ULAN
UNDERGROUND

GLENCORE

Plan for

Ulan Underground Extraction Plan Longwalls 30 & LWW6-LWW8

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Document Control

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Mine:	Ulan Underground Mine
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Mining Leases:	ML1468, ML1554, ML1656
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Version	Date	Review team (Consultation)	Change Summary
0.1	October 2016	Tara Stokes, Robyn Stoney, Ben Anderson	Document Development
0.2	October 2017	Jessica Southgate	Document formatting updated in accordance with Dept. of Planning feedback. Included statement of commitments summary.
1.0	May 2019	Robyn Stoney, Lucy Stuart and Brad Tanswell	Review and update in response to feedback received from DPIE, DPI Water and OEH in October 2018
2.0	August 2019	Tara Stokes	Updated correspondence for DPIE Approval of plan 19/08/2019.
3.0	April 2020	Robyn Stoney, Lucy Stuart, Stephen Bragg	This EP was amended to align with the approved MOD4 for the extension of longwall panels
4.0	December 2020	Robyn Stoney, Lucy Stuart, Stephen Bragg	This EP was resubmitted on the 21/12/2020 to address the requirements from the DPIE Water feeback

1 Overview of the Extraction Plan

1.1 Background

The Ulan Coal Mine Complex (UCMC) operated by Ulan Coal Mines Pty Limited (UCMPL) and owned by Glencore Coal Assets Australia Pty Limited (Glencore). UCMC is situated in the central west of New South Wales (**Figure 1**). It is located in the Mid-Western Regional Council (MWRC) Local Government Area (LGA) near the village of Ulan, approximately 38 kilometres (km) north-northeast of Mudgee and 19 km northeast of Gulgong.

The Ulan Underground Mine (UUG) is a component of the approved Ulan Coal Mine Complex (**Figure 2**). UUG utilises the secondary extraction of coal by standard longwall mining methods, targeting only the economic portion of the Ulan Coal Seam. Primary extraction, also known as 'development or first workings,' utilises continuous miners and shuttle cars to develop roadways which form the longwall panels. The extraction of coal using the mining methods described occurs within the subsurface Mining Lease (ML) ML1468 (**Figure 4**).

The potential environmental impacts of the existing and proposed Ulan Coal Mine Complex were assessed in the *Ulan Coal - Continued Operations Environmental Assessment 2009* (Project EA). Project Approval 08_0184 (PA08_0184) under Part 3A of the *Environmental Extraction Planning and Assessment Act 1979* (EP&A Act) was granted on 15 November 2010 for the Ulan Coal – Continued Operations Project, herewith in referred to as the Project Area.

An application to modify PA08_0184 (MOD1) was lodged in 2011 to allow longwall mining in the North 1 Area, modify the approved UUG and UWO mine plans and construction of a concrete batching plant. MOD1 was approved in December 2011.

An application to modify PA08_0184 (MOD2) was lodged in May 2012 to reduce the first three longwall panel widths at the Ulan West Operations (UWO) from 400m, therefore increasing the number of longwall panels to four within the footprint of the first three longwalls. MOD2 was approved in May 2012.

An application to modify PA08_0184 (MOD3) was submitted in March 2015 to modify the UWO mine plan, the modification included the assessment of an Interaction Zone between UUG and UWO. The assessment of the Interaction zone included a proposed mine plan which shortened the UUG longwall panels LWW4–LWW6 in line with the approved extent of LWW3, to allow UWO to mine further north in LW06. MOD3 was approved in March 2016.

An application to modify PA08_0184 (MOD4) was submitted in 2018 to modify the approved mine plans at both the UUG and UWO mines through the extension of LW30 to LW33 and LWW7 to LWW8 and widening LW33 longwall panels. MOD4 also sought approval for the construction of surface infrastructure required to support mining in these areas. MOD4 was approved in July 2019.

The Ulan Underground Extraction Plan Longwalls LW30 & LWW6-LWW8 (the Extraction Plan) was originally approved by the Secretary on the 19 August 2019. The approved original Extraction Plan Application Area is displayed on **Figure 3**.

The current approved UUG mine plan (as modified by MOD4), is shown in this amended Extraction Plan in **Figure 4** and includes the approved first workings extent.

Two first workings amendments, relevant to this Extraction Plan were approved by the Department of Planning, Industry and Environment (DPIE); the first to lengthen longwall 30 in February 2016 and the second to shorten Longwall W4 to W6, approved on 3 November 2016.

1.2 Extraction Plan Purpose and Scope

This Extraction Plan has been developed to satisfy various statutory requirements including the conditions of PA 08_0184 and relevant mining leases. This Extraction Plan was prepared in accordance with the *Draft Guidelines for the Preparation of Extraction Plans* version 5 (herein referred to as "the Guidelines") issued by the DPIE.

The purpose and scope of this Extraction Plan is to outline the proposed management, mitigation, monitoring and reporting of potential subsidence impacts and environmental consequences from the secondary extraction of longwalls LW30 and LWW6–LWW8 within the Application Area at UUG.

This Extraction Plan has been amended to incorporate the approved MOD4 mine plan which extended[1] the longwall panel lengths of LW30, LWW7 and LWW8. Amendments to the Extraction Plan are identified by red text. A summary of the predicted changes to potential subsidence effects, subsidence impacts and environmental consequences, as a result of the revised mine plan layout at UUG is provided in **Section 2.5**. There are no significant changes to the monitoring or management measures previously proposed, as a result of the revised layout of LW30, LWW7 and LWW8.

Therefore the objectives of this Extraction Plan are to:

- Provide detailed mine plans of LW30 & LWW6 – LWW8;
- Outline potential subsidence effects, subsidence impacts and environmental consequences of mining LW30 & LWW6 – LWW8;
- Describe the subsidence management measures that will be implemented to ensure compliance;
- Provide the performance measures and the mitigation, management and remediation measures of potential subsidence impacts and environmental consequences;
- Detail a monitoring program for potential subsidence impacts and environmental consequences, including detailed performance indicators for subsidence performance measures; and
- Outline the adaptive management approach and contingency plans in the event of exceedances of performance measures and predicted environmental consequences.

This Extraction Plan forms part of the Environmental Management Strategy (EMS)[2]. The relationship of this Extraction Plan to the EMS is outlined in **Section 1.3.2**.

This Extraction Plan was prepared with assistance from Strata Control Technology (SCT), Mackie Environmental Research (MER), Umwelt Australia (Umwelt), Eco Logical Australia (Eco Logical), Pacific Environmental and South East Archaeology (SEA).

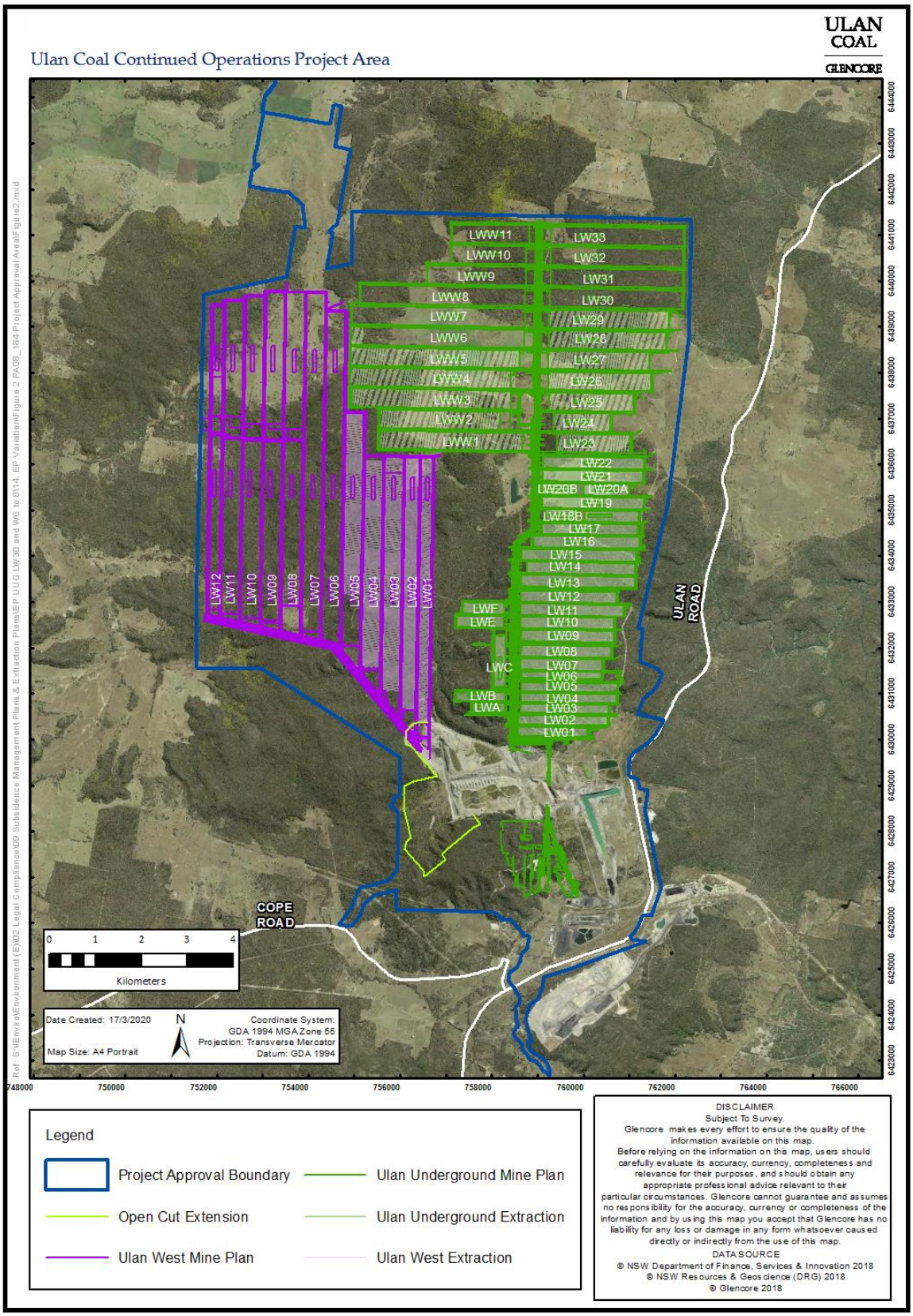
The endorsement of the Secretary DPIE, for qualified and experienced specialists to assist in the preparation of the Extraction Plan was sought in accordance with Condition 26 (a) to (h) of the PA 08_0184. On 27 June 2016, the Secretary of the DPIE endorsed qualified and experienced specialists: Strata Control Technology (SCT); Mackie Environmental Research (MER); Umwelt Australia (Umwelt); Eco Logical Australia (Eco Logical); Pacific Environmental and South East Archaeology (SEA) to assist in the preparation of this Extraction Plan (**Attachment 2**).

A separate Extraction Plan has been developed and implemented at the adjacent UWO. UWO currently undertake longwall mining activities in accordance with the approved[3] Ulan West Extraction Plan for Longwalls W1 to LW6 (**Figure 2**) at the Ulan Coal Mine Complex.

[1] As a result of MOD4, llength of approximate extensions for LW30, LWW7 and LWW8 are 195m, 220m, 155m respectively.
[2] Condition 1, Schedule 5 of PA08_0184
[3] Ulan West Extraction Plan for Longwalls W1 to LW6 was approved on 25 January 2019

Figure 1 Locality Extraction Plan

Figure 2 PA 08_184 Project Approval Area



1.3 Application Area

The Extraction Plan area proposed for LW30 & LWW6-LWW8, herewith referred to as the Application Area, was revised approximately 195m to the east to accommodate the start line of LW30, as a result of MOD4. The northern, southern and western boundaries of the revised Application Area remain unchanged as the original Application Area was defined by a conservative boundary allowing for the extensions of LWW7 and LWW8 (**Figure 3**).

The key longwall panel dimensions for LW30 & LWW6 - LWW8 are provided in **Table 3**.

The Application Area has been chosen to include any area that is likely to be perceptibly impacted by mining subsidence as well as the surrounding area within a distance equal to the overburden depth from the outermost goaf edges of the four longwall panels. Subsidence movements occur predominantly within the limits of the longwall panels. Subsidence impacts are generally within a distance of half depth of overburden cover from the longwall panels.

1.3.1 Description of the Application Area

The Application Area for the amended mine plan for LW30 & LWW6 - LWW8 only includes an additional section of the Durridgere State Conservation Area (DSCA). All other natural features and surface infrastructure, including farm or mining related infrastructure, remains the same except for new built features constructed by UCMPL within the original Application Area (**Figure 3**).

The Application Area is a combination of undeveloped bushland, gently undulating open grazing and irrigation agricultural lands. The Application Area is split by the Great Dividing Range with land in the east in the Goulburn River Catchment, and land in the west in the Talbragar River catchment. Bushland in the east is gently undulating, bushland in the west is a little steeper dominated by sandstone outcrops and partially cleared valleys. Most of the land within the Application Area is owned by UCMPL, with the exception of one private property in the west of the Application Area and a small section of the Durridgere State Conservation Area (DSCA) in the east (**Figure 3**). There are no privately owned dwellings within the Application Area.

The mining authorisations applicable to UUG include ML1468, ML1341, ML1511, ML1554, ML1656, ML 1365, ML 1366, ML1467 and CCL741 (**Figure 4**).

The depth of cover as measured from the top of seam varies from 165 meters to 335 meters. The depth of cover increases in northeast direction as the seam dips between 1 and 3 degrees along this orientation. Therefore the depth, in general terms, ranges from 165 meters to 270 meters for western panels (LWW6 to LWW8) and from 270 meters to 335 meters in the east (LW30).

Longwall mining at UUG targets the economic portion of the Ulan Coal Seam. The thickness of this section varies across the revised Application Area from approximately 2.5m to 3.3m with an average of 2.9m.

UCMPL owned and controlled land within the Application Area is used for mining related activities (e.g. underground mining and surface support infrastructure) and agricultural purposes (e.g. grazing and cropping) including the Bobadeen Irrigation Scheme (BIS). Privately owned land within the Application Area is used for cattle grazing. The DSCA is State-owned land controlled by the NSW National Parks and Wildlife Services (NPWS).

The main soil units found within the Application Area are the Turill and Goonoo soil landscapes. The Goonoo Landscape of Jurassic sandstone origin and the Turill landscape of Jurassic or Triassic origin are composed of earthy and siliceous sands that drain well, have low fertility, high erosivity and slight to strongly acidic topsoil.

Non UCMPL owned built features within the Application Area include an overhead Essential Energy power line, permanent mark state survey stations, a small shelter, two farm dams and farm fences. The Essential Energy owned 12.7kV single wire earth return (SWER) type minor power line passes through the Application Area over the main headings and will not be undermined within the Application Area

(**Figure 7**). There are no private bores within the Application Area, however a number of private bores could be affected by groundwater drawdown (**Figure 17**).

The major natural features within the Application Area include sandstone formations, a number of ephemeral watercourses, a spring fed dam and the DSCA. The spring is located within a dam located on privately owned land. All water courses within the Application Area are ephemeral in nature comprising of drainage lines and occasional pools that form after rain. Flow lines in the east of the Application Area report to Ulan Creek, Curra Creek and Bobadeen Creek in the Goulburn River catchment. Flow lines in the west report to Mona Creek in the Talbragar River catchment (**Figure 11**).

Approximately 2.8ha of the DSCA is located directly above the eastern portion of LW30. The revised Application Area that extends over the DSCA is predominately undeveloped bushland. There are no features of specific conservation values known to exist within the Application Area over DSCA.

There are two Endangered Ecological Communities (EEC) present within the Application Area. Blakely's Red Gum Woodland is present along sections of Mona Creek and its tributaries in the north and west of the Application Area. Derived Native Grassland is located within open grazing areas surrounding the irrigation pivots.

Threatened fauna species recorded in the Application Area during the environmental assessment (Umwelt 2009) include the following bird and microbat species: black-breasted buzzard; blue-billed duck, brown treecreeper, diamond firetail, eastern bentwing bat, grey-crowned babbler and the painted honeyeater (**Figure 9**).

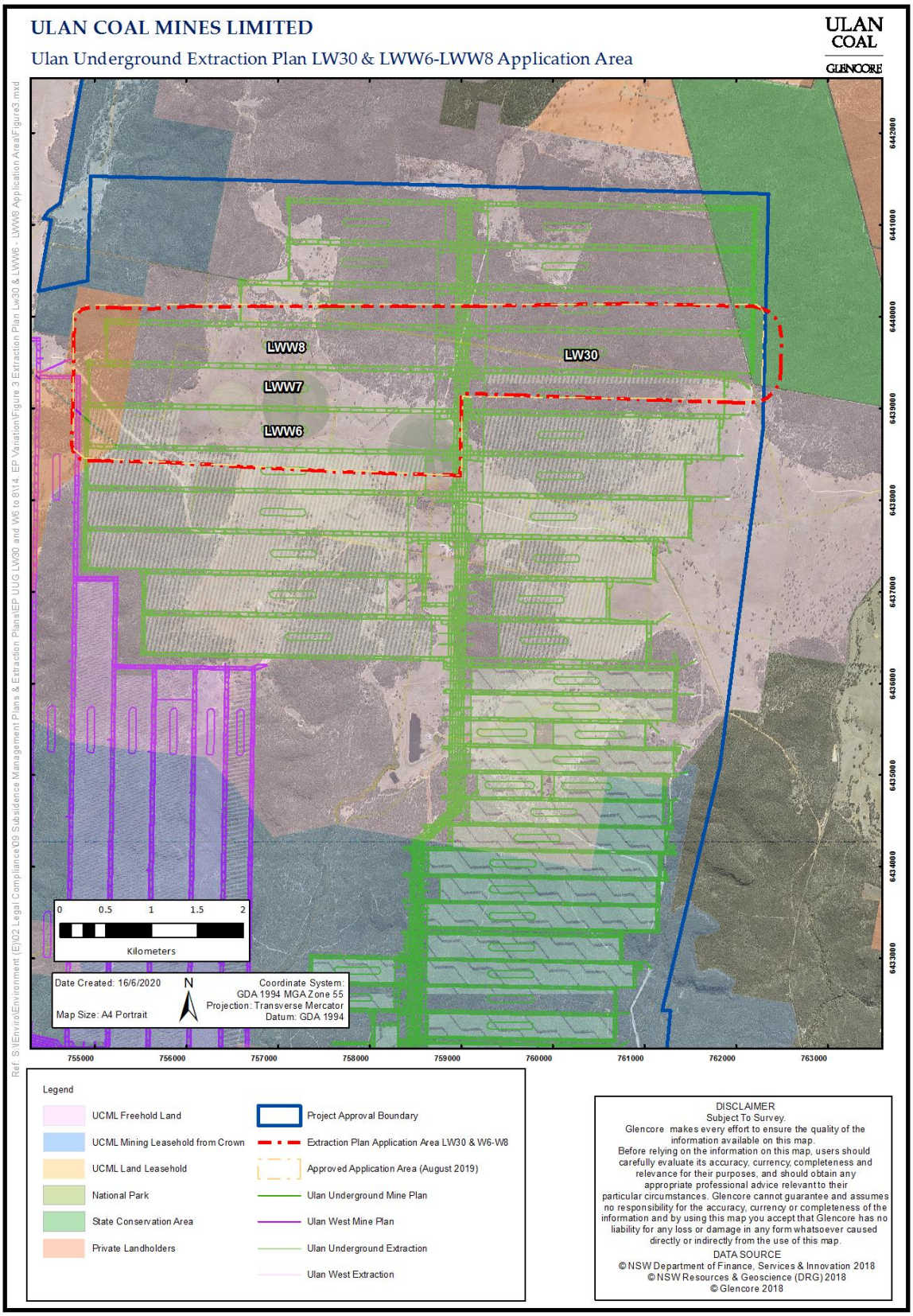
The following vulnerable microbat species have been recorded in recent years via Echolocation monitoring within the Application Area, including the Eastern Bentwing Bat, Eastern Horseshoe Bat, Large Eared Pied Bat and the Yellow-Bellied Sheathtail Bat.

There are two cliff formations within the Application Area (**Figure 9**). The cliff line in the north-west corner of the Application Area across both UCMPL owned land and privately owned land and contains the Mona Creek Aboriginal rock shelter sites (Ulan ID#180 to 187) which are protected from subsidence impacts by an offset from mining. The cliff line over LWW7 is approximately 300m in length, is less than 20 meters high and has no recorded Aboriginal rock shelter sites. This cliff line extends from UCMPL owned land onto privately owned land.

Aboriginal and European Heritage sites have been recorded within the Application Area including:

- 127 recorded Aboriginal heritage sites (i.e. 41 of these sites are artefact scatters, 30 are isolated finds, 4 are stone arrangements and 527 are rock shelter sites (**Figure 8**); and
- 2 European heritage sites (i.e. a timber getting site comprising evidence of timber clearing and timber offcuts and the Apple Tree Flat Farming Complex (PK243) (**Figure 8**).

Figure 3 Extraction Plan LW30 & LWW6 - LWW8 Application Area



1.3.2 Existing Environmental Management System

UCMPL have implemented a comprehensive Environmental Management System (EMS) for existing mining operations, consistent with PA 08_0184. The EMS was developed to meet GCAA requirements and is consistent with ISO14001. The EMS provides a risk based platform on which relevant environment and community controls, procedures and management plans are established and regularly reviewed.

The EMS contains procedures to minimise, monitor and report the overall performance of the Ulan Coal Complex operations. Operational procedures are developed to appropriately manage environmental impacts, with relevant site personnel trained in relation to these procedures. Existing EMS plans, monitoring programs and procedures will be applied to environmental management of the Project Area including the Application Area. Plans and monitoring programs specific to the management of environmental and public safety impacts of secondary extraction within the Application Area will be developed and submitted for approval[4] as part of this Extraction Plan.

This Extraction Plan and all other approved EMS plans as required by PA08-0184 are published on the UCMPL website: https://www.ulancoal.com.au/en/environment/Pages/environment-management-system.aspx

Revisions of the EMS, including all relevant EMS plans approved by DPIE, will be applied to the management of the Project Area including the revised Application Area where applicable.

[4] Extraction Plan to be submitted to and approved by DPIE prior to commencement of secondary extraction within the Application Area.

1.4 Structure of the Extraction Plan

The Extraction Plan comprises a main text component (this Plan) and supporting management plans and studies, which include **Appendices A** through to **K**. An overview of the main text sections includes:

Section 1 Provides an overview to the Extraction Plan, including the purpose and scope and a summary of the mine plan and design, subsidence predictions, subsidence performance measures and subsidence management approach.

Section 2 Describes the process of development of the Extraction Plan, including: the process of reviewing and updating the predictions of subsidence effects, impacts and environmental consequences; the risk assessment process and consultation undertaken by the Mine with affected agencies and other key stakeholders.

Section 3 Describes the measures that will be implemented to mitigate, manage, remediate and monitor potential subsidence impacts and environmental consequences on natural features, built features and public safety.

Section 4 Addresses key elements of Extraction Plan implementation, including an adaptive management approach, reporting, regular review and key responsibilities for personnel.

Section 5 Defines abbreviations and terms used in **Sections 1** to **4** of this Extraction Plan. Lists the reference documents referred to in **Sections 1** to **4** of this Extraction Plan. Provides additional accountabilities in relation to this Extraction Plan.

Attachment 1 Provides a checklist of key requirements of the *Draft Extraction Plan Guidelines* and where they are addressed within this Extraction Plan.

Attachment 2 Provides evidence of ongoing consultation for this Extraction Plan.

Attachment 3 Provides details of existing and proposed programs to collect sufficient baseline data for future Extraction Plans.

Attachment 4 Contact details.

Appendices A to **J** provide the key component management and monitoring plans of the Extraction Plan, including:

Appendix A	Water Management Plan for LW30 & LWW6-LWW8
Appendix B	Land Management Plan for LW30 & LWW6-LWW8
Appendix C	Biodiversity Management Plan for LW30 & LWW6-LWW8
Appendix D	Built Features Management Plan for LW30 & LWW6-LWW8
Appendix E	Heritage Management Plan for LW30 & LWW6-LWW8
Appendix F	Public Safety Management Plan for LW30 & LWW6-LWW8
Appendix G	Subsidence Monitoring Program for LW30 & LWW6-LWW8
Appendix H	Rehabilitation Management Plan for LW30 & LWW6-LWW8
Appendix I	Extraction Plans for LW30 & LWW6-LWW8
Appendix J	Essential Energy Management Plan for LW30 & LWW6-LWW8

This Extraction Plan is supported by several technical reports, which provide a review of predictions of subsidence effects and subsidence impacts with respect to the completion of secondary extraction of previous UUG longwall panels.

These technical reports are provided as:

Technical Report 1	Revised Predictions of Subsidence Effects and Subsidence Impacts
Technical Report 1a	Subsidence Assessment for Amendment to LW30 & LWW6 – LWW8 Extraction Plan
Technical Report 2	Subsidence Risk Assessment for Longwalls for LW30 & LWW6 - LWW8
Technical Report 3	Groundwater Impact Assessment Review
Technical Report 4	Surface Water Impact Assessment Review
Technical Report 5	Ecological Impact Assessment Review
Technical Report 6	Aboriginal Heritage Impact Assessment Review

1.5 Statutory Requirements

1.5.1 Extraction Planning Summary

Regulatory approvals relevant to this Extraction Plan include:

- PA08_0184 (as modified) granted November 2010, issued under the *Environment and Planning Assessment Act 1979*;
- Approval from the Commonwealth Minister for the Environment of the *Environment Protection and Biodiversity Conservation Act 199* (approval reference No. 2009/5252);
- Mining Lease (ML) ML1468 issued under the *Mining Act 1992*; and
- Environmental Protection Licence (EPL) 394 issued under the *Protection of the Environment Operations Act 1997.*

1.5.2 Project Approval

The Extraction Plan[5] and the key supporting component management Plans (**Section 1.4**), are prepared in accordance with Condition 26, Schedule 3 of PA08_0184 and *the Guidelines*. The PA08_0184 requirements and where they are addressed are presented in **Table 1**.

