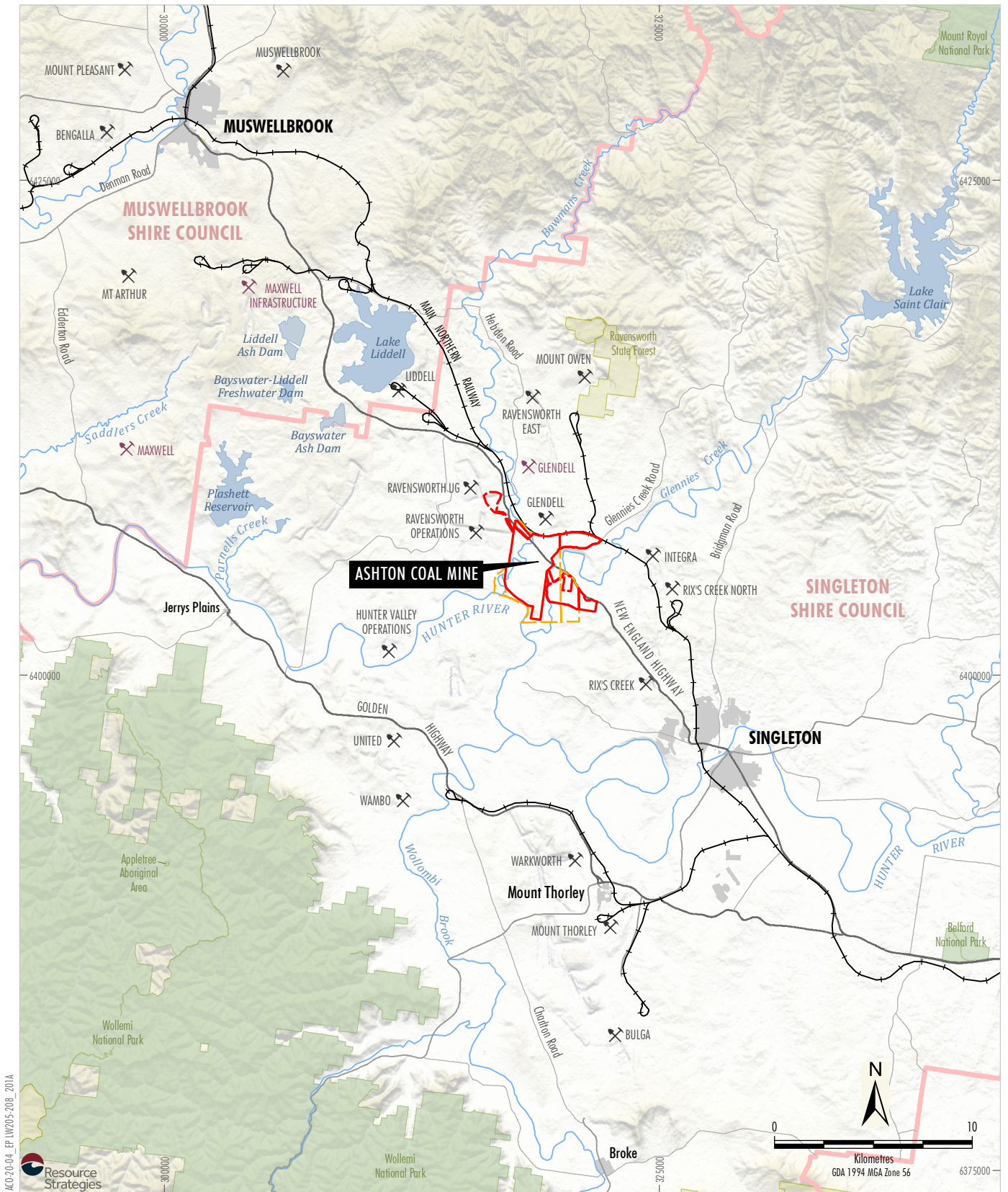
1 INTRODUCTION

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**).

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 Mine is approved to produce up to 5.45 million tonnes per annum (Mtpa) of run of mine (ROM) coal and operate until 2024. The consolidated Development Consent has been modified on ten occasions, with the most recent amendment approved on 20 June 2016.

