



Strata Control Technology

ULAN COAL MINES PTY LTD

2024 Annual Review of Subsidence Monitoring at
Ulan West and Ulan Underground Mines

ULA5849



RESEARCH



CONSULTING



FIELD SERVICES



INSTRUMENTATION



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TITLE 2024 Annual Review of Subsidence
Monitoring at Ulan West and Ulan
Underground Mines

REPORT NO ULA5849

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DATE 28 March 2025

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Report No	Version	Date	Revisions
ULA5849	Draft	19 March 2025	
ULA5849	Final	28 March 2025	

SUMMARY

Ulan Coal Mines Pty Limited (UCM) owns and operates the Ulan West (UW) and Ulan Underground (UUG) Mines located approximately 25 km northeast of Gulgong in the Central West of New South Wales. UCM undertakes an annual review of the subsidence monitoring and other environmental monitoring conducted at both mines. UCM commissioned SCT Operations Pty Ltd (SCT) to undertake a review of the subsidence monitoring conducted for the 2024 calendar year, including a comparison of observed behaviour with subsidence forecasts and an assessment of compliance with subsidence performance measures of the Ulan Coal - Continued Operations (UCCO) Project Approval 08_0184 (as modified). This report presents the results of our review of subsidence effects, subsidence impacts and environmental consequences from the secondary extraction of sections of Longwalls 7 and 8A at UW and a section of Longwall 31 at UUG during 2024.

Our review indicates subsidence behaviour observed is consistent with expectation. The magnitudes of primary subsidence effects are within expectations and less than the maxima forecast for the extraction plans covering the areas mined by longwalls in 2024.

Subsidence impacts and environmental consequences to natural and built features on private property and land owned or leased by UCM are consistent with expectations and less than the maxima forecast.

No impacts or consequences were observed or are expected within the Brokenback Conversation Area, the Talbragar Fish Fossil Reserve, Mona Creek Rock Shelters and Grinding Groove Conservation Areas. All these significant sites are either remote from active longwall mining or protected by barriers or coal to prevent impacts during 2024.

No significant impacts were observed within the Durridgere State Conservation Area.

Subsidence impacts and environmental consequences, including to water, biodiversity, land, heritage, built features and public safety risk, are likely to be compliant with the subsidence performance measures detailed in the UCCO Project Approval 08_0184 (as modified), notwithstanding the input of other specialists.

Impacts and risks on private property are being mitigated and remediated by management plans and agreements between the landholder and UCM.

No incidents relating to public safety on land owned or leased by UCM, private property or in a public space have been reported.

Ongoing monitoring is recommended consistent with subsidence monitoring programs detailed in relevant Extraction Plans for both the UW and UUG mines.

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1. INTRODUCTION

Ulan Coal Mines Pty Limited (UCM) owns and operates the Ulan West (UW) and Ulan Underground (UUG) Mines, within the Ulan Complex (UC), approximately 25 km northeast of Gulgong in the Central West of New South Wales. UCM undertakes an annual review of the subsidence monitoring conducted at both mines in accordance with the requirements of the approved Ulan West Extraction Plan (EP) for Longwalls LW1 to LW8 and the Ulan Underground EP for Longwalls 30-32 and W6-W8. UCM commissioned SCT Operations Pty Ltd (SCT) to undertake a review of the subsidence monitoring conducted for the 2024 calendar year, including a comparison of observed behaviour with subsidence forecasts and assessment of compliance with subsidence performance measures of the modified Ulan Coal - Continued Operations (UCCO) Project Approval (PA) 08_0184 under which both mines operate. This report presents our review of subsidence effects and impacts resulting from the mining of sections of Longwall 7 and Longwall 8A at UW and a section of Longwall 31 at UUG during 2024.

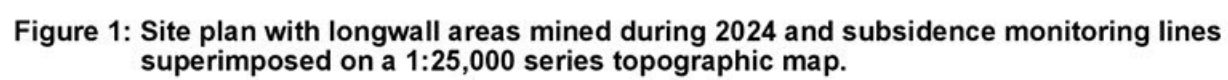
Our review is based on analysis of the survey data from subsidence monitoring, site inspections, and reports by UCM personnel and other specialists. A surface inspection was conducted by SCT over areas the longwalls mined below during 2024 on 2 January 2025 in the company of UCM environmental staff.

This report is structured to provide:

- Conclusions and recommendations from the review and analysis of the subsidence monitoring including a comparison of measured subsidence effects and observed impacts against forecast expectations for each mine in EPs and assessment of compliance with the subsidence performance measures in PA08_0184 (as modified).
- A general site description including descriptions of surface features, approvals context, mining geometry and extraction timing.
- A review of the measured subsidence effects.
- Observations of subsidence impacts and environmental consequences.

Where appropriate, details in the report are divided into two sections, one for each mine.

Figure 1 shows a plan of the areas mined by the longwalls at UW and UUG during the 2024 reporting period superimposed onto a 1:25,000 series topographic map of the area. This map shows the locations Ulan, Mona, Cockabutta and Brokenback Creeks, Brokenback Conservation Area (BBCA), two Grinding Groove Conservation Areas, Mona Creek Rock Shelter Sites, Talbragar Fish Fossil Reserve and Durrigere State Conservation Area. Private properties and subsidence monitoring lines (including GNSS units in the BBCA) in the vicinity the longwall panels are also shown.



2. CONCLUSIONS AND RECOMMENDATIONS

Analyses and interpretation of the subsidence monitoring conducted for the areas mined during the 2024 calendar year indicate that the observed subsidence behaviour is consistent with expectation. Measured subsidence effects are less than forecasts presented in SCT reports to inform the 2009 Environmental Assessment (EA) for the UCCO Project, the EP for Longwalls 7-8 at UW and the EP for Longwalls 30-32 and LWW6-LWW8 at UUG.

Table 1 shows the measured maxima of primary subsidence parameters for conventional subsidence behaviour above each longwall shown (abbreviated M and shown in bold typeface) and the subsidence values forecast in the corresponding EP assessment for the longwall and depth on each subsidence monitoring line (abbreviated F and shown in normal typeface).

Table 1: Summary of subsidence effects for the primary subsidence parameters for the 2024 reporting period

	Subsidence (m)		Tilt (mm/m)		Strain (mm/m)			
					Compressive		Tensile	
	M	F	M	F	M	F	M	F
UW LW7 D Line	1.46	1.7	29	45	7	25	9	20
UW LW7 C Line	1.4	1.7	35	45	4	25	8	20
UW LW8A I Line	1.2	1.7	25	45	8	25	7	20

Primary subsidence parameters measured during 2024 are all less than the maximum forecast in the EP for Longwalls 1 to 8 at UW and the EP for Longwalls 30-32 and LWW6-LWW8 at UUG.

Subsidence impacts and environmental consequences to natural and built features observed on private property and land owned or leased by UCM are consistent with expectations and less than the maxima forecast.

Table 2 summarises the subsidence performance measures outlined in Table 14 of UCCO Project Approval 08_0184 (as modified), and the status of compliance expected for the 2024 reporting period, notwithstanding the input of other specialists.

Subsidence monitoring measurements and observations indicate compliance with the UCCO Project Approval subsidence performance measures.

Monitoring measurements and observations indicate subsidence effects are less than forecast. Subsidence impacts and environmental consequences are anticipated to be compliant with subsidence performance measures in PA08_0184 (as modified).

During 2024, active longwall mining was more than 2.5 km from the main channel of Ulan Creek (downstream of the Bobadeen water treatment facility), more than 500 m from the 4th order main channel of Mona Creek and more than 2 km from the main channel of Cockabutta Creek. No perceptible impacts or consequences are expected at Ulan and Cockabutta Creeks and any consequences to Mona Creek are expected to be less than predicted in EAs, notwithstanding the assessment of other specialists.

Table 2: Subsidence performance measures and compliance status for 2024

<i>Subsidence Performance Measure</i>		<i>Assessment of status of compliance for 2024</i>
Water		
Ulan, Mona & Cockabutta Creeks	No greater environmental consequences than predicted in EAs	Compliance expected. Main channels of creeks remote from longwall mining in 2024 (assessed by other specialists).
Biodiversity		
Threatened species, populations, habitat or ecological communities	Negligible impact	Compliance expected because no greater subsidence effects compared to EAs and EPs (assessed by other specialists).
Land		
Cliffs in the Brokenback Conservation Area	Nil environmental consequences	Recent mining too remote from this area to cause impacts. Significant features protected by barrier of coal to be left.
Other Cliffs	Minor environmental consequences	Assessment by Pacific Environmental and UCM (PE 2025a) indicates compliance.
Heritage		
Aboriginal Sites	Nil impact in the Brokenback Conservation Area, Grinding Groove Conservation Areas and Mona Creek Rock Shelters	Compliance expected. No impacts observed at Brokenback cliffs (PE 2025a). Significant features protected by barriers of coal to be left.
Talbragar Fish Fossil Reserve	Negligible impact	Compliance expected. Recent mining too remote to cause significant impacts.
Other Heritage Sites	No greater impact than predicted in EAs	Compliance expected (other specialists to assess) Subsidence effects are less than forecast in EP.
Built Features		
All built features	Safe, serviceable and repairable unless the owner agrees otherwise in writing	Compliance expected. (Impacts managed via provisions of Built Features Management Plan (BFMP) and Private Property Subsidence Management Plans (PPSMP).
Public Safety		
Public Safety	No additional risk due to mining	Compliance expected. (Hazards managed via Public Safety Management Plan (PSMP) and (PPSMP).

Subsidence impacts to biodiversity and heritage sites are assessed by other specialists, but, notwithstanding the input from these specialists, the subsidence effects are less than forecast, so it is anticipated that the subsidence impacts would also be less than expected and, therefore, compliant with subsidence performance measures in PA08_0184 (as modified).

Pacific Environmental Pty Ltd (PE) reports no consequences or impacts to cliffs and Aboriginal heritage rock shelter sites in the Brokenback Conservation Area. Monitoring of subsidence movements using GNSS units installed at the eastern end of the BBKA indicates low-magnitude subsidence effects consistent with expectation and of no practical consequence to significant features protected from mining impacts within the BBKA.

PE (2025a) reports on impacts and consequences to the cliff formations located above or within the vicinity of Longwalls 1-7 at UW and Longwalls W4 and W7 at UUG. These impacts are consistent with expectations and less than forecast in the UCCO EA and updated by SCT for the Longwalls 1-8 EP and Longwalls 30-32 and W6-W8 EP.

The Talbragar Fish Fossil Reserve is more than 250 m to the west of active longwall mining within Longwall 8A and, due to the nature of the deposit, too remote to be impacted.

The Grinding Grooves Conservation Areas are protected by offset barriers from longwall mining and are too remote from the active longwall mining in 2024 to be impacted.

The Mona Creek Rock Shelters are protected by coal offset barriers from longwall mining and, in 2024, were more than 700 m from the nearest active longwall, Longwall 8A. Several inspections by SCT during 2024 indicate no subsidence impacts or environmental consequences to these sites.

No impacts have been reported at these significant sites that are subject to the subsidence performance measures of PA 08_0184.

No significant impacts were observed in the Durridgere State Conservation Area adjacent to the mining in Longwall 31 during 2024 at UUG.

Consequences to built features owned by UCM or on private property have been minor with safety, serviceability and repairs managed by the Built Features Management Plan (BFMP) and applicable Private Property Subsidence Management Plans (PPSMPs).

No incidents relating to public safety on Crown land leased by UCM, land owned by UCM, private property or in public space have been reported.

Impacts and risks on private property are being mitigated and remediated by the relevant EP, and provisions of BFMP, PPSMP and alternative water supply agreement between private landholders and UCM as required.

Ongoing monitoring as detailed in the subsidence monitoring program for the current EPs at UW and UUG is recommended.

3. SITE DESCRIPTION

Figure 2 shows the mining layout, the areas mined by longwalls during 2024, creeks and dams, sandstone outcrop formations (including steep slopes and cliffs), sensitive Aboriginal heritage sites, conservation areas/reserves and private properties superimposed onto an aerial image. Features at or in the Brokenback Conservation Area, Grinding Groove Conservation Areas, Mona Creek Rock Shelters and Talbragar Fish Fossil Reserve are subject to subsidence performances measures of PA 08_0184.

3.1 Surface Features

The major topographic feature above the areas mined during 2024 is the ridge of the Great Dividing Range located over Longwall 7 at UW and Longwall 31 at UUG. Longwall panels were mined on both sides of the Great Divide during 2024. To the east of the Great Divide, tributaries of Curra, Bobadeen and Ulan Creeks flow into the Goulburn River and east into the Hunter River. To the west, tributaries of Mona, Brokenback and Cockabutta Creeks flow into the Talbragar River and southwest into the Murray-Darling Rivers catchment. Drainage lines above the longwall areas mined in 2024 are first order streams. These tributaries are all ephemeral in nature.