Table 1 Project Approval Extraction Plan Conditions

Project Approval (PA 08_0184) Condition	Section Addressed
Condition 26 of Schedule 3 26. The Proponent shall prepare and implement an Extraction Plan for all second workings on site to the satisfaction of the Secretary. Each Extraction Plan must:	**This Extraction Plan**
a) be prepared by a team of suitably qualified persons whose appointment has been endorsed by the Director-General.	**Section 1.2 & Attachment 2**
b) be approved by the Director-General before the Proponent carries out an of the second workings covered by the Extraction Plan.	**Approval to be added to Attachment 2 once received**
c) include detailed Extraction Plans of the proposed first and second workings and any associated surface development.	**Section 1.6 & Appendix I**
d) included detailed performance indicators for each of the performance measures in Table 14.	**Section 3**
e) provide revised predictions of potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this approval.	**Section 2.5 & Technical Report 1 & Technical Report 1a**
f) describe the measures that would be implemented to ensure compliance with the performance measures in Table 14, and manage or remediate any predicted impacts and/or environmental consequences.	**Section 3**
g) include the following to the satisfaction of the DRE: • a subsidence monitoring program... • a Built Features Management Extraction Plan... • a Public Safety Management Extraction Plan... • a revised Rehabilitation Management Extraction Plan h) include: • revised Water, Biodiversity and Heritage Management Extraction Plans... • a Land Management Extraction Plan... • include a program to collect sufficient baseline data for future Extraction Plans.	**Appendix G** **Appendix D** **Appendix F** **Appendix H** **Appendices A, C and D** **Appendix B** **Attachment 3**
Appendix 9: 6.3.1 Where a potential subsidence impact is predicted on private property, UCMPL will prepare a Private Property Subsidence Management Plan for each of the potentially affected private landholders. These plans will clearly outline impacts of mining on the property and the management and remediation measures to be implemented, by agreement with the landowner.	PPSMP - **Section 2.1.4** of this EP and **Appendix B**, attachment: PPSMP – **Section 3** outline of mining impacts and **Section 4** remediation measures to be implemented by agreement with the landholder.

[5] PA08_0184, Schedule 3, Condition 26.

1.5.3 Mining Leases

The proposed secondary extraction within the Application Area is located within sub surface mining lease (ML) ML1468. The surface mining leases within the Application Area are ML1554 and ML1656. Previous mine workings and surface infrastructure for the UUG are also located within mining leases CCL741, MPL 315, ML1341, ML1344, ML1365, ML1366, ML1467 and ML1511. **Table 2** outlines the mining lease conditions relating directly to subsidence management[6] for ML1468.

Table 2 Mining Lease Extraction Plan Conditions

Mining Leases(s) Extraction Plan Condition	Section Addressed
(a) In this condition: (i) **approved Extraction Plan** means a plan being: A. an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided by the Secretary; and B. a subsidence management plan relating to the mining operations subject to this leases: I. submitted to the Secretary on or before 31 December 2014; and II. approved by the Secretary. (ii) **relevant development co**nsent means a development consent or project approval issued under the Environmental Planning & Assessment Act 1979 relating to the mining operations subject to this lease.	**This Extraction Plan** **Section 1.1.1** **Section 1.5**
(b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.	**This Extraction Plan**
(c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.	**Section 2.4 & Section 3**
(d) The lease holder must notify the Secretary within 48hrs of any: (i) incident caused by subsidence which has a potential to expose any person to health and safety risks; (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing: A. Built Features B. Public Safety; or C. Subsidence Monitoring.	**Section 4.3.1** **Section 4.1 – 4.3** **Section 4.1 – 4.3** **Appendix D** **Appendix F** **Appendix G**

1.5.4 Other Relevant Legislation

1.5.4.1 Commonwealth Legislation

Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the approval of the Commonwealth Minister for the Department of Environment (DoE) for actions that may have a significant impact on Matters of National Environmental Significance (MNES).

The purpose of the EPBC Act is to ensure that these actions undergo a rigorous assessment and approval process. The Act also provides for the identification, conservation and protection of places of National Heritage significance and provides for the management of Commonwealth Heritage places.

The Project EA (Umwelt, 2009) identified threatened species and communities, therefore triggering the requirement for approval of the Project under the EPBC Act. Approval from the Commonwealth Minister

[6] In accordance with the provisions of Section 239(2) of the Mining Act 1992, the Minister has amended the Subsidence Management Plan (SMP) Condition on this lease by imposing an alternative Extraction Plan Condition.

for the Environment was granted under Section 130 and Section 133 of the EPBC Act (approval reference No. 2009/5252) on the 30 November 2010, expiring September 2031.

1.5.4.2 State Legislation

Environmental Extraction Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP & A Act) and the *Environmental Planning and Assessment Regulation 2000* (EP & A Regulation) provide the framework for environmental Planning in NSW and include provisions to ensure that proposals which have the potential to impact the environment are subject to detailed assessment, and also provide opportunity for public involvement. It is administered by the DPIE.

The potential environmental impacts of the existing and proposed Ulan Coal Mine Complex were assessed in the *Ulan Coal - Continued Operations Environmental Assessment* (Project EA) (Umwelt, 2009). Project Approval 08_0184 (PA08_0184) was granted under Part 3A of the EP&A Act on 15 November 2010.

Mining Act 1992

The *Mining Act 1992* (Mining Act) makes provision for a variety of mining authorities, including mining leases and exploration licences which are required for the prospecting and mining of minerals and coal. The Mining Act also makes provision for the protection of the environment in relation to mining activities, including rehabilitation of areas affected by mining activities.

UCMPL holds the sub surface Mining Lease ML1468 within the Application Area (**Section 1.5.3**), **Table 2** outlines the Extraction Plan Condition relating directly to subsidence management for ML1468. UCMPL also holds surface mining leases ML1554 and ML1656 within the Application Area.

Part 11 of the Mining Act deals with the protection of the environment and provides that conditions may be imposed upon a mining authority or mineral claim requiring that land affected by mining activities be rehabilitated. Standard conditions generally imposed upon a mining lease include requirements to submit a Mining Operations Plan (MOP) prior to the commencement of mining operations.

An integrated MOP[7] for underground, open cut and associated mining activities of the Ulan Coal Mine Complex was approved 16 September 2017 and expires in 30 November 2024[8].

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (PoEO Act) is administered by Environment Protection Authority (EPA). The PoEO Act establishes, amongst other things, the procedures for issuing of licences for environmental protection on aspects such as waste, air, water and noise pollution control.

The owner or occupier of premises that are engaged in scheduled activities is required to hold an Environment Protection Licence (EPL) and comply at all times with the conditions of that licence. Coal mining is a scheduled activity listed in Schedule 1 of the PoEO Act.

UCMPL currently holds EPL No. 394 which applies to the Ulan Coal Mine Complex. EPL 394 includes the coal mining production, processing rates, water discharge, and monitoring points (air, noise, water and meteorological) associated with the Project Area.

Work Health and Safety Act 2011* and *Work Health and Safety Regulation 2011

The *Work Health and Safety Act 2011* (WHS Act) and the *Work Health and Safety Regulation 2011* (NSW), came into force on the 01 January 2012. The WHS Act, is the primary piece of legislation dealing with the health and safety of workers in NSW.

[7] ULN SD PLN 0131 Ulan Coal Mines Limited Mining Operations Plan 2017 to 2024

[8] A revised MOP will be submitted and approved by the DPIE – Resource Regulator prior to its expiry

The Work Health and Safety (Mines) Act 2013 & Work Health and Safety (Mines) Regulation 2014

The *Work Health and Safety (Mines) Act 2013* and *Work Health and Safety (Mines) Regulation 2014* apply to all mining workplaces in NSW. These laws support the WHS Act and WHS Regulation and provide additional provisions for work health and safety issues unique to mines.

Notification of high risk activities, as required by WHS Regulation, will be submitted to the DRE separately to this Extraction Plan, prior to the commencement of secondary extraction.

Coal Mine Subsidence Compensation Act 2017

Under the *Coal Mine Subsidence Compensation Act 2017*, the approval of the Chief Executive of Subsidence Advisory NSW MSA is required for the erection or alteration of improvements within a mine subsidence district. As of 1 July 2017, the area within the project approval is a proclaimed Mine Subsidence District.[9] Structural damage to council approved structures by the impacts of subsidence must be compensated by MSAUCMPL. There are no council approved structures within the Application Area.

Water Management Act 2000

The Water Management Act 2000 (WM Act) regulates the use and interference with surface water and groundwater sources which are governed by operational water sharing plans (WSP) in NSW.

Baseflow losses are compensated by:

- The *Hunter Unregulated and Alluvial Water Sources WSP 2009* applies in the vicinity of LW30. The losses of baseflows from this system are compensated as required by the Project Approval 08_0184[10] by the discharge of water to the Goulburn River and are covered under WAL19047, which has 600 units of allocation in the Upper Goulburn River water source.
- The *Macquarie Bogan Unregulated and Alluvial Water Sources WSP 2012* applies in the vicinity of LWW6-W8. The losses of baseflows from this system will be compensated as required by the Project Approval 08_0184[11] through WAL 34921 (Obtained Dec 2018), which provides 30 units of allocation from Talbragar Alluvial GW sources and WAL 41817 (Obtained Feb 2019), which provides 50 units of allocation from the Upper Talbragar River Water Source.

Dewatering extraction is provided for by:

- The *WSP North Coast Fractured and Porous Rock Groundwater Sources 2016* applies in the vicinity of LW30. UCMPL holds WAL41492 which provides 7060 units of allocation in the Oxley Basin Coast Groundwater Source.
- The *WSP for NSW Murray Darling Basin (MDB) Porous Rock Groundwater Sources 2011*: applies in the vicinity of LWW6-W8. UCMPL holds WALs within the Sydney Basin of the MDB Groundwater Source as follows: WAL 37192, 704 units and WAL 41906, 2215 units. UCMPL secured a further 4031 units in the 2018 gazetted water allocation.

Crown Lands Act 1989

The Crown Lands Act 1989 provides for the administration and management of Crown land in the eastern and central divisions of the state. Crown land may not be occupied, used, sold, leased, dedicated, reserved or otherwise dealt with unless authorised by this Act or the *Crown Lands (Continued Tenures) Act 1989*. The Minister may grant a 'relevant interest', such as a lease, licence or permit, over Crown land for the purpose of any infrastructure, activity or other purpose that the Minister thinks fit.

Crown land leased to UCMPL is located adjacent to the Application Area. UCMPL are obligated to carry out activities in an environmentally responsible manner (**Figure 10**).

[9] PP5217: Mudgee Mine Subsidence District.
[10] PA08_0184, Schedule 3, Condition 29.
[11] PA08_0184, Schedule 3, Condition 29.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NP&W Act) is the principal legislation dealing with the management of Aboriginal heritage and protection of native flora and fauna. Approval is not required under the Act for impacting on native flora or fauna where that activity is carried out in accordance with a development approval granted under the EP&A Act. Additional approvals for impacting on Aboriginal sites are not required for projects approved under Part 3A of the EP&A Act. The Project will not require approval under sections 87 and 90 of the NP&W Act due to the exemptions outlined under section 75U of the EP&A Act.

The *National Parks and Wildlife Act 1974* (NP&W Act) regulates the protection of the DSCA (**Figure 3**) defined as a Community Conservation Area Zone 3. Land is reserved as a state conservation area where mineral values preclude reservation as another category.

1.6 Ulan Underground Mine Plan

The current approved[12] UUG longwall panels run in an east-west alignment (**Figure 2**). Underground mining commences in the main headings progressing north in the centre of the mine plan with longwall panels to the east and west of the main headings. The longwall panel widths are approximately 400m (**Table 3**). The approved UWO mine is adjacent to the west panels of UUG with Ulan West longwall panels running perpendicular to the UUG mine plan in a north-south alignment (**Figure 2**).

Longwall panels LW30 and LWW6 – LWW8 range in length from approximately 2.7 km to 3.8 km. Access to the UUG mine is via a drift entry point located near the UUG Offices.

1.6.1 Longwall Panel Parameters

Table 3 provides information for LW30 & LWW6 - LWW8 within the Application Area including panel dimensions, depth of cover and Run of Mine (ROM) coal to be extracted. Detailed mine layout drawings are provided in **Appendix I** including the **Plans 1 to 8**, as required under *the Guidelines*.

Table 3 Longwall Panel Parameters

Parameter	LW30	LWW6	LWW7	LWW8
ROM Coal Extracted (tonnes)*	5,285,891	6,677,545	6,672,161	6,310,507
Gate Road Width (m)	5.2	5.2	5.2	5.2
Gate Road Height (m)	3.2	3.2	3.2	3.2
Maingate (MG) Chain Pillar Width (m)	45	39.8	47.5	45
Tailgate (TG) Chain Pillar Width (m)	47.5	39.8	39.8	47.5
Tailgate (TG) Chain Pillar Length (m)	130	130	130	130
Longwall Void Width (m) (ribline of goaf edge)	410.4	410.4	410.4	410.4
Longwall Void Length (m)	2907	3778	3787	3599
Longwall Extraction Height (m)	3.1 - 3.26	2.75 - 3.15	2.85 - 3.12	2.82 - 3.15
Minimum Depth of Cover (m)	268	165	167	166
Maximum Depth of Cover (m)	344	275	274	261

Notes: *ROM Coal Extracted calculated based on dimensions of longwall and average extraction height of 2.9m.

The depth of cover as measured from the top of seam varies from 165 meters to 335 meters. The depth of cover increases in northeast direction as the seam dips between 1 and 3 degrees along this orientation. Therefore the depth, in general terms, ranges from 165 meters to 270 meters for western panels (LWW6 - LWW8) and from 270 meters to 335 meters in the east (LW30).

Longwall mining at UUG targets the economic portion of the Ulan Coal Seam. The thickness of this section varies across the Application Area from approximately 2.75m to 3.3m with an average of 2.9m.

[12] As approved by MOD4

1.6.2 Mining Schedule

UUG operates five days a week, 24 hours a day with support operations on weekends. The proposed sequence of longwall mining under the Extraction Plan and anticipated start and completion dates of LW30 & LWW6 - LWW8 are summarised in **Table 4**. Underground mining at the UUG mine is currently scheduled to conclude in 2029.

Table 4 Proposed Longwall Mining Schedule*

Longwall	Estimated Start Date	Estimated Duration	Estimated Completed Date
LWW6	February 2020	15 months	April 2021
LWW7	April 2021	14 months	May 2022
LW30	June 2022	13 Months	July 2023
LWW8	August 2023	13 Months	September 2024

Notes:* Proposed longwall schedule consistent with MOD4

1.6.3 Other Mining

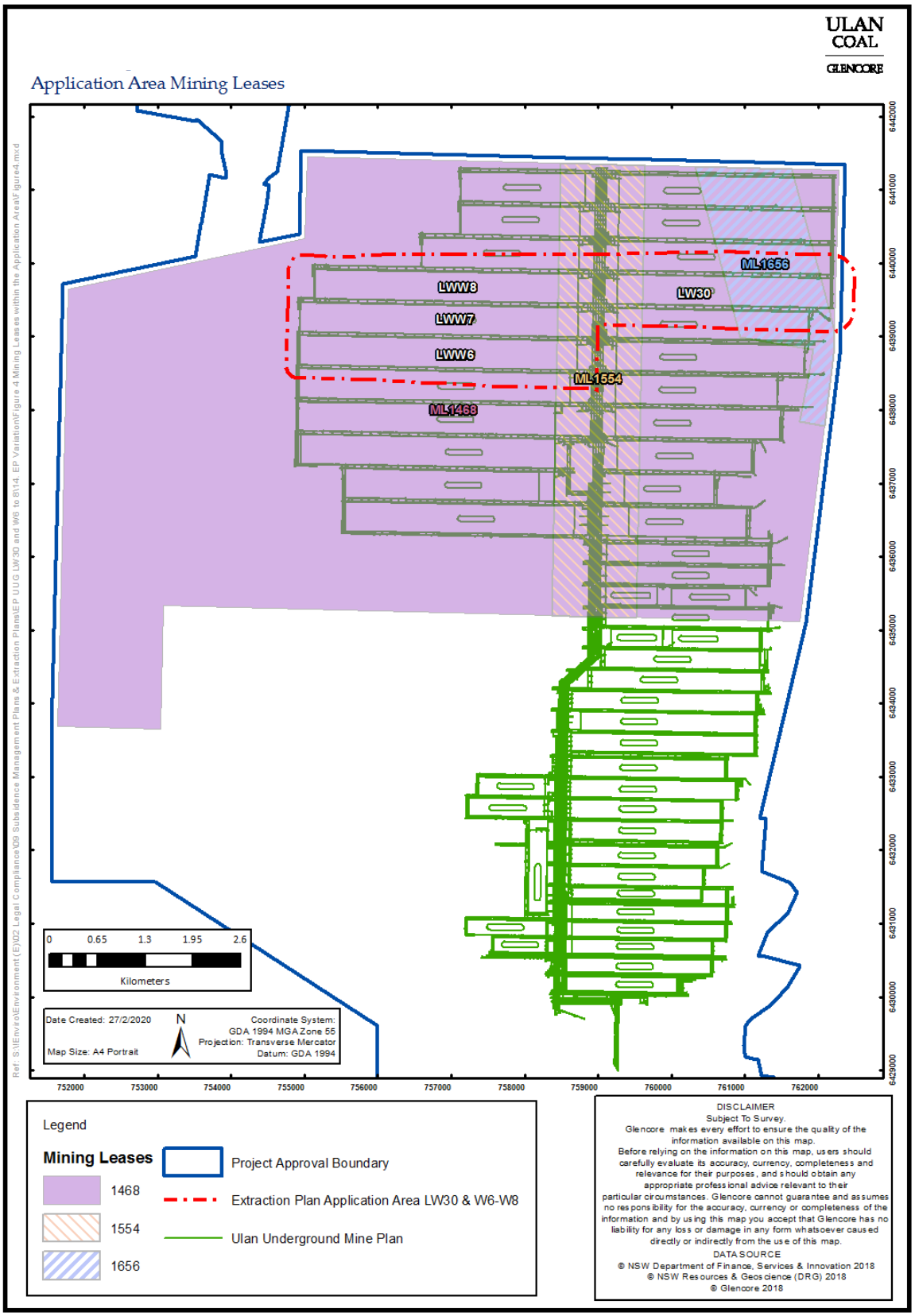
Longwall mining has previously been undertaken within the UUG mine under previous SMP/Extraction Plan approvals. The completion of LWW5 at UUG in January 2020 concludes longwall mining activities under the Subsidence Management Plan (SMP) Approval (File No.09/5344) for Longwalls (LW) LW27 - LW29 and LWW4 & LWW5[13].

A separate Extraction Plan has been developed and implemented at the adjacent UWO. UWO currently undertake longwall mining activities in accordance with the approved[14] Ulan West Extraction Plan for Longwalls W1 to LW6. The UWO longwall panels are located approximately 2 kilometres to the south of the Application Area (**Figure 2**).

[13] SMP/EP for LW27-LW29 and LWW4 & LWW5 approval granted on 29 May 2013

[14] Ulan West Extraction Plan for Longwalls W1 to LW6 was approved on 25 January 2019

Figure 4 Mining Leases within the Application Area



1.6.4 Mining Methods

Underground mining at UUG will utilise standard longwall mining methods and target the economic portion of the Ulan Coal Seam. Access to the mine is via the drift located near the UUG Office Complex. Primary extraction, known as 'development,' utilises continuous miners and shuttle cars to develop roadways which form the longwall panels. The development mining equipment for UUG typically includes, but not limited to:

- Continuous miners;
- Shuttle cars;
- Breaker feeders;
- Auxiliary fans;
- Graders;
- Underground personnel transporters; and
- Underground Load Haul Dumps.

Secondary extraction will utilise retreat longwall mining methods, within the longwall parameters provided in **Table 3**. Longwall extraction mining equipment for UUG typically includes, but not limited to:

- A shearer to cut coal from the face of the seam;
- A face conveyor to collect sheared coal and carry it to a coal sizer and stage loader;
- A panel conveyor to transfer the coal to a trunk conveyor in one of the main headings; and
- Hydraulic roof supports to support the roof in which personnel and equipment operate.

1.6.5 Coal Handling and Processing

ROM coal from UUG is conveyed to the surface via a conveyor network and discharged to the ROM Hub Stockpile area, where the coal is reclaimed and surface conveyed to the Underground ROM Stockpile area.

From the Underground ROM Stockpile area the coal is reclaimed, crushed and transferred by surface conveyors directly to the product stockpile area. Underground coal requiring washing can be transferred by truck from the Underground ROM Stockpile area to the Coal Handling Preparation Extraction Plant (CHPP), where the coal enters the Open Cut conveyor system for processing in the CHPP.

Product coal is reclaimed and transferred by surface conveyors from the product stockpile area to the Rail Load Out Bin and loaded into rail coal wagons and transported to the Port of Newcastle by rail.

1.6.6 Geology and Resource Description

The Ulan Coal Mine Complex is at the western limit of the geological formation known as the Sydney Basin and at the southern end of the Gunnedah Sub-basin. A sequence of massive Triassic Sandstone (Wollar Sandstone), siltstone and the pebbly conglomerate of the Narrabeen Group overlie the Permian Illawarra Coal Measures. The Permian Measures in the LW30 & LWW6 - LWW8 area range from 80 metres to 100 metres thick.

The overburden above the Ulan Seam in the LW30 & LWW6 - LWW8 area comprises approximately 90 metres of interbedded Permian strata overlain by approximately 60 to 220 metres of Triassic sandstone. The underlying Illawarra Coal Measures comprise an interbedded sequence of siltstone, sandstone and claystone up to 90 metres thick and contains up to coal horizons of which the Ulan seam is considered to be the only seam of economic significance. Characteristics of these eight horizons are shown in **Table 5**. The Middle River, Goulburn, Irondale and Ulan coal seams are continuous throughout the Ulan area, whilst the remaining seams only occur over portions of the area. With the exception of the Ulan Seam, those seams are either too high in ash, low in calorific value or too thin to be considered of economic interest.

Table 5 Characteristics of Coal Seams

Ulan Seam	Thickness Range (metres)	Seam Description	Mining Potential
Middle River and Goulburn Coal Members	3-8*	Interbedded coal / claystone. 50:50 ratio. Deteriorates to carbonaceous siltstone towards the west.	No. High ash = low yield
Turill Coal Member	1-3	Interbedded coal / claystone. 40:60 ratio.	No. Thin seam with high ash = low yield
Moolarben Coal Member	<2	Stony coal leading to carbonaceous claystone. Seam often splits into A and B Seams.	No. Thin seam with high ash = low yield
Glen Davis Coal Member	2-3	Dull coal with minor claystone bands	No. High ash = low yield
Irondale Coal Member	1-5	Interbedded dull coal and claystone, 60:40 ratio. Seam often splits into upper & lower seams.	No. High ash = low yield
Ulan Seam	~7	Interbedded stony and dull coal plies with minor claystone bands.	Yes basal section. High ash in upper plies. Lower plies (~3m) composed current working section.
Lithgow Seam	0.5-1	Dull coal	No. Thin coal

** Combined seam thickness*

The Ulan Seam dips uniformly towards the north-east throughout the Ulan area at between 1 and 3 degrees. Seam thickness at UUG over the proposed underground mining area is approximately 7 metres. Within this thickness, the Ulan Seam itself is divided into a number of plies interspersed with claystone bands. Current longwall extraction involves mining of the lower section of the seam, comprising four plies known as 'Penny Band' (UCLP) 'D Working Section' (DWS), 'D Working Section Z' (DWSZ) and 'D Top' (DTP).

The DWS ply is generally 2.5 metres to 2.9 metres thick and comprises dull coal with numerous bright bands while the DTP overlies the DWS and is mostly dull coal of approximately 0.3 metre thick, DWSZ ply is 0.3 metre thick and underlies the DWS ply. UCLP overlies the DTP ply, and is the marker band for determining the mining horizon underground. A stratigraphic column showing the geology of the Ulan areas is provided in **Figure 5**.

Mining section thickness is expected to be 2.75 metres to 3.3 metres within the Application Area. Raw ash for mining within the Application Area is predicted to range between 14% and 20%, while total sulphur ranges from 0.4% to 0.6%.

1.6.7 Geological Conditions

There were a number of significant geological features identified within the Project Area. Those relevant to the Application Area, identified and defined by the exploration and geotechnical drilling programs are shown in **Figure 6**. The geological features include:

- Faults (planar rock fractures which show evidence of relative movement): a large east-west trending normal fault was intersected in North 2 mains and is interpreted to continue into the W6 block. A fault of unknown size was also intersected in a borehole along the western end of MGW5 and will likely impact LWW6.
- Dykes (Volcanic/sedimentary material deposited along a plane of weakness in the strata): an east-west trending dyke was also intersected in North 2 mains that is likely to impact on LWW8.
- Seam floor contour anomalies: there are several anomalies in the seam floor contours that are typically associated with poor conditions at UUG. These anomalies are present in the western extents of LWW6-W8. It is possible that poor geological conditions will be present in these areas.

The geological features shown in **Figure 6** are not expected to significantly impact mining of the coal resource. These features have been intersected by previous mining at UUG. Further exploration programs will seek to further identify and characterise these structures and variations prior to mining (refer to **Plan 6** in **Appendix I**).

1.6.8 Floor and Roof Conditions

For UUG, the development roof will be to a penny band to give a 3.2 meter roadway height. On the longwall the working section will be to the same penny band and leave some of the DWS in the floor giving an average extraction height of 2.9 meters.

Available information and experience suggests that the immediate roof and floor strengths and bedding structures at UUG will allow the use of current Australian practices. The overburden units are conducive to good caving conditions. The extraction depths will be within the range of Australian longwall experience.

There is no evidence of low strength floor that would rule-out longwalling, with sonic derived strength values for the immediate 1 meter of the stone floor below the Ulan Seam generally greater than 35 Megapascals (MPa) over the majority of the UUG area.