The underground mine is approved for multi-seam longwall extraction, targeting four coal seams in descending order (Pikes Gully (PG), Upper Liddell (ULD), Upper Lower Liddell (ULLD) and Lower Barrett (LB)) (**Figure 2**). 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.

ACOL has subsequently prepared an Extraction Plan for mining of Longwalls 205 to 208 in the ULLD Seam of the Ashton Underground Coal Mine, varying between 185 metres and 255 metres below the surface. Proposed mining of Longwalls 205 to 208 (the **Extraction Plan Area** – refer **Figure 3**) is due to commence in March 2021 and is planned to take place over a three-year period.



AKO-20-04, EP LW2015-208, 2014
Resource Strategies

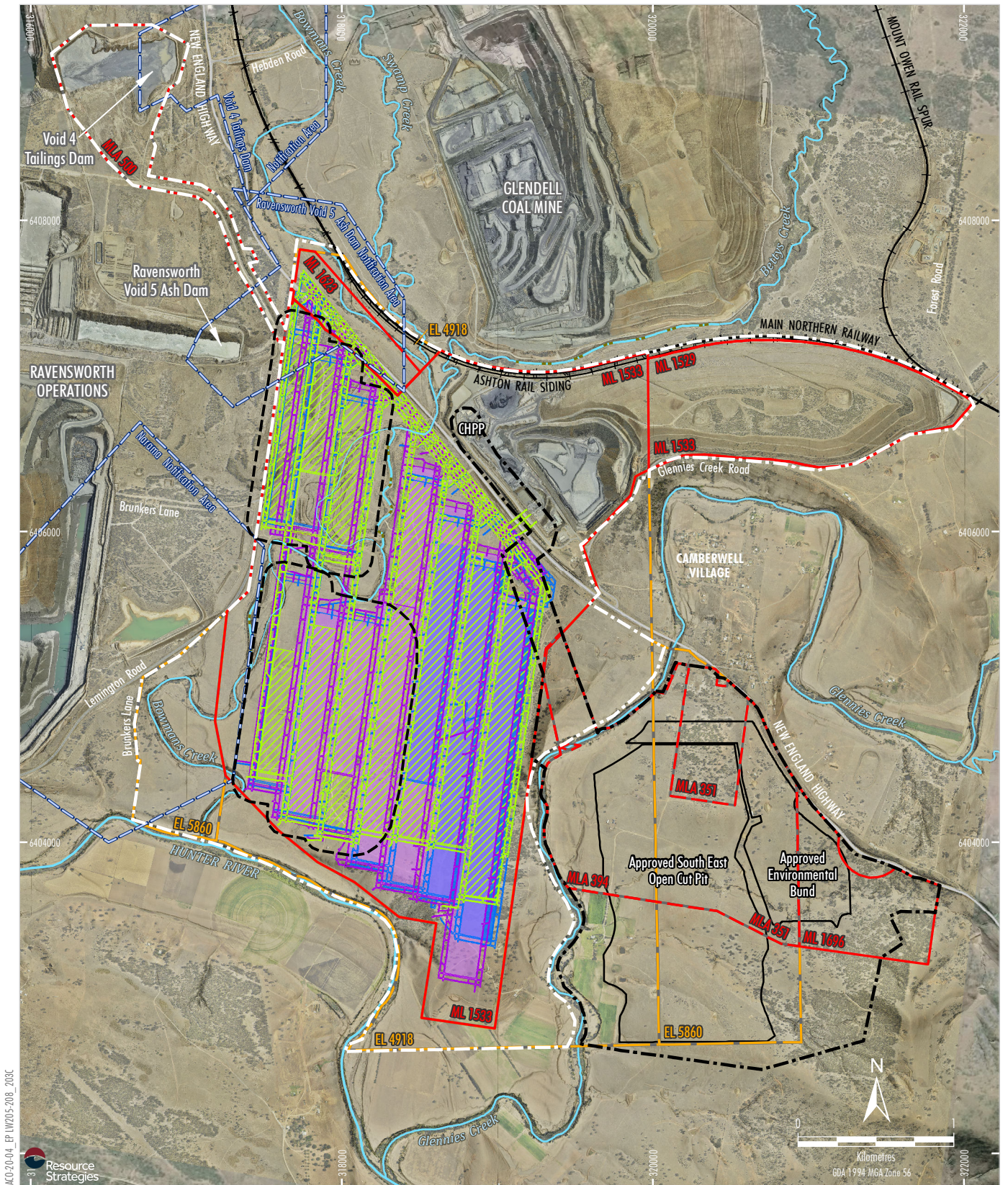
Source: NSW Spatial Services (2020)