The landform above areas mined by Longwalls 7 and 8A at UW are dominated by the outcrop of Triassic Sandstone strata. In the north, over Longwall 8A, the landform is gently sloping with a drainage line of Mona Creek without any substantial sandstone outcrops. In the central and southern parts, the terrain is steeper with a drainage line of Brokenback Creek formed between sandstone outcrop formations. In the south of Longwall 7, the terrain is steeper with a drainage line of Ulan Creek between sandstone outcrop formations.

Over the area mined by Longwall 31 at UUG, the overburden depth is greater, and the landform is influenced by the outcrop of Jurassic strata leading to gently undulating terrain without substantial outcrop formations. A drainage line of Mona Creek is located above the section of Longwall 31 mined during 2024.

The sandstone outcrop formations at the southern ends of Longwall 7 and Longwall 8A associated with valleys of tributaries of the Ulan and Brokenback Creeks host a variety of Aboriginal heritage sites.

The UCCO Project Approval defines continuous outcrop formations with a height greater than 10 m and a slope greater than 66°, as a cliff. Steep slopes are defined as an area of land having a natural gradient of between 33° and 66°. Sandstone formations above or in the vicinity of the areas mined by Longwalls 7 and 8A at UW during 2024 are typically less than 7 m high and classified as steep slopes. There are no cliffs above or in the vicinity of the areas mined by longwalls at UW and UUG during 2024.

As shown on Figure 2, the majority of surface above the southern section of Longwall 7 at UW mined during 2024 is undeveloped bushland. A smaller part is cleared or semi-cleared. This land is owned by UCM or Crown Land leased by UCM.

The northern section of the area mined by Longwall 8A at UW during 2024 is cleared or semi-cleared land suitable for grazing. This land is owned by UCM and part of a private property known as Farris Hill. The southern part of land over Longwall 8A is undeveloped bushland on the Farris Hill property.

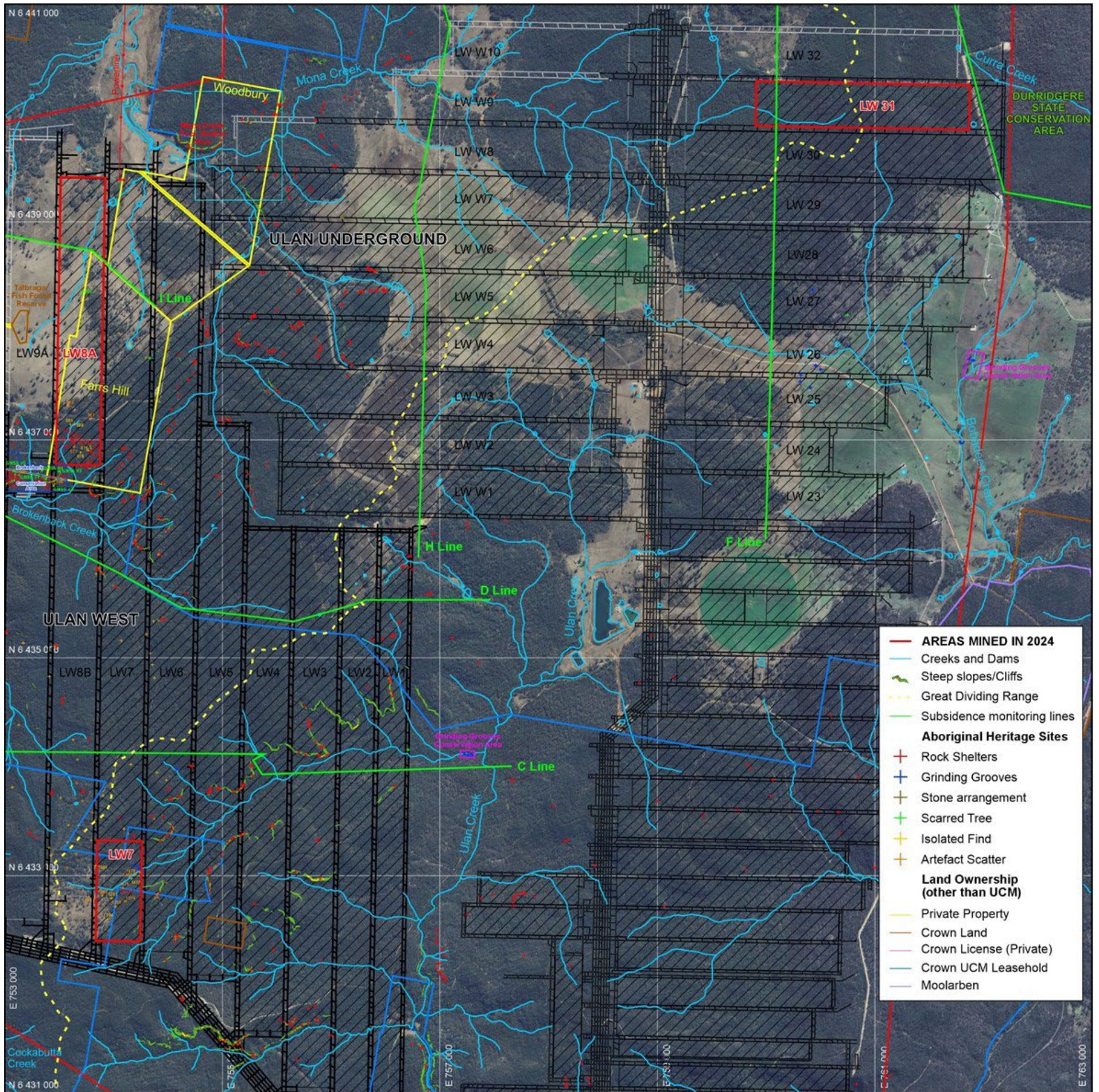


Figure 2: Site plan with surface features and land ownership.

The surface above the section of Longwall 31 at UUG mined during 2024 is undeveloped bushland owned by UCM. This area is adjacent to the Durridgere State Conservation Area (DSCA).

Features at or in the Brokenback Conservation Area, Grinding Groove Conservation Areas, Mona Creek Rock Shelters and Talbragar Fish Fossil Reserve are either protected from subsidence impacts and environmental consequences by barriers of coal or remote from areas of longwall mining during 2024.

Mining related infrastructure, built features and farm infrastructure owned by UCM above or in the vicinity of areas mined during 2024 by Longwalls 7 and 8A at UW and Longwall 31 at UUG include:

- An infrastructure corridor above the eastern end of Longwall 31 along the western boundary of the DSCA for mine water management equipment, and associated services.
- Overhead powerline and access road/four-wheel-drive track in easement over the chain pillars along the northern edge of Longwall 31 supplying the mine infrastructure in the DSCA.
- Farm infrastructure including, dams, access roads/four-wheel drive tracks, fences and gates.

Privately owned built features include farm infrastructure on the Farris Hill property such as a dam, fencing/gates along the northern boundary with the Woodbury private property and internal fencing/gates, access roads/four-wheel-drive tracks and mobile sawmill equipment.

There are no public utilities and amenities above or in the vicinity of areas mined during 2024 by Longwalls 7 and 8A at UW and Longwall 31 at UUG.

The natural and built features including heritage sites considered sensitive to subsidence movements, above the areas mined by longwalls at both mines during 2024 are detailed in the following sections.

3.1.1 Surface Features Above Areas Mined At UW

The southern section of Longwall 7 mined below approximately 37.9 ha of land owned by UCM or Crown Land leased by UCM. The land owned by UCM is 22.2 ha 58.6 % of this total area. The Crown Land leased by UCM is 15.7 ha 41.4 % of the total area.

Features on these parcels of Crown Land and UCM land are generally listed from north to south include:

- Undeveloped bushland.
- Sandstone outcrops forming steeper ground.
- A first order tributary of Ulan Creek.
- Semi-cleared and cleared land.
- A localised topographic high point.

- Undeveloped bushland.
- Sandstone outcrops forming steeper ground.
- Aboriginal Heritage sites, including isolated finds, artefact scatters, grinding grooves and a rock shelter. Only the grinding grooves site in Ulan Creek and the rock shelter site are considered sensitive to the expected subsidence movements.
- Minor farm infrastructure such as a dam, access roads/four-wheel-drive tracks, fences and gates.

Longwall 8A mined below approximately 108.6 ha of land owned by UCM or the private property known as Farris Hill. The land owned by UCM is 27.5 ha or 25.3 % of this total area. The part of Farris Hill is 81.1 ha or 74.7 % of the total area mined under by Longwall 8A during 2024.

Features on these parcels of land are generally listed from north to south include:

On land owned by UCM -

- Cleared undulating grazing land with remnant paddock trees.
- Minor farm infrastructure including water tanks and sheds.
- A first order tributary of Mona Creek.
- Other minor infrastructure such as access roads/four-wheel-drive tracks, fences and gates.

On the Farris Hill private property –

- Minor infrastructure such as access roads/four-wheel drive tracks, boundary fences and gates.
- A farm dam on the first order tributary of Mona Creek.
- Cleared undulating grazing land with remnant paddock trees.
- Internal fencing and gates.
- A localised topographic high point.
- Access roads/four-wheel-drive tracks.
- Undeveloped bushland.
- Mobile sawmill equipment.
- A first order tributary of Brokenback Creek.
- Sandstone outcrops forming steeper ground.
- Aboriginal Heritage sites, including a scar tree, isolated finds, artefact scatters and several rock shelters. Only the scar tree in open terrain and the rock shelter sites are considered sensitive to the expected subsidence movements.

3.1.2 Surface Features Above Area Mined At UUG

The central part of Longwall 31 mined below approximately 80.7 ha of undeveloped bushland owned by UCM. Features within this area listed from generally east to west include:

- The ridge line of the Great Dividing Range.
- A first order tributary of Mona Creek.
- Access roads/four-wheel-drive tracks, fences and gates.

A farm dam is located on land owned by UCM over Longwall 31 immediately adjacent to the section of Longwall 31 mined in 2024.

There are no substantial sandstone outcrop formations or Aboriginal heritage sites recorded above or in the vicinity of the area mined by Longwall 31 during 2024.

There is no mining related infrastructure owned by UCM directly above the area mined by Longwall 31 during 2024. However, there are UCM owned access roads, powerlines and water pipelines in the corridors are immediately to the east and north of the area mined by Longwall 31.

3.2 Approvals Context and Subsidence Forecasting

UW and UUG both operate under modified approval for the Ulan Coal - Continued Operations (UCCO) Project 08_0184, originally approved in November 2010. Since 2010, modifications have been granted to the UCCO Project Approval to facilitate changes to the mining plan geometries at both UUG and UW (MOD1, MOD2, MOD3 and MOD4) and for other operational requirements (MOD2) at the UC. MOD5 was a minor variation to rectify an administration error to clarify the southern extent of Longwall 8 at UW and MOD7 to provide for an alternative biodiversity offset site. MOD6, proposing extensions to longwall panels into adjacent exploration licence areas at both UUG and UW, is yet to be determined.

SCT (2009) presented subsidence predictions to inform the original UCCO Project Environmental Assessment (EA). SCT (2009) was prepared after the mining of Longwall W1 and Longwall 23 at UUG and before the secondary extraction of longwall panels commenced at UW.

In addition to the forecast of subsidence effects and assessment of impacts for the subsequent modifications to the UCCO Project Approval, SCT has provided updated forecasts and assessments for the former Subsidence Management Plans (SMPs) and/or EPs at each mine. The most recent updates include:

- SCT (2021) for Longwalls 7 and 8 at UW to support the preparation of the EP for Longwalls LW1 to LW8. The EP including Longwalls 7 and 8 was approved in July 2022.
- SCT (2022) for Longwalls 31 and 32 at UUG to support the preparation of and application for a consolidated EP for Longwalls LW30-32 and LWW6-LWW8. The EP including Longwalls 31 and 32 was approved in September 2023.

3.3 Mining Geometry and Timing

At UW, the retreating longwall faces mine from north to south. At UUG, the retreating longwall faces mine from west to east in the western domain, and from east to west in the eastern domain where Longwall 31 is located.

The longwall faces at both mines cut a block of coal 400 m wide. The voids created by the secondary extraction of the longwall blocks are slightly different in width due to the roadways at each end of the coal face being of a slightly different width. Roadways are nominally 5.4 m wide at UW and 5.2 m wide at UUG. This results in a nominal extracted longwall void width of 410.8 m at UW and a nominal longwall void width of 410.4 m at UUG.