Figure 5 Stratigraphic Column for Ulan Underground

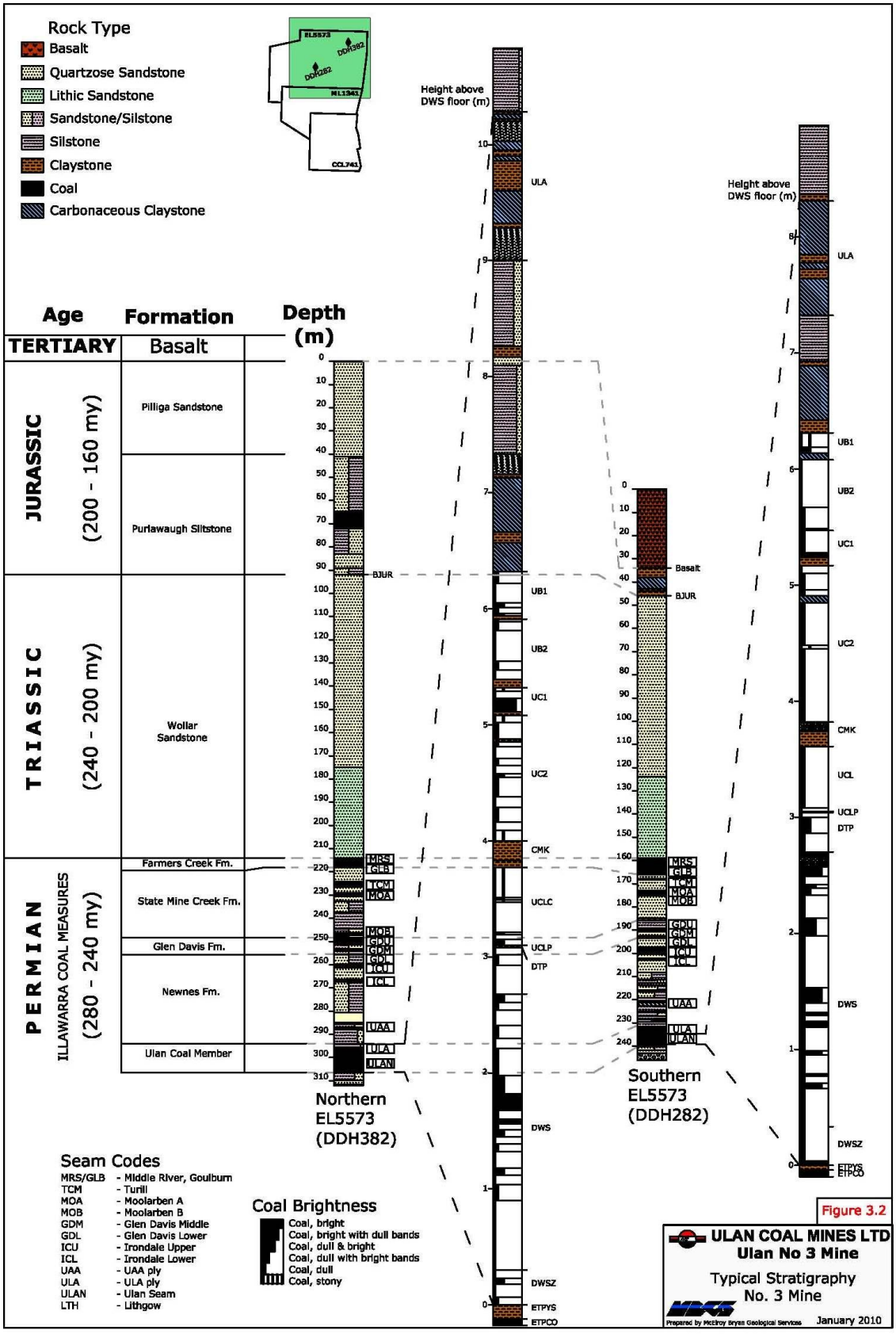
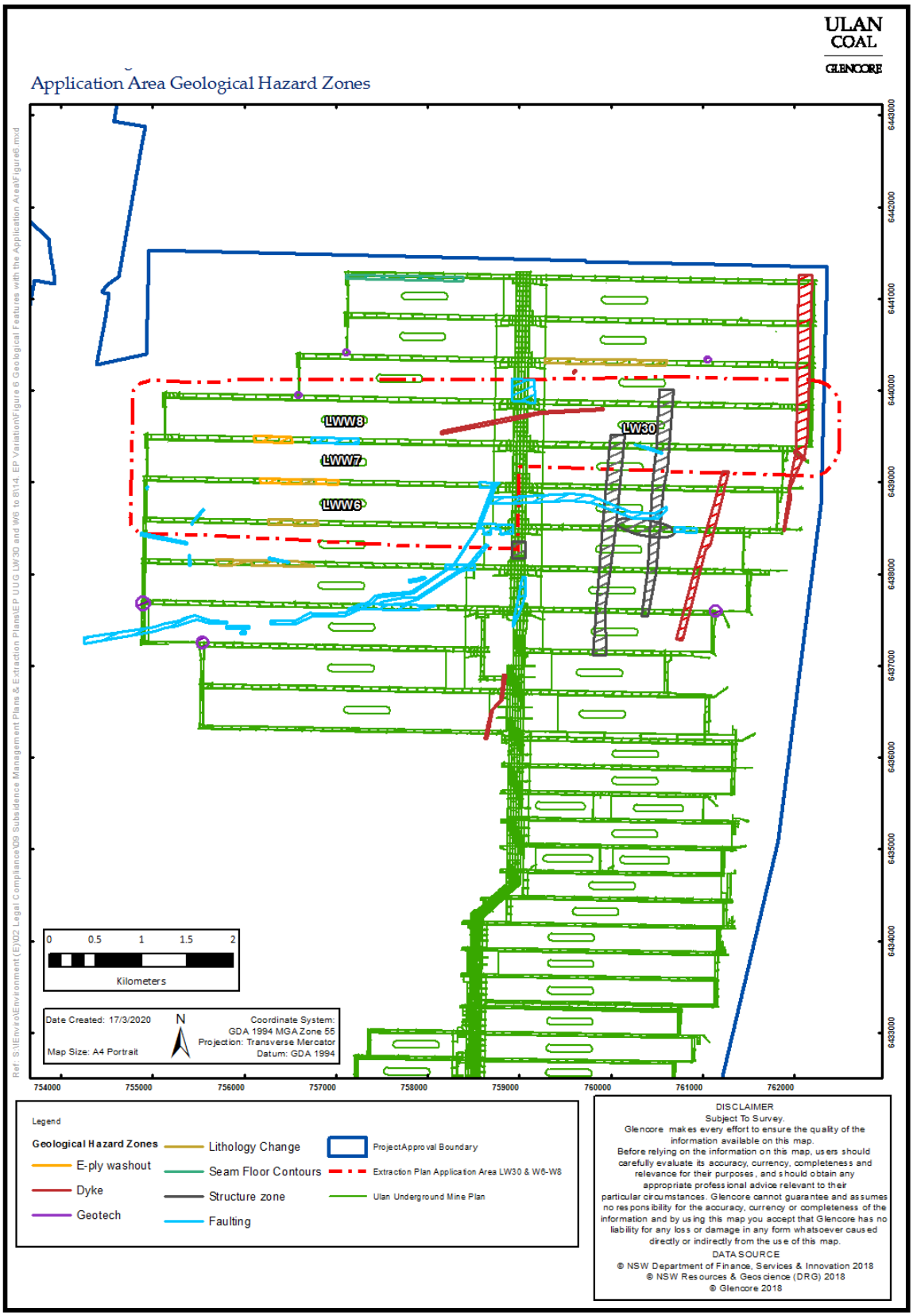


Figure 6 Geological Features within the Application Area



2 Development of the Extraction Plan

2.1 Consultation

Meetings with relevant government authorities and stakeholder groups to discuss this Extraction Plan commenced in May 2016. Consultation undertaken during the preparation of this Extraction Plan is summarised in **Sections 2.1.1** to **Section 2.1.4.**

2.1.1 Government Consultation

Consultation for this Extraction Plan was undertaken with various NSW government departments. **Table 6** identifies the departments consulted and a summary of the consultation undertaken**. Attachment 2** provides detailed comments and responses and the confirmation of technical experts for preparation of the Extraction Plan.

Table 6 Summary of Consultation with Government Agencies

Government Department	Summary of Consultation	Matters Raised by Department During Consultation
Department of Planning, Industry and Environment (DPIE)	• 20 June 2016 letter from UCMPL requesting specialist team endorsement. • 21 June 2016 meeting of DPIE and UCMPL representatives (DPIE Sydney) - outline the proposed Application Area and discuss the requirements of the Extraction Plan. • 27 June 2016 letter from DPIE endorsing specialist team. • 13 September 2016 follow up meeting of DPIE, DRE and UCMPL representatives (DPIE Sydney Office) - management and monitoring of key features of the Application Area and timeline for submission of the Extraction Plan. • 10 October 2016 draft Extraction Plan provided for agency review • 21 March 2017 – Forwarded feedback from EPA, DRG, DoI-Water and OEH • 3 October 2017 – DPIE provided feedback on their review of the EP • Extensive consultation undertaken during the preparation of MOD4 (refer to *Section 3.2 Community and Other Stakeholder Engagement in Ulan Continued Operations Project - Modification 4 Longwall Optimisation Project Environmental Assessment*). • 12 September 2018 DP&E request agencies provide further feedback. • 12 October 2018 further feedback from agencies provided to UCMPL. • 30 May 2019 Extraction Plan re-submitted to DPIE. • 2 July 2019 DoI Water endorses the approval of the Extraction Plan. • 9 August 2019 meeting with DPIE to discuss Extraction Plan, MOD 4 and revising all management plans including the Extraction Plan to align the recently approved MOD 4 on the 17 July 2019. • DPIE approved the Extraction Plan 19 August 2019. • The amended EP to align with MOD4 was submitted for reapproval on the 7 August 2020.	• DPIE sought clarification that no offset or conservation areas are within the Application Area (21/06/2016). Email response (22/06/2016) there are no Ulan offset or conservation areas within the Application Area. A small section of the Durridgere State Conservation Area is within the Application Area. • DPIE to be kept informed of any issues or concerns raised by regulators during consultation for preparation of the extraction plan. • Corrections to numbering, cross referencing, include detailed consultation (provided in Attachment 2) and timing and frequency of inspections for the PSMP. The updated plans were provided on 30/10/2017. • DPIE requested further assessments in relation to potential rock falls, Aboriginal Heritage and shallow aquifers on private property from subsidence in relation to MOD 4. UCMPL provided this information in January 2019. • The DPIE requested on the 2 September 2020 further consultation with the DPIE-Resource Regulator (DPIE-RR) and DPIE-Natural Resources Access Regulator (DPIE-NRAR) was required for the Extraction Plan amendment.

Government Department	Summary of Consultation	Matters Raised by Department During Consultation
Department of Planning, Industry and Environment (DPIE) – Resource Regulator (DPIE-RR)	• 29 June 2016-meeting of DRG and UCMPL representatives (DRG Maitland)- Outline of proposed Application Area and discuss the preparation requirements of the EP. • 13 September 2016 follow up meeting of DPIE, DRG and UCMPL representatives (DPIE Sydney Office) - management and monitoring of key features of the Application Area and proposed timeline for submission of the EP. • 10 October 2016 Provision of draft Extraction Plan for review. • 24 February 2017 – Letter DRG to DPIE responding to the draft Extraction Plan • On the 17 September 2020, UCMPL sought further consultation with DPIE-RR as requested by DPIE, specifically to the amended Subsidence Monitoring Program, Built Features Management Plan, Public Safety Management Plan and the Rehabilitation Management Plan.	• Ensure rehabilitation strategies to address subsidence induced impacts are included in the EP. Request a joint meeting with DPIE once draft plans are ready (29/06/16), this was held on 13 September 2016 • The plans are requested to be in final form so that they can be approved (24/02/2017) • On the 6 November 2020, the Resources Regulator provided its reviewed of the amended Extraction Plan and is of the view that the modified mine plan does not materially change the health & safety risk due to subsidence at the site to that subject to the already approved Extraction Plan (refer to **Attachment 2**)
Mid-Western Regional Council (MWRC)	• 8 July 2016 letter sent to MWRC informing that preparation of the EP has commenced. • 10 October 2016 Provision of draft Extraction Plan for review.	• No matters raised at the time of submission, or since.
NSW Environment Protection Authority (EPA)	• 8 July 2016 letter sent to EPA informing that preparation of the EP has commenced. • 10 October 2016 Provision of draft EP for review. • 24 February 2017 EPA feedback supplied to DPE.	• No matters raised at the time of submission • On 24/02/2017: Noted no changes to TSS in Creeks and impacts not greater than predicted. The 2016 Creek stability assessment should have been used if it was available (the 2016 survey had not been completed at the time of submission of the extraction plan). • Recommends stream health monitoring is conducted annually and be conducted at a similar time of the year.

Natural Resources Access Regulator (NRAR), Department of Planning, Industry and Environment (DPIE) – Water (DPIE-Water)	• 8 July 2016 letter to DoI – Water informing that preparation of the EP has commenced. • 10 October 2016 Provision of draft EP for review. • 6 March 2017 Letter DoI-Water to DPIE, feedback on draft EP • 18 May 2017 Comments and UCMPL responses returned to DoI—Water and DPIE • ~12 September 2018 DPIE sent responses provided by UCMPL to request their further feedback • 12 October 2018 – DoI provided feedback on UCMPL response • On the 17 September 2020, UCMPL sought further consultation with DPIE-NRAR as requested by DPIE. • On the 17 December 2020, NRAR provide its review of the amended Extraction Plan. • On the 21 December 2020, UCMPL provided a letter response with an update and further information addressing NRAR's recommendations.	• UCMPL should consult with DoI—Water to ensure the adequate Water Allocation. Greater detail on private bore and dam monitoring and management requested. Ponding and erosion monitoring to occur annually as well as pre and post mining. Reporting of flow events in the Mona Creek. Reporting of water take against WAL in the Annual Review, including losses from surface streams where applicable. Detail when notification of an incident to DPI Water will occur. Reporting of stream health, monitored annually, and water consumption records in the Annual Review. Flow gauges should be installed on the Goulburn River both up and downstream of 'the Drip'. Consider the installation of a Class A Evaporation Pan gauge. • Updated water licencing strategy requested and re-iterated the request for upstream and downstream flow gauges at the Drip and the Class A Evaporation Pan (12/10/2018). • On the 17 December 2020, NRAR provide its review of the amended Extraction Plan and recommended the following (refer to **Attachment 2**): **Prior to Approval** **1. <u>Licencing</u>** Provide a breakdown of the peak annual groundwater flow being incidentally taken / dewatered; for each of the groundwater sources to be intersected by the project including breakdown by management zone where applicable (Refer to letter response from UCMPL dated 21 December 2020). **2. <u>Site Water Balance</u>** The proponent should present an amended site water balance which demonstrates predicted and actual inflows and take of groundwater from each water source - including management zones if applicable – considered essential to demonstrate compliance with the AIP and WMA. (Refer to letter response from UCMPL dated 21 December 2020). **3. <u>The Drip</u>** In addition to current pore pressure and water quality monitoring, the proponent should commit to undertaking and reporting of regular visual inspection and qualitative assessments of the 'The Drip' flows for the purpose of determining any or no impacts due to mining activities Refer to **Appendix A Section 4.2.3.1** of the Water Management Plan and **Table 27** of this EP). **Not Required Prior to Approval** 4. **<u>Mona Creek Alluvium Monitoring</u>** The proponent should install the proposed monitoring bores and VWP, as per Enclosure 1, as soon as practical in order to meet the requirement of a minimum two years of temporal and spatial baseline data. (Refer to letter response from UCMPL dated 21 December 2020). 5. **<u>Evaporation Monitoring</u>** Install a class A Evaporation Pan on site (Refer to letter response from UCMPL dated 21 December 2020). 6. **<u>EMP Documents</u>** Assessment Criteria and TARPs should be updated to include additional monitoring points.

Government Department	Summary of Consultation	Matters Raised by Department During Consultation
		The proponent should update the relevant UCMPL environmental management plan documents (Water Management Plan, Groundwater Monitoring Program, Surface Water Monitoring Program etc.) to align with amendments to the Extraction Plan for LW30 and LWW6-8 and related sub-plans, and the recommendations provided in this assessment (eg. adjusted drawdown contours, additional monitoring points, assessment criteria, and TARPs). (Refer to letter response from UCMPL dated 21 December 2020).

Mine Subsidence Advisory (MSA)	• 8 July 2016 letter sent to the MSAMSA providing information regarding the commencement of preparation of the Extraction Plan LW30 & W6-W8. MSA to receive copy of the draft Built Features and Public Safety Management Plans and Subsidence Monitoring Program once prepared.
	• Email request on the 19 July 2016 from the MSA requesting opportunity to review a copy of the extraction plan in relation to;
	  • Any surface improvements likely to be impacted by subsidence.
	  • Detailed performance indicators as per Table 14, s.24 (Project Approval 08_0184), ensuring surface improvements remain safe, serviceable and repairable.
	  • Current predictions of the potential subsidence effects and impacts (in respect of surface improvements).
	  • Measures to ensure compliance with the performance measures.
	  • Extent of subsidence monitoring in respect of surface development.
	• 21 October 2016 Provision of draft Extraction Plan for review including response to information requested in email 19 July 2016.
		• No matters raised at the time of submission or since.

Department of Planning, Industry and Environment (DPIE) – Biodiversity and Conservation Division (DPIE-BCD) **Formally NSW Office of Environment & Heritage (OEH)**	• 8 July 2016 letter sent to OEH providing information regarding the commencement of preparation of the Extraction Plan LW30 & W6-W8. • 28 September 2016 Phone conversation with Senior Team Leader Planning – North West Region regarding the status of heritage survey on Private Property within the Application Area. • 10 October 2016 Provision of draft Extraction Plan for review. • 24 February 2017 Letter OEH to DPIE. • 25 September 2018 Email OEH to DPIE.	• OEH request the opportunity to review the draft Extraction Plan and Technical Heritage report prior to the proposed meeting (21 Oct 2016). • Identify how an appropriate amount of data will be collected for statistical analysis and identify statistical tests. Clarify the number of observations and time period for a 'declining trend'. Amend the monitoring program (Table 5) to be consistent with Section 8.3 of BMP. • Review performance indicators prior to finalisation of the extraction plan.

Government Department	Summary of Consultation	Matters Raised by Department During Consultation
NSW National Parks & Wildlife Service (NPWS)	• 28 June 2016 meeting outlined Extraction Plan Application Area and predicted impacts. • 8 July 2016 letter sent to NPWS providing information regarding the commencement of preparation of the Extraction Plan LW30 & W6-W8. NPWS to receive copy of the draft Water, Land, Biodiversity and Public Safety Management Plans once prepared. • 26 September 2016 Consultation regarding proposed management and monitoring of potential subsidence within the Durridgere State Conservation Area. • 10 October 2016 Provision of draft Extraction Plan for review. • Draft DSCA Access Licence issued from UCMPL to NPWS 4 March 2019 in relation to MOD4 infrastructure. • NPWS replied on 26 July 2019 with updates regarding the DSCA Access Licence process. • DSCA Access Licence issued by NPWS for Execution on the 5 June 2020.	• No matters raised at the time of submission or since.

2.1.2 Community Consultation

Four Community Consultative Committee (CCC) meetings are scheduled for each calendar year. Each meeting provides a forum to discuss the environmental performance, community performance and mining operational aspects of the Ulan Coal Mine Complex operations. A summary of consultation with CCC members regarding this Extraction Plan is provided in **Table** 7 . Minutes from each CCC meeting are provided on the Ulan Coal website http://www.ulancoal.com.au.

Table 7 Summary of Community Consultation

Party Consulted	Summary of Consultation	Matters Raised by Department During Consultation
Ulan Coal CCC	• CCC Meeting scheduled 7 July 2016 was adjourned due to insufficient members being present to hold a forum. The presentation which included an outline of the features of the Application Area and a timeline for the preparation of the proposed Extraction Plan for LW30 & W6-W8 was distributed via email to the CCC members on 11 July 2016. • CCC Meeting on the 19 March 2020 provided details regarding the amendments required to the Extraction Plan to align with MOD 4. No matters raised at the time of the March 2020 CCC meeting.	• No matters raised at the time of submission. •

This Extraction Plan and associated component management plans for UUG, will be available on the Ulan Coal website at http://www.ulancoal.com.au once approved by DPIE.

2.1.3 Aboriginal Groups

Two Aboriginal Heritage Meetings are held during each calendar year. Each meeting provides a forum to discuss the environmental performance, community performance, Aboriginal Heritage and mining operational aspects of the Ulan Coal Mine Complex. A summary of the consultation with registered Aboriginal stakeholders regarding this Extraction Plan is provided in **Table 8**.

Table 8 Summary of Aboriginal Heritage Consultation

Party Consulted	Summary of Consultation	Matters Raised During Consultation
Traditional Owner Groups	• 14 July 2016 an outline of the features of the Application Area and a timeline for the preparation of the proposed Extraction Plan for LW30 & W6-W8 was provided to the Traditional Owner Groups at the Heritage Meeting. • MOD4 updates provided at the July 2019 Heritage Meeting within no issues were raised in regards to MOD4 or with the Extraction Plan. • Extraction Plan amendment discussed at Heritage Meeting held on the 9 July 2020 with no issues raised in regards to the amended Extraction Plan.	• No matters raised at the time of submission.

2.1.4 Asset Owners

There are several asset owners located within the Application Area, including:

- One private landholder to the west of the Application Area;
- NPWS as the landowner for the DSCA within the eastern portion of the Application Area;
- Three permanent state owned survey control marks; and
- Essential Energy as the owner of the 12.7KW powerline that crosses through the Application Area.

These parties have been previously consulted either during the preparation of the Environmental Assessment for the Project EA, preparation and revisions of the SMP/Extraction Plan for LW27-29 and W4-W5, preparation of this Extraction Plan and MOD4.

Consultation with asset owners with regard to this Extraction Plan commenced in May 2016. A summary of the consultation undertaken for this Extraction Plan is outlined in Table 9. The Private Property Subsidence Management Plan (PPSMP) for LWW6 as agreed with the private landholder is located in **Appendix J**. The PPSMP for LWW7 and LWW8 will be updated in consultation with the private landholder prior to the commencement of mining in each of the respective longwall panels. The agreed management of the Essential Energy asset is in accordance with the revised Essential Energy Management Plan[15] as provided in **Appendix K**.

Table 9 Summary of Asset Owner Consultation

Party Consulted	Summary of Consultation	Matters Raised by Department During Consultation
Private Landholder	• 2012 consultation with landholder regarding the preparation of a draft Private Property Subsidence Management Plan (PPSMP) for the SMP/EP LW27-29, W4 & W5. • May 2016 initial contact with landholder regarding Extraction Plan and requirements for land access and finalisation of the draft PPSMP. • June-July 2016 further discussion with landholder of access and survey requirements, and provision of information requested by the landholder. • August 2016 Meeting with landholder to discuss landholder concerns. Ulan Coal provided further information and developed proposed alternative approach to heritage survey at the request of the landholder. • September 2016 Meeting with landholder and agreement on approach for management of water and heritage. Inspection of property by subsidence engineer and Ulan Coal to aid preparation of the Extraction Plan.	• Negotiation of a written Alternative Water Supply Agreement. • Landholder will not permit further heritage survey on property. • PPSMP to be prepared for UUG rather than Ulan Coal Mine Complex at this stage.

[15] ULN SD PLN 0071 Essential Energy Management Plan submitted and approved for SMP/Extraction Plan for LW27-29 and W4-W5.

Party Consulted	Summary of Consultation	Matters Raised by Department During Consultation
	• October 2016 Supplied draft revised Private Property Management Plan (Appendix J of EP) to landholder for review. • February, March, April 2017 Additional information on cultural heritage supplied. • April 2018 Document prepared indicating the impacts and Schedules for each longwall. • March 2019 Update of PPSMP LWW6-W8 consistent with DPIE and landholder previous feedback provided in hardcopy. • May 2019 Meeting to discuss timing of LWW6. Further revised and updated PPSMP and LMP provided to the landholder for review and discussion. • Ongoing consultation with the landowner continued during 2019 and 2020 in relation to finalising PPSMP for LWW6 and monitoring requirements as required by the PPSMP for LWW5.	
Essential Energy	• May 2016 Consultation with Manager Planning- North Western Region Essential Energy to provide update on preparation of new Extraction Plan and express intention to complete a minor review of the existing agreed Essential Energy Management Plan to include the LW30 & W6-W8 Extraction Plan Application Area. • October 2016 Supplied draft revised Essential Energy Management Plan (Appendix K of EP) to Manager Planning- Northern Region Essential Energy for review. Essential Energy accepted the Essential Energy Management Plan on 26 October 2016.	• No matters raised at the time of submission or since.

2.2 Identification of Surface and Subsurface Features

Table 10 provides a summary of surface and sub-surface features (**Figures 7-12**), including environmentally sensitive areas within the Application Area, and whether these features are likely to be impacted by subsidence (**Technical Report 1** and **Technical Report 1a**). The relevant section to where the item has been addressed in this Extraction Plan is provided in **Table 10**.