- LEGEND**
- Mining Operation
 - Proposed Mining Operations (Application Lodged)
 - Local Government Area
 - State Forest
 - National Parks and Wildlife Estate
 - Exploration License Boundary
 - Mining Lease Boundary
 - Mining Lease Application Boundary

YANCOAL
 宏业澳洲大煤业有限公司
ASHTON COAL MINE
 Regional Location

Figure 1



AKO20-04-EP-1W205-208_203C

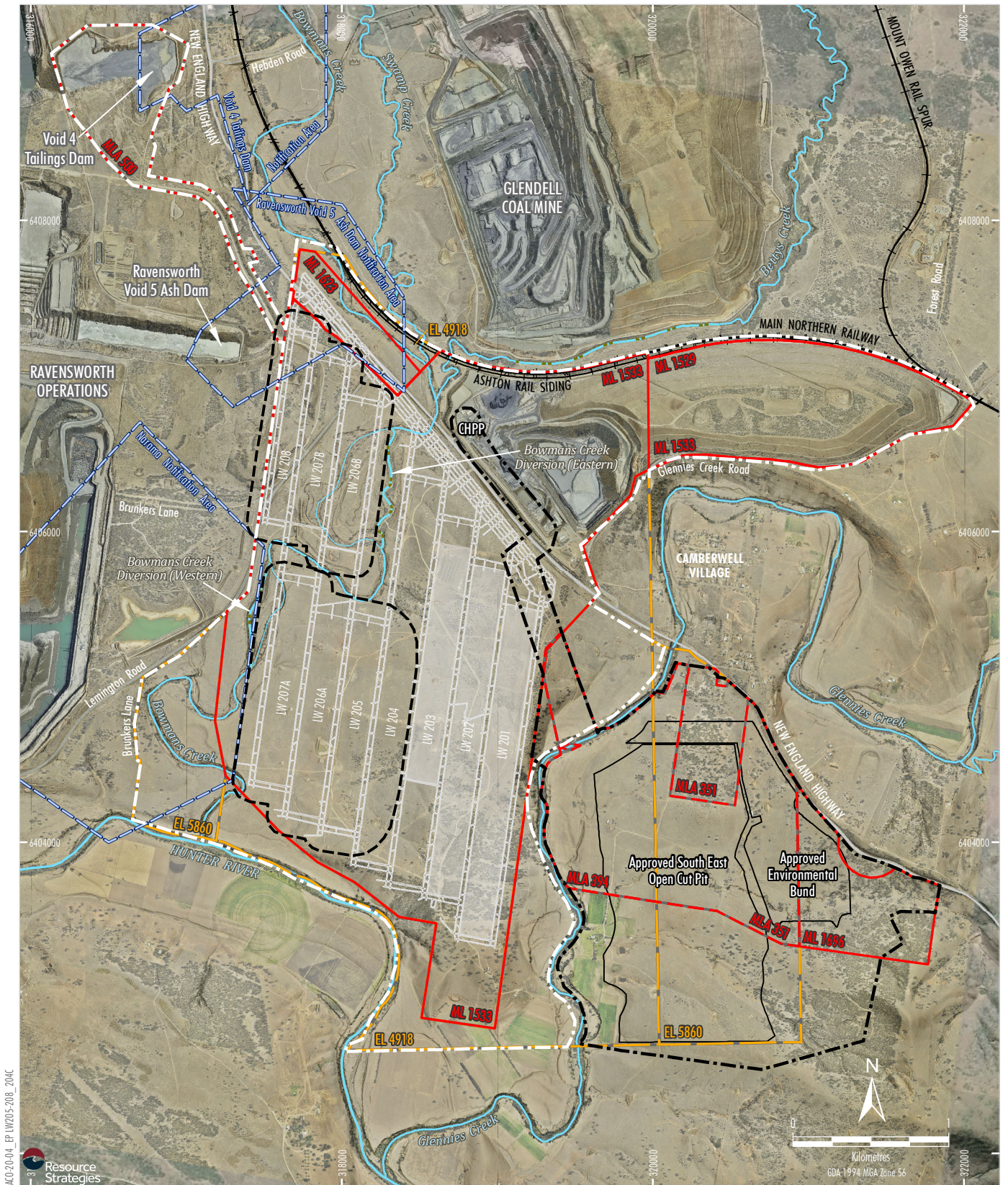


- LEGEND**
- Exploration Licence Boundary
 - Mining Lease Boundary
 - Mining Lease Application Boundary
 - Prescribed Dam Notification Area
 - Project Approval Boundary
 - South East Open Cut Approval Boundary
 - Pike's Gully Seam Longwall
 - Upper Liddell Seam Longwall
 - Upper Lower Liddell Seam Longwall
 - Extraction Plan Application Area

Source: NSW Spatial Services (2020)
 Orthophoto: Ashton Coal (Dec 2019); NSW Spatial Services (2019)


 ASHTON COAL MINE
 General Arrangement

Figure 2



AKO20-04-EP LW205-208_2014C



- LEGEND**
- Exploration Licence Boundary
 - Mining Lease Boundary
 - Mining Lease Application Boundary
 - Prescribed Dam Notification Area
 - Project Approval Boundary
 - South East Open Cut Approval Boundary
 - Upper Lower Liddell Seam Longwall
 - Extraction Plan Application Area

Source: NSW Spatial Services (2020)
 Orthophoto: Ashton Coal (Dec 2019); NSW Spatial Services (2019)



ASHTON COAL MINE
 Upper Lower Liddell Seam Longwall Layout

Figure 3

2 SCOPE & OBJECTIVE

This Asset Management Plan has been developed to manage risks associated with the potential subsidence impacts on the TransGrid infrastructure within the Longwalls 205-208 Extraction Plan area as a result of the secondary extraction of Longwalls 205-208 within the ULLD 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 TransGrid power supply network whilst mining is in progress.

TransGrid infrastructure of relevance to the Extraction Plan area has been identified as a 330 kilovolt (kV) transmission line running roughly north-south parallel to Longwall 208 offset by approximately 100 m to the west (**Figure 4**).

This Asset Management Plan forms part of the Longwalls 205 to 208 Extraction Plan and should not be read in isolation.