Figure 3 shows the overburden depth to the Ulan Seam with the locations of sandstone outcrops forming steep slopes and cliffs, surface watercourses and dams, and Aboriginal heritage sites, of a type considered sensitive to impacts from subsidence movements, positioned relative to the longwall panels at both mines.

The Ulan Seam at the UC dips gently to the northeast so most of the variation in overburden depth at each mine is a result of surface topography.

At UW, the overburden depth to the mining horizon in the Ulan Seam ranges 150-195 m over the section of Longwall 7 mined during 2024. The depth varies from 195 m in the north to 155 m below the tributary of Ulan Creek and up 180 m at a topographic high point before reducing to 150 m approaching another tributary of Ulan Creek beyond the finish line of the Longwall 7 panel in the south. The overburden depth for the section of Longwall 8A mined during 2024 ranges 175-225 m. The depth varies from 175 m at the start line in the north of Longwall 8A and increases to 225 m below a topographic high point near the southern end of this panel before reducing to 175 m in the steeper ground forming the sides of the Brokenback Valley.

At UUG, overburden depth to the mining horizon ranges 295-335 m over the section of Longwall 31 mined during 2024. The depth varies from 320 m at the start of the 2024 increasing to 335 m below the ridgeline of the Great Divide and then reduces to 295 m at the end of 2024.

For UW, the thickness of the mining section at the base of the seam, known as the D working section (DWS), ranged 3.1-3.3 m in the section of Longwall 7 and 3.0-3.2 m in the section of Longwall 8A mined during 2024.

At UUG, the DWS ranged 3.0-3.2 m in the section of Longwall 31 mined during 2024.

During the 2024 calendar year:

- UW mined the southern part of Longwall 7 from CH921 m to the finish line at CH0 m and from the start of Longwall 8A at CH6588 m to CH3958 m. The longwalls at UW mined a total distance of 3,551 m, 921 m in Longwall 7 and 2,630 m in Longwall 8A.
- Longwall 7 finished in March 2024, Longwall 8A started in May 2024 and finished at CH3953 m on 7 January 2025.
- UUG mined, the central part of Longwall 31 a distance of 1965 m from CH2605 m to CH640 m.

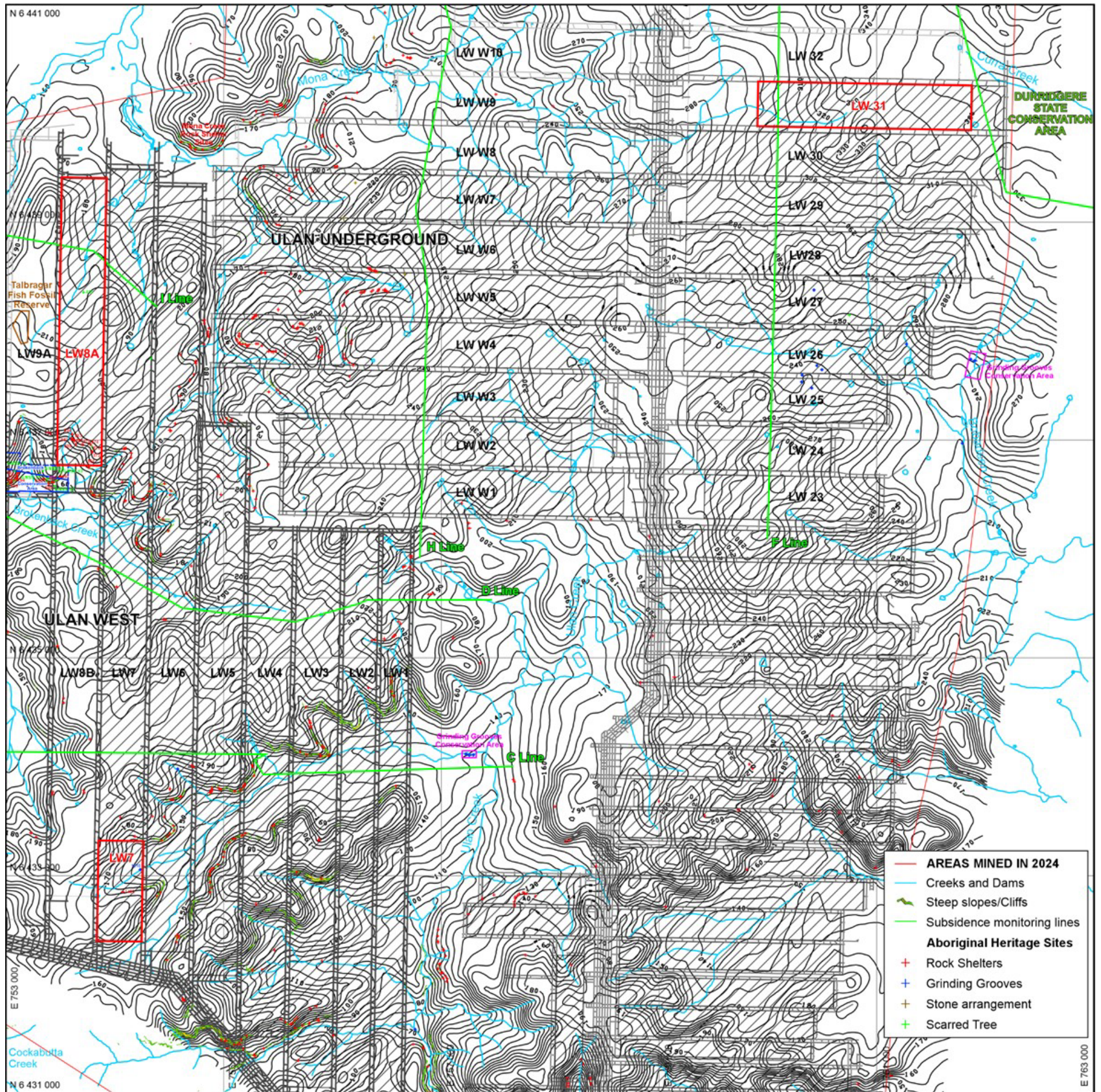


Figure 3: Site plan with areas mined in 2024, subsidence monitoring lines and overburden depth.

4. SUBSIDENCE EFFECTS MONITORING

This section presents the subsidence movements measured during 2024 on I, D and C Lines at UW above the areas mined by longwalls during 2023 and 2024. Details of the survey measurements and calculation of primary and secondary subsidence effects parameters on these monitoring lines are discussed.

Only I Line was mined under (by Longwall 8A) during 2024, D and C Lines were mined under during 2023, and surveys of these lines were undertaken during 2024 to satisfy the Longwall 7 end of panel requirements.

Longwall 31 at UUG mined below F Line but the survey, required by the subsidence monitoring program (SMP) of the EP for Longwall 31, is not expected to be completed until after mining in Longwall 31 is finished later in 2025.

All points on subsidence lines were measured in three dimensions (3D) using the survey control provided from Permanent Marks (PM) or State Survey Marks (SSM) and GNSS (GPS) stations.

In recent years both mines have changed coordinate systems from the GDA 94 – MGA 55 ('MGA94') to GDA 2020 – MGA 55 ('MGA2020'). This involved transformation of the latest surveys and resurveys with adjustments to the XYZ (North, East, Height-Reduced Level) values for subsidence pegs. At UUG, this was relatively consistent with the differences in X, Y and height between MGA94 and MGA2020 on H and F Lines. At UW however, the 2023 surveys for D and C Lines have adjusted X and Y values but the same RL as the MGA94 RL. The 2024 surveys of D and C Lines now have adjusted RL values making comparisons with previous subsidence effects from historical surveys difficult.

Subsidence monitoring at UW includes GNSS monitoring units installed at the eastern end of BBKA to monitor subsidence effects and to manage subsidence impacts and environmental consequences at significant surface features within the BBKA. The GNSS units provide continuous, near-real-time measurements of changes in the easting, northing, and height at strategic points.

In addition to the GNSS units, continuous, high-resolution measurement of geological structures (bedding planes and natural joints/fractures) and stress change monitoring within the rockmass with automated reporting systems have been installed at the sandstone outcrop formation in the eastern part of the BBKA.

Inspections of the surface by SCT along the monitoring lines and other monitoring installations were conducted on 2 January 2025 in conjunction with site inspections for subsidence impacts and environmental consequences to natural and built features.

4.1 D Line at UW

D Line crosses the northern ends of Longwalls 1-4 before crossing Longwalls 5-8 in the Brokenback Valley. D Line crosses obliquely over the central part of Longwall 7 and northern part of Longwall 8B and extends for approximately 800 m to the west to above Longwall 10B.

Figure 4 shows the terrain typical of the surface along D Line over Longwall 7.



Figure 4: The terrain typical of the surface along D Line over Longwall 7.

The end of panel survey of D Line for Longwall 7 required by the subsidence monitoring program (SMP) for Longwalls 1 to 8, was conducted on 3 May 2024 after extraction of Longwall 7 finished on 21 March 2024.

The section of D Line above Longwall 7 was previously surveyed on 11 and 14 July 2023 when the Longwall 7 face line was below the eastern (southern) side of D Line and when the face line had mined 46 m (~ 0.3 times depth) past the eastern side of D Line.

The overburden depth to the mining horizon in the Ulan Seam has decreased along D Line from 215 m over Longwall 1 to 165 m at the western edge of Longwall 7. The average overburden depth along D Line above Longwall 7 is approximately 165 m. UW advise that the longwall mining height of Longwall 7 below D Line was 3.0 m.

Figure 5 shows a summary of the subsidence movements measured on D Line from the mining of Longwalls 1-7 at UW during 2024. The subsidence behaviour observed along D Line is consistent with expectation and less than the maximum forecast. The development of the patterns of vertical and horizontal movements shown are consistent with the alignment of D Line relative to the longwall face line and timing of surveys.

Additional vertical subsidence of 120 mm was measured over Longwall 7, between the 14 July 2023 and 3 May 2024 surveys, consistent with expectations.

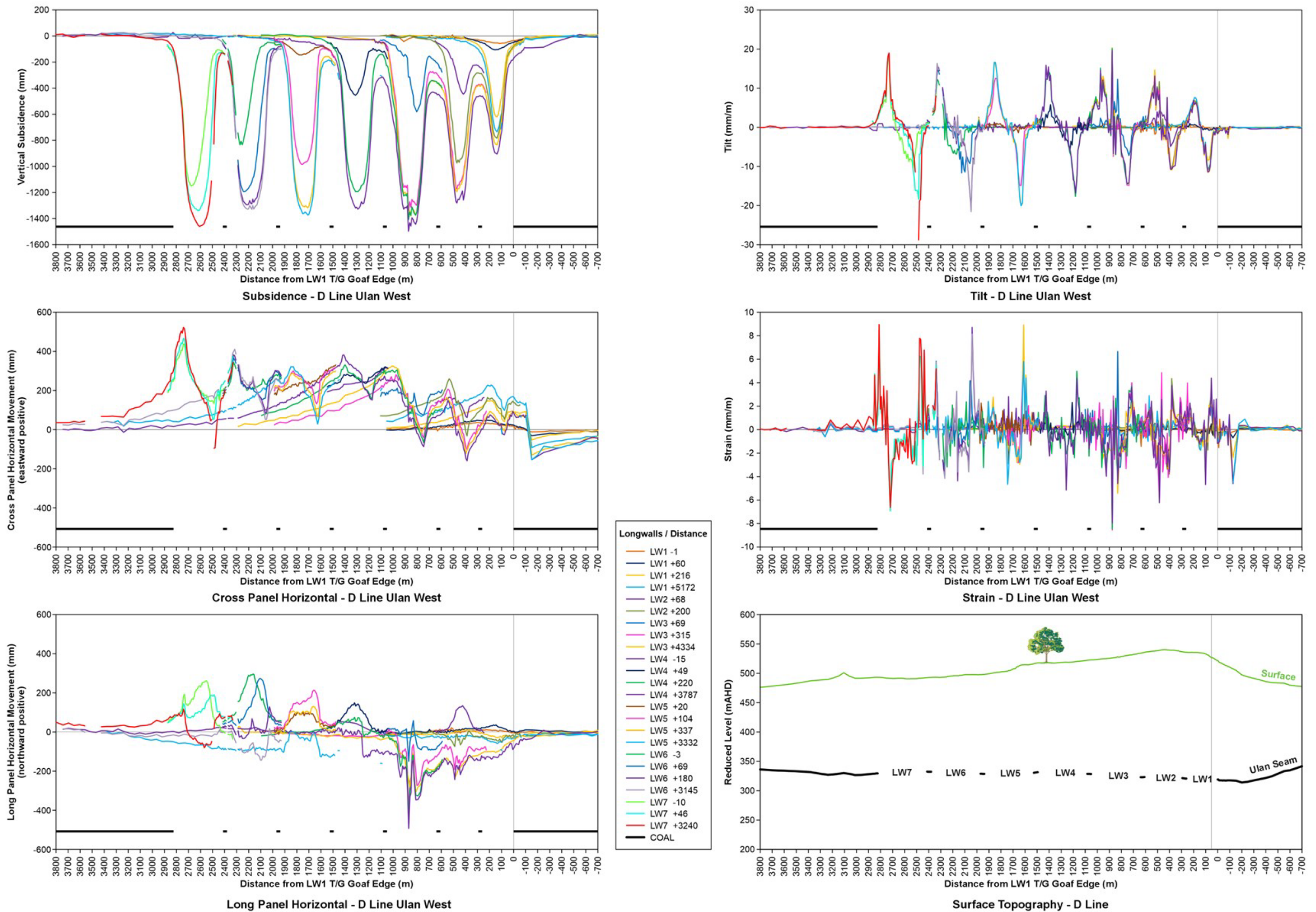


Figure 5: Subsidence summary of the main parameters of subsidence from the monitoring on D Line over Longwall 7 during 2024.