Table 10 Summary of Surface & Subsurface Features

	Within Application Area	Potential to be impacted by subsidence	Relevant Sections
Natural Features			
Rivers and creeks	Yes	Yes	**2.3.1 & 3.1**
Aquifers, known groundwater resources	Yes	Yes	**2.3.2 & 3.1**
Cliff formations	Yes	Yes	**2.3.3.2 & 3.2 & 3.6**
Threatened and protected species	Yes	Yes	**2.3.4 & 3.3**
Natural vegetation	Yes	Yes	**2.3.4 & 3.3**
Conservation Areas			
Durridgere State Conservation Area	Yes	Yes	**2.3.3 & 2.5.3 & 3.2 & 3.6**
Ulan Coal Vegetation or Conservation Offset Areas	No	No	**2.5.2**
Public Utilities			
Essential Energy 12.7 kV overhead power line	Yes	No	**2.3.5.3 & 2.5.3 & 3.4**
State Survey Control Marks	Yes	Yes	**2.3.5.4 & 3.4**
Private Bores/Wells	No	No[1]	**2.3.5.5 & 3.1**
Ulan Coal Owned Infrastructure			
Internal Roads (unsealed all weather access roads)	Yes	Yes	**2.3.5.1 & 3.4**
Power line to Bobadeen Irrigation Scheme (BIS)	Yes	Yes	**2.3.5.1 & 3.4**
MG29 Dewatering Borehole/Station	Yes	No	**2.3.5.1 & 2.5.3 & 3.4**
Mine dewatering surface polyethylene pipeline	Yes	No	**2.3.5.1 & 3.4**
Vent Tube Bundle Monitoring Site	Yes	No	**2.3.5.1 & 3.4**
Groundwater Monitoring Piezometers	Yes	Yes	**2.3.5.1 & 3.4**
Polyethylene water line to BIS	Yes	Yes	**2.3.5.1 & 3.4**
Centre pivots 1 to 4 (BIS)	Yes	Yes	**2.3.3.3& 3.4**
Farm Dams	Yes	Yes	**2.3.3.1 & 3.4**
Fences/Gates	Yes	Yes	**2.3.3.1 & 3.4**
Access Tracks	Yes	Yes	**2.3.3.3 & 3.2 & 3.6**
Heritage Sites			
Mona Creek Rock Shelter Sites	Yes	No	**2.3.6.1 & 2.5.3 & 3.5**
Other Aboriginal Cultural Heritage Sites	Yes	Yes	**2.3.6.1 & 2.5.3 & 3.5**
European Heritage Sites	Yes	Yes	**2.3.6.2 & 2.5.3 & 3.5**
Private Property			
Fences/Gates	Yes	Yes	**2.3.3.3 & 3.4**
Farm Dams	Yes	Yes	**2.3.3.3 & 3.4**
Access Tracks	Yes	Yes	**2.3.3.3 & 3.2 & 3.6**
Shooting Range Shelter	Yes	Yes	**2.3.5.2 & 3.4**
Residence and associated buildings, Sheds, Services and Stock Yards	No	No	**2.5.2**

Notes: [1] Several Private Bores are predicted to be impacted by groundwater drawdown as a result of secondary extraction within the Application Area.

2.3 Description of Surface and Subsurface Features

The revised Application Area (**Section 1.3**) includes an additional section of the DSCA (**Section 2.3.3**). All other natural features and surface infrastructure as described below remains the same with the exception of newly built features constructed by UCMPL within the Application Area, as described in **Section 2.3.5.1**.

2.3.1 Surface Water

Four surface water creek catchment areas are present within the Application Area (**Figure 11**). Ulan Creek, Curra Creek and Bobadeen Creeks are tributaries of the Hunter River system. Mona Creek is located in the Murray Darling Basin system.

The Mona Creek Catchment area is present centrally and west of the Application Area. Mona Creek is a fourth order ephemeral stream (third order within the subsidence zone) which flows to the Talbragar River. Flows in Mona Creek are triggered during storm events or after prolonged rainfall and pools of permanent or semi-permanent water are present in the downstream reaches. Approximately 600m of Mona Creek will be undermined during the extraction of LWW8. Tributaries of Mona Creek will be undermined across the Application Area.

A small portion of the Ulan Creek catchment is located in the south of the Application Area, with the creek line considered remote from the Application Area. Ulan Creek is a fourth order stream (third order within the subsidence zone) flowing in a southerly then easterly direction, through the Project Approval boundary before joining the Goulburn River. Ulan Creek is an ephemeral creek system with flows occurring during storm events or after prolonged rainfall. The flow in Ulan Creek is augmented by discharge under licence EPL394 from the Bobadeen Water Treatment Facility (BWTF).

A small portion of the Curra Creek catchment is located in the north-east of the Application Area, with the creek line is considered remote from the Application Area. Curra Creek is a third order ephemeral stream which flows only during storm events or after prolonged rainfall. This creek flows in a southerly direction in the very north eastern section of the Project Approval Boundary, upstream of the influence of current mining activities, before joining with Bobadeen Creek.

A small portion of the Bobadeen Creek catchment is present in the south-east of the Application Area, with the creek line considered remote from the Application Area. Bobadeen Creek is a fourth order stream (first & second order within the subsidence zone) and flows through the north-east section of the Ulan Coal Mine Complex in a south-easterly direction to the Goulburn River. The creek is ephemeral and generally experiences very low flows, with some pools of permanent or semi-permanent water present in the downstream reaches.

2.3.2 Groundwater

The regional groundwater systems were described in detail in the Groundwater Assessment prepared as part of the Project EA (Umwelt 2009). An overview of the regional groundwater systems is provided below. The regional groundwater system comprises two general aquifer types:

- Alluvial aquifers associated with major drainage lines; and
- Hardrock/coal aquifers associated with the coal measures

The properties of the two aquifer systems vary significantly. The alluvial aquifers within the region include alluvial deposits along the Goulburn River and Ulan Creek. These deposits are generally a mix of clayey silts and sands with occasional coarser gravel layers. The alluvial deposits within the region are considered shallow and of limited extent. The hardrock/coal aquifers comprise Jurassic sandstones and siltstones overlying Triassic sandstones with Permian coal measures underlying the Triassic layer. These geological units form relatively discrete layers dipping to the north-east at a shallow angle and overlie a relatively impermeable granite basement.

There are no identified groundwater dependant ecosystems (GDE) (for example no hanging swamps and limestone cave systems) or associated springs within the Project Area[16]. Potential examples of these ecosystems within the boundary of the Ulan Mine Complex are generally not well-defined and blend into adjacent drier communities (Project EA).

The Goulburn River and Talbragar River act as regional drainage sinks. Groundwater discharge into rivers is termed 'baseflow' and typically takes longer to reach a river than rainfall-runoff across the land surface. Flow analysis of the Goulburn River (MER, 2009) indicates that the upper reaches of the Goulburn River exhibit fast recession of stream flows with flows sustained only for short periods of time. This suggests that the upper reaches of the Goulburn River have modest to poor storage characteristics in the shallow aquifer systems which contribute to baseflow. As stated by MER (2009), "Minor contributions of baseflows from slightly deeper hardrock systems (as upward leakage possibly via springs), are more likely to dominate the extended dry periods when flows are frequently less than 0.5 ML/day".

2.3.3 Land

Land in the west of the Application Area consists of gentle valleys with sandstone outcrops. Land within the Application Area is largely owned by UCMPL with one private landholder in the west and a small section of the Durridgere State Conservation Area (DSCA) in the east (**Figure 10**). The Application Area extends approximately 445 meters into the DSCA which is managed by NPWS. As a result of the extension of LW30, approximately 2.8ha would be mined below the DSCA.

There are no current proposed developments within the Application Area by non-UCMPL parties.

2.3.3.1 Agricultural Land

The majority of Agricultural land within the Application Area is owned by UCMPL and leased for grazing purposes. The private property located in the west is also used for cattle grazing (**Figure 10**).

2.3.3.2 Sandstone Cliff Formations

There are two cliff formations within the Application Area (**Figure 9**). The cliff line in the north-west corner of the Application Area (which contains the Mona Creek Rock Shelters) is protected from subsidence impacts by a barrier greater than half depth of cover from the closest goaf edge. Management of the Mona Creek Rock Shelters will be undertaken in accordance with the HMP LW30 & LWW6-LWW8. The cliff line over LWW7 is approximately 300m in length and less than 20 meters high. It extends from UCMPL owned land onto private property.

2.3.3.3 Access Tracks

There are several UCMPL owned internal access roads within the Application Area (**Figure 7**). Access to the internal tracks that traverse the surface is controlled by UCMPL through fencing, signage and locked gates, although access may be possible if these controls are breached.

There is a four wheel drive access track existing in the DSCA within the Application Area, running in a north-south alignment adjacent to the UCMPL boundary fence.

There are several access tracks on private property in the east within the Application Area, no access tracks occur directly beneath the cliff lines within the Application Area.

2.3.4 Biodiversity

The Application Area contains two Endangered Ecological Communities (ECC); Blakely's Red Gum Open Forest, located along sections of Mona creek and drainage lines, and Derived Native Grassland, in the open areas. There may be threatened species of woodland birds and microbats utilising habitat within the Application Area, those previously identified are shown in **Figure 9**. The Application Area

[16] Ulan Coal - Continued Operations Environmental Assessment (Umwelt 2009).

does not contain any UCMPL vegetation or conservation offset areas. A small section of the DSCA is present in the east of the Application Area (**Figure 9**).

There are no identified groundwater dependant ecosystems (GDEs) or associated springs within the Project Area. While there are potentially several examples of these ecosystems within the boundary of the Ulan Coal Mine Complex, these are generally not well-defined, blend into adjacent drier communities and are not significant GDEs such as hanging swamps and limestone cave systems, which are not present within the boundary of the Ulan Coal Mine Complex (EA 2009).

2.3.5 Built Features

The majority of built features within the Application Area are owned by UCMPL. Non-UCMPL owned infrastructure includes one built feature located on private property, a power line owned/managed by Essential Energy and state owned survey control marks (**Figure 7**).

2.3.5.1 UCMPL Owned Infrastructure

UCMPL owned infrastructure located within the Application Area includes permanent irrigation pivots, an overhead power line and polyethylene water pipeline servicing the Bobadeen Irrigation Scheme (BIS), MG29 Dewatering Station (including surface equipment, power supply and surface polyethylene pipeline), a services monitoring site, several groundwater monitoring piezometers, farm dams and farm fences.

A new service corridor installed by UCMPL is positioned diagonally across the western corners of LWW6 - LWW7 and consists of an unsealed road, powerline and pipelines to service UWO's small bore ventilation shaft and dewatering installations to the west of the Application Area (**Figure 7**).

Changes to the location of UCMPL owned infrastructure as a result of MOD4 include the mine dewatering systems at the eastern end of LW30, which now will be positioned above the longwall extraction area (**Figure 7**).

The infrastructure within the service corridor and mine dewatering systems above LW30, LW32 and LW33[17] have been designed to accommodate the subsidence movements forecast in these areas.

2.3.5.2 Private Property Built Features

A small shelter made of timber and corrugated iron is located on Private Property within the Application Area (**Figure 7**). Agricultural built features of the property with the Application Area include boundary and internal farm fences and two farm dams.

2.3.5.3 Essential Energy Power Line

An Essential Energy Single Wire Earth Return (SWER) 12.7 kV power line is located in a north-south alignment over the main headings of UUG within the Application Area. The power line services one rural property to the north of the project area.

2.3.5.4 State Survey Control Marks

Three state survey control marks are located within the Application Area and a further ten marks within a two kilometre radius of the Application Area boundary. Some of these state survey controls marks are already reported as 'disturbed' by mining.

[17] Mine dewatering systems above LW30, LW32 and LW33 to be constructed prior to longwall extraction.

2.3.5.5 Private Bores

There are no Private Bores located within the Application Area. Boreholes located within 3 to 5 km of UUG may be impacted by groundwater drawdown (**Technical Report 3**). The location of all known private bores within approximately a ten kilometre radius of UUG are displayed in **Figure 17**.

2.3.6 Heritage

2.3.6.1 Aboriginal Heritage

There are approximately 127 recorded Aboriginal archaeological sites identified within the Application Area, a further 31 sites are located within 50 metres of the Application Area (**Figure 8**). These are a subset of those discussed in the Project EA and include scatter sites, isolated finds, rock shelters and scar trees.

The Mona Creek Rock Shelters sites Ulan Site ID#180 - 184[18] are located in the north-west of the Application Area, sites Ulan Site ID#185 – 187 are located adjacent to the Application Area.

Approximately 25 ha area of the Application Area, in which subsidence impacts could occur, has not been subject to heritage survey[19] due to a restriction of access by the landholder for the survey (**Technical Report 6**).

2.3.6.2 European Heritage Sites

There are two known European heritage sites within the Application Area, a historical timber getting site (CC6) and Apple Tree Flat Farming Complex (PK243) (**Figure 8**). Photographs and details of these sites are described in the Project EA and in the Heritage Management Plan[20].

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[18] PA08_0184 requires Nil impact under Condition 24 Schedule 3.
[19] In accordance with the requirement of Section 3.7.5 of Ulan Coal's HMP ULNCX-111515275-95.
[20] ULNCX-111515275-95 Heritage Management Plan.