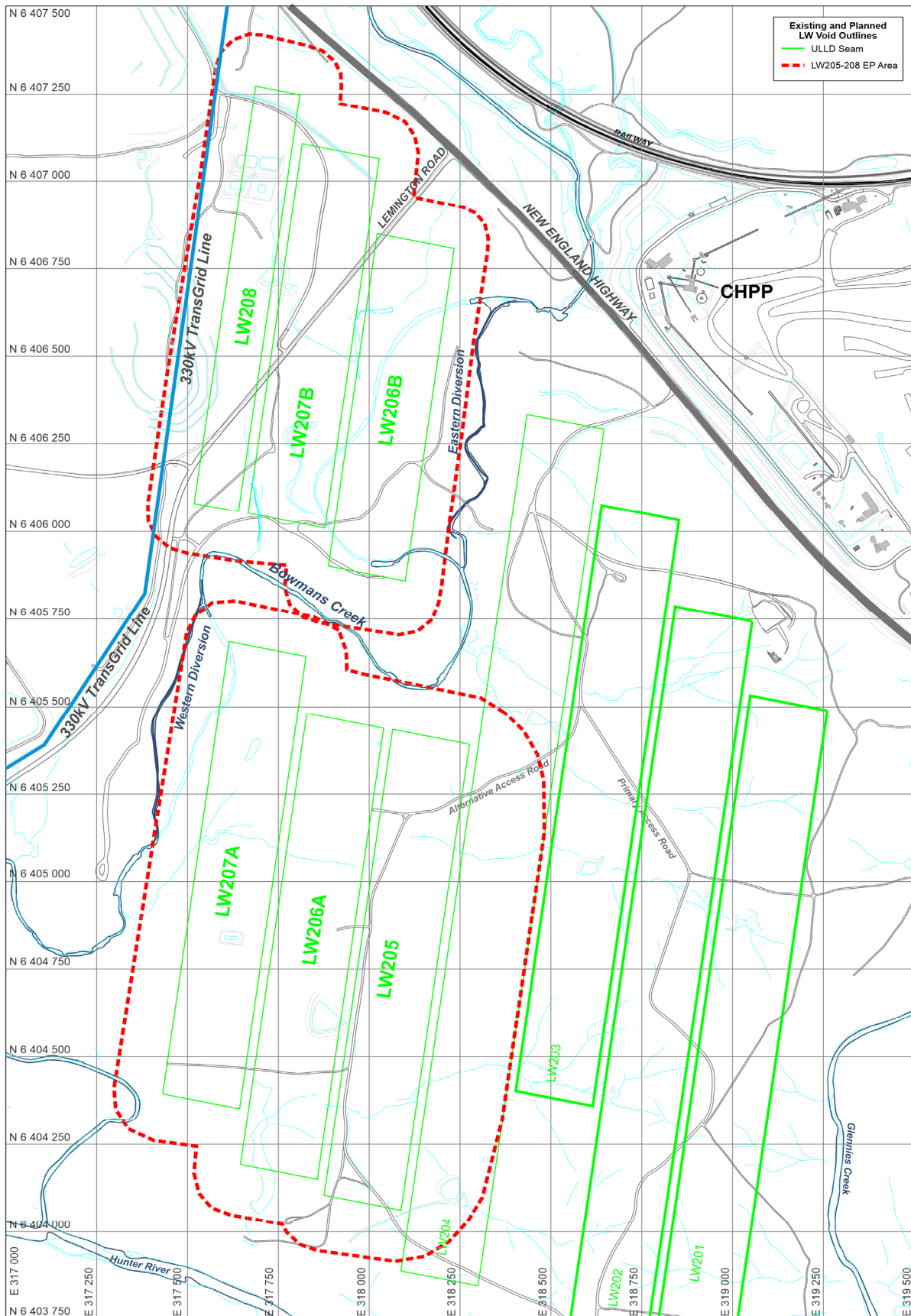


Figure 4: Plan Showing Location of TransGrid Infrastructure in the Vicinity of Longwalls 205 to 208

3 ASSETS AND IMPACTS

The TransGrid 330 kV transmission line is located west of Lemington Road and traverses along the western boundary of the Extraction Plan Area parallel to Longwall 208. Five steel truss pylons that support the conductors are within the Extraction Plan Area (**Plate 1**).



Plate 1: TransGrid 330 kV Transmission Line along western boundary of Extraction Plan Area

The transmission line was previously relocated into the corridor along the lease boundary between the Ashton Underground Coal Mine and Ravensworth Underground Mine (RUM) as part of the Ravensworth North Open Cut expansion to minimise the impacts from future mining. Three of the five towers located within the Extraction Plan area are positioned over solid coal beyond the RUM workings in the PG Seam. The remaining towers are located on the fill and capping material approximately 40 m from the edge of the Ravensworth No 2 Bayswater Pit.

Towers are approximately 90-100 m from the edge of Longwall 208 in the ULLD Seam. Tower foundations are designed and built to accommodate the combined subsidence movements associated with both the Ashton Underground Coal Mine and RUM.

3.1 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 metres from the edge of the longwall panel. Tilt is usually expressed in millimetres per metre.

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 millimetres per metre.

3.2 MAXIMUM PREDICTED SUBSIDENCE

Table 1 below describes the maximum predicted subsidence estimates detailed in the subsidence assessment for Longwalls 205-208 (SCT Operations, 2020). Subsidence impacts have been categorised as:

- incremental subsidence: subsidence as a direct result of mining in the ULLD Seam; and
- cumulative subsidence: combined subsidence as a result of mining the ULLD Seam and previously mined seams (i.e. PG Seam and ULD Seam).