The end of panel values for primary subsidence parameters above Longwall 7, are vertical subsidence of 1.46 m, tilt of 29 mm/m, compressive strain of 7 mm/m, and tensile strain of 9 mm/m. These primary subsidence effects are less than the minimum values of 1.7 m for vertical subsidence, 45 mm/m for tilt, 25 mm/m for compressive strain, and 20 mm/m for tensile strain forecast in SCT (2021) for the Longwalls 7-8 EP.

Secondary subsidence parameters for Longwall 7, including horizontal movements, goaf edge subsidence and chain pillar subsidence are currently consistent with the range of values previously observed over previous longwall panels and less than the estimates provided as a guide in SCT (2021).

Maximum horizontal movement over the goaf is approximately 530 mm. Cross panel movements at the goaf edge are approximately 300 mm. These movements are both less than the estimate of up to 600 mm.

Goaf edge subsidence is approximately 120 mm. This value is similar to the range measured for previous panels and less than the estimate of 150-250 mm.

Vertical subsidence above the Longwall 6-7 chain pillar is approximately 140 mm. This value is similar to the 100-190 mm for the chain pillars between Longwalls 4-5-6 and less than the estimates of 300-500 mm.

The angle of draw (to 20 mm of vertical subsidence) on the western side of Longwall 7 is estimated as 47°. This value is slightly greater or similar to the angle estimated for previous panels recognising these estimates are sensitive to survey tolerance and peg spacing. This angle of 47° is within the 40-55° range provided in SCT (2021).

4.2 C Line at UW

C Line traverses Longwalls 1-4 near the centre of the panel length. The line follows a valley, alongside a tributary of Ulan Creek, and then is offset 180 m to the north above Longwall 4 to negotiate steeper terrain between sandstone outcrop formations. The two sections of the line overlap. C Line then crosses Longwalls 5-7 in the southern section of these panels.

Figure 6 shows the surface terrain typical along C Line in the vicinity of Longwall 7 at UW.

The end of panel survey of C Line for Longwall 7 required by the subsidence monitoring program (SMP) for Longwalls 1 to 8, was conducted on 9 May 2024 after extraction of Longwall 7 finished on 21 March 2024.

The section of C Line above Longwall 7 was previously surveyed on 1 and 3 November 2023 when the Longwall 7 face line was below C Line and when the face line had mined 61 m (~0.3 times depth) past C Line.

The overburden depth to the mining horizon in the Ulan Seam has decreased along D Line from 215 m over Longwall 1 to 165 m at the western edge of Longwall 7. The average overburden depth along D Line above Longwall 7 is approximately 165 m. UW advise that the longwall mining height of Longwall 7 below D Line was 3.0 m.



Figure 6: Surface terrain typical along C Line in the vicinity of Longwall 7 at Ulan West.

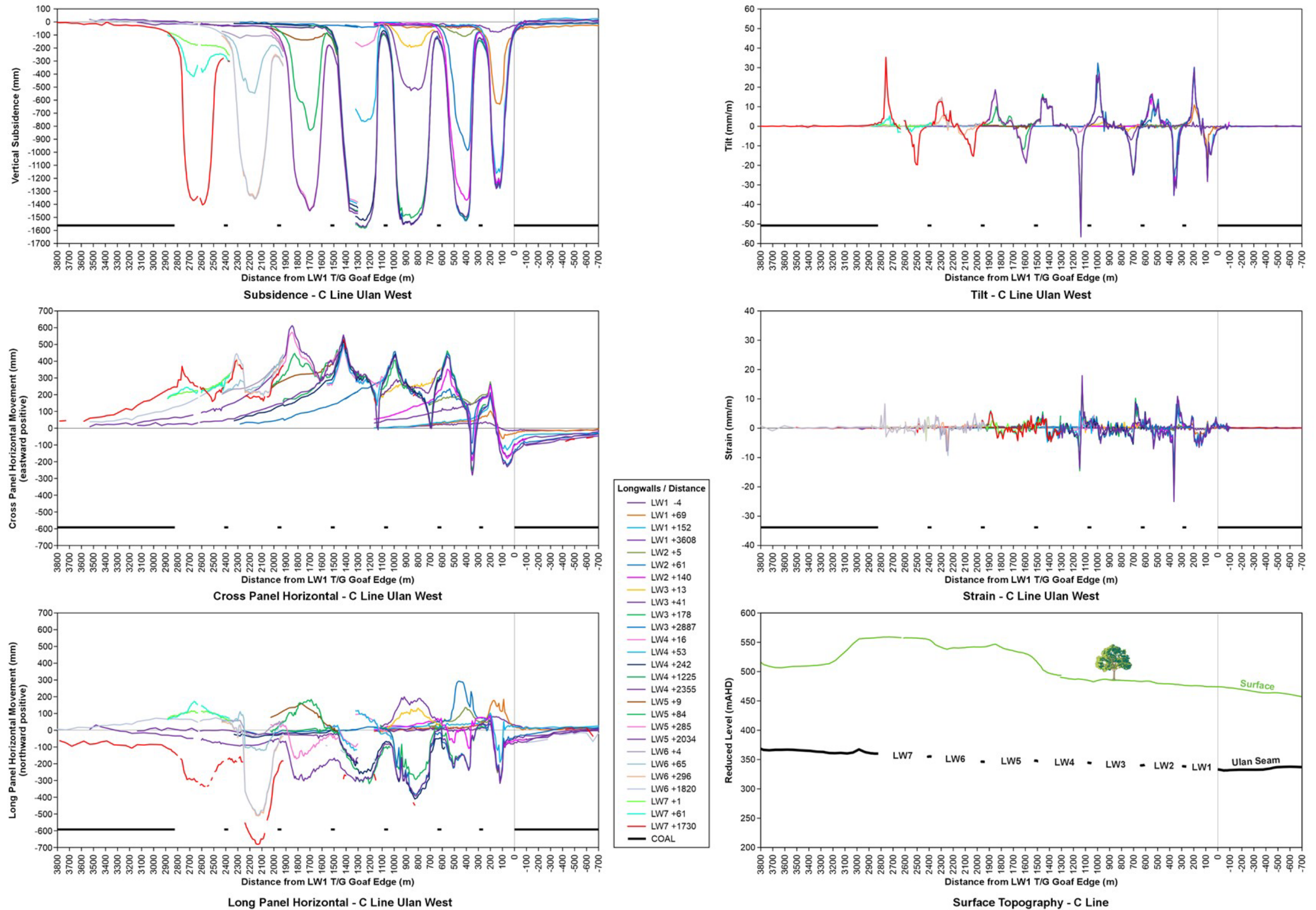
The overburden depth to the mining horizon in the Ulan Seam along C Line is typically 140 m above Longwalls 1-4 but increases to 170 m over the western edge of Longwall 4 and increases to 200 m at the western edge of Longwalls 5 and 6.

The overburden depth along the section of C Line over Longwall 7 is 200 m. C Line crosses Longwall 7 at CH1730 m. UW advise that the longwall mining height below C Line was 3.0 m.

Figure 7 shows a summary of the subsidence movements measured on C Line following the mining of Longwalls 1-7 at UW.

Substantial subsidence occurred over Longwall 7, between the 3 November 2023 and 9 May 2024 surveys, consistent with expectations.

The end of panel values for primary subsidence parameters above Longwall 7, are vertical subsidence of 1.4 m, tilt of 35 mm/m, compressive strain of 4 mm/m, and tensile strain of 8 mm/m. These primary subsidence effects are less than the minimum values of 1.7 m for vertical subsidence, 45 mm/m for tilt, 25 mm/m for compressive strain, and 20 mm/m for tensile strain forecast in SCT (2021) for the Longwalls 7-8 EP.



Secondary subsidence parameters for Longwall 7, including horizontal movements, goaf edge subsidence and chain pillar subsidence are currently consistent with the range of values previously observed over previous longwall panels and less than the estimates provided as a guide in SCT (2021).

Maximum horizontal movement over the goaf is approximately 410 mm. Cross panel movements at the goaf edge are approximately 250 mm. These movements are both less than the estimate of up to 600 mm.

Goaf edge subsidence is approximately 130 mm. This value is similar to the range measured for previous panels and less than the estimate of 150-250 mm.

Vertical subsidence above the Longwall 6-7 chain pillar is estimated as approximately 270 mm. This value is the same as the 270 mm for the chain pillars between Longwalls 4-5 at similar overburden depth and less than the estimates of 300-500 mm.

The angle of draw (to 20 mm of vertical subsidence) on the western side of Longwall 7 is estimated as 38° after consideration of survey tolerance. This value is similar to the angle estimated for previous panels at similar overburden depths recognising these estimates are sensitive to survey tolerance and peg spacing. This angle of 38° is less than the 40-55° range provided in SCT (2021).

4.3 I Line at UW

Prior to the mining in Longwall 7, UCM installed a new subsidence monitoring line (I Line) along the northern boundary fence line of the Farris Hill property to measure subsidence effects on the private properties in the north of UW.

I Line starts above the eastern side of Longwall 7 on the Woodbury property running to the west along the boundary line between the Woodbury and Farris Hill properties. In this position, the line runs in close proximity to the Woodbury residential homestead and outbuildings. The line then continues onto UCM land adjacent to the Farris Hill property and extends to the west on property owned by UCM along the common Farris Hill/UCM boundary fence line over Longwalls 8A and 9A. I Line is oblique to the longwall mining direction.

This conventional subsidence monitoring line is expected to provide an indication of the quantum of subsidence movements likely to have occurred over the Woodbury and Farris Hill private properties.

I Line was installed after the mining of Longwall 6, as such, far-field horizontal movements of 200-300 mm that are likely to have occurred on the surface at the eastern end of I Line from the Longwall 6 and previous longwalls are not captured in the I Line dataset. The baseline survey and subsequent surveys were undertaken using the GDA 2020 – MGA 55 ('MGA2020') coordinate system.

Figure 8 shows the terrain typical of the surface along I Line over Longwall 8A.

The overburden depth to the mining horizon in the Ulan Seam along I Line ranges from 180-185 m above Longwall 7 and 185-195 m above Longwall 8A. A longwall mining height of 3.0 m has been used by UW to calculate coal extraction tonnages for mining in the vicinity of I Line.



Figure 8: The terrain typical of the surface along I Line over Longwall 8A.

Measurements of subsidence effects on I Line have been undertaken for the mining of the northern section of Longwall 7 and Longwall 8A.

The end of panel survey of I Line for Longwall 7 required by the subsidence monitoring program (SMP) for Longwalls 1 to 8, was conducted on 11 April 2024 after extraction of Longwall 7 finished on 21 March 2025.

The section of I Line above Longwall 7 was previously surveyed twice as this longwall mined below the Woodbury and Farris Hill properties. These surveys were undertaken on 22 December 2022 and 3 January 2023 when Longwall 7 face line was below the eastern end of the line and when the face line was approximately 120 m past the eastern end of the line.

For Longwall 8A, two surveys of I Line were undertaken on 28 August 2024 and 2 September 2024 when Longwall 8A face line was below the Farris Hill property and had mined 20 m and 110 m, respectively, past the eastern end of I Line.

Maximum subsidence movements from the mining of Longwall 8A are not expected to be measured until the end of panel survey is conducted. Additional vertical subsidence of approximately 200-300 mm is expected.