Figure 7 Location of Built Features within Application Area

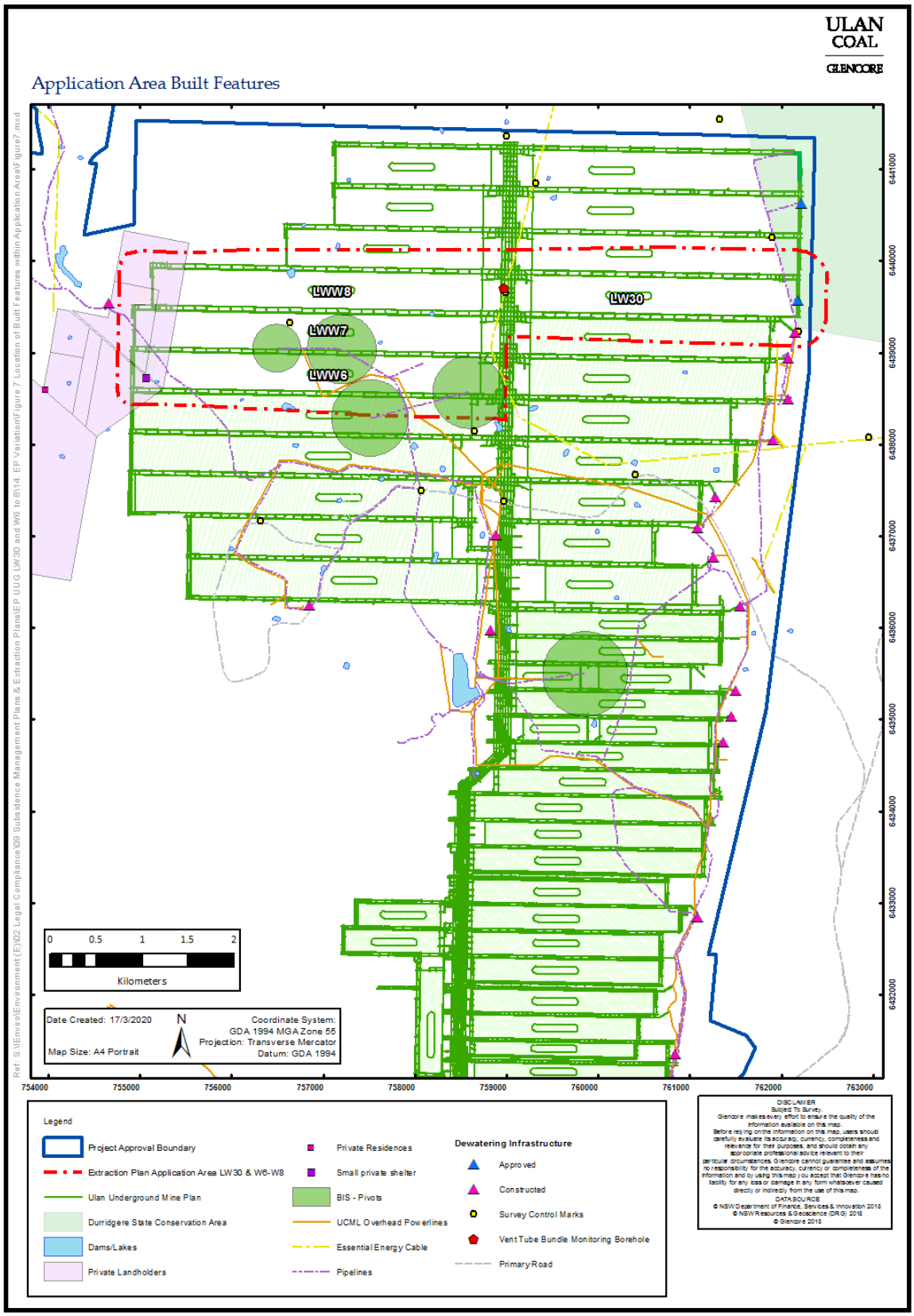


Figure 8 Heritage Features of the Application Area

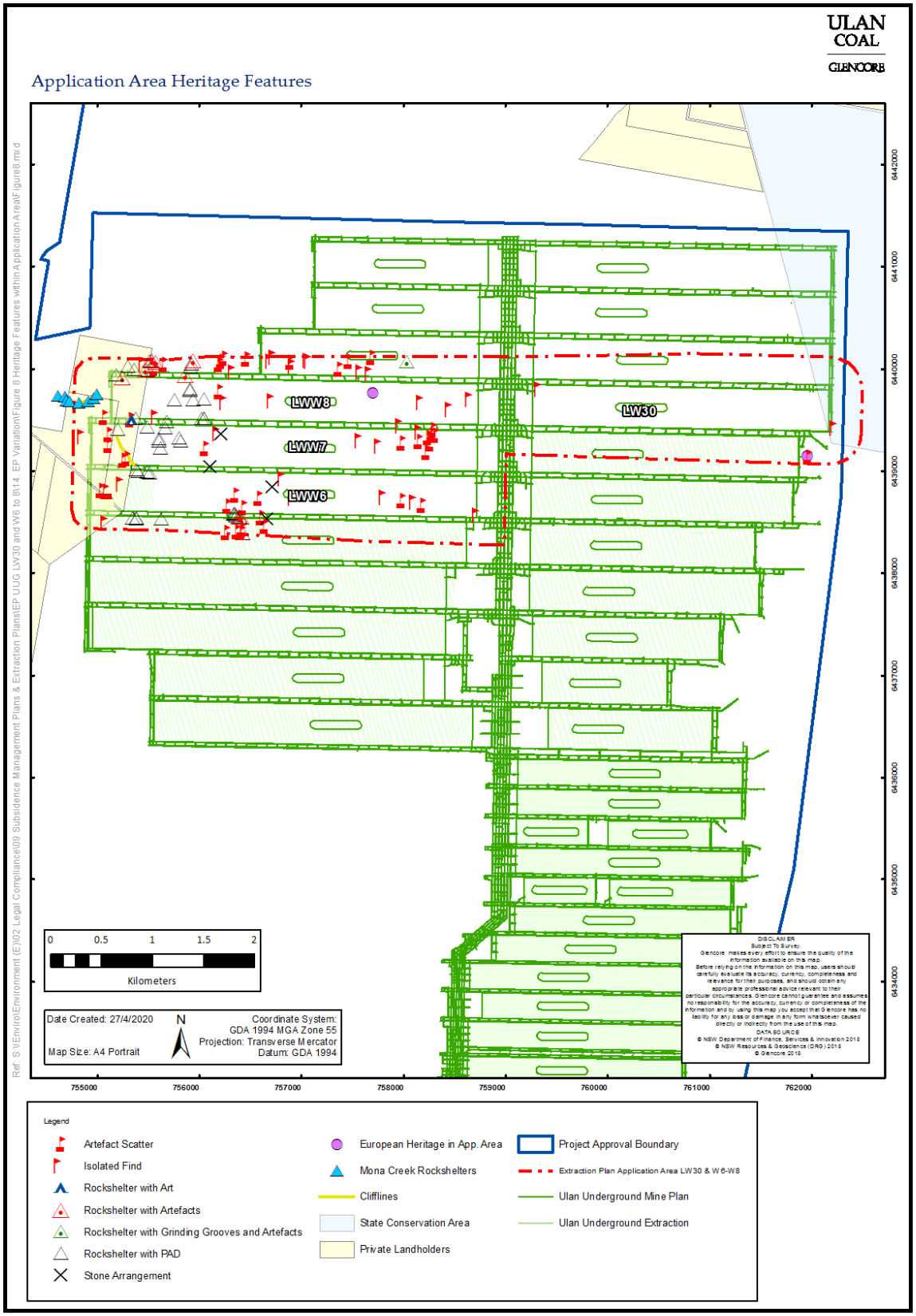


Figure 9 Flora, Fauna and Natural Features of the Application Area

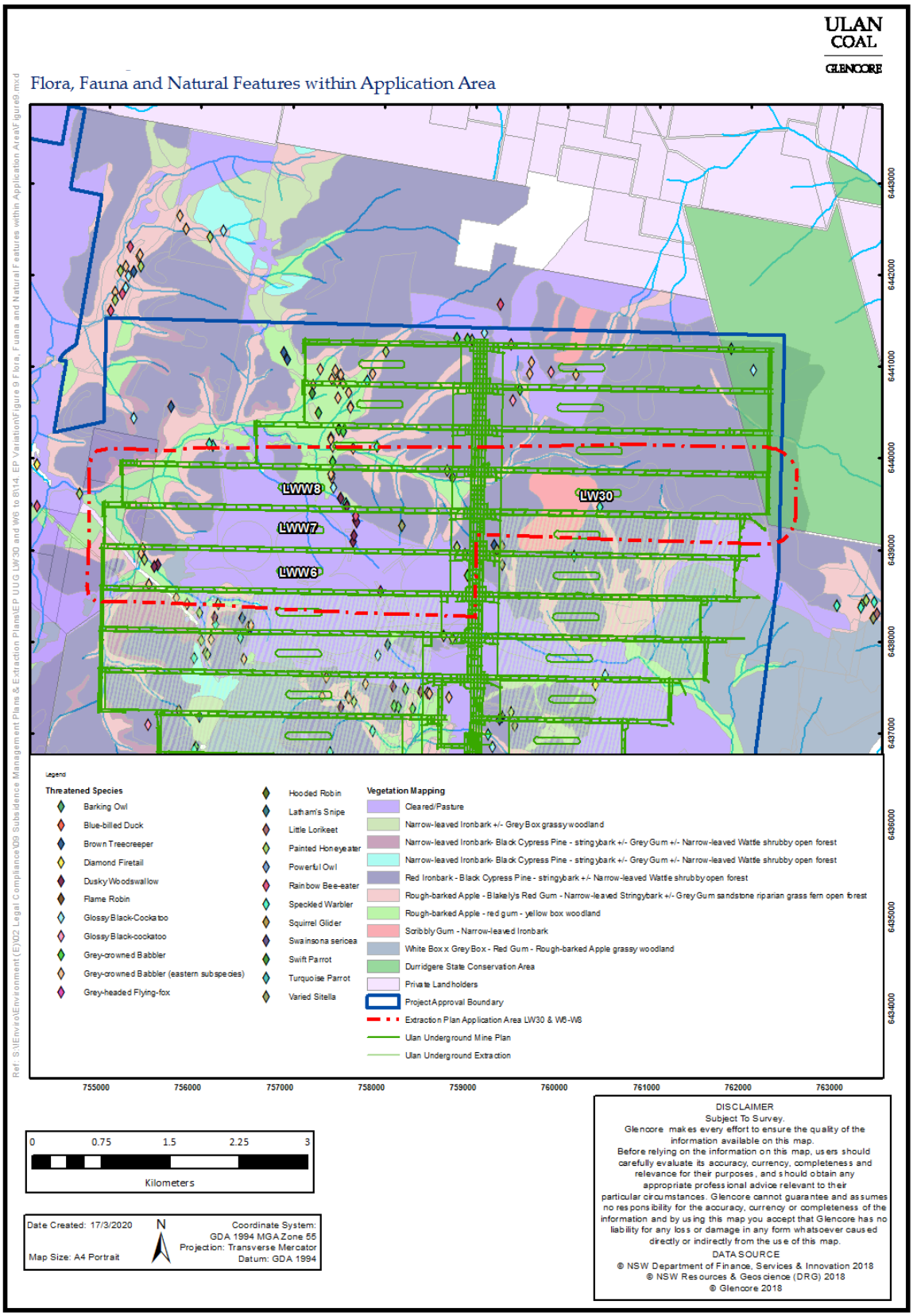


Figure 10 Land Ownership and Conservation Areas

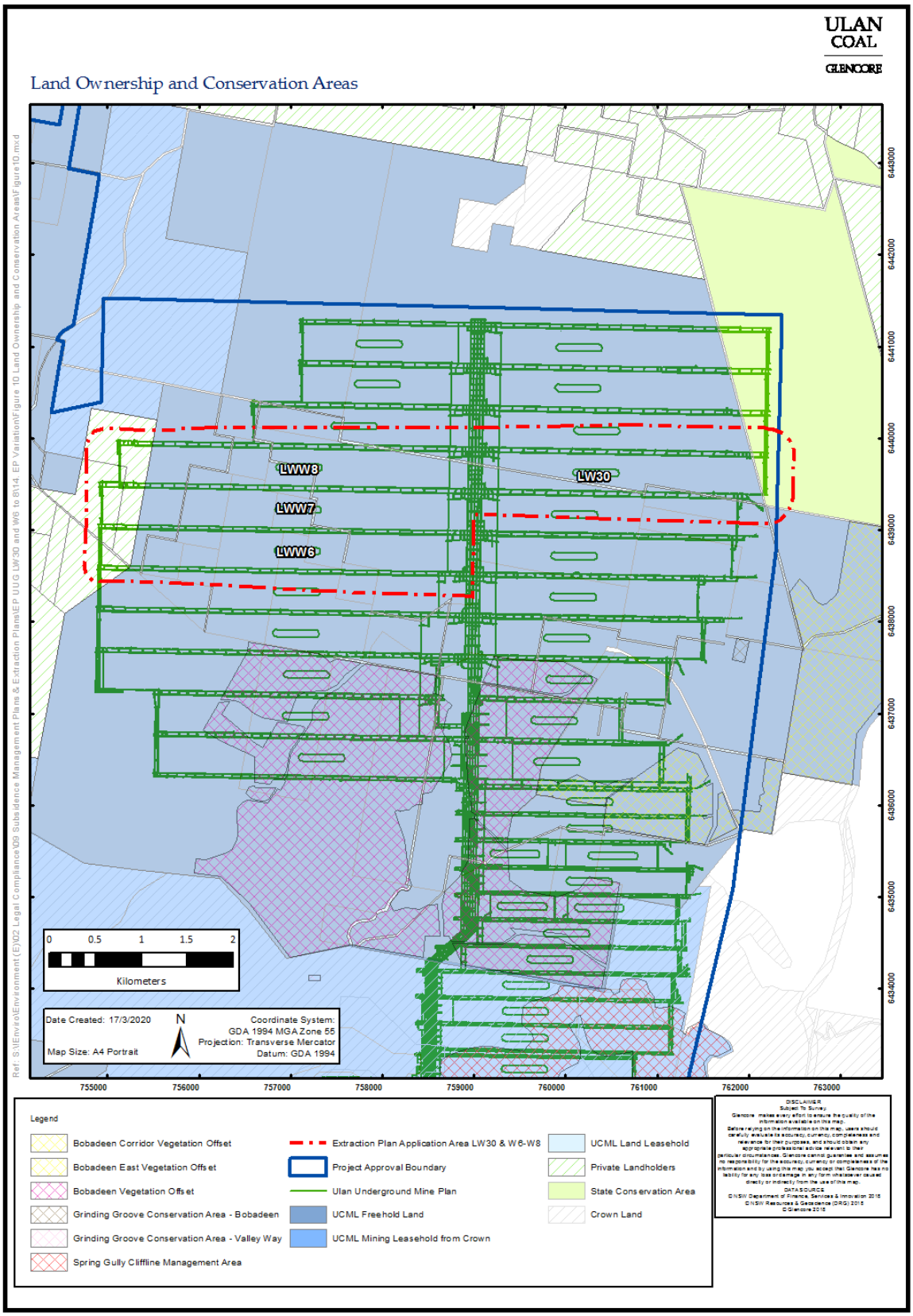
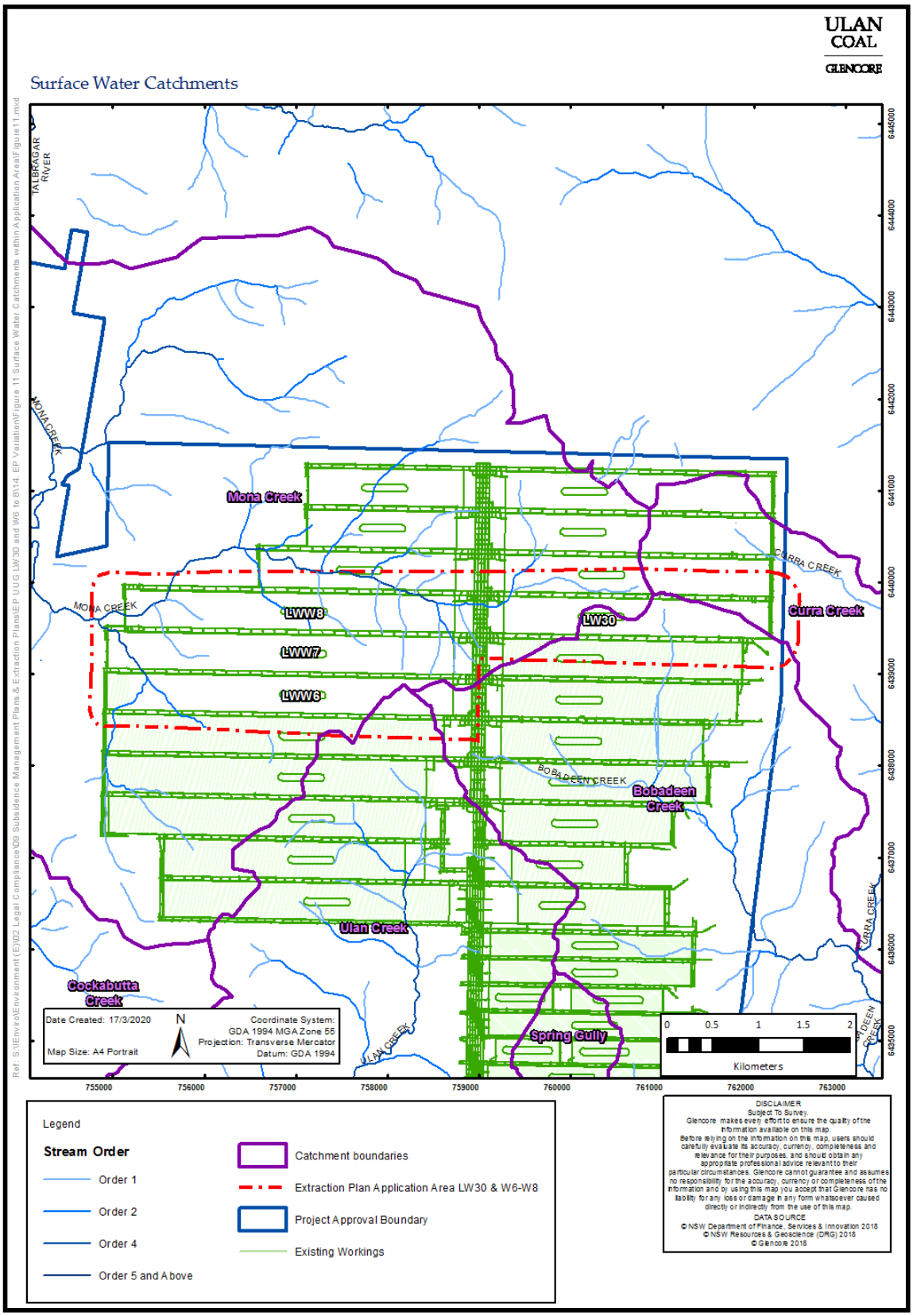


Figure 11 Surface Water Catchments in relation to the Application Area



2.4 Risk Assessment

A risk assessment for the Extraction Plan and Application Area was completed on 7 July 2016. The risk assessment was facilitated by AXIS Consulting (**Technical Report 2**) and attended by relevant UCMPL personnel and subsidence specialists. The primary objectives of the risk assessment were:

- To identify items to be addressed in the Extraction Plan (and related studies);
- Use the risk assessment as input into the preparation of the Extraction Plan;
- Develop parameters for inclusion in component management plans;
- Involve a cross section of UCMPL personnel, subject matter experts, decision makers and key stakeholders in the issue (hazard) identification process;
- Provide a risk rating for identified issues;
- Identify requirement for additional controls;
- Create implementation plan for additional investigations and/or controls; and
- Document the process and the results.

The potential consequences raised during the risk assessment process are provided in **Table 11** with a cross-reference to where the potential consequence has been addressed in this Extraction Plan. All hazards were ranked as low with the implementation of the existing and additional controls.

Table 11 Key Issues Raised in Risk Assessment

Potential Consequence	Section Addressed
Water flow and quality changes to tributaries feeding into Mona and Bobadeen Creek due to mine subsidence.	**Section 3.1, Appendix A, Technical Report 4**
Damage to environment due to subsidence repair activities.	**Section 3.8, Appendix H**
Step formations and large cracks resulting in impacts on watercourses.	**Section 3.1, Appendix A, Technical Report 1, Technical Report 1a**
Groundwater impacts	**Section 3.1, Appendix A, Technical Report 3**
Impacts to Threatened or Protected Species.	**Section 3.3, Appendix C, Technical Report 5**
Far field subsidence outside the 26.5^0 zone.	**Section 2.5, Technical Report 1, Technical Report 1a**
Damage to archaeological sites whilst mining is occurring in the vicinity.	**Section 3.5, Appendix E, Technical Report 1, Technical Report 1a**
Personnel exposed to subsidence affected roads / tracks.	**Section 3.6, Appendix F, Technical Report 1, Technical Report 1a**
Subsidence leads to ecological impacts in Vegetation and/or Habitat in Natural vegetation or Endangered Ecological communities.	**Section 3.3, Appendix C, Technical Report 5**
Surface water alterations and impacts on vegetation.	**Section 3.3, Appendix C, Technical Report 5**
Surface cracking (minor based on historical experience) impacting public safety.	**Section 3.6, Appendix F, Technical Report 1 Technical Report 1a,**
Damage to Built features on Private Property caused by subsidence.	**Section 3.4, Appendix D, Appendix J**
Impacts to Mine Owned and Private Agricultural Utilisation or Agricultural Suitability of Farm Land due to mine subsidence.	**Section 3.2, Appendix B, Appendix J**
Impacts on Private Bores due to Groundwater drawdown	**Section 3.1, Appendix A, Technical Report 3**

2.5 Revised Subsidence Predictions

The potential subsidence impacts of longwall mining and environmental consequences of UUG have been assessed in the:

- Project EA,
- *Environmental Assessment Modification of Ulan Coal - Continued Operations 2011* (MOD 1),
- *Environmental Assessment Modification to Ulan Coal - Continued Operations 2012* (MOD 2),
- *Environmental Assessment – Ulan West Modification 2015* (MOD 3); and
- *the Ulan Continued Operations Project - Modification 4 Longwall Optimisation Project Environmental Assessment 2018 (MOD 4).*

The *Subsidence Assessment for Extraction Plan LW30 and LWW6 - LWW8 at Ulan Underground Mine (2016)* was prepared by SCT and is provided as **Technical Report 1**.

A revised *Subsidence Assessment for Amendment to LW30 and LWW6 - LWW8 Extraction Plan (2019)* was prepared by SCT and is provided as **Technical Report 1a.**

A summary of the revised predictions are provided in **Sections 2.5.1**, **2.5.2** and **2.5.3**.

2.5.1 Subsidence Behaviour Parameters

Subsidence monitoring has been conducted routinely since the commencement of longwall mining in 1986 at UUG and provides a strong basis for predicting future subsidence over LW30 & LWW6 - LWW8 (**Technical Report 1**). Maximum tilts and strains have been estimated using the approach described by Holla (1991) for estimating subsidence behaviour in the Western Coalfield, with consideration of the site specific conditions and the results of previous measurements at UUG (**Technical Report 1**).

The subsidence impacts anticipated are not particularly sensitive to specific values of subsidence, strain or tilt, but rather to general trends in subsidence behaviour. The prediction methodology focuses on understanding the general nature of the subsidence behaviour and the impacts such subsidence behaviour is likely to have. This approach is considered appropriate for the types of surface features and the type of impacts that are expected (**Technical Report 1**).

The subsidence predictions made for the Project EA were undertaken based on the subsidence information available at the time from mining at UUG and focussed more generally across the broad areas of future mining at UUG and all of the Ulan West Mine. The revised subsidence assessment specific for LW30 & LWW6 - LWW8 has considered the approved modifications to panel geometry for UUG, improvements in survey techniques and applied a conservative maximum mining height of 3.3 meters.

The revised subsidence parameters are more conservative than the Project EA predictions, this is mainly a result of improved subsidence monitoring that has allowed more accurate recording of subsidence movements. Despite the predicted changes in subsidence parameters, no significant changes in subsidence impacts are expected from those described in the Project EA (**Technical Report 1**). Performance indicators have been developed for impacts anticipated during the secondary extraction of LW30 & LWW6-LWW8.

Table 12 summarises the subsidence parameters that were predicted in the Project EA and the maximum subsidence predictions presented in **Technical Report 1** on the basis of updated information. Parameters are the maximum likely subsidence during the secondary extractions of each longwall panel, actual subsidence will vary across the subsided areas.

The EA (Umwelt 2009) predicted maximum vertical subsidence of 1.6m. This maximum is increased to 1.7m within the Application Area to reflect a potential increase in the coal seam extraction height. **Figure 13** shows contours of vertical subsidence that are expected at the completion of secondary extraction within the Application Area. These subsidence contours are based on goaf edge subsidence profiles

measured previously at UUG with an upper limit of maximum subsidence of 1.7m. The actual maximum subsidence is expected to range between 0.9m and 1.5m over most of the area. Maximum vertical subsidence in a single seam situation is naturally variable by about 15% for any given panel geometry and overburden depth. The revised subsidence contours in **Figure 12** should be regarded as indicative of the general level of subsidence rather than a precise indication of subsidence at a point.

Table 12 Assessment against Project EA & EP Maximum Subsidence Parameters

Longwall Panels	LW30	LWW6	LWW7	LWW8
Subsidence (m)	1.7 **1.6**	1.7 **1.6**	1.7 **1.6**	1.7 **1.6**
Tilt (mm/m)	30-35 **10-20**	50-55 **10-20**	50-55 **10-20**	50-55 **10-20**
Tensile Strain (mm/m)	10-15 **15**	15-20 **15**	15-20 **15**	15-20 **15**
Compressive Strain (mm/m)	15-20 **15**	20-25 **15**	20-25 **15**	20-25 **15**

Notes: Normal typeface: EP (Revised Subsidence Assessment for Longwalls 30 & W6 - W8, SCT 2016)
Bold Typeface: EA (Environmental Assessment - 2009)

Maximum tilt predicted has increased slightly to 55mm/m compared to maximum tilt predicted in the EA (Umwelt 2009) at similar depth (20-40mm/m). This increase is a result of the use of Holla's more general Western Coalfield guidelines and recent measurements using the improved survey technique, rather than the site specific experience from UUG. This increase is considered appropriate for the purpose of impact assessment and managing the natural variation in subsidence parameters including extraction height. Similarly maximum strain predicted is increased to 25mm/m compared to maximum strain of 5-15mm/m predicted in the EA (Umwelt, 2009).

Subsidence over each panel is likely to be substantially complete once the panel has been mined, but additional subsidence is expected when the next longwall panel is mined, mainly close to the intermediate chain pillar. Additional subsidence of 50-100 mm is expected in these areas (**Technical Report 1**).

2.5.2 Revised Subsidence Predictions

SCT Operations Pty Ltd (SCT) were commissioned by UCMPL to update the subsidence assessment to support this amendment to the Extraction Plan. The revised *Subsidence Assessment for Amendment to LW30 and LWW6 - LWW8 Extraction Plan (ULA5059)* (**Technical Report 1a**). In summary SCT confirmed:

- The proposed longwall extensions represent a marginal increase in the overall mining and subsidence footprint but subsidence effects are expected to be the same for the approved Extraction Plan and the impacts are expected to the similar to these presented in SCT (2016) and consistent within those described in SCT (2018a) for the MOD 4 extension areas.
- The suggested values of performance indicators for conventional subsidence behaviour for the proposed amendment to LW30 and LWW6-LWW8 Extraction Plan remain the same as those recommended in SCT (2016).
- The predictions for maximum subsidence effects within the revised Extraction Plan Application Area for the amendment to LW30 and LW6-LW8 Extraction Plan have not changed. The maximum values for subsidence parameters are the same as in SCT (2016) and consistent with those presented in SCT (2018a) for MOD4.
- Although subsidence estimates are likely to represent the maximum values of subsidence, tilt and strain, it should be recognised that some unconventional subsidence movements including steps, compression overrides and high compression zones at low topographic points may locally exceed the estimated conventional parameters. It is not possible to estimate the occurrence of

unconventional subsidence movements with a high degree of certainty, but such movements are not expected to have a particularly significant impact in a bushland environment or in open grazing land.

2.5.3 Subsidence Related Phenomena

Experience from mining at UUG since approval of the EA (Umwelt 2009) indicates the potential for three types of subsidence related phenomena that had not previously been observed: valley closure, steps in the surface and compression ripples.

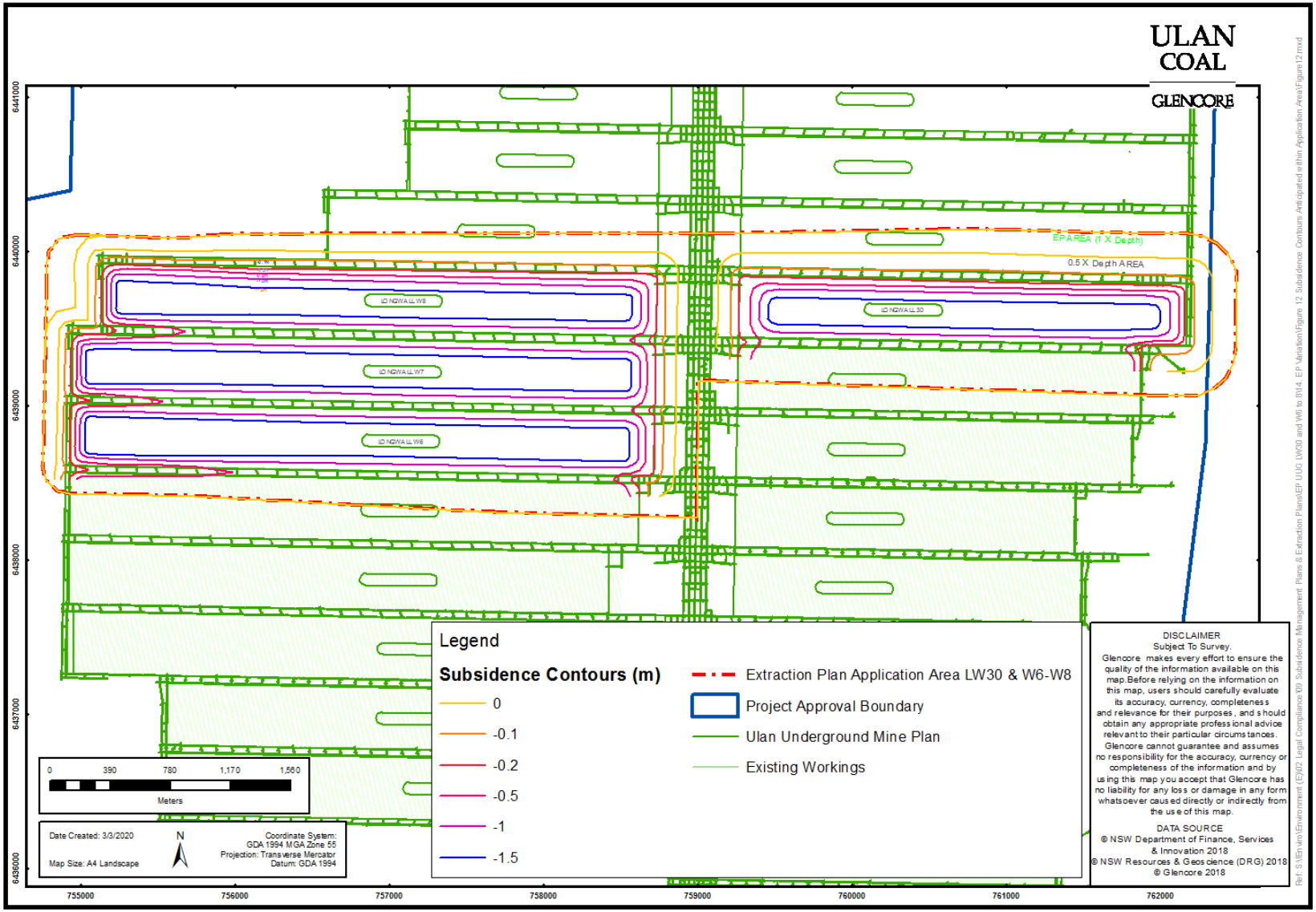
Valley closure effects were recognised to occur at the time the EA (Umwelt 2009) was prepared but there were no direct measurements of this phenomena at UUG. Subsequent to the EA (Umwelt 2009), valley closure was observed across Bobadeen Creek and at other locations. Valley closure and concentration of far field horizontal movements may occur at topographic low points.

Steps in the surface were observed to develop in areas of sandstone outcrop above Longwalls C, E and F, typically at overburden depths of less than about 140m but also at 180m. There are no areas within the Application Area where the overburden depth is less than 165m so steps are considered unlikely to develop.

Compression ripples were observed to occur over Longwalls 25, 26, and 27. They lead to localised compression hump, surface cracks and over-steepening of the ground surface at the front edge. They appear to occur primarily within the Jurassic strata at overburden depths of about 240-260m. There is potential for a compression ripple to develop within the Application Area. The consequences of a ripple forming in an open farmland or bushland environment are considered to be low.

The parameters provided in **Table 13** are likely to represent the maximum values of subsidence, tilt and strain for the Application Area, however it should be recognised that some subsidence movements including valley closure, steps in the surface and compression ripples may locally exceed the estimated conventional parameters presented. It is not possible to estimate the occurrence of these subsidence movements with a high degree of certainty, but such movements are not expected to have a significant impact in the bushland environment or open grazing land present within the Application Area (**Technical Report 1**).

Figure 12 Subsidence Contours Anticipated within Application Area



2.5.4 Performance Indicators

The subsidence parameters measured as part of the ongoing subsidence effects monitoring at UUG are suitable as performance indicators of subsidence behaviour. The following performance indicators will be implemented in the assessment of subsidence behaviour within the Application Area:

- Vertical subsidence no greater than 1.9m;
- Tilts no greater than 60mm/m; and
- Horizontal strains no greater than 30mm/m.

Unconventional subsidence associated with the phenomena of valley closure, steps and ripples (**Section 1.6.1**) may exceed these performance indicators but all these phenomena are easily identifiable as localised effects. The presence of these phenomena is not an indication that subsidence behaviour is out of range or non-compliant with predictions and therefore will not be considered an exceedance of the performance indicators.

Subsidence movements that exceed the performance indicators and are not associated with valley closure, steps or ripples will be managed and reported in accordance with the Contingency Plan (**Figure 20**).

2.5.5 Subsidence Performance Measures

Subsidence performance measures specified in Table 14 Condition 24, Schedule 3, of PA08_0184 are listed in **Table 13**. Further details in relation to assessment of these subsidence performance measures are provided in **Section 3**.

Table 13 Subsidence Performance Measures

Water	
Ulan, Mona & Cockabutta Creeks	No greater environmental consequences than predicted in the EA
Biodiversity	
Threatened species, populations, habitat or ecological communities	Negligible impact
Land	
Cliffs in the Brokenback Conservation Area	Nil environmental consequences
Other cliffs	Minor environmental consequences
Heritage	
Aboriginal sites	Nil impact in the Brokenback Conservation Area (CA), Grinding Groove Conservation Area; and on Mona Creek Rock Shelter Sites
Talbragar Fish Fossil Reserve	Negligible impact
Other Heritage Sites	No greater impact than predicted in the EA
Built Features	
All built features	Safe, serviceable and repairable unless the owner agrees otherwise in writing
Public Safety	
Public Safety	No additional risk due to mining

2.5.6 Features Remote from the Application Area

Horizontal movements of greater than 20mm are likely to extend outside the Application Area to a distance of about 1.8-2km from the nearest goaf edge. The impacts from horizontal movements beyond a distance from the goaf equal to overburden depth are expected to be imperceptible for all practical purposes (**Technical Report 1 & Technical Report 1a**). There is no credible potential for subsidence impacts to the following features which are remote from the Application Area;

- Cockabutta Creek;
- UCMPL's vegetation and conservation offset areas;
- The Talbragar Fish Fossil Reserve; or
- The private residence or associated services and farm buildings of property No. 254[21] .

2.5.7 Features of No Perceptible Impact

The revised subsidence predictions for LW30 & W6-W8 provided by SCT Operations (**Technical Report 1 & Technical Report 1a**) predict no perceptible impact to the following surface features located within the Application Area: (**Figures 8 and 9**)

- Mona Creek rock shelter sites ID# 180-184[22];
- Aboriginal heritage isolated finds and artefact scatter sites;
- European Heritage Sites Apple Tree Flat Farming Complex (PK243)[23] and timber getting site (CC6);
- MG29 Dewatering Bore (including station infrastructure, power lines and dewatering pipelines); and
- The Essential Energy owned power line.

[21] Private property identification No. 254 as displayed in Appendix 3 'Land Ownership Plans' of PA08_0184.
[22] Nil subsidence impact predicted as required by Table 14 of PA08-0184. Sites Ulan ID#180-184 within the Application Area, sites Ulan ID#185-187 adjacent.
[23] Previously impacted by subsidence during the mining of LW29, no further impacts predicted

3 Subsidence Management and Monitoring

Section 3.1 to **Section 3.6** provide a summary of EA (Umwelt 2009) and revised subsidence predictions, management and monitoring of surface and sub-surface features that may be affected by subsidence (**Table 11**) as a result of longwall mining within the Application Area.

Surface water monitoring applicable to the Extraction Plan is provided in **Figure 14**. Groundwater monitoring and Private Bore monitoring applicable to the Extraction Plan is provided in **Figure 17**. Details are summarised from the component management plans **Appendix A to F.**

3.1 Water Subsidence Predictions, Monitoring and Management

The purpose of the Water Management Plan for Longwalls 30 & LWW6-LWW8 (WMP LW30 & LWW6-LWW8) (**Appendix A**) is to outline the management strategies, controls and monitoring programs to be implemented for the management of groundwater and surface water in relation to potential subsidence impacts from secondary extraction within the Application Area. The scope of the WMP LW30 & LWW6-LWW8 applies to surface water and groundwater resources potentially impacted as a result of mining within the Application Area.

The key environmental consequences for water resources associated with the extraction of LW30 & LWW6-LWW8 include:

- Surface cracking within Mona Creek and ephemeral drainage lines;
- Groundwater inflows requiring management;
- Hardrock baseflow losses; and
- Drawdown impact on private bores.

The WMP LW30 & LWW6-LWW8 references key components of approved water management plans for the project area, as required by PA08_0184, including:

- Water Management Plan (WMP[24]);
- Surface Water Monitoring Program (SWMP[25]);
- Groundwater Monitoring Program (GWMP[26]); and
- Surface Water and Groundwater Response Plan (SWGWRP[27]).

A review of surface water impacts (**Technical Report 4**) in previous UUG mining areas was completed by Umwelt. Based on a review of the available monitoring results there have been no greater environmental consequences than predicted in the EA to the surface waters of Ulan Creek, Curra Creek, Bobadeen Creek or Mona Creek. Monitoring indicates that minimal changes have occurred in these creeks in the last five years and that the changes that have occurred are not considered to have occurred due to subsidence impacts (**Technical Report 4**).

Mining subsidence is expected to cause fracturing of the strata through the full overburden section directly above each longwall panel and depressurisation of the groundwater above the mining area. Mackie Environmental Research (MER) addressed the potential subsidence and groundwater drawdown impacts in a groundwater model developed as part of the Project EA (Umwelt 2009). Since that time, MER have undertaken several reviews of the model in 2013 and 2016. The latest review (June 2016) has included a model recalibration using additional piezometric data associated with Ulan West together with improved monitoring of mine water ingress to underground operations. Some material

[24] Ulan Coal Document Number: ULNCX-111515275-99.
[25] Ulan Coal Document Number: ULNCX-111515275-1642.
[26] Ulan Coal Document Number: ULNCX-111515275-1643.
[27] Ulan Coal Document Number: ULNCX-111515275-1644.

properties (permeabilities and porosities) have been adjusted while the time discretisation of longwall extraction has been increased threefold in order to derive improved estimates of mine water make. The 2016 model included revised scheduling for secondary extraction of longwall panels at UUG. MER prepared a report summarising the predicted groundwater impacts for the extraction of LW30 & LWW6-LWW8 (**Technical Report 3**) including the predicted impact to Private Bores, see **Table 15** for predictions.