Table 1. Maximum Predicted Subsidence Parameters for ULLD Seam Longwall Panels

ULLD Seam Longwall Panels (depth range in brackets [m])		Longwalls 205-208 Forecast						
		ULLD Subs (m)	ULLD Strain (mm/m)			ULLD Tilt (mm/m)		
			General	Stacked Edges	Undercut Edges	General	Stacked Edges	Undercut Edges
Incremental Subsidence Parameters								
LW205	(185-225)	2.8	30	53	N/A	53	106	N/A
LW206A	(205-240)	2.8	27	48	N/A	48	96	N/A
LW206B	(175-210)	2.5	29	50	N/A	56	100	N/A
LW207A	(220-260)	2.6	24	41	47	45	83	95
LW207B	(190-225)	2.5	26	46	53	52	92	105
LW208	(210-240)	2.2	21	37	N/A	33	73	N/A
Cumulative Subsidence Parameters								
LW205	(185-225)	5.8	47	110	N/A	94	219	N/A
LW206A	(205-240)	5.8	42	99	N/A	85	198	N/A
LW206B	(175-210)	3.9	33	78	N/A	67	156	N/A
LW207A	(220-260)	4.4	30	70	80	60	140	160
LW207B	(190-225)	4.2	33	77	88	66	155	177
LW208	(210-240)	3.1	22	52	N/A	44	103	N/A

3.3 PREDICTED SUBSIDENCE IMPACTS

Absolute vertical and horizontal movements at the TransGrid 330 kV transmission line towers are expected to be less than 50 mm and 100 mm, respectively and imperceptible for all practical purposes. The tower foundations are expected to be able to accommodate any small differential movements that may occur.

No impacts are expected to this transmission line from the planned mining of Longwalls 205-208 in the ULLD Seam (SCT, 2020).

3.4 PROPOSED MONITORING/MANAGEMENT MEASURES

Monitoring of the full three-dimensional subsidence movements in the general vicinity of the towers at the end of each longwall panel and at specific east-west survey monitoring lines (i.e. XL13 and XL14) will take place to ensure subsidence movements are as expected in the subsidence assessment by SCT (2020).

4 PERFORMANCE MEASURES

ACOL will aim to ensure that all built features owned by TransGrid within the Extraction Plan area are always 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 TransGrid assets under Schedule 3, Condition 29 of DA 309-11-2001-i 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 built features, including other public infrastructure.	<ul style="list-style-type: none"> 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.	No additional risk due to mining.

Table 3. TransGrid Electricity Transmission and Distribution Line Management Objectives

Objective	Performance Measure
<ul style="list-style-type: none"> To ensure unplanned disruption to power supply do not occur as a result of subsidence related damage to transmission lines. To prevent public safety hazards from damaged transmission lines. 	<ul style="list-style-type: none"> All infrastructure is assessed in consultation with TransGrid and any required mitigation / relocation works carried out prior to undermining. No power shortages occur due to subsidence induced damage to transmission lines. Where subsidence related impacts are realised and transmission lines and towers within the site to remain structurally sound and serviceable at all times. Safety – Line clearances appropriately managed and maintained.

5 MONITORING AND MANAGEMENT

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

Table 4. TransGrid Asset Monitoring and Management

Item	Feature	Action/Response	Trigger/Timing
1.0 Monitoring			
1.01	330 kV Transmission Line	<ul style="list-style-type: none"> Pre-subsidence survey of 330 kV tower bases to obtain xyz coordinates. The survey is to be undertaken in accordance with the approved Subsidence Effects Monitoring Program and the proposed methods therein. No power shortages occur due to subsidence induced damage to transmission lines. 	Prior to mining LW 208.
1.02		<ul style="list-style-type: none"> Assets to be monitored in accordance with the <i>Subsidence Effects Monitoring Program</i>. Visual inspections conducted during subsidence (see Section 5.1). Undertake final inspections and survey following completion of mining. 	<ul style="list-style-type: none"> During active subsidence; and Final inspection and survey following completion of mining.
2.0 Management			
2.01	330 kV Transmission Line	<ul style="list-style-type: none"> Monitoring as per requirements above. It should be noted that the 330kV transmission line has been designed to tolerate subsidence. 	<ul style="list-style-type: none"> Monitoring as per timing above.
3.0 Incident Response			
3.01	330 kV Transmission Line	Notify TransGrid on 1800 027 253 of any fallen/damaged electrical assets and take appropriate measures to prevent potential injury (e.g. signage, fencing).	If required as a result of subsidence impacts (i.e. either through inspections or service disruptions), as soon as practicable.
4.0 Reporting			
4.01	Item 1.01	Provide a copy to TransGrid.	Once completed.
4.02	Item 1.02	Notify TransGrid and provide copies of monitoring results.	If subsidence monitoring results are greater than predicted or if potential impacts are identified.
4.03	Item 2.01	Consult with TransGrid regarding potential management measures.	If required.
4.04	Item 3.01	Notify stakeholders. Notify Resources Regulator if deemed a reportable incident.	Reporting as per Extraction Plan requirements.