The survey of I Line on 2 September 2024 indicates the current maximum values for the primary subsidence parameters were vertical subsidence of 1.2 m, tilt of 25 mm/m, compressive strain of 8 mm/m, and tensile strain of 7 mm/m over Longwall 8A.

These measurements of primary subsidence parameters are all less than the lower values of 1.7 m for vertical subsidence, 45 mm/m for tilt, 25 mm/m for compressive strain, and 20 mm/m for tensile strain forecast in SCT (2021) for the Longwalls 7-8 EP.

Figure 9 shows a summary of the subsidence movements measured on I Line during the mining of Longwall 7 and Longwall 8A at UW, to date.

Not all secondary subsidence parameters for both Longwall 7 and Longwall 8A, including horizontal movements, goaf edge subsidence and chain pillar subsidence were not able to be determined and compared to the estimates provided as a guide in SCT (2021) due to the limited extent and timing of the surveys undertaken to date. However, some secondary subsidence parameters for each panel were able to be estimated from the surveys to date.

For Longwall 7:

- Maximum horizontal movement over the goaf is approximately 390 mm.
- Cross panel movements at the goaf edge are approximately 300 mm.
- Goaf edge subsidence is approximately 120 mm.
- The angle of draw (to 20 mm of vertical subsidence) on the western side of this panel is estimated as 34°.

For Longwall 8A:

- Maximum horizontal movement over the goaf is approximately 500 mm.
- Cross panel movements at the goaf edge are approximately 300 mm.
- Goaf edge subsidence is approximately 120 mm.
- Vertical subsidence above the Longwall 7-8A chain pillar is approximately 180 mm.

These results compare with the estimates in SCT (2021) for:

- Maximum horizontal movement of up 600 mm.
- Goaf edge subsidence of 150-250 mm
- Vertical subsidence over chain pillars of 300-500 mm
- Angle of Draw of 40-55°.

4.4 GNSS Monitoring and High-Resolution Measurements in BBCA at UW

The boundary of the BBCA was determined, circa 2009, based on a 0.5 times depth (equivalent of 26.5° angle of draw) protection barrier zone around 10 significant Aboriginal heritage rock shelter sites for the proposed longwall mining plan geometry at that time. The basis for the boundary in the eastern part of the BBCA is the significant rock shelter site Ulan ID#192 located just west of the current mining plan for Longwalls 8A and 8B.

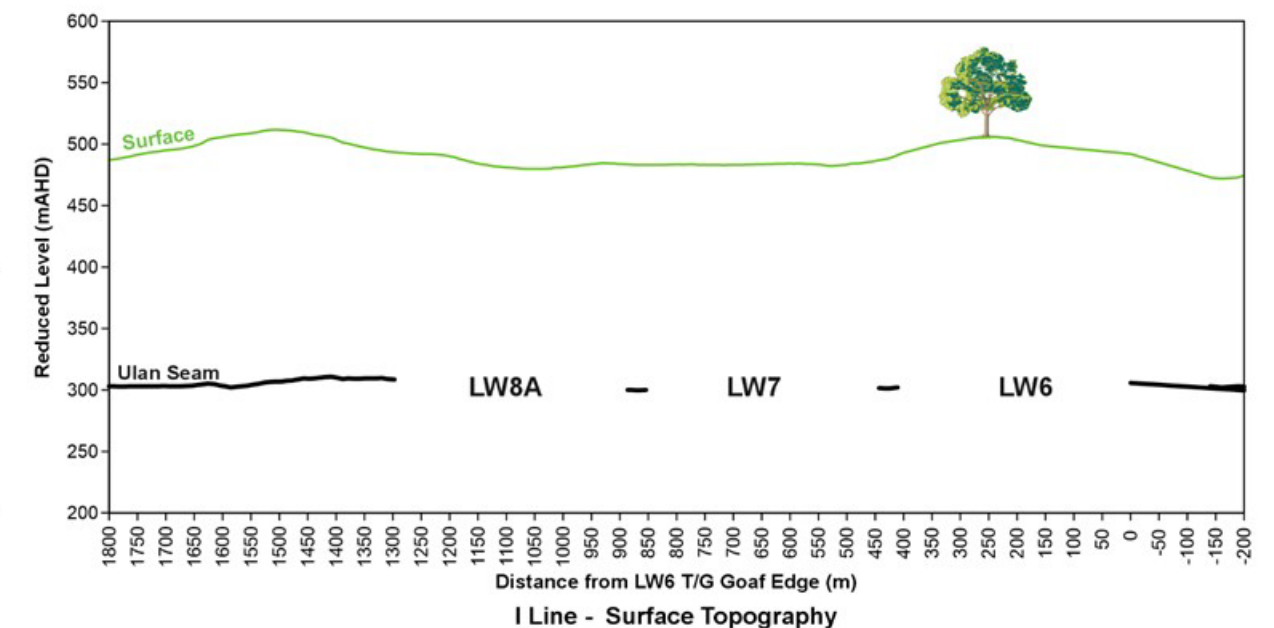
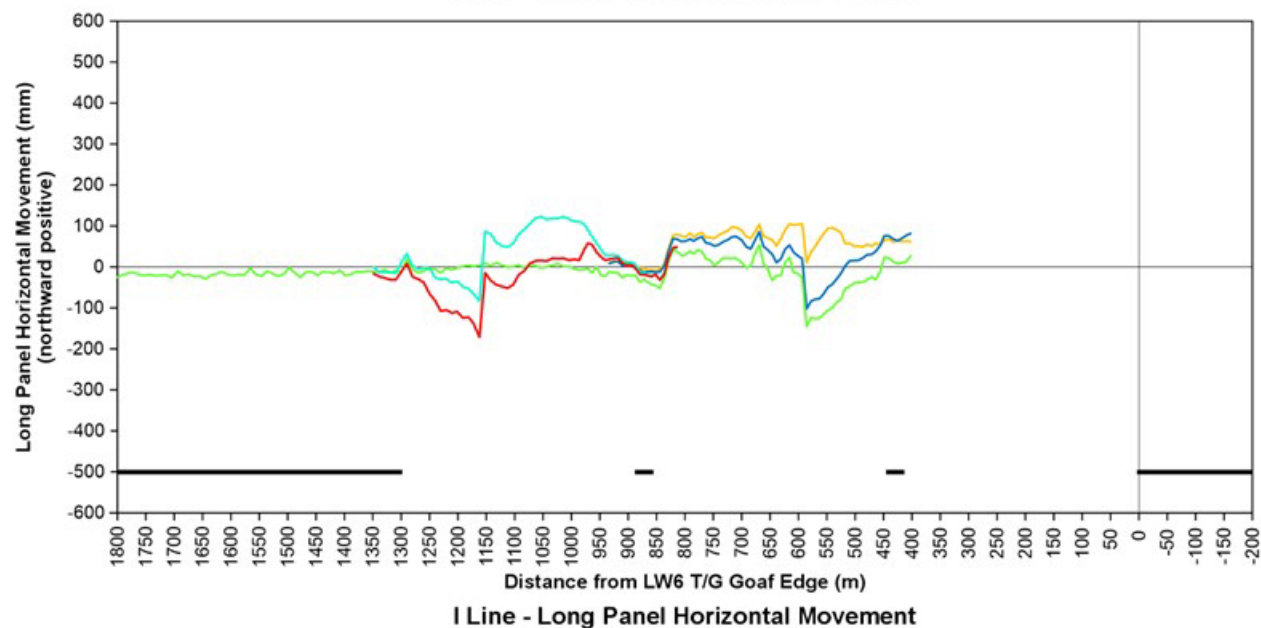
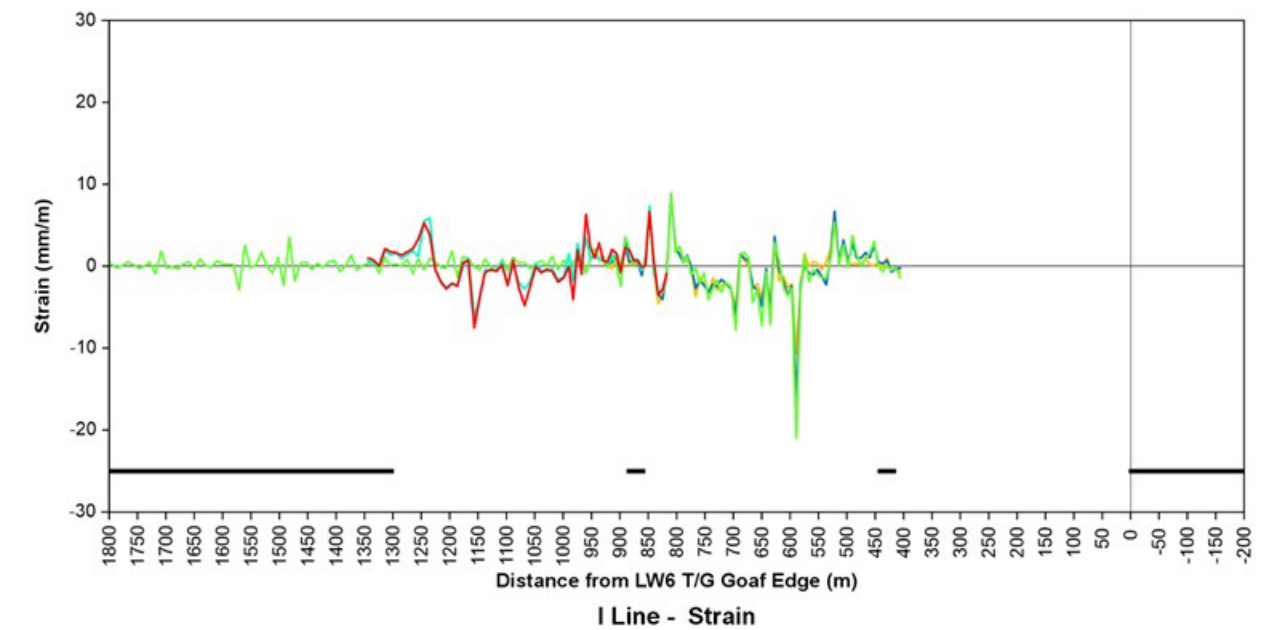
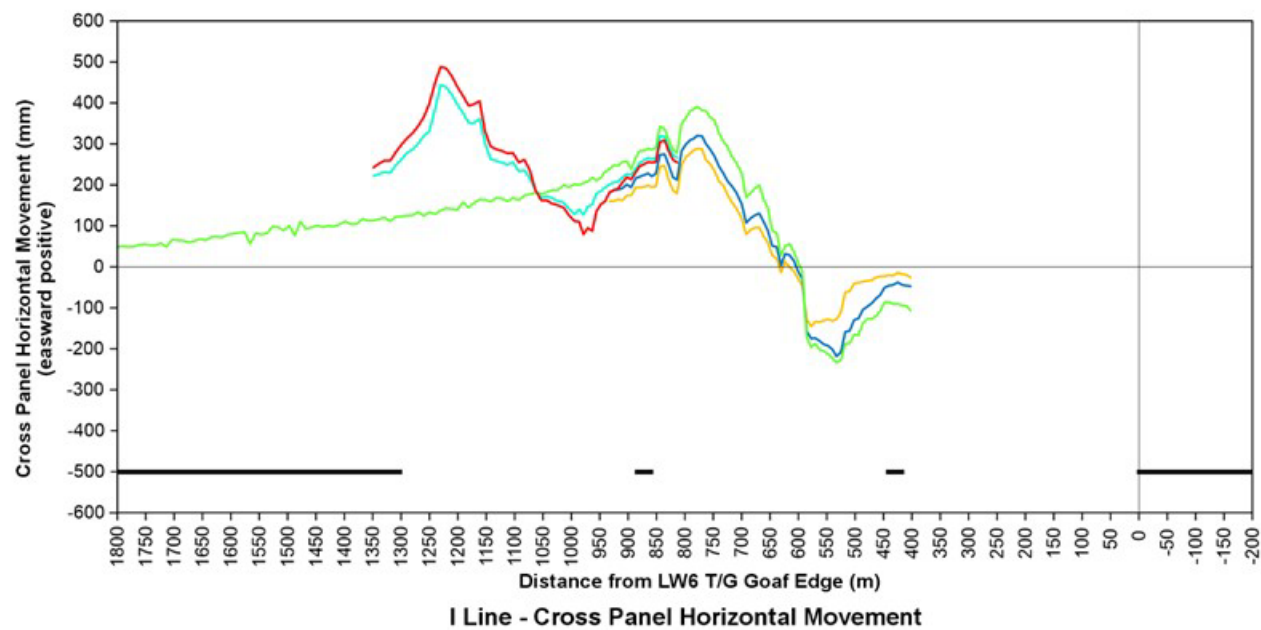
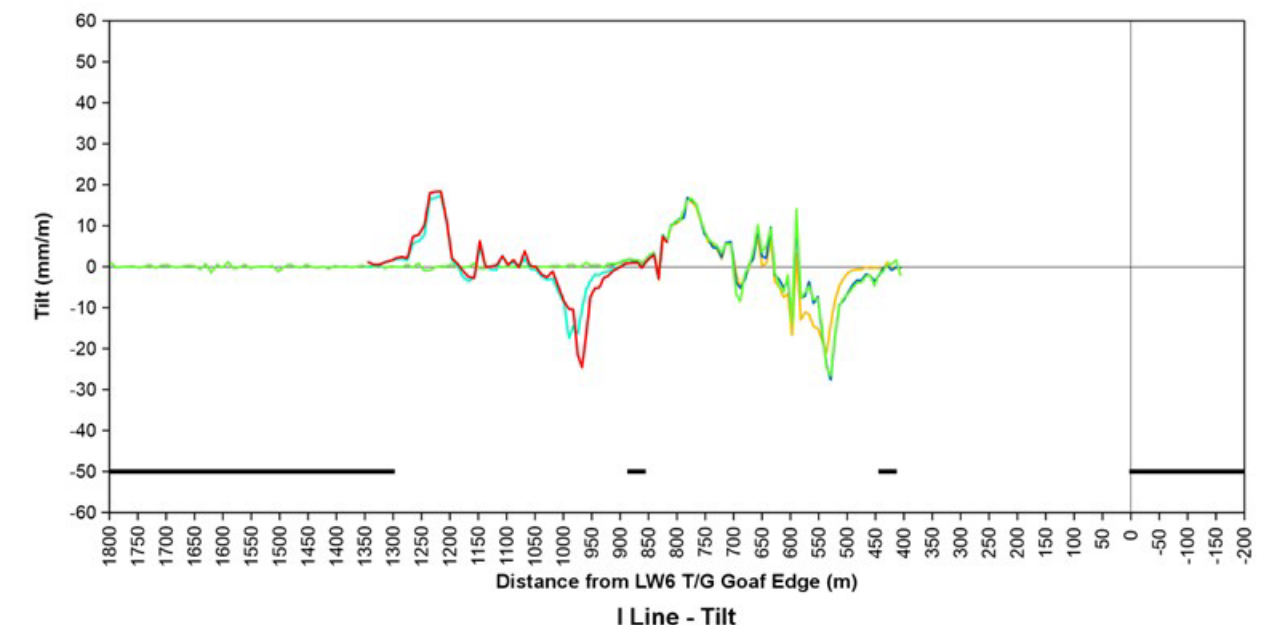
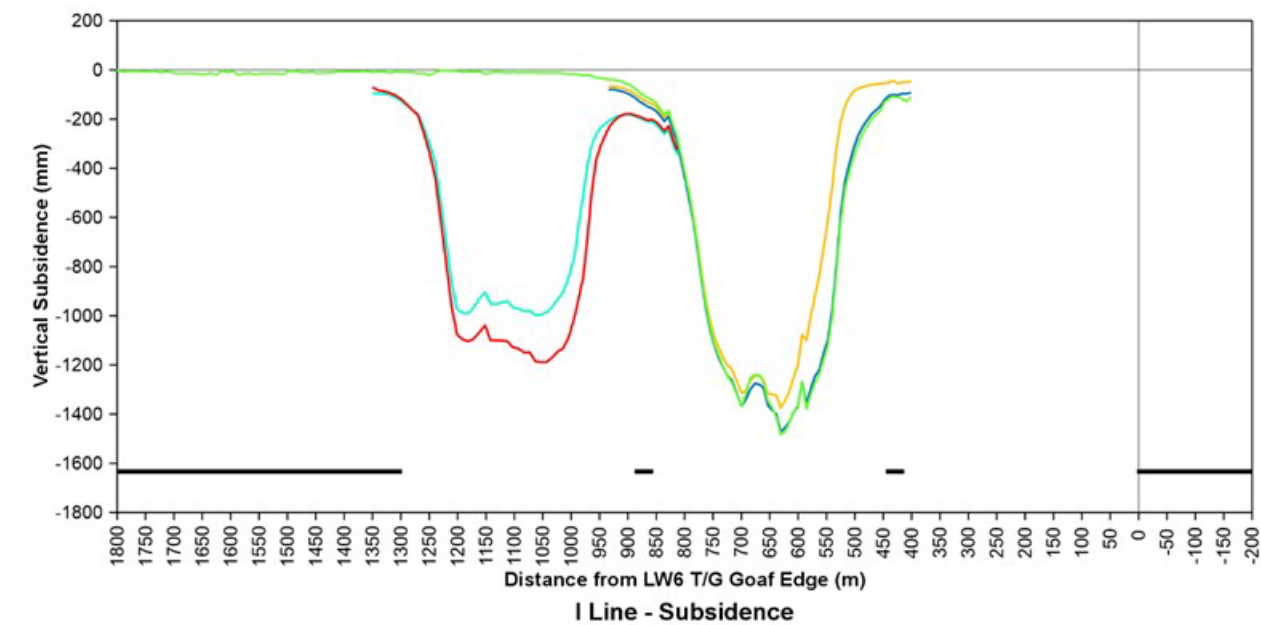