The Triassic sandstone strata is recognised as an aquifer capable of supplying water and is used in the general region for stock and domestic water supply purposes. The location of all known private bores within approximately 10km radius of UUG are displayed in **Figure 17**. MER reviewed predicted impacts on private water supply boreholes in the region of drawdown and predicted impacts in the Triassic sandstone aquifer at the end of mining (**Technical Report 3**). Boreholes close to but not within the mine footprint, may be impacted by 2-10 meters drawdown (the Aquifer Interference Policy requires an assessment of impact for boreholes subject to greater than 2 meters drawdown). Annual measurement of standing water levels are conducted for all private bores (where the landholder permits monitoring). No drawdown impacts are evident in privately owned boreholes to date.

Table 14 outlines the key predicted subsidence impacts, management issues, monitoring, management and contingency measures for surface and groundwater during the secondary extraction of LW30 & LWW6-LWW8. Details are provided in the WMP LW30 & LWW6-LWW8 (**Appendix A**).

Table 14 Summary of Water Impacts, Monitoring, Management & Contingency

Issue	Approved Impact (Project EA)	Revised Impact LW30 & LWW6-LWW8	Monitoring	Management
Mona, Bobadeen and Curra Creek	*Predicted subsidence impacts will not result in any substantial ponding or drainage realignment within the project area.* *Project will not significantly alter water quality or ecology of downstream systems or adversely impact potential use of water for downstream users.*	**Revised Predictions by SCT (2016):** Horizontal fracturing and upsidence is expected in topographic low points where the stream bed is comprised of sandstone rock strata. There is also potential for open tension cracks to occur along drainage channels located directly over and around the edges of longwall panels. The effect of any cracks in a drainage channel would be similar to that of other compression cracking and would tend to divert surface water downward into the overburden strata. The main surface impacts are considered to be that ephemeral streams and pools located directly above longwall panels are not likely to hold water for as long after rain as they did prior to mining. **Revised Predictions by SCT (2019):** The proposed extensions to LWW7 and LWW8 below the Woodbury Property would mine under longer sections of the third order main channel of Mona Creek and a third order tributary of this creek. There are no significant drainage lines in the DSCA within the extended Extraction Plan Application Area. Impacts to the sections of Mona Creek above the proposed extension areas are expected to be consistent with those assessed in	Section 4.2 of the WMP LW30 & LWW6-LWW8 details the monitoring program and evaluation of potential mining related impacts on drainage lines and creeks specific to the Application Area. The following routine monitoring is undertaken within the Application Area in accordance with existing environmental management plans: • Monthly sampling and analysis for TSS of surface waters (sites SW10, SW08, SW07, relevant to the Application Area); • Annual creek stability survey along the section of Mona Creek above LWW8; and • Annual monitoring of stream health (including aquatic fauna and riparian assessment) of Mona, Bobadeen and Curra Creeks. • Pre and post mining channel stability monitoring of representative 2nd and 3rd order	Section 4.1.1 of the WMP LW30 & LWW6-LWW8 outlines the management measures for potential subsidence related impacts on drainage lines. Section 5 of the WMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring indicates the subsidence performance measures are likely to or have been exceeded.
Ephemeral Drainage Lines	*Surface cracking is expected to be present where Triassic strata outcrops directly above each longwall panel.* *Mining below ephemeral creeks is considered to have potential to reduce surface flows and the duration that pools retain water following a rainfall event. Over time, fine grained material is expected to gradually fill surface cracks and reduce the hydraulic conductivity of the immediate surface strata as observed in Ulan*			

Issue	Approved Impact (Project EA)	Revised Impact LW30 & LWW6-LWW8	Monitoring	Management
	Creek over the medium term	SCT (2016) and SCT (2018a) for MOD 4.	drainage lines of Mona Creek within 0.2m subsidence contours for longwall panels; and • Pre and post mining monitoring of ponding & erosion sites.	
Ulan Creek	*The mine plan has been configured to avoid subsidence impacts on the main channel of Ulan Creek.*	Ulan Creek is remote from the Application Area and no perceptible impacts are predicted.		
Groundwater Inflows	*The groundwater assessment indicated that the total cumulative groundwater seepage to mine workings from underground operations is predicted to rise from the current rate of approximately 9.2 ML/day to approximately 24.0 ML/day in 2018. After 2018, the seepage rate is predicted to decline.*	MER's 2016 Groundwater model predicts that within the constraints and limitations imposed by numerical modelling, the potential impacts on regional groundwater systems include: Complete depressurisation of Triassic and Permian strata within the footprint of mined panels; Drawdown impacts, extending some 10 to 20 km at the end of mining in the Ulan seam; Drawdown impacts, extending some 3 to 5 km beyond the mine footprint in Triassic strata; Groundwater inflows to UUG being sustained at 18 to 20 ML/day during extraction of longwall panels 30 & LWW6-LWW8; and Base flow losses of about 0.16 ML/day to the Talbragar River system and about 0.07 ML/day to the Goulburn River system for the period from 2009-2010 to the completion of mining. **Revised Predictions (MOD 4):** The 5m drawdown contour is predicted to extend a further 1 km at the north eastern corner of the operations as a result of the proposed modification, though this is not predicted to change the number of private bores impacted in this area. The additional baseflow reduction from the mine plan associated with the proposed Modification over the MOD3 mine plan is 0.001 ML/day for the Goulburn River and 0.003 ML/day for the Talbragar River. These changes are very low to the overall baseflow likely to occur in those rivers and the changes are not practically measurable. Therefore, there will be no discernible change in the flow, and the predicted changes are within the within the accuracy of predictions.	Section 4.2 of WMP LW30 & LWW6-LWW8 details the groundwater monitoring program and evaluation of potential mining related impacts on groundwater behaviour as a result of mining in the Application Area. The following routine monitoring will be undertaken in accordance with existing environmental management plans: • NMN quarterly monitoring water levels and download VW data loggers; • NMN EC and pH (Biannually); • NMN full chemical analysis (Annually). • IMN water levels, chemistry and data download as required. • MCAM quarterly monitoring water levels and download VW data loggers. • Annual private bore survey for groundwater levels and water quality.	Management of potential subsidence related impacts on groundwater and private bores are detailed in Section 4.1.2 of the WMP LW30 & LWW6-LWW8. Section 5 of the WMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring indicates the subsidence performance measures are likely to or have been exceeded.
Hardrock Baseflow Losses	*At the close of mining it is predicted that baseflow losses from the hardrock aquifers to the Goulburn River catchment arising from the proposed mining, may be of the order of 0.05 ML/day while losses to the Talbragar River catchment may be of the order of 0.13 ML/day, for the period between 2011 and 2030.*			

Issue	Approved Impact (Project EA)	Revised Impact LW30 & LWW6-LWW8	Monitoring	Management
Farm Land and Facilities (Private Wells, Bores, Springs)	*Depressurisation and drawdown of the groundwater table as a result of mining activities has the potential to affect five privately owned bores as defined by the predicted 5 metre drawdown contour.* *Depressurisation and drawdown of the groundwater table as a result of mining activities has the potential to affect 8 privately owned bores as defined by the predicted 2 metre drawdown contour in the 2009 Groundwater model. Two of these private bores also likely to be impacted by subsidence.* *Water bores and natural springs located directly over the mining area are expected to dry up as a result of mining.*	MER (**Technical Report 3**) predicts the following impact to private bores: Two private bores (PB2[28] and PB8) located within the Ulan West footprint are expected to fail when undermined, these bores could be impacted by drawdown prior to being undermined; and Six private bores are likely to be impacted by more than 2 meters drawdown (as defined by the Aquifer Interference Policy) during the course of mining. These boreholes are identified as PB9, PB11, PB14, PB21, PB30 and PB32. The dam located over Longwall W6 is fed from a spring located directly below it. Fracturing of the overburden strata during the start of mining Longwall W6 is expected to disrupt the spring that feeds the dam. It is considered unlikely that this spring fed system could be repaired or re-established. **Revised predictions for (MOD3):** included additional boreholes that are likely to be impacted during the course of mining including PB05, PB10, PB17, PB26, PB31 and PB33. **Revised Predictions (MOD 4):** The groundwater assessment undertaken shows that there are no additional private bores that are likely be impacted by the proposed Modification.	Section 4.2.4 of the WMP LW30 & LWW6-LWW8 describes the annual survey of private bores, within the vicinity of the Project Approval boundary, in accordance with the GWMP.	Section 4.1.2 of the WMP LW30 & LWW6-LWW8 outlines the management measures for potential secondary extraction related impacts on private wells, bores or springs). Section 5 of the WMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring indicates the subsidence performance measures are likely to or have been exceeded.

3.1.1 Assessment of Performance Indicators and Measures for Water

Performance indicators are developed to assess if there is a potential or likely chance the performance measures are exceeded or are likely to be exceeded during longwall extraction (**Table 15**)**.** Analysis of monitoring data will be undertaken to assess the potential impacts of mining within the Application Area against the relevant subsidence performance measures for water.

In the event that the subsidence performance measures relating to water (**Table 15**) are considered to have been exceeded or are likely to be exceeded, then Ulan Coal will implement a Contingency Plan as described in **Section 4.1** and contingency measures as outlined in **Table 15**.

[28] PB2 is no longer considered a private bore as the land was purchased by UCMPL.

Table 15 Water Performance Measures and Performance Indicators

Water	Subsidence Performance Measures	Performance Indicators	Management Measures and Contingency Measures
Ulan, Mona & Cockabutta Creeks[1]	No greater environmental consequences than predicted in the EA	Performance indicators will be considered to have been triggered if: • Surface water flow Total Suspended Solids (TSS) sample within Mona Creek at SW10, Bobadeen Creek at SW07 or Curra Creek at SW08, is greater than 50 mg/L for 3 or more consecutive samples[3] and investigation reveals subsidence impact as a contributing cause; or • Monitoring results from the stream health program within Mona, Curra, Bobadeen or Ulan Creeks[4] identify a deteriorating trend in water quality and stream health; or • Monitoring results from the channel stability monitoring program within Mona Creek and 2nd and 3rd tributaries of Mona Creek identify a deteriorating trend in channel stability; or • If the measured and projected decline in piezometric heads (assessed quarterly) exceeds the model predicted trends.	If the assessment of performance indicators determine an exceedance of the performance measures is due to subsidence related impacts as a result of mining within the Application Area, the Contingency Plan would include: • Notify relevant government agencies; • Conduct investigations; • Implementation of remediation works (Section 4.2 of the SWMP and Section 3.1 of the SWGWRP); and • Reassess subsidence impacts.
All Built Features	**Safe, serviceable and repairable unless the owner agrees otherwise in writing[2]**	This performance indicator will be triggered if: • UCMPL receive a complaint from a private bore owner in regards to water supply from their bore/s which is not predicted to be impacted by groundwater drawdown; and/or • Analysis of the Private Bore monitoring data indicates drawdown impacts have or likely to have exceeded groundwater model predictions.	If the assessment of performance indicators determine an exceedance of the performance measures is due to secondary extraction related impacts as a result of mining within the Application Area, the Contingency Plan to include: • Notify relevant government agencies; • Conduct investigations; • Undertake consultation with affected built feature owners; • Respond to community complaint in accordance with **Section** 4.4; and • Refer to TARP action and response measures in Table 3.5 of the SWGWRP for private bores.

Notes:

[1] The main channel of Cockabutta Creek is remote from the Application Area, approximately 2.4km to the south-west. There is not expected to be any impact to Cockabutta Creek as a result of ground movements associated with mining longwalls in the Application Area, therefore subsidence performance indicators are not considered applicable.

[2] This Built Features subsidence performance measure is relevant to the integrity of Private Bores impacted by groundwater drawdown as a result of secondary extraction within the Application Area.

[3] Performance indicator is based on exiting investigation level in the SWGRP (ULN SD PLN 0057). This indicator may be revised during revision of the SWGRP as interim trigger investigation levels are replaced by baseline data trigger levels for the relevant creeks.

[4] Insufficient permanent or semi-permanent pools of water within Curra Creek prevent inclusion of this creekline in the stream health monitoring program.

3.2 Land Subsidence Predictions, Monitoring and Measurement

The purpose of the Land Management Plan for Longwalls LW30 & LWW6-LWW8 (LMP LW30 & LWW6-LWW8) (**Appendix B**) is to outline the management strategies, controls and monitoring programs to be implemented for the management of the general surface lands in relation to potential subsidence impacts from secondary extraction within the Application Area. The scope of the LMP LW30 & LWW6-LWW8 applies to the general surface potentially impacted as a result of mining within the Application Area. Cliff lines for monitoring applicable to this Extraction Plan are displayed in **Figure 18**.

The key subsidence impacts that may have potential consequences on land associated with the extraction of LW30 & LWW6-LWW8 include:

- Surface cracking (including steps, overrides and erosion holes[29]);
- Agricultural utilisation or agricultural suitability of farm land; and
- Rock falls and cracking on cliff lines.

Post mining inspections of the land above previously mined longwalls at UUG have been undertaken by Ulan Coal and SCT Operations personnel for the preparation of post mining reporting. Subsidence predictions for land outlined in **Table 19** are expected to be consistent with impacts previously observed at UUG.

The magnitude of tensile strain at which surface cracking is detectable is sensitive to the nature of the surface terrain. Cracks are typically evident on hard surfaces such as roads and bare rock outcrops at strains of greater than 2-5 mm/m and in bushland environments at strains of greater than about 5-10 mm/m. Cracks are typically less than about 20 mm wide in flat or gently undulating terrain but may be larger, generally less than 100 mm wide but possibly up to 200 mm wide, in shallower areas. There is potential for unconventional subsidence movements including steeps, compression overrides, and high compression zones at low topographic points (**Technical Report 1**).

Previous experience over Longwalls 27, 28, and 29 indicates that subsidence impacts are imperceptible at the start of the panel for all practical purposes. This experience is consistent with the 300-320 m overburden depths in this area and the low levels of tilt and strain that are observed as a result of the subsidence.

Subsidence effects at the edge of the DSCA are expected to increase with vertical subsidence up from around 0.1m to approximately 1.0m as a result of the proposed extension to LW30. Subsidence impacts to features in and within the vicinity of the revised Extraction Plan Application Area are expected to be consistent with those presented in SCT (2018a) for MOD4. Impacts are expected to be largely imperceptible given the large overburden depth and manageable under existing subsidence management plans. Minor impacts in the form of cracking on hard surfaces, including the access road, are considered possible but easily manageable (**Technical Report 1a**).

Sections of land within the Application Area are utilised for Agricultural production generally consisting of beef cattle grazing. The proposed mining within the Application Area is not expected to have any greater impact to agricultural utilisation or agricultural suitability of farm land than that outlined in the EA (**Technical Report 1)**. Subsidence impact and monitoring for the Bobadeen Irrigation Scheme, farm fences and farm dams are addressed as Built Features in **Section 3.4** of this plan.

The PPSMP (**Appendix J**) for the Private Property includes mapping, monitoring and remediation requirements for all land potentially impacted by the UUG secondary extraction of longwalls LWW6-LWW8. The PPSMP also identifies procedures for compensation to the Private Landholder in the unlikely event that agricultural productivity was affected by subsidence.

[29] A coincidence of mining induced cracking at the commencement of LWW5, a drainage line and recent heavy rainfall events, approximately 14 months after the area was mined led to flow into subsidence cracks and localised erosion of surface soils.

Table 16 outlines the key predicted subsidence impacts, management issues, monitoring, management and contingency measures for land during the secondary extraction of LW30 & LWW6-LWW8. Details are provided in the LMP LW30 & LWW6-LWW8 (**Appendix B**).

Table 16 Summary of Land Impacts, Monitoring, Management & Contingency

Issue	Approved Impact (Project EA)	Revised Impact	Monitoring	Management
Surface Cracking	*Surface cracks are expected to be generally isolated and increase in size inversely to overburden thickness ranging from 40mm wide where the overburden is 250m thick, 100mm wide where the overburden is 150m thick, and up to 250mm wide where the overburden is 80m thick.*	**Revised Predictions by SCT (2016):** Cracks are expected to develop over the longwall panels and remain in the vicinity of panel edges and along the tops of topographic highs once mining is complete. Cracks are typically evident on hard surfaces such as roads and bare rock outcrops at strains of greater than 2-5 mm/m and in bushland environments at strains of greater than about 5-10 mm/m. Cracks are typically less than about 20 mm wide in flat or gently undulating terrain but may be larger, generally less than 100 mm wide but possibly up to 200 mm wide, in shallower areas. There is considered to be no potential for a step or compression ripple or any other perceptible subsidence impact within the Durridgere Conservation Area. **Revised Predictions by SCT (2019):** The proposed longwall extensions represent a marginal increase in the overall mining and subsidence footprint but subsidence effects are expected to be the same for the approved Extraction Plan and the impacts are expected to the similar to these presented in SCT (2016) and consistent within those described in SCT (2018a) for the MOD 4 extension areas.	Section 4.2 of the LMP LW30 & LWW6-LWW8 details the monitoring program and evaluation of potential mining related impacts on surface features including internal access roads within the Application Area. The following monitoring specific to the extraction of LW30 & LWW6-LWW8 will be undertaken: • During and post mining surface cracking inspection of UCMPL owned lands within subsidence impact zone; • Pre and post mining surface cracking inspection of privately owned land within the subsidence impact zone; and • Pre and post mining surface cracking inspection of the Durridgere State Conservation Area access track within the subsidence impact zone.	Section 4.1 of the LMP LW30 & LWW6-LWW8 outlines the management measures for potential subsidence related impacts including surface cracking, steps, overrides and rock falls. Internal access roads affected by subsidence posing an immediate safety risk will be barricaded and sign posted until remedial measures can be implemented. Remedial measures will be completed as soon as possible in accordance with Section 4.1 of Public Safety Management Plan LW30 & LWW6-LWW8. Section 5 of the LMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring indicates the subsidence performance measures are likely to or have been exceeded.
Agricultural utilisation or agricultural suitability of farm land	*Agricultural utilisation or agricultural suitability of farm land is not expected to be significantly impacted by mining subsidence movements.*	**Revised Predictions by SCT (2016):** The proposed mining of Longwall 30 and Longwalls W6, W7 and W8 is not expected to have any greater impact to agricultural utilisation or agricultural suitability of farm land than that outlined in the EA. The impacts of mining subsidence on the tracks are expected to be essentially similar to impacts previously observed over UUG. There is		

Issue	Approved Impact (Project EA)	Revised Impact	Monitoring	Management
		some potential for cracks to form and a much lower probability of steps forming. These impacts would not be significantly out of context with the general nature of the terrain and other hazards that might exist. **Revised Predictions by SCT (2019):** In general, the impacts to UCMPL owned property and farm or mining related infrastructure within the revised Extraction Plan Application Area are expected to be the same as those presented in SCT (2016).		
Sandstone Cliff Formations	*Based on previous experience of mining under similar sandstone cliffs at Ulan, mining subsidence is expected to cause rock falls on 10-20% of the sandstone cliff formations located directly above the mining area.*	**Revised Predictions by SCT (2016):** Subsidence induced Rock fall could occur on up to 20% of the length of sandstone formations, perceptible cracking is expected along up to 50-70% of the length of sandstone formations within the footprint of extracted longwall panels and to a distance of 0.4 times overburden depth outside the goaf edge. The cliff formation over LWW7 would be directly undermined and is expected to experience the full range of subsidence movements with rock falls likely. The eastern portion of the Cliff line containing the Mona Creek rock shelters 23-27 is located within the EP area but well beyond the area where any impacts are expected. **Revised Predictions by SCT (2019):** There is a sandstone cliff formation located at the western end of LWW7. No Aboriginal rock shelter sites have been identified along this feature. The northern end of this formation, close to the longwall start line, is expected to experience more vertical subsidence due to the proposed extension to LWW7, however impacts to this feature are expected to remain consistent with those forecast in SCT (2016) and SCT (2018a) for MOD4.		

3.2.1 Assessment of Performance Indicators and Measures for Land

Monitoring indicated in **Section 3.2** will be undertaken to identify subsidence impacts to land and ensure remediation activities are undertaken where required. No performance indicators were considered to apply to general lands for the mining of LW30 & LWW6-LWW8, see **Table 17.**

Potential subsidence impacts to general lands may affect performance indicators identified in the LMP LW30 & LWW6-LWW8 and/or PSMP LW30 & LWW6-LWW8.

Table 17 Land Performance Measures and Performance Indicators

Water	Subsidence Performance Measures	Performance Indicators	Management Measures and Contingency Measures
Cliffs in the Broken Back Conservation Area	Nil environmental consequences	Not Required [1]	Not Required [1]
Other Cliffs	Minor Environmental consequences	This performance indicator will be considered to be triggered if: Subsidence monitoring identifies an exceedance (or a trend to an exceedance) of the predicted probability of subsidence induced impacts to cliffs within Application Area i.e. rock falls >20% of total cliff length.	If the assessment of performance indicators determine an exceedance of the performance measures is due to subsidence related impacts as a result of mining within the Application Area, the Contingency Plan would include: • Notify relevant government agencies; • Conduct investigations; • Additional monitoring (increases in frequency or additional sites); and • Reassess subsidence impacts.

Notes: [1] The Brokenback Conservation Area contain those cliff lines afforded the greatest protection under Project Approval 08_0184 (performance criteria of Nil Environmental consequence). The Brokenback Conservation Area is located approximately 2km south-west of the Application Area. There is considered to be no potential for subsidence related ground movements at this site as a result of longwall mining within the Application Area (**Technical Report 1**). Management and monitoring of the Brokenback Conservation Area is undertaken by the adjacent Ulan West Operations under the existing Extraction Plan for Longwalls 1 to 6 approved 25 January 2019.

3.3 Biodiversity Subsidence Predictions, Monitoring and Management

The purpose of the Biodiversity Management Plan for Longwalls 30 & LWW6-LWW8 (BMP LW30 & & LWW6-LWW8) (**Appendix C**) is to outline the management strategies, controls and monitoring programs to be implemented for the management of biodiversity in relation to potential subsidence impacts from secondary extraction within the Application Area. The scope of the BMP LW30 & LWW6-LWW8 applies to flora and fauna potentially impacted as a result of mining within the Application Area (**Figure 9**). Flora and fauna subsidence monitoring sites applicable to this Extraction Plan are displayed in **Figure 15**.

The key subsidence impacts that may have potential consequences on flora and fauna associated with the extraction of LW30 & & LWW6-LWW8 include:

- Surface cracking; and
- Alteration to hydrology that may be reflected in impacts on vegetation.

The BMP LW30 & & LWW6-LWW8 references key components of the approved management plans for the project area, as required by PA08_0184, including;

- Biodiversity Management Plan (BMP[30]);
- Appendix B of the BMP - Offset Management Program (OMP); and
- Bushfire Management Plan[31].

In 2015, Eco Logical Australia (ELA) conducted an assessment of biodiversity impacts from subsidence which occurred during the previous five years. This review included analyses of data collected for terrestrial and aquatic fauna and microbats monitoring as required by the BMP, as well as specific floristic assessment. Monitoring results for the Ulan Coal Mine Complex indicate (**Technical Report 5**):

- The observed stability of overall vegetation structure and canopy species health in floristic-based subsidence (FBS), determined that there are no clear impacts of subsidence upon vegetation above longwall panels;
- Analysis of terrestrial fauna data showed that there are no significant differences between the habitat and biodiversity values as a result of mining activities. Therefore, no discernible impacts from subsidence upon threatened species, populations, habitats or ecological communities associated with the terrestrial environment have been shown;
- Aquatic fauna diversity and stream health remains stable, and that there are no significant or observable impacts from subsidence on these values; and
- Results from the four years of consistent microbat monitoring indicate that overall microbat diversity and abundance has not declined during this time, and that both age composition and body condition of the two most commonly captured species have remained stable. These latter two measures are indicators of population health and composition; as such, these results suggest that microbat population dynamics are similarly stable, and not under stress from mining related impacts.
- Negligible subsidence impacts to biodiversity were predicted in the Project EA (Umwelt 2009). Results of monitoring to date do not indicate any declining trends or significant changes in vegetation or fauna.

Table 18 outlines the key predicted subsidence impacts, management issues, monitoring, management and contingency measures for flora and fauna during the secondary extraction of LW30 & & LWW6-LWW8. Details are provided in the BMP LW30 & & LWW6-LWW8 (**Appendix C**).

[30] Ulan Coal Document Number: ULNCX-111515275-225
[31] Ulan Coal Document Number: ULNCX-111515275-2049

Table 18 Summary of Biodiversity Impacts, Monitoring, Management & Contingency

Issue	Approved Impact (Project EA)	Revised Impact	Monitoring	Management
Fauna	*Rock fall has the potential to impact on habitat for cave-dependent species (particularly micro-bats), where this occurs.* *Project will not significantly alter water quality or ecology of downstream systems or adversely impact potential use of water for downstream users.*	**Revised Predictions by SCT (2016):** Subsidence induced rock fall could occur on up to 20% of the length of sandstone formations, perceptible cracking is expected along up to 50-70% of the length of sandstone formations within the footprint of extracted longwall panels, no environmental consequence predicted. Subsidence assessment based on ELA monitoring review (**Technical Report 5**): Monitoring results to the end of 2015 indicate UCMPL operations are having a negligible impact upon threatened species, populations, habitat and ecological communities as a result of subsidence. **Revised Predictions by SCT (2019):** There is a sandstone cliff formation located at the western end of LWW7. The northern end of this formation, close to the longwall start line, is expected to experience more vertical subsidence due to the proposed extension to LWW7, however impacts to this feature are expected to remain consistent with those forecast in SCT (2016) and SCT (2018a) for MOD4. **Revised Predictions (MOD 4):** Subsidence from the proposed Modification is predicted to be similar to that predicted for previously approved mining.	Section 4.2 of the BMP LW30 & LWW6-LWW8 outlines the specific ecological monitoring to determine if an exceedance of the biodiversity subsidence impact performance measure has occurred, within the Application Area. The following routine monitoring is undertaken within the Application Area in accordance with existing environmental management plans: • Residual vegetation monitoring; • Biennial general fauna monitoring in spring within the Application Area; • Biennial targeted threatened Species monitoring within the general Project Area; and • Annual stream health monitoring (aquatic and riparian assessment) in Mona, Bobadeen & Ulan Creeks. The following additional monitoring specific to the extraction of LW30 & LWW6-LWW8 will be undertaken: • Spring and autumn floristic based subsidence monitoring above longwall panels to determine any potential subsidence related impacts on vegetation health[1]; and • Targeted cliff line subsidence microbat monitoring of the cliff line over LWW7.	Section 4.1 of the BMP LW30 & LWW6-LWW8 outlines the management measures for potential subsidence related impacts flora and fauna. Section 5 of the BMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring indicates the subsidence performance measures are likely to or have been exceeded.
Flora	*The degree of landscape change expected from subsidence is not of a degree that it is likely to cause tree fall or failure, except in areas where vegetation is lost as a result of rock fall from cliff lines.* *Subsidence is not expected to cause significant cracking or alteration to hydrology that is likely to be reflected in impacts on vegetation (Umwelt 2009).* *Subsidence movements are also recognised to have potential to cause tree root damage.*	Subsidence assessment based on ELA monitoring review (**Technical Report 5**): Monitoring results to the end of 2015 indicate UCMPL operations are having a negligible impact upon threatened species, populations, habitat and ecological communities as a result of subsidence. No significant subsidence impact to flora species, populations or ecological communities due to secondary extraction. **Revised Predictions (MOD 4):** Subsidence from the proposed Modification is predicted to be similar to that predicted for previously approved mining.		