5.1 SUBSIDENCE INSPECTIONS

Subsidence inspections will be carried out by mine staff pre-mining (prior to the start of LW208), when mining is adjacent to a tower structure (+/- 20 m) and when mining is >200 m past the tower structure.

The inspections will be carried out to assess impact on the ground surface adjacent to the towers, tower footings, wires and conductors. Observed impacts on the ground surface may indicate an impact on the transmission line. The inspection checklist used for this task is shown in **Appendix B**.

5.1.1 Scope of Inspections

Regular surface inspections will cover a zone defined as being 200 metres behind and 100 metres in front of the current face position. The inspections will cover the full subsidence bowl out to the 45 degree 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, conductors, transmission lines;
- reduced ground clearances of conductors;
- tilting of towers, increased/decreased tension in conductors; and
- bent crossarms or insulators.

5.1.2 Public and/or Transmission Line 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;
- erect “NO ROAD” or barrier tape and warning signs if immediate remediation is not possible; and
- the Operations Manager shall immediately notify the NSW Resources Regulator, Landholder and the infrastructure owner (contact details in Appendix A).

5.1.3 Remediation of Transmission Line 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 TransGrid and advise the identified impact;
- arrange for TransGrid to implement immediate repairs if necessary; and
- liaise with Mine Management and Subsidence Advisory NSW to arrange long term repairs.

5.2 CONTINGENCY PLANS

Should interruption of power supply to a user occur as a result of, or suspected to be related to, subsidence impacts to the network, ACOL will attempt to provide auxiliary power supply 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.

5.3 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.

6 RESPONSIBILITIES

6.1 ASHTON OPERATIONS MANAGER

The Operations 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>.

6.2 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 Operations Manager of impacts requiring notification to the NSW Resources Regulator and/or TransGrid; and
- liaise with officers of TransGrid and remediation consultants and contractors as required.

6.3 ASHTON ENVIRONMENT & COMMUNITY SUPERINTENDENT

The Environment & Community Superintendent must:

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

6.4 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.

6.5 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.

6.6 TRANSGRID

TransGrid must arrange repairs as necessary through consultation between TransGrid and ACOL.

6.7 PAYMENT OF COSTS IN RELATION TO REPAIRS

ACOL will liaise with Subsidence Advisory NSW in relation to payment for any necessary repairs such that no cost will be borne by TransGrid.

7 TRAINING

All personnel who conduct inspections will be trained in the requirements of the Ashton Longwalls 205-208 Built Features Management Plan, Longwalls 205-208 Subsidence Monitoring Program and the Longwalls 205-208 TransGrid 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.

8 AUDIT AND REVIEW

8.1 AUDIT

The requirements of the Longwalls 205-208 TransGrid Asset Management Plan are to be audited as required.

8.2 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 TransGrid; and
- following each audit.

9 REFERENCES

Strata Control Technology (2020) *Subsidence Assessment for the Extraction Plan for Longwalls 205 – 208 in the Upper Lower Liddell Seam*, Report Number ASH4927.

Appendices

Appendix A

Stakeholder Contact Details

Longwalls 205-208 Extraction Plan Stakeholder List

Position	Name	Phone
ASHTON		
Operations Manager	Aaron McGuigan	6570 9104
Technical Services Manager	Tony Sutherland	6570 9110
Environment and Community Superintendent	Phillip Brown	6570 9219
Mine Surveyor	Jeff Peck	6570 9125
Senior Mining Engineer	Ben Tockuss	6570 9124
After Hours	Ashton Control Room	6570 9166
GOVERNMENT		
Subsidence Advisory NSW	Newcastle Office	4908 4300
Resources Regulator		1300 814 609
TRANSGRID		
Emergencies	NA	1800 027 253
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:

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

If repairs or remediation work are required these will be undertaken by TransGrid.