Figure 9: Summary of the subsidence movements measured on I Line for the mining of Longwall 7 and Longwall 8A during 2024.

As required by the subsidence performance measures condition of PA 08_0184, UCM are committed to protecting all Aboriginal Heritage sites and cliffs within the BBCA. As a result, UCM have amended the mining plan to reduce longwall mining adjacent to the boundary of the BBCA to provide a high level of protection to sandstone outcrop formations, in particular, cliffs and lessor outcrops that host Aboriginal heritage rock shelter sites within the BBCA.

Part of this commitment involves the installation of continuous, near-real-time GNSS unit monitoring and reporting of subsidence effects. In addition to the GNSS units, continuous, high-resolution measurement of geological structures (shear planes and natural joints/fractures) and stress change monitoring within the rock mass with automated reporting systems have been installed. The intent of these systems is to confirm to the satisfaction of the Department of Planning, Housing and Infrastructure (DPHI) that the cliffs and Aboriginal heritage sites within the BBCA are fully protected from subsidence impacts and environmental consequences and demonstrate compliance with the subsidence performance measures of PA 08_0184.

Figure 10 shows the positions of GNSS units and a stress change measurement borehole in the rock mass and high resolution measurement devices (pots) across pre-existing (pre-mining), natural joints/fractures, in proximity to the mining in Longwall 7 and Longwall 8A and more recent mining in Longwall 8B.

Monitoring systems being used to manage subsidence at the site have detected small movements consistent with expectation. These movements have however, been much less than the magnitude of movements that would be expected to cause perceptible impacts (cracks) and consequences (rock falls) to sandstone outcrop formations based on experience at Ulan and elsewhere in NSW.

For context, cracks are typically not apparent on hard surfaces at horizontal strains less than 2 mm/m and impacts related to mining subsidence are not typically observed beyond 0.4 times depth outside the goaf edge of longwall mining.

4.4.1 GNSS Monitoring

Initially, two GNSS units were installed in August 2022 to measure horizontal and vertical movements as Longwall 7 mined past the BBCA and establish a monitoring baseline for the mining of Longwall 8A and Longwall 8B. An additional six GNSS units have been installed to date for the mining in Longwall 8A and Longwall 8B and subsequent longwall panels that are divided into two parts to “step-around” the BBCA as to provide protection to the significant surface features within the BBCA.

Since becoming operational, the data from GNSS these units indicates an accuracy or tolerance of ± 5 mm.

For the mining of Longwall 7, changes in horizontal and vertical movements at GNSS#1 (BBCA01) and GNSS#2 (BBCA02) clearly showed the influence of longwall mining and far-field, stress relief movements towards the goaf void as the face line of this panel approached and passed by these two GNSS units. The horizontal movements were initially to the east-northeast towards the approaching longwall face and then turned to the east-southeast to follow in the direction of mining.

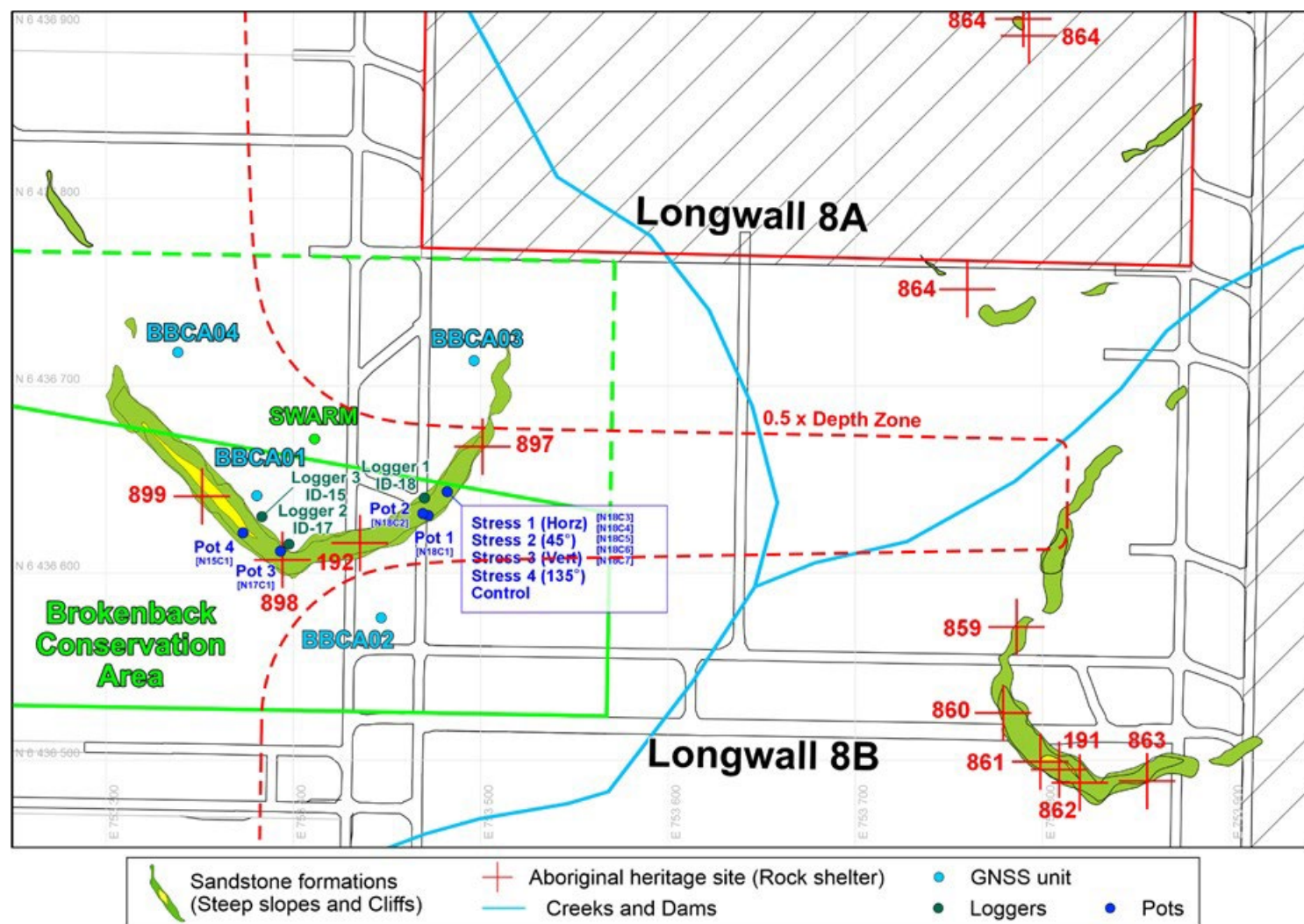


Figure 10: Positions of GNSS monitoring and high-resolution measurement units in BBCA.

Similar patterns of horizontal movements have been recorded on all GNSS units during the approach of Longwall 8A and more recently with the start-up of Longwall 8B.

GNSS monitoring systems indicate there has been less than 10 mm vertical subsidence observed on any of the GNSS units. These instruments show less than 100 mm of general horizontal movement of the ground.

GNSS monitoring indicate strains from BBKA01 to BBKA03 are less than 0.03 mm/m in a direction along the length of the sandstone outcrop.

These levels of subsidence effects are within expectation for the longwall mining geometry and subsidence management systems and strategies for impacts and consequences.