Notes: [1] Subsidence floristic monitoring plots within the Application Area will include the monitoring of the EEC Blakely's Red Gum.

3.3.1 Assessment of Performance Indicators and Measures for Biodiversity

Performance indicators have been adopted from the BMP[32] to assess if there is a potential the performance measures have been exceeded or are likely to be exceeded during longwall extraction (**Table 19**). Analysis of monitoring data will be undertaken to assess the potential impacts of mining within the Application Area against the performance measures relevant to biodiversity.

In the event that the subsidence performance measures relating to biodiversity (**Table 19**) are considered to have been exceeded or are likely to be exceeded, then UCMPL will implement a Contingency Plan as described in **Section 4.1** and contingency measures as outlined in **Table 19**.

Table 19 Biodiversity Performance Measures and Performance Indicators

Biodiversity	Subsidence Performance Measures	Performance Indicators	Management Measures and Contingency Measures
Threatened species, populations, habitat or ecological communities	Negligible impact	This performance indicator will be considered to be triggered if: • Analysis of subsidence based flora data indicates a >10% negative movement in vegetation cover and/or abundance over two or more monitoring periods outside of normal seasonal fluctuation; or • Analysis of subsidence based flora data indicates >10% negative movement in the health condition of vegetation in Blakely's Red Gum Woodland or Derived Native Grassland communities located above LW30 & LWW6-LWW8 inconsistent with results obtained from monitoring of analogue vegetation sites ; or • Analysis of fauna monitoring data indicates a indicates >10% population decline in targeted threatened species over two or more monitoring periods outside of seasonal variations; or • Analysis of fauna monitoring data analysis indicates a negative change >10% in targeted threatened species at an impact site not reflected in the analogue fauna sites. • Analysis of micro-bat monitoring data identifies decreasing activity levels (>10% population or species richness decline) of endangered micro-bats species during cliff line monitoring within the Application Area over two or more monitoring periods outside of seasonal variations.	If the assessment of performance indicators determines an exceedance of the performance measures is due to subsidence related impacts as a result of mining within the Application Area, the Contingency Plan would include: • Notify relevant government agencies; • Conduct investigations; • Additional monitoring (i.e. increases in frequency or additional sites); • Reassess subsidence impacts; • Remediate affected areas in accordance with the RMP LW30 & LWW6-LWW8 (e.g. filling in large surface cracks); • Consider impact to threatened vegetation in relation to offset commitments; and • Consider impact to threatened fauna in relation to suitable habitat provision within cliff line offset areas.

[32] Ulan Document Number: ULNCX-111515275-3575

3.4 Built Features Predicted Impacts, Monitoring and Management

The purpose of the Built Features Management Plan for Longwalls 30 & LWW6-LWW8 (BFMP LW30 & LWW6-LWW8) (**Appendix D**) is to outline the management strategies, controls and monitoring programs to be implemented for the management of built features (either UCMPL owned or non-UCMPL owned) in relation to potential subsidence impacts from secondary extraction within the Application Area. The scope of this BFMP LW30 & LWW6-LWW8 applies to built features potentially impacted as a result of mining within the Application Area. Built features monitoring applicable to this Extraction Plan are displayed in **Figure 18**.

Key built features that may be affected by extraction of LW30 & LWW6-LWW8 include:

- Ulan Coal Owned Built Features (farm fences, farm dams, power lines, monitoring boreholes, Bobadeen Irrigation Scheme pivots and pipeline, service corridor and dewatering systems);
- Private Property Built Features (farm fences, dams and small shelter);
- Essential Energy power line; and
- State Survey Control Marks.

There are no additional public utilities within the revised Extraction Plan Application Area or areas to be impacted by mining the proposed extension areas of LW30 and LWW7 and LWW8 (Technical Report 1a).

Following the completion of mining in previous UUG longwall panels a UCMPL and SCT Operations personnel. The post mining inspections of general surface features subsidence impacts to these features were consistent with predictions (**Technical Report 1**).

Seven poles supporting the Essential Energy power line have been previously undermined, by the corner of LW27 (one pole) and along the centreline of LW26. No interruptions to supply were experienced during the secondary extraction of LW26-29 even when the line experienced full subsidence of up to 1.5 m. No perceptible impacts to this power line are expected as a result of secondary extraction within the Application Area (**Technical Report 1**). Details regarding consultation and management of this asset are available within the Essential Energy Management Plan in **Appendix K.**

The PPSMP (**Appendix J**) for the Private Property includes mapping, monitoring and remediation requirements for all built features potentially impacted by the secondary extraction of UUG longwalls LWW6-LWW8. The PPSMP also identifies procedures for repair of subsidence impacts to farm fences, dams and a small shelter within the subsidence impact zone.

Table 20 outlines the key predicted subsidence impacts, management issues, monitoring, management and contingency measures for built features during the secondary extraction of LW30 & LWW6-LWW8. Details are provided in the BFMP LW30 & LWW6-LWW8 (**Appendix D**).

Table 20 Summary of Built Features Impacts, Monitoring, Management & Contingency

Issue	Approved Impact (Project EA)	Revised Impact	Monitoring	Management
Farm Land and Facilities (Private Property)	*Fences and access tracks are not expected to be significantly impacted by mining subsidence movements. However, some minor remedial work may be necessary to fill in cracks and remove compression humps.* *The subsidence impact on farm dams tends to be limited to subsidence cracks that pass directly through the dam wall or through the base of the dam. These may cause scouring and loss of water.*	**Revised Predictions by SCT (2016):** The main residential building (Property ID 254 "Woodbury") and associated outbuildings are positioned approximately 700m to the west of the EP area. The power and telecommunications services to the dwelling run along the western boundary of this property. In these locations neither the structures nor the services are likely to be perceptibly impacted by the proposed mining. A dam located over LWW6 is expected is to experience the full range of subsidence movements. Minor impacts including cracking and water loss is possible during the period of active mining below and in the general vicinity of the dam. The dam is fed from a spring located directly below it. Fracturing of the overburden strata during the start of mining Longwall W6 is expected to disrupt the spring that feeds the dam. A small open sided weather shelter constructed from rough sawn timber poles is located over Longwall W6. The shelter is about 5m long by 4m wide. It is expected to experience the full range of subsidence movements. The shelter is not expected to be significantly impacted although it is possible that some repairs may be necessary. In areas of higher strain, fences may become affected to the extent that they become ineffective for stock control. Other infrastructure such as gates, cattle grids, and stockyards may also be affected depending on their specific location. **Revised Predictions by SCT (2019):** Although the proposed extensions to LWW7 and LWW8 would result in a greater mining and subsidence footprint on Woodbury, the impacts are not expected to be significantly different to those presented in SCT (2016) and consistent with those described in SCT (2018a) for MOD4.	Section 4.2 of the BFMP LW30 & LWW6-LWW8 describes the pre and post monitoring of Private Property Built Features, in accordance with the PPSMP.	Management measures for built features on private property are outlined in the PPSMP (**Appendix J**). Section 5 of the BFMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring indicates the subsidence performance measures are likely to or have been exceeded.
Farm Land and Facilities & Industrial, Commercial & Business Establishments (Ulan Coal Owned infrastructure)	*Fences and access tracks are not expected to be significantly impacted by mining subsidence movements. However, some minor remedial work may be*	**Revised Predictions by SCT (2016):** The power lines and pipelines located over Longwalls W6 and W7 to service the pivot irrigation scheme have potential for impacts if they are subject to unconventional subsidence movements such as horizontal shears and steps. Single pole power line structures have been found to be generally tolerant of subsidence	Section 4.2 of the BFMP LW30 & LWW6-LWW8 describes the following monitoring of Ulan Coal owned infrastructure. Farm dams and fences will be inspected monthly during undermining to	Section 4.1.3 of the BFMP LW30 & LWW6-LWW8 outlines the management measures for potential subsidence related impacts on Ulan Coal owned built Features. Section 5 of the BFMP LW30 & LWW6-LWW8

Issue	Approved Impact (Project EA)	Revised Impact	Monitoring	Management
	necessary to fill in cracks and remove compression humps. *The subsidence impact on farm dams tends to be limited to subsidence cracks that pass directly through the dam wall or through the base of the dam. These may cause scouring and loss of water.* *Single pole power lines not anticipated to be impacted based on previous mining experience.* *Boreholes located directly over mining areas may be physically impacted by shear movements in the rock strata.*	movements especially if the poles are closely enough spaced that ground clearances are not compromised. The ground water monitoring installations are expected to be impacted. They are likely to be physically impacted by shear movements in the rock strata several hundred metres ahead of mining. The ground water monitoring installations are not expected to remain serviceable. Minor impacts are expected to dams consistent with previous experience. Some cracking that may cause minor water loss is expected. In areas of higher strain, fences may become affected to the extent that they become ineffective for stock control. Other infrastructure such as gates, cattle grids, and stockyards may also be affected depending on their specific location. **Revised Predictions by SCT (2019):** In general, the impacts to UCMPL owned property and farm or mining related infrastructure within the revised Extraction Plan Application Area are expected to be the same as those presented in SCT (2016).	identify any subsidence impacts. Ulan Coal owned power lines and pipelines are inspected and maintained in accordance with the Ulan Coal Maintenance Management System.	outlines the contingency measures to be implemented if subsidence monitoring indicates the subsidence performance measures are likely to or have been exceeded.
Permanent Survey Control Marks	*Subsidence movements from the project mining geometry are expected to change the vertical and horizontal location of permanent survey marks in the general vicinity out to a distance of up to 2km from the mining area*	**Revised Predictions by SCT (2016):** There are three state survey stations within the Application Area. Two of these have already been impacted by mining and one to be impacted by mining within the Application Area. A further 10 marks have been identified within a 10km radius, 6 are to the south in proximity to previously subsided areas and 4 are to the north. The impact predicted is a change in physical location of the survey marks. **Revised Predictions by SCT (2019):** Estimates of impacts to the 12.7kV power line and survey control stations are expected to remain the same as those described in SCT (2016) and manageable using the same strategies or measures suggested in that assessment.	Section 4.2 of the BFMP LW30 & LWW6-LWW8 describes the subsidence effects monitoring to identify cessation of subsidence movements verified by the subsidence engineer.	Section 4.1.2 of the BFMP LW30 & LWW6-LWW8. In accordance with Section 40 of the *Surveying Regulation 2006*, UCMPL will notify the Surveyor General when it becomes aware a permanent survey mark has been spatially moved as a result of subsidence from mining within the Application Area. UCMPL will resurvey the permanent survey marks after cessation of subsidence movements is identified by the Subsidence Monitoring Program and verified by a suitably qualified subsidence engineer.
Public Utilities and Public Amenities (Essential Energy Power Line)	*Subsidence impact to poles and stays possible.*	**Revised Predictions by SCT (2016):** Five poles are located within the EP area. Four are expected to experience maximum subsidence of less than 50 mm and one of up to 100 mm. None of them are directly mined under. Single pole power line structures are generally tolerant to subsidence movements. No	Section 4.2 of the Essential Energy Management Plan **Appendix K** describes the inspection and monitoring regime for the Essential Energy power line.	The Essential Energy Management Plan **Appendix K** outlines Ulan Coal management actions (section 4) and accountabilities (section 6) for the Essential Energy Power line within

Issue	Approved Impact (Project EA)	Revised Impact	Monitoring	Management
		perceptible impacts to this power lines are expected. **Revised Predictions by SCT (2019):** Estimates of impacts to the 12.7kV power line and survey control stations are expected to remain the same as those described in SCT (2016) and manageable using the same strategies or measures suggested in that assessment.		the Ulan Coal project boundary. Section 5 of the BFMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring indicates the subsidence performance measures are likely to or have been exceeded.

3.4.1 Assessment of Performance Indicators and Measures for Built Features

Performance indicators were developed to assess if there is a potential or likely chance the performance measures have been exceeded or are likely to be exceeded during longwall extraction (**Table 21**). Analysis of monitoring data will be undertaken to assess the potential impacts of mining within the Application Area against the performance measures relevant to built features.

In the event that the subsidence performance measures relating to built features (**Table 21**) are considered to have been exceeded or are likely to be exceeded, then UCMPL will implement a Contingency Plan as described in **Section 4.1** and contingency measures as outlined in **Table 21**.

Table 21 Built Features Performance Measures and Performance Indicators

Issue	Subsidence Performance Measures	Performance Indicators	Management Measures and Contingency Measures
All built features	Safe, serviceable and repairable unless the owner agrees otherwise in writing.	This performance indicator will be considered to be triggered if: • An assessment or notification of non-UCMPL owned built features integrity and functionality has determine to have been comprised without a written agreement in place with the built feature owner. • Built features monitoring indicates subsidence impacts have or likely to have exceeded subsidence impact predictions.	If the assessment of performance indicators determine an exceedance of the performance measures is due to subsidence related impacts as a result of mining within the Application Area, the Contingency Plan to include: • Notify relevant government agencies; • Conduct investigations; • Undertake consultation with affected built feature owners; • Respond to community complaint in accordance with **Section 4.4**; and • Refer to TARP action and response measures in Table 3.5 of the SWGWRP for private bores.

3.5 Heritage Subsidence Predictions, Monitoring and Management

The purpose of the Heritage Management Plan for Longwalls 30 & LWW6-LWW8 (HMP LW30 & LWW6-LWW8) (**Appendix E**) is to detail the management strategies, controls and monitoring programs to be implemented for the management of Aboriginal and European Heritage sites in relation to potential subsidence impacts from secondary extraction within the Application Area. The HMP LW30 & LWW6-LWW8 applies to all Aboriginal and European Heritage sites potentially affected by subsidence within the Application Area. Heritage monitoring sites applicable to this Extraction Plan are displayed in **Figure 16**.

The key potential impacts on heritage associated with the extraction of LW30 & LWW6-LWW8 include:

- Damage to Aboriginal Heritage sites (i.e. rock shelters); and
- Damage to European Heritage (i.e. Timber getting site CC6).

The HMP LW30 & LWW6-LWW8 references key relevant components of the existing approved Heritage Management Plan (HMP[33]) for the project area, as required by PA08_0184.

SCT have completed post mining inspections of general surface features above all previous longwall mining areas of UUG. There have been several minor rock falls at rock shelter sites consistent with the predicted probabilities of impact (**Technical Report 1**). Subsidence impacts to European Heritage Sites have been consistent with potential impacts described in the EA (**Technical Report 1**).

Subsidence movements are not expected to have any practical effect on artefact scatters and isolated finds in open terrain. There is a slight possibility of subsidence cracks causing disturbance to stone arrangement sites located close to the edge of or directly over mining areas. However the magnitude and frequency of previous surface cracking at UUG has been so small that the potential for change at these sites is considered to be insignificant for all practical purposes (**Technical Report 1**).

The potential for impact to rock shelter sites is dependent on a range of factors, but in general terms, rock falls are expected at up to 20% of sites located adjacent or under sandstone rock formations that are directly mined under. Perceptible impacts are expected on up to approximately 50%-70% of the length of rock formations mined under. The potential impact to some rock shelter sites has changed from the predictions in the EA due to changes in the mine plan.

The significant rock shelter sites of Mona Creek (Ulan ID#180-184) are protected by a mining set-back conservation barrier (**Technical Report 1**).

The proposed mining in the extension areas of LW30, LWW7 and LWW8 are not expected to significantly impact artefact scatter or isolated find sites. Subsidence impacts to these types of sites are expected to remain negligible consistent with expectations presented in SCT (2016 and SCT (2018a) for MOD4. The MOD4 assessment indicated the potential for impacts to two rock shelter sites (Ulan ID#179 and 724) above and adjacent to the proposed extension to LWW8. The changes in probabilities of impacts to sites Ulan ID#179 and Ulan ID#724 do not exceed the maxima forecast for similar sites (**Technical Report 1a**). Two new rock shelter sites were identified near Mona Creek in early 2019 during MOD4 but are outside the revised Extraction Plan Application Area. Mona Creek sites Ulan ID#180 – 184 and a new rock shelter site Ulan ID#1630 are fully protected from subsidence impacts (**Technical Report 1a**).

The European Heritage site CC6 a timber getting site, located above LWW8, is expected to experience the full range of subsidence movements. The site is not likely to be sensitive to these movements and no perceptible impact to the site is expected (**Technical Report 1**). **Table 22** outlines the key predicted subsidence impacts, management issues, monitoring, management and contingency measures for Aboriginal and European heritage features during the secondary extraction of LW30 & W6-W8. Details are provided in the HMP LW30 & W6-W8 in **Appendix E**.

[33] Ulan Coal Document Number: ULNCX-111515275-95

Table 22 Summary of Heritage Impacts, Monitoring, Management & Contingency

Issue	Approved Impact (Project EA)	Revised Impact	Monitoring	Management
Aboriginal Heritage	*Sites that are located over solid coal and remote from the longwall goaf edge will not be impacted by mining subsidence were given a zero probability* *Subsidence movements are not expected to have any practical effect on artefact scatters and isolated finds in open terrain.* *For archaeological sites located in or close to rock shelters along outcrop of the Triassic sandstone, the approach taken to assess subsidence impacts is to provide a generic assessment of the types of subsidence impacts that can be expected and a probability of impact.* *A summary of the probability of each site being impacted, based on the consideration of the likelihood of rock fall / cliff line impact has been detailed in the subsidence assessment and considered in the archaeological assessment.*	**Revised Predictions by SCT (2016):** It is predicted that there will be some changes to the probability of impact by subsidence to some aboriginal rock shelters sites as a result of changes in the mine plan. In general there has been a reduction in the probability of impact to a number of rock shelter sites than that predicted in the EA. No perceptible impacts to the sandstone formation containing Mona Creek Rock shelter sites 23-30 offset from the mine plan (Ulan ID#180-187). Subsidence movements are not expected to have any practical effect on artefact scatters and isolated finds in open terrain. The impacts to these types of sites are expected to remain negligible consistent with expectations presented in the UCCO Project EA. **Revised Predictions by SCT (2019):** The proposed mining in the extension areas of LW30, LWW7 and LWW8 are not expected to significantly impact artefact scatter or isolated find sites. **Revised Predictions by SCT (2019):** The significant rock shelter sites of Mona Creek (Ulan ID#180-184) and a new rock shelter site with artefacts (Ulan ID#1630) within or adjacent to the revised Extraction Plan Application Area are fully protected by from subsidence impacts by a mining setback conservation barrier equal to greater than 0.5 times overburden depth.	Section 4.2 of the HMP LW30 & LWW6-LWW8 describes the monitoring to be undertaken for a number of rock shelter sites and open grinding groove sites (as specified in Appendix 2 of the HMP), in order to identify and document any subsidence impacts from mining within the Application Area. This information will be used to guide future assessments within the Project Area. General monitoring will involve inspecting and recording the condition of these specific Aboriginal sites within three to six months after undermining has occurred. Stone Arrangement sites within the Application Area will undergo detailed archaeological recording prior to the commencement of the relevant longwalls as required by the HMP[34].	Section 4.1.1 of the HMP LW30 & LWW6-LWW8 details the management measures for known Aboriginal sites within Longwalls 30 & W6-W8 to be implemented (as set out in Appendix 2 of the HMP), including procedures for excavations, curation of artefacts, stakeholder engagement, reporting Aboriginal heritage and further investigations. Section 5 of the HMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring as described for Aboriginal heritage management indicates the subsidence performance measures are likely or have been exceeded.
European Heritage	*Site CC6 (Timber Getting Site) is not expected to be sensitive to subsidence movements and no perceptible impact is expected.*	**Revised Predictions by SCT (2016):** No change in subsidence impacts from those described in the Project EA was observed at European heritage sites. Site CC6 (Timber Getting Site) is not expected to be sensitive to subsidence movements and no perceptible impact is expected. Within previous subsidence zone of LW29, no additional impacts to PK243 (Apple Tree Flat Farm Complex) expected. **Revised Predictions by SCT (2019):** No additional European heritage items from those assessed in SCT (2016) have been identified within the vicinity of the extension areas.	Section 4.2 of the HMP LW30 & LWW6-LWW8 describes the site CC6 will be inspected post mining to document any subsidence impacts at the site.	Section 4.1.2 of the HMP LW30 & LWW6-LWW8 details the management actions to be taken if the site is significantly impacted by subsidence.

[34] Ulan Coal Document Number: ULNCX-111515275-95.

3.5.1 Assessment of Performance Indicators and Measures for Heritage

Performance indicators were developed to assess if there is a potential or likely chance the performance measures have been exceeded or are likely to be exceeded during longwall extraction (**Table 23**). Analysis of monitoring data will be undertaken to assess the potential impacts of mining within the Application Area against the performance measures relevant to heritage.

In the event that the subsidence performance measures relating to heritage features (**Table 23**) are considered to have been exceeded or are likely to be exceeded, then Ulan Coal will implement a Contingency Plan as described in **Section 4.1** and contingency measures as outlined in **Table 23**.

Table 23 Heritage Features Performance Measures and Performance Indicators

Heritage Features	Subsidence Performance Measure	Performance Indicators	Management Measures and Contingency Measures
Aboriginal sites	Nil impact in the Brokenback Conservation Area, Grinding Groove Conservation Areas[1]; and on Mona Creek Rock Shelter Sites	This performance indicator will be considered to be triggered if: • Subsidence monitoring identifies an exceedance (or a trend to exceedance) of the predicted subsidence values for far field horizontal movements; and/or • Subsidence monitoring identifies a perceptible change (e.g. cracking) within the Mona Creek Rock Shelter Sites.	If the assessment of performance indicators determine an exceedance of the performance measures is due to subsidence related impacts as a result of mining within the Application Area, the Contingency Plan would include: • Notify relevant government agencies; • Conduct investigations; • Additional monitoring; and • Reassess subsidence impacts.
Talbragar Fish Fossil Reserve	Negligible impact	Not Required [2]	Not Required [2]
Other Heritage Sites	No greater impact than predicted in the EA	The performance indicators will be considered to be triggered if: • Subsidence monitoring data identifies an exceedance (or a trend to exceedance) of the predicted probability of subsidence induced impacts on Aboriginal rock shelter sites within the Application Area; and/or • Visual monitoring identifies Aboriginal rock shelter sites displaying greater than predicted probabilities of impact or evidence of subsidence-induced cracking or rock fall) at sites not predicted to be impacted.	If the assessment of performance indicators determine an exceedance of the performance measures is due to subsidence related impacts as a result of mining within the Application Area, the Contingency Plan (**Figure 19**) would include: • Notify relevant government agencies; • Conduct investigations; • Additional monitoring; and • Reassess subsidence impacts.

Notes: [1] The Brokenback Conservation Area is located approximately 2km south-west of the Application Area. The Bobadeen Grinding Groove Conservation Area is located approximately 1.2km south of the Application Area. There is considered to be no potential for subsidence related ground movements at this site as a result of longwall mining within the Application Area (**Technical Report 1**).

[2] The Talbragar Fish Fossil Reserve is located approximately 1.6km south-west of the Application Area. There is considered to be no potential for subsidence related ground movements at this site as a result of longwall mining within the Application Area (**Technical Report 1**).

3.6 Public Safety Subsidence Predictions, Monitoring and Management

The purpose of the Public Safety Management Plan for Longwalls 30 & LWW6-LWW8 (PSMP LW30 & LWW6-LWW8) (**Appendix F**) is to outline the management strategies, controls and monitoring programs to be implemented for the management of public safety in relation to potential subsidence impacts from secondary extraction within the Application Area. The scope of the PSMP LW30 & LWW6-LWW8 applies to land within the Application Area (**Figure 11**). Public safety monitoring applicable to this Extraction Plan are displayed in **Figure 18**.

The primary public safety hazards associated with the extraction of LW30 & LWW6-LWW8, include:

- Surface cracking; and
- Rock falls.

The impacts of mining subsidence on the tracks are expected to be essentially similar to impacts previously observed over UUG.

The magnitude of tensile strain at which surface cracking is detectable is sensitive to the nature of the surface terrain. Cracks are typically evident on hard surfaces such as roads and bare rock outcrops at strains of greater than 2-5 mm/m and in bushland environments at strains of greater than about 5-10 mm/m. Cracks are typically less than about 20 mm wide in flat or gently undulating terrain but may be larger, generally less than 100 mm wide but possibly up to 200 mm wide, in shallower areas (**Technical Report 1**).

There is potential for subsidence movements including steps, compression overrides, and high compression zones at low topographic points. The formation of a step has potential to affect the utility of four wheel drive access tracks but is considered unlikely to present a significant safety hazard in the context of the normal driving conditions along these tracks (**Technical Report 1**).

Minor rock falls are considered likely around sandstone formations in the west of the Application Area as a result of mining (**Technical Report 1**). There is potential for rock falls to occur along the sandstone cliff formation located on Private Property (**Technical Report 1)**.

The potential subsidence impact to lands not owned by Ulan Coal have been communicated to the Private Landholder and the NPWS through consultation undertaken for this Extraction Plan (**Section 2.1**).