4.4.2 High-Resolution Measurements

The bespoke monitoring set-up for changes to sandstone outcrop formations includes:

- High resolution (± 0.1 mm) measuring devices across selected pre-existing natural joints/fractures and bedding planes to measure changes in openings including shear movements.
- High resolution measurements of strain across a 206 mm diameter borehole drilled in the rockface for calculation of stress change.

These measurements are supported by an atmospheric weather station and temperature monitoring for consideration of thermal variation, humidity and rainfall influences.

To the end of the reporting period measured changes were than 0.6 mm on joints and less than 0.03 mm across the monitoring borehole. These levels of subsidence effects are within expectation for impacts and consequences given the geometry of Longwall 8A at the end of the reporting period.

The low-level subsidence movements measured by the GNSS units and high-resolution instruments to date are consistent with expectation.

5. OBSERVATIONS OF SUBSIDENCE IMPACTS AND ENVIRONMENTAL CONSEQUENCES

SCT undertook a site visit on 2 January 2025 to inspect the surface above areas mined by longwalls during 2024. The inspections were undertaken in the company of UCM environmental staff. Observations made by SCT during these inspections are summarised in this section, together with reports from regular and periodic inspections by UCM environmental personnel and other environmental specialists (PE).

5.1 Surface Landform

Impacts to the surface landform are consistent with expectations and are less than the maxima forecast.

The main subsidence impact from the mining during 2024 is cracking of the ground surface.

Surface cracks and minor distortions are evident over the longwall goaf areas primarily near the panel edges. The width of these cracks varies with overburden depth, the mechanics of ground movement, topography, and characteristics of the surface materials. Crack widths, range from small cracks in sandy soil to larger cracks on hard surfaces. Slumping of surface soil into cracks and erosion effects gives the impression of larger crack widths. Small compression overrides (ripples) and small steps at some wider cracks in the shallower depth areas were also observed.

Overall, impacts from the longwall mining in 2024 are similar in nature and magnitude to those observed after 2023. Although mapping indicates the frequency of subsidence cracks recorded during 2024 appears to be generally less than in 2023.

Cracks observed in the shallower areas above the southern end of Longwall 7 and over Longwall 8A at UW are larger than those observed over the deeper areas in the central part of Longwall 31 at UUG. Cracks over Longwall 7 and Longwall 8A are typically 50–200 mm wide. A longer, wider, more continuous crack up to 300 mm wide over the eastern side of Longwall 8A on the Farris Hill property was repaired after the period of active subsidence.

Cracks over Longwall 31 are generally imperceptible except as minor features on the hard surface of the access roads/four-wheel drive tracks in the undeveloped bushland setting. These cracks are typically short in length and 10–40 mm wide.

Figure 11 shows the range of impacts with the largest cracks in the shallower areas over the southern part of Longwall 7 and over Longwall 8A and smaller cracks over the central part of Longwall 31.

Figure 12 shows a small compression override (ripple) on the Farris Hill property above Longwall 8A. Much larger and longer compression overrides have previously been observed following bedding plane outcrops across open grazing land in the western longwall domain at UUG. Similarly, much larger steps have previously been observed.

The minor compression override (ripple) observed in the DSCA over Longwall 31 during the inspection for the 2023 Annual Review was rehabilitated by UCM in April 2024.

The Talbragar Fish Fossil Reserve (TFFR) was not inspected by SCT during the site visit on 2 January 2025. However, the TFFR is remote from the mining in Longwall 8A during 2024 and no significant changes would be expected since the last inspection by PE in March 2024 when no impacts were observed recognising that the TFFR is considered a disturbed site due to previous and current archaeological excavations and ongoing cattle grazing.



Figure 11: The range of impacts with largest cracks in the shallower areas over the southern part of Longwall 7 and over Longwall 8A and smaller cracks over the central part of Longwall 31.



Figure 12: A small compression override (ripple) on the Farris Hill property above Longwall 8A.

5.2 Sandstone Outcrop Formations and Rock Shelters

All sandstone outcrop formations in PE and UCM reports are referred to as cliffs even though most are technically not cliffs using the definitions in PA 08_0184.

Subsidence impacts and environmental consequences to sandstone outcrop formations are within expectations and are less than the maxima forecast.

No substantial sandstone outcrop formations are located above the area of Longwall 31 mined at UUG during 2024.

The longer and more substantial sections of sandstone outcrop formations mined under during 2024 are located over the southern end of Longwall 7 and southern end of Longwall 8A at UW. These sandstone outcrops are classified as steep slopes. The outcrop formations over Longwall 7 are located on land owned by UCM or Crown Land leased by UCM. The outcrop formations over Longwall 8A are located on the Farris Hill private property. The outcrop formations over the southern end of Longwall 7 include one Aboriginal heritage rock shelter. The outcrop formations over the southern end of Longwall 8A host 11 Aboriginal heritage rock shelter sites.

Impacts to the sandstone outcrop formations above the southern end of Longwall 7 panel and within 0.5 times depth of the panel edge have included perceptible cracking consistent with expectations but no rockfalls. These impacts and consequences are less than the maximum forecast and less than impacts and consequences observed over previous longwalls.

Impacts to the sandstone outcrop formations above the southern end of Longwall 8A panel and within 0.5 times depth of the panel edge have included perceptible cracking and rockfalls consistent with expectations but these impacts and consequences are less than the maximum forecast and less than impacts and consequences observed over previous longwalls.

Impacts and consequences were recorded at some sandstone outcrops adjacent to Aboriginal heritage rock shelter sites while other outcrops have remained unaffected.

Figure 13 shows examples of impacts to sandstone outcrop formations above the southern part of Longwall 7 mined in 2024.

Figure 14 shows a rock fall at a sandstone outcrop formation above the area of mining in Longwall 8A during 2024. The rockfall shown is adjacent to the Ulan ID#874 rock shelter site over the southern end of Longwall 8A.

PE (2025a) reports on the 2024 annual quantitative surveys of impacts to cliff lines above Longwalls 1-7 at UW to determine the length of cliff lines subject to subsidence impacts (qualitatively noted as perceptible cracking) and environmental consequences (rock falls) at the time of surveys in February and April 2024. Impacts and consequences to sandstone outcrop formations, including rock shelter sites, over Longwall 8A are not included in PE (2025a).

PE (2025a) also includes:

- A record of inspections of sandstone outcrop formations and Aboriginal heritage rock shelter sites in the BBKA during August and October 2024.
- Impacts and consequences recorded by UCM personnel for Longwall W4 and Longwall W7 at UUG as a cumulative assessment of total impacts and consequences to sandstone outcrop formations at the UC.

The PE (2025a) report focuses on the sandstone outcrop formations above the area mined by Longwall 7 at UW (monitoring sites referred to as the CL 1000 and C9 series cliff line sites – C9-10, C9-11, C9-12 and C9-13). There are no Aboriginal heritage sites associated with these outcrop formations required to be monitored.

Five locations along these outcrops above the eastern side of Longwall 7 were monitored by PE.

The quantitative assessment of rock fall and cliff line lengths contained in PE (2025a) indicates 7.3 % of the length of cliff lines above or adjacent to the areas mined by Longwalls 1-7 at UW have experienced rock falls. PE (2025a) reports no change to impacts to cliff lines over Longwalls W4 and W7 at UUG and the rockfalls remain at 4.3% of the length of cliff lines mined under in these two longwall panels at UUG.



Figure 13: The range of impacts to sandstone outcrop formations above the southern part of Longwall 7 mined in 2024.



Figure 14: Rock fall at a sandstone outcrop formation above the Longwall 8A during 2024.

PE (2025a) calculates the percentage for total cumulative rockfalls on the cliff lines monitored at the UC above Longwalls 1-7 at UW and Longwalls W4 and W7 at UUG to date as 7.0 %.

PE (2025a) indicates there were no rock falls on monitored sandstone outcrops formations over the south end of Longwall 7 mined under during 2024.

All these percentages for rock falls are less than the up to 20 % forecast in SCT (2021 and SCT (2016, 2019 and 2022) for this type of impact.

PE (2025a) also includes details that allows for a general qualitative assessment of impacts to locations above or adjacent to the southern section of Longwall 7 mined during 2024, to be made. Of the five cliff locations assessed, two had perceptible cracking but no rockfalls and there was no perceptible cracking or rockfalls at the other three locations. This indicates that 40 % of the monitored locations were impacted. This level of impact is less than the forecast of, on average, perceptible impacts to 50–70 % of the length of sandstone outcrop formations above or within 0.4 depth of longwall panels experiencing impacts.

No perceptible subsidence impacts were observed in the BBCA at any of the sandstone cliff formations and Aboriginal heritage rock shelter sites during inspections by PE in August and October 2024 and by SCT in January 2025. Significant features within the BBCA are protected from subsidence impacts by a barrier of coal, a minimum of 0.5 times depth (equal to 26.5° angle of draw) that excludes longwall mining. No

perceptible impacts from longwall mining were expected to features within the BBCE during 2024 and none were observed.

Although sandstone outcrop formations over Longwall 8A are not required to be monitored and no assessment is included in PE (2025a), a rockfall was recorded on a sandstone outcrop above the southern end of Longwall 8A by UCM environmental staff and PE during their regular inspections on 19 December 2024. This rockfall location, adjacent to Aboriginal heritage rock shelter site Ulan ID#874, was subsequently inspected by SCT on 2 January 2025. Observations by SCT indicate impacts and consequences to sandstone outcrop formations and rock shelter sites above the southern end of Longwall 8A are consistent with expectations and likely to be less than the maxima forecast.

Overall, perceptible cracking and rock falls on sandstone outcrop formations and at Aboriginal heritage rock shelter sites observed from the longwall mining during 2024 are consistent with expectation and less than the forecasts in SCT (2009) for the UCCO Project EA, in SCT (2021) for the Longwalls 1-8 EP at UW and in SCT (2016, 2019 and 2022) for the Longwalls 30-32 and W6-W8 EP at UUG.

5.3 Surface Water - Drainage Lines - Dams

Subsidence impacts and environmental consequences to surface water features were consistent with expectation and less than the maxima forecast.

No significant impacts or consequences were reported or observed at drainage lines over areas mined by Longwall 7 and Longwall 8A at UW and Longwall 31 at UUG during 2024.

No significant impacts or consequences were observed in the drainage line of Mona Creek above the central section of Longwall 31 at UUG.

No significant impacts or consequences were reported to the drainage line of Ulan Creek on land owned by UCM above the southern section of Longwall 7 at UW.

No significant impacts were reported to the drainage lines of Mona Creek and Brokenback Creek on land owned by UCM and the Farris Hill private property above Longwall 8A at UW.

No significant impacts or consequences were reported to the three dams, two on land owned by UCM and one on the Farris Hill property, above or adjacent to the longwall mining during 2024.

Minor impacts to the drainage lines of Mona Creek, Brokenback Creek, and Ulan Creek at UW in the form of cracks, primarily where the flow lines cross bedrock, and valley closure fracturing of rocky outcrops have been observed. A small ripple was also observed crossing the drainage line of Mona Creek on the Farris Hill property as shown in Figure 12.

Figure 15 shows cracks crossing the drainage line of Ulan Creek (UCFL4) above Longwall 7 near the Aboriginal heritage grinding grooves site (Ulan ID#1210). No impacts to the actual grinding grooves were reported.

No impacts were reported to the first order drainage line of Mona Creek above the central section of Longwall 31 at UUG.



Figure 15: Cracks crossing along the drainage line of Ulan Creek (UCFL4) above Longwall 7 near the Aboriginal heritage grinding grooves site (Ulan ID#1210).

PE (2025b) reports on the 2024 annual monitoring of subsidence impacts and environmental consequences to creeks above Longwalls 1-7 at UW for inspections completed on 27 November 2024. The purpose of this monitoring is to identify the presence of surface cracking and erosion, surface ponding or out of channel flows and distinguish between natural erosion and erosion induced by subsidence.

The PE (2025b) report focuses on impacts and consequences to the ephemeral drainage lines of Ulan Creek and Brokenback Creek above Longwalls 1-8 at UW. PE (2025b) includes details of monitoring over previous longwall panels, rehabilitation of previous impacts and potential consequences as well as additional monitoring points established on Brokenback Creek in 2024 for the planned mining in Longwall 8B.

During 2024, only two drainage lines on a tributary of Ulan Creek, identified as Flow Line 4 (UCFL4), were mined under by the southern end of Longwall 7. Minor cracking was observed at two of the four monitoring points.

PE (2025b) reports cracking in Brokenback Creek at two locations over the central section of Longwall 7 mined in 2023 with remediation recommended..