Subsidence effects at the edge of the DSCA are expected to increase with vertical subsidence up from around 0.1m to approximately 1.0m as a result of the proposed extension to LW30. Subsidence impacts to features in and within the vicinity of the revised Extraction Plan Application Area are expected to be consistent with those presented in SCT (2018a) for MOD4. Impacts are expected to be largely imperceptible given the large overburden depth and manageable under existing subsidence management plans. Minor impacts in the form of cracking on hard surfaces, including the access road, are considered possible but easily manageable (**Technical Report 1a**).

Table 25 outlines the key public safety management issues, monitoring, management and contingency measures in relation to potential subsidence impacts from longwall mining in the Application Area. For further details regarding monitoring, evaluation and management of public safety refer to PSMP LW30 & LWW6-LWW8 in **Appendix F.**

Table 24 Summary of Public Safety Impacts, Monitoring, Management & Contingency

Issue	Approved Impact (Project EA)	Revised Impact	Monitoring	Management
Public Safety	*Surface cracks are expected to be generally isolated and increase in size inversely to overburden thickness ranging from 40mm wide where the overburden is 250m thick, 100mm wide where the overburden is 150m thick, and up to 250mm wide where the overburden is 80m thick.* *There are numerous sandstone cliff formations located within the project area. Based on previous experience of mining under similar sandstone cliffs at Ulan, mining subsidence is expected to cause rock falls on 10-20% of the sandstone cliff formations located directly above the mining area. In general, cliff formations that are high, overhanging, re-entrant and laterally extensive are likely to experience perceptible changes the most.* *There are several unsealed access roads and numerous four wheel drive tracks located within the project area. Subsidence movements are not expected to cause impacts that are significantly out of character with the general nature of the access roads and tracks.*	**SCT Operations revised predictions (2016):** Cracks are expected to develop over the longwall panels and remain in the vicinity of panel edges and along the tops of topographic highs once mining is complete. Cracks are typically evident on hard surfaces such as roads and bare rock outcrops at strains of greater than 2-5 mm/m and in bushland environments at strains of greater than about 5-10 mm/m. Cracks are typically less than about 20 mm wide in flat or gently undulating terrain but may be larger, generally less than 100 mm wide but possibly up to 200 mm wide, in shallower areas. There is considered to be no potential for a step or compression ripple or any other perceptible subsidence impact within the Durridgere Conservation Area. Subsidence induced rock fall could occur on up to 20% of the length of sandstone formations, perceptible cracking is expected along up to 50-70% of the length of sandstone formations within the footprint of extracted longwall panels and to a distance of 0.4 times overburden depth outside the goaf edge. The cliff formation over LWW7 would be directly undermined and is expected to experience the full range of subsidence movements with rock falls likely. **Revised Predictions by SCT (2019):** The proposed longwall extensions represent a marginal increase in the overall mining and subsidence footprint but subsidence effects are expected to be the same for the approved Extraction Plan and the impacts are expected to the similar to these presented in SCT (2016) and consistent within those described in SCT (2018a) for the MOD 4 extension areas. **Revised Predictions by SCT (2019):** There is a sandstone cliff formation located at the western end of LWW7. The northern end of this formation, close to the longwall start line, is expected to experience more vertical subsidence due to the proposed extension to LWW7, however impacts to this feature are expected to remain consistent with those forecast in SCT (2016) and SCT (2018a) for MOD4.	Section 4.2 of the PSMP LW30 & LWW6-LWW8 details the inspections to be undertaken to monitor for signs of cracking, rock falls and other subsidence induced impacts, including: • Pre, during and post-mining inspection of lands for surface cracking and rock falls in accordance with LMP LW30 & LWW6-LWW8. These inspections will be documented and photos taken where appropriate, with relevant subsidence mitigation actions entered into CMO[1].	Section 4.1 of the PSMP LW30 & LWW6-LWW8 details the subsidence management measures, in regards to public safety, including: • Signage, security, fencing and locks on gates; • Provide updates of operations to CCC meetings, private landholders, NPWS and other relevant stakeholders; • Post mining inspections; and • Completion of Contractor Work Authorisation Forms prior to commencing work; Section 5 of the PSMP LW30 & LWW6-LWW8 outlines the contingency measures to be implemented if subsidence monitoring as described for public safety management indicates the subsidence performance measures are likely to be or have been exceeded.

Notes: [1]CMO is an action tracking software which automates the tracking of actions generated from incidents, audits, training, obligations or risk assessments (or similar).

3.6.1 Assessment of Performance Indicators and Measures for Public Safety

Performance indicators were developed to assess if there is a potential or likely chance the performance measures have been exceeded or are likely to be exceeded during longwall extraction (**Table 25**). Analysis of monitoring data will be undertaken to assess the potential impacts of mining within the Application Area against the performance measures relevant to public safety.

In the event that the subsidence performance measures relating to public safety (**Table 25**) are considered to have been exceeded or are likely to be exceeded, then UCMPL will implement a Contingency Plan as described in **Section 4.1** and contingency measures as outlined in **Table 25**.

Table 25 Public Safety Performance Measures and Performance Indicators

Heritage Features	Subsidence Performance Measure	Performance Indicators	Management Measures and Contingency Measures
Public Safety	No additional risk due to mining	This performance indicator will be triggered if: • UCMPL have recorded a public safety incident as a result of subsidence induced impacts within the Application Area.	If the assessment of performance indicators determine an exceedance of the performance measures is due to subsidence related impacts as a result of mining within the Application Area, the Contingency Plan would include: • Notify relevant government agencies; • Conduct investigations; • Additional site security monitoring - consider increasing frequency or additional sites; and • Review site security procedures.

3.7 Subsidence Monitoring Program

The purpose of the Subsidence Monitoring Program for Longwalls 30 & W6-W8 (SMP LW30 & LWW6-LWW8) at UUG is to:

- Outline the subsidence monitoring for subsidence effects (**Table 26**) as a result of secondary extraction of longwall panels, as described in the Extraction Plan within the Application Area (**Section 2.5.1**); and
- Outline the consolidated monitoring programs (**Table 27**) for water, land, biodiversity, built features, heritage and public safety.

The SMP LW30 & LWW6-LWW8 is provided in **Appendix G**.

The various subsidence effects and consolidated monitoring programs provided in each of the component management plans, as described in **Section 3** are summarised in **Table 27**.

The scope of the SMP LW30 & W6-W8 applies to longwalls 30 & LWW6-LWW8 as described in the Extraction Plan within the Application Area. This SMP LW30 & LWW6-LWW8 has been prepared with assistance from SCT Operations Pty Ltd (SCT).

3.7.1 Subsidence Effects Monitoring Program

UUG offers the opportunity to measure full subsidence movements over two monitoring lines using a continuation of the high confidence subsidence monitoring currently undertaken in accordance with the current Subsidence Monitoring Program[35]. These measurements will not only provide confidence in the predictions but also provide data to assist in the management of risks associated with subsidence and allow analysis of the relationship between the subsidence effects and environmental impacts of extraction (**Technical Report 1**).

Subsidence effects monitoring for UUG within the Application Area includes three ground transect cross lines, the established F line over the eastern panels, the established H line over the western panels, and establishment of a new line over the western panels LWW8-LWW11 of the mine plan, as shown **Figure 13**.

The subsidence effects monitoring lines include:

- F Line (established cross line eastern panels); and
- H Line (established cross line western panels);

The two established ground transect lines are currently monitored in accordance with previous and current approved Subsidence Monitoring Programs (**Figure 13**). **Appendix I** provides an A0 size plan of the subsidence monitoring lines.

A summary of the subsidence monitoring program to measure the effects of the subsidence and to evaluate against the maximum subsidence predictions (**Table 13**) is provided in **Table 26** and displayed in **Figure 13**.

The UUG Technical Services Manager is responsible for ensuring the implementation of the subsidence effects monitoring program as outlined in **Table 26**. The UUG Registered Mine Survey is responsible for ensuring the surveys of the ground transects are completed during each longwall and the data is verified, processed and maintained as outlined in **Table 26**.

The Environment and Community Manager immediately after becoming aware of an exceedance of the predicted subsidence parameters and/or a subsidence related incident.

[35] Ulan Coal Document Number ULNCX-111515275-1804

3.7.2 Consolidated Subsidence Monitoring Program

A summary of the groundwater, surface water, land, flora, fauna, built features, heritage and public safety monitoring programs implemented by the UUG to evaluate the impacts from subsidence within the Application Area has been consolidated in **Table 27** and displayed in **Figures 15 to 19.**

Monitoring and evaluation of subsidence performance measures and potential mining related impacts on groundwater, surface water, land, flora, fauna, built features and heritage are described in detail in the following management plans:

- Appendix A: Water Management Plan for LW30 & LWW6-LWW8;
- Appendix B: Land Management Plan for LW30 & LWW6-LWW8;
- Appendix C: Biodiversity Management Plan for LW30 & LWW6-LWW8;
- Appendix D: Built Features Management Plan for LW30 & LWW6-LWW8;
- Appendix E: Heritage Management Plan for LW30 & LWW6-LWW8; and
- Appendix F: Public Safety Management Plan for LW30 & LWW6-LWW8.

The Environment and Community Manager is responsible for ensuring all monitoring, visual inspections and recording data of groundwater, surface water, land, flora and fauna, built features, heritage sites and public safety management are carried out as outlined in **Table 27**. The Environment and Community Manager is also responsible for ensuring all incident and annual reporting requirements are undertaken as outlined in **Table 27**.

Table 26 Summary of Subsidence Effects Monitoring Program

Survey Line[1]	Data Type	Parameters	Accuracy of Survey[2]	Survey Frequency	Responsibilities & Reporting
F & H Lines	3D Position (X, Y, Z)	• Subsidence parameters to be measured on survey monitoring marks based on three dimensional position of each peg using far field GPS control network: - Vertical subsidence; - Cross Panel Horizontal Movement; - Tilt; & - Strain along Line.	• Class "D" or greater standard of accuracy as defined in ICSM (2007)	• Survey to be completed upon completion of the installation of the line. • Survey to be completed within two weeks of the completion of secondary extraction of each longwall panel.	• Survey data recorded from the subsidence line survey program will be verified, processed and maintained by the UUG Mine Surveyor and the UUG Technical Services Manager. • Cliff line and internal road data recorded from the visual inspection program will be verified, processed and maintained by the Environment & Community Manager. • Incident and annual reporting requirements will be the responsibility of the Environment & Community Manager. • Reporting of subsidence monitoring program in accordance with **Section 4.3** to include: - Incident Reporting: Notification with 24hrs of becoming aware of the occurrence. - Annual Review (AR): Submitted before 31 March annually. Reporting period 01 January to 31 December. This document includes the Annual Report.
Layout of Monitoring Points		• **Layout of survey** lines and survey marks across the Application Area shown on Extraction Plan 7 (**Appendix G**). • **Survey marks** Pegs on these subsidence lines will be installed at intervals of approximately 1/20th depth of cover across each longwall block or generally 10m where 1/20th depth of cover is greater than 10m. In non-rock areas galvanised steel star pickets driven to approximately 0.1m above ground RL or refusal. In solid rock areas a hole is drilled to 0.2m and brass or stainless steel threaded rod or bolt installed with approximately 0.01m above ground RL.			
Visual Inspections: (Cliff Lines & Internal Roads)	X, Y Coordinates	• Parameters to be monitored for general surface and landscape features of internal access tracks and cliff lines include: - Length of rock falls (m) along cliff lines; - Perceptible cracking along cliff lines; - Surface cracking on access tracks; - Subsidence steps on access tracks; & - Fallen trees across access tracks.	• Equipment to record locations include: - Inspection Forms; - GPS digital camera; or - Camera and Handheld GPS accurate +/- 5m.	• Visual inspections of cliff lines and internal roads completed prior to commencement of each longwall. • Visual inspections to be completed monthly during each longwall for access tracks. • Visual inspections of cliff lines to be completed at the end of each longwall. • Pre and post mining inspections of cliff lines and access roads to be undertaken on private property. Landholder will contact UCMPL for inspection during mining if subsidence impacts of concern to the landholder are present.	

Notes: All surveys made must be calculated and plotted using **GDA 1994 MGA Zone 55**

1 Layout of survey lines and survey marks across the Application Area shown on Extraction Plan 7 in Appendix I of the Extraction Plan LW30 & LWW6-LWW8.

2 In accordance with *Survey Methodology* and *Subsidence Survey Accuracies* provided in **Attachment 1** of this SMP LW30 & LWW6-LWW8.

Figure 13 Subsidence Monitoring Lines

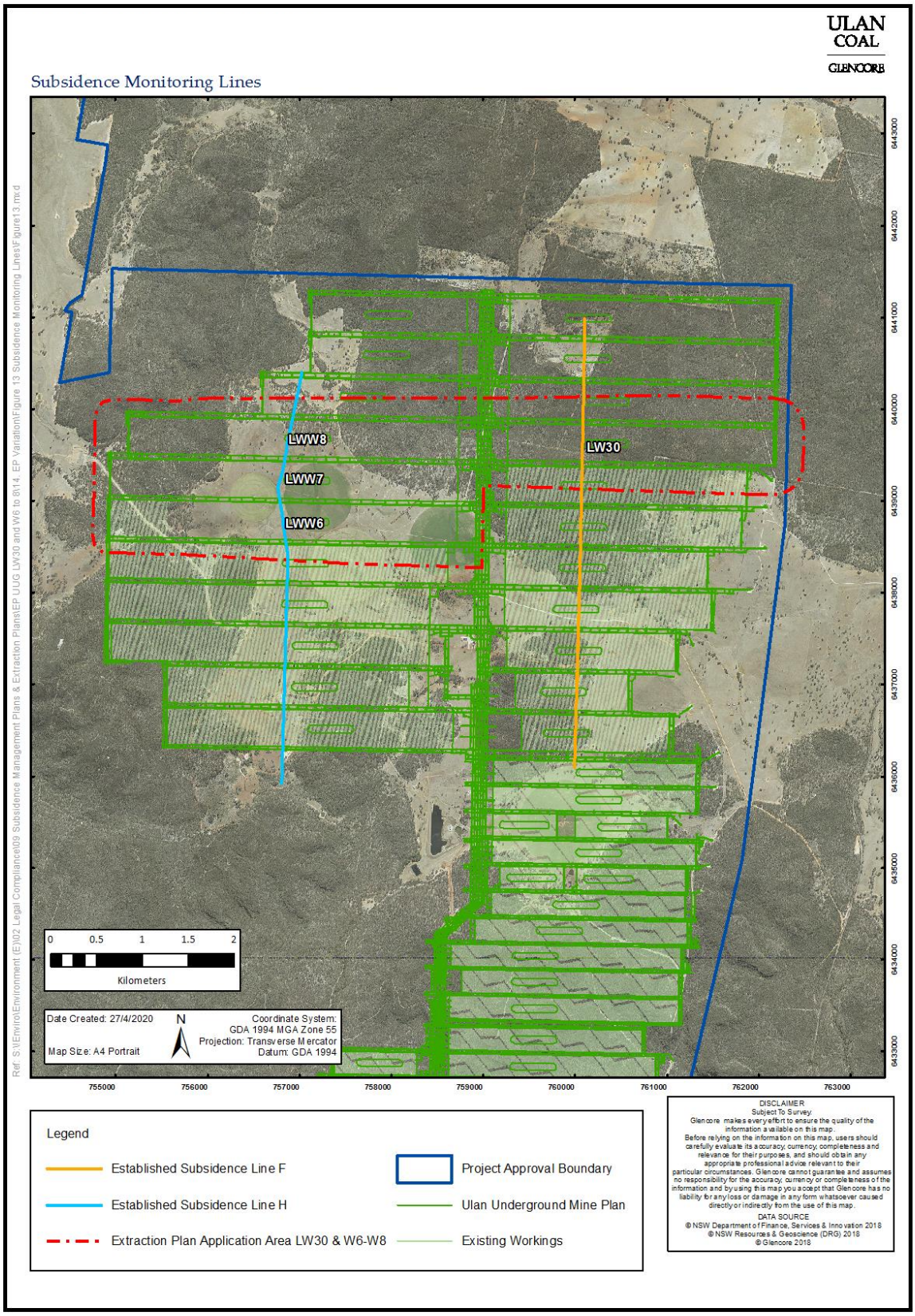


Table 27 Summary of the Consolidated Subsidence Monitoring Program

Management Plan	Monitoring Component	Parameters	Location/Network	Monitoring Frequency	Monitoring Type[36]
Water Management Plan LW30 & LWW6-LWW8	Surface Water Quality Monitoring	• TSS (mg/L)	• SW10, SW07, SW08. • Refer to **Figure 14.**	• Monthly grab sample during creek flow events.	EMS
	Channel Stability Monitoring	• Document any significant erosive or depositional features for quantitative evaluation. • Recording of any visible subsidence impacts.	• Along the section of Mona Creek above LWW8; and • 2nd and 3rd order drainage lines of Mona Creek within 0.2m subsidence contours of LW30, LWW6 to LWW8. • Refer to **Figure 14.**	• Pre-mining; • Post mining (at least 3 months after cessation of mining, within 12 months of cessation of mining). • Annually for two years post mining.	EMS EP
	Ponding and Erosion Monitoring	• Presence of surface cracking and changes in erosion, surface ponding or out of channel flows.	• Potential ponding and erosion sites (Indicative sites identified during EA (Umwelt 2009) sites for monitoring to be finalised during pre-mining inspection. • Refer to **Figure 14** for indicative potential ponding and erosion sites.	• Pre-mining; • Post mining (at least 3 months after cessation of mining, within 12 months of cessation of mining). • Annually for two years post mining.	EP
	Stream Health Monitoring	• Monitoring aquatic macro invertebrate assemblages and riparian vegetation/health.	• Ulan Creek, Mona Creek and Bobadeen Creek. • Refer to SWMP for monitoring locations.	• Annually	EMS
	Groundwater Monitoring	• Standing water levels (m). • Groundwater quality: - EC (µS/cm) & pH; and - Full chemical analysis. • Piezometric head pressures.	• North Monitoring Network (NMN) • Intermittent Monitoring Network (IMN) • Mona Creek Alluvium Monitoring (MCAM) • Refer to **Figure 17.**	• NMN quarterly monitoring water levels and download VW data loggers; • NMN EC and pH (Biannually); and • NMN full chemical analysis (Annually). • IMN water levels, chemistry and data download as required. • MCAM quarterly monitoring water levels and download VW data loggers.	EMS EP
	Private Bores (Groundwater)	• Standing water levels (m). • Water quality: - pH; and - EC (µS/cm)	• Private Bore Monitoring Network • Refer to **Figure 17** • Refer to GWMP for site coordinates of private bores.	• Annually	EMS
	The Drip	• Water Quality • Pore Pressure Monitoring • Photographic Monitoring (Refer to Section 4.2 of the GWMP)	• The Drip • Pore pressure data collected from PZ29 (within the NMN) • (Refer to Section 4.2 of the GWMP)	• Water quality sampling and photographs every two months • Pore pressure downloads quarterly • (Refer to Section 4.2 of the GWMP)	EP EMS

[36] EMS = Monitoring in accordance with PA_0184 Environmental Management Plans; (EP) - Monitoring specific this Extraction Plan

Management Plan	Monitoring Component	Parameters	Location/Network	Monitoring Frequency	Monitoring Type[36]
Land Management Plan LW30 & W6-W8 **and** **Public Safety Management Plan LW30 & LWW6-LWW8**	Surface cracking inspection of UCMPL owned land and Durridgere State Conservation Area (DSCA)	• Visual observation to monitor the condition of the ground surface; • Handheld GPS accurate +/- 5m or GPS equivalent camera to record subsidence impact to lands.	• Monitoring of UCMPL's internal access tracks within the active subsidence zones of LW30, LWW6 to LWW8. • Monitoring of the DSCA will be undertaken within the active subsidence zone of LW30. • Refer to **Figure 18**	• During mining: visual inspections to be completed monthly during the extraction of the longwall; and • Post-mining: visual inspections to be completed at the end of each longwall (at least 3 months after cessation of mining, within 12 months of cessation of mining).	EP
	Cliff formation inspection on UCMPL owned land	• Visual observations and photographic record to record signs of surface cracking and quantify length (m) of rock falls.	• Cliff formation located above LWW7. • Refer to **Figure 18**	• Pre-mining visual inspection. • Post-mining: visual inspection to be completed upon the completion of LWW7 secondary extraction (at least 3 months after cessation of mining, within 12 months of cessation of mining).	EP
	Surface cracking/cliff formation inspection of privately owned land	• Visual observation and photographic record to monitor the condition of the ground surface and access tracks; • Visual observations and photographic record to record signs of surface cracking and quantify length (m) of rock falls; and • Handheld GPS accurate +/- 5m or GPS equivalent camera to record subsidence impact to lands.	• Cliff formation located above LWW7 • Monitoring of landholders existing access tracks within subsidence zones of LWW6 to LWW8; • Monitoring of agricultural land within subsidence zones of LWW6 to LWW8; and • Monitoring of bushland within subsidence zones of LWW6 to LWW8. • Refer to **Figure 18** • **Notes:** Access to cliff line for monitoring on Private Property will be subject to approval by the landowner.	• Pre-mining visual inspection. • During mining: visual inspections to be completed monthly during the extraction of the longwall under the property. • Landholder to contact UCMPL immediately if surface cracking is observed. UCMPL will conduct visual verification inspections[37]; • Post-mining: visual inspections to be completed within one month of the longwall leaving the boundary of the property. • Private Property Conditional Assessment Report to be completed at least 3 months after cessation of mining and no later than within 12 months of cessation of mining.	EP
Biodiversity Management Plan LW30 & LWW6-LWW8	Floristic Based Subsidence Monitoring	• Monitoring to identify any deterioration of the vegetation health that may be subsidence induced.	• Floristic Based Subsidence (FBS) sites as identified by **Figure 15**.	• In autumn and spring prior to longwall mining, during mining and at least two years post mining.	EMS
	Residual Vegetation Monitoring	• Monitoring as a control (analogue sites) to identify any deterioration of the vegetation health that may be subsidence induced.	• Floristic sites in residual vegetation areas as identified by **Figure 15**.	• Monitoring occurs annually, sites are generally monitored every 2 years (full floristic every 4 years and rapid assessment every 4 years).	EMS

[37] No Inspection of cliff line during mining, no persons (including landholder) to enter the vicinity of this area during active undermining.

Management Plan	Monitoring Component	Parameters	Location/Network	Monitoring Frequency	Monitoring Type[36]
	Microbat monitoring of cliff lines	• Monitoring to identify decreasing trends in threatened micro-bat species activity levels.	• Cliff line above LWW7 • Refer to **Figure 15** • **Notes:** The cliff line for monitoring on Private Property will be subject to approval by the landowner.	• Pre-mining between October to February and two years after longwall mining during the same period.	EMS
	Subsidence Area Microbat Habitat-usage Monitoring	• Monitoring to identify presence/absence of cave-dependent micro-bat species (i.e. Large-pied Ear Bat)	• Cliff line above LWW7 • Refer to **Figure 15** • **Notes:** The cliff line for monitoring on Private Property will be subject to approval by the landowner.	• Pre-mining at least two years prior to longwall mining between September and December. • Annually thereafter if monitoring establishes potential maternity roost sites.	EMS
	Monitoring to identify any deterioration of potential threatened species or associated habitat.	• Masked Owl: Monitoring to identify reduction in abundance and/or condition of HBTs; and • Regent Honeyeater and Swift Parrot: Monitoring to identify decline in canopy cover of key feed species.	• Floristic Based Subsidence (FBS) sites as identified by **Figure 15** • Floristic sites in residual vegetation areas as identified by **Figure 15**	• In autumn and spring prior to longwall mining, during mining and at least two years post mining.	EMS
Built Features Management Plan LW30 & LWW6-LWW8	UCMPL owned Built Features	• Visual inspections to record the general condition of UCMPL's assets including serviceability and safety.	• UCMPL owned built features within the Application Area • Refer to **Figure 19**	• Farm dams, roads, pivots will be inspected monthly during undermining to identify any subsidence impacts. • UCMPL owned power lines and pipelines are inspected and maintained in accordance with the UCMPL Maintenance Management System.	EP

Management Plan	Monitoring Component	Parameters	Location/Network	Monitoring Frequency	Monitoring Type[36]
	Built Features on Private Property	• Visual conditional assessment of Built Features including serviceability and safety.	• Non-UCMPL owned built features located on private property within the Application Area. • Refer to **Figure 19**	• Pre-mining visual inspection. • During mining: visual inspections to be completed monthly during the extraction of the longwall under the property. • Landholder to contact UCMPL immediately if damage to built feature is observed. UCMPL will conduct visual verification inspections[38]; • Post-mining: visual inspections to be completed within one month of the longwall leaving the boundary of the property. • Private Property Conditional Assessment Report to be completed at least 3 months after cessation of mining and no later than within 12 months of cessation of mining.	EP
	Essential Energy Power Line	• Visual inspection by suitably qualified person to ensure integrity of the asset	• 5 poles located within the Application Area • Refer to **Figure 19**	• Prior to the commencement of each longwall extraction; • At a frequency of monthly during the extraction of each longwall; and • Inspected six monthly for at least 2 years (or until no further movement is recorded) after the extraction of each longwall.	EP
	State Survey Control Marks	• Ensure State Survey Control Marks within 2km radius of the goaf edge of active longwall are registered as 'Disturbed' through appropriate processes. • Reinstate and resurvey the Survey Control Mark after cessation of subsidence movements is evidenced by the Subsidence Monitoring Program.	• All State Survey Control Marks within 2km radius of longwall mining. • Refer to **Figure 19**	• Prior to the commencement of each longwall; and • Post mining to determine if there are any state survey marks which meet the criteria for recommissioning.	EP
Heritage Management Plan LW30 & LWW6-LWW8	Aboriginal Heritage Monitoring on UCMPL land	• Visual inspections of selected rock shelters within the Application Area	• LWW6 – Rock shelter Ulan ID # 599 • LWW7-8 – Mona Creek Rock Shelter Sites Ulan ID # 185-187 (Site No. 28-30) • Application Area – Ulan ID#735[39] • LWW8 – Ulan ID#741 • LWW9 – Ulan ID#171 • Refer to **Figure 16**	• Pre mining of heritage sites prior to commencement of the relevant longwall panel. • Post mining, within six months of cessation of mining the relevant longwall panel.	EMS EP