Previous impacts and potential consequences to Brokenback Creek, in the form of subsidence cracks and holes from nick-point erosion, over Longwalls 4-6 at UW were remediated during 2023.

PE (2025b) also indicates the monitoring points on Brokenback Creek, Ulan Creek Flow Line (UCFL4), Ulan Creek Flow Line 3 (UCFL3) and Ulan Creek Flow Line 2 (UCFL2) over previous longwall panel where remediation has been completed and/or no changes have been observed for two years that have been removed from the monitoring and rehabilitation program.

5.4 Other Observations

Subsidence impacts and environmental consequences to natural and built features on private property, State of NSW Crown Land, Crown Land eased by UCM owned and land owned by UCM are consistent with expectation and less than the maximum forecast and are discussed in this section.

5.4.1 Farris Hill Private Property

A detailed review of subsidence impacts to the Farris Hill property from the mining of Longwall 8A at UW has been prepared and is presented in SCT Letter Report ULA5878 (SCT 2025), to satisfy the post-mining requirements of the PPSMP for Farris Hill. A summary of the measured subsidence effects and observed subsidence impacts and environmental consequences reported in SCT (2025) is provided in this section.

Our review of subsidence effects monitoring and recording of impacts indicates:

- Subsidence effects have been less than forecast.
- Impacts and consequences to agricultural landform, natural features including sandstone outcrop formations have been consistent with expectation and less than the maxima forecast.
- Impacts and consequences to drainage lines, surface dams are consistent with expectation and less than the maxima forecast.

- Impacts and consequences to built features including farm infrastructure are consistent with expectation and less than the maxima forecast.
- No public safety incidents from impacts and consequences to sandstone outcrop formations or access roads/four-wheel-drive tracks have been reported.

Longwall 8A mined from north to south below the eastern section of the Farris Hill property. Longwall 8A mined a total distance of 2,020 m below the Farris Hill property, commencing at the boundary with the Woodbury private property on 13 August 2024 at CH5973 m (CH2020 m) and finishing at CH3953 m (CH0 m) on 7 January 2025 at the boundary of the Brokenback Conservation Area (BBCA).

The overburden depth to the mining horizon in the Ulan Seam ranges 185-225 m. The depth varies from 185 m in the north to a maximum of 225 m at a topographic high point before reducing to 175 m below the Brokenback Valley. The Ulan Seam is nominally 7 m thick, but only the 2.9-3.1 m thick D Working Section (DWS) at the base of the seam is mined.

The surface landform above the section of Longwall 8A mined undulates from the lower reduced level (RL) of approximately 480 m in the north up to a RL of 540 m in the south. The surface terrain includes steeper ground on the sides of a tributary of Mona Creek in the north and higher ground in the south with the steep slopes from sandstone outcrop formations, on the northern side of the Brokenback Valley, in the far south.

Most of the surface land is cleared or semi cleared and used for grazing. The southern section of land in the Brokenback Valley is undeveloped bushland. In addition to the tributary of Mona Creek in the north, a tributary of Brokenback Creek drains the steeper ground in the south.

A farm dam has been constructed on the drainage line tributary of Mona Creek near the northern boundary of the Farris Hill property.

A number of Aboriginal heritage sites including rock shelters, a scar tree, isolated finds and artefact scatter sites are located over the section of Farris Hill mined under by Longwall 8A. The scar tree is located adjacent to the cleared land in the north with the other sites primarily located adjacent or along the sandstone outcrops forming the steeper slopes in the undeveloped bushland at the southern end of Longwall 8A.

Other built features are limited to fencing/gates along the northern boundary with the Woodbury private property and internal fencing/gates, access roads/four-wheel-drive tracks and mobile sawmill equipment.

A conventional subsidence monitoring line (I Line) just inside the Woodbury property along the common Farris Hill/Woodbury boundary above Longwall 7 and extends to the west on UCM property along the common Farris Hill/UCM boundary fence line over Longwalls 8A and 9A, is expected to provide an indication of subsidence movements likely to have occurred over the Farris Hill property from the mining of Longwall 8A.

The survey of I Line on 2 September 2024 indicates maximum values for the primary subsidence parameters were vertical subsidence of 1.2 m, tilt of 25 mm/m, compressive strain of 8 mm/m, and tensile strain of 7 mm/m over Longwall 8A at that time. These measurements of primary subsidence parameters are all less than the forecast values of 1.7 m for vertical subsidence, 45 mm/m for tilt, 25 mm/m for compressive strain, and 20 mm/m for tensile strain presented in SCT (2021) for the Longwalls 7-8 EP and the Farris Hill PPSMP for Longwall 8A.

Additional vertical subsidence of approximately 200-300 mm is expected to be measured when the end of panel survey is undertaken.

Subsidence impacts and environmental consequences to the Farris Hill property were monitored during the period of mining in Longwall 8A. This monitoring included pre-mining and monthly inspections and reporting by UCM environmental staff and other environmental specialists as well as site visits by SCT to inspect impacts and consequences.

Overall, impacts and consequences over Longwall 8A are similar in nature and magnitude to those observed over Longwall 7, although mapping indicates the frequency of subsidence cracks over Longwall 8A is less and there were no consequences to the farm dam. All impacts and consequences are consistent with expectation and less than the maxima forecast.

The main impacts include cracks in the ground around the panel edges and across the panel width. These cracks intersected the farm dam and are more prominent on hard surfaces such as access roads/four-wheel-drive tracks and rocky outcrops in drainage lines and at topographic high points. Impacts and consequences in the form of cracking and rock falls were observed on some sandstone outcrop formations that host Aboriginal heritage rock shelters. Minor impacts to fencing were also observed.

Cracks around the panel edges and across the panel width have been observed and mapped. Soil has slumped into some wider cracks. Cracks are more prominent on hard surfaces such as rocky outcrops and access roads/four-wheel-drive tracks.

A wider, longer and more continuous crack along the eastern side of Longwall 8A was remediated by UCM soon after the period of active subsidence at this panel edge location.

Cracks have been observed across drainage lines and intersecting the farm dam. Ongoing inspections indicate no consequences from this impact as this cracking did not affect the capacity of the dam to hold water. No repairs to the dam have been required to date.

Larger, more continuous cracks are apparent on hard surfaces such as access roads/four-wheel-drive tracks and at topographic high points. Some of these cracks on access roads/four-wheel-drive tracks have already been remediated to mitigate personal safety issues.

No significant impacts to drainage lines (flow lines) including ponding, potholes or erosion due to subsidence movements and impacts (cracks) and have been recorded. Minor fracturing in the rocky base of drainage lines from valley closure effects were observed at some locations.

Mining induced impacts and consequences in the form of perceptible cracking and small rock falls have been observed at some sandstone outcrops. Other outcrops remain unaffected. No personal safety issues from instability have been reported. A larger rockfall adjacent to an Aboriginal heritage rock shelter site was reported to the landholder at the time of discovery.

No impacts were observed to the Aboriginal heritage scar tree.

Minor consequences to gates and fences were reported with high tension in wires and a broken strand in a fence line at one location. These have been repaired by UCM. No other significant impacts have been reported to other farm infrastructure.

Minor cracking of the surface was observed at the location of the portable sawmill equipment. These impacts are not expected to affect the operation of the equipment and timber milling operations at this site.

5.4.2 Built Features Owned by UCM

No significant impacts were reported to farm infrastructure owned by UCM including agricultural land, dams, access roads/four-wheel drive tracks, fences and gates.

There have been no reports of significant impacts to mining related infrastructure owned by UCM over all areas undermined by longwalls during 2024. This includes the infrastructure corridor that crosses the surface above Longwall 31 along the western boundary of the DSCA with an access road and water pipelines and the overhead powerline and access road/four-wheel-drive track in the easement over the chain pillars along the northern edge of Longwall 31. Only minor cracks have been recorded on these access roads/four-wheel-drive tracks.

6. REFERENCES

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SCT 2017 "Ulan West Mine: Subsidence Assessment for Longwalls 5-6 Extraction Plan" - SCT Report ULA4755 - 21 December 2017.

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SCT 2019 "Ulan Underground Mine: Subsidence Assessment for Amendment to LW30 and LWW6 – LWW8 Extraction Plan" SCT Report ULA5059 – 29 August 2019.

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SCT 2022 "Ulan Underground Mine: Subsidence Assessment for Longwalls 31-32 Extraction Plan" SCT Report ULA5470 – 19 August 2022.

SCT 2024 "2023 Annual Review of Subsidence Monitoring at Ulan West and Ulan Underground Mines" SCT Report ULA5713 – 8 March 2024.

SCT 2025 "Ulan West: Longwall 8A Subsidence Review – Farris Hill Private Property" SCT Letter Report ULA5878 – 20 March 2025.

APPENDIX 1

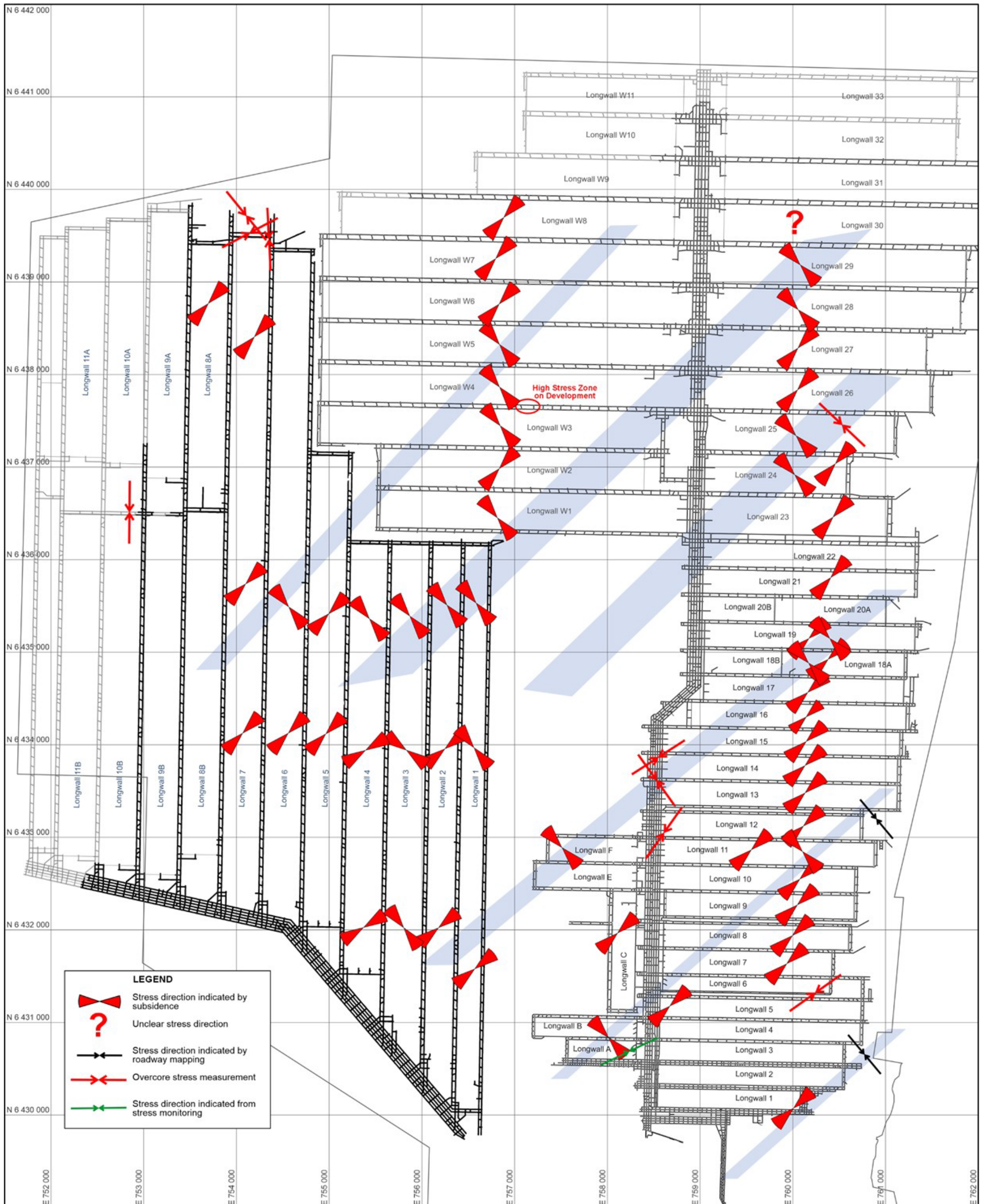


Figure 16: Stress direction indicated from subsidence observations and other sources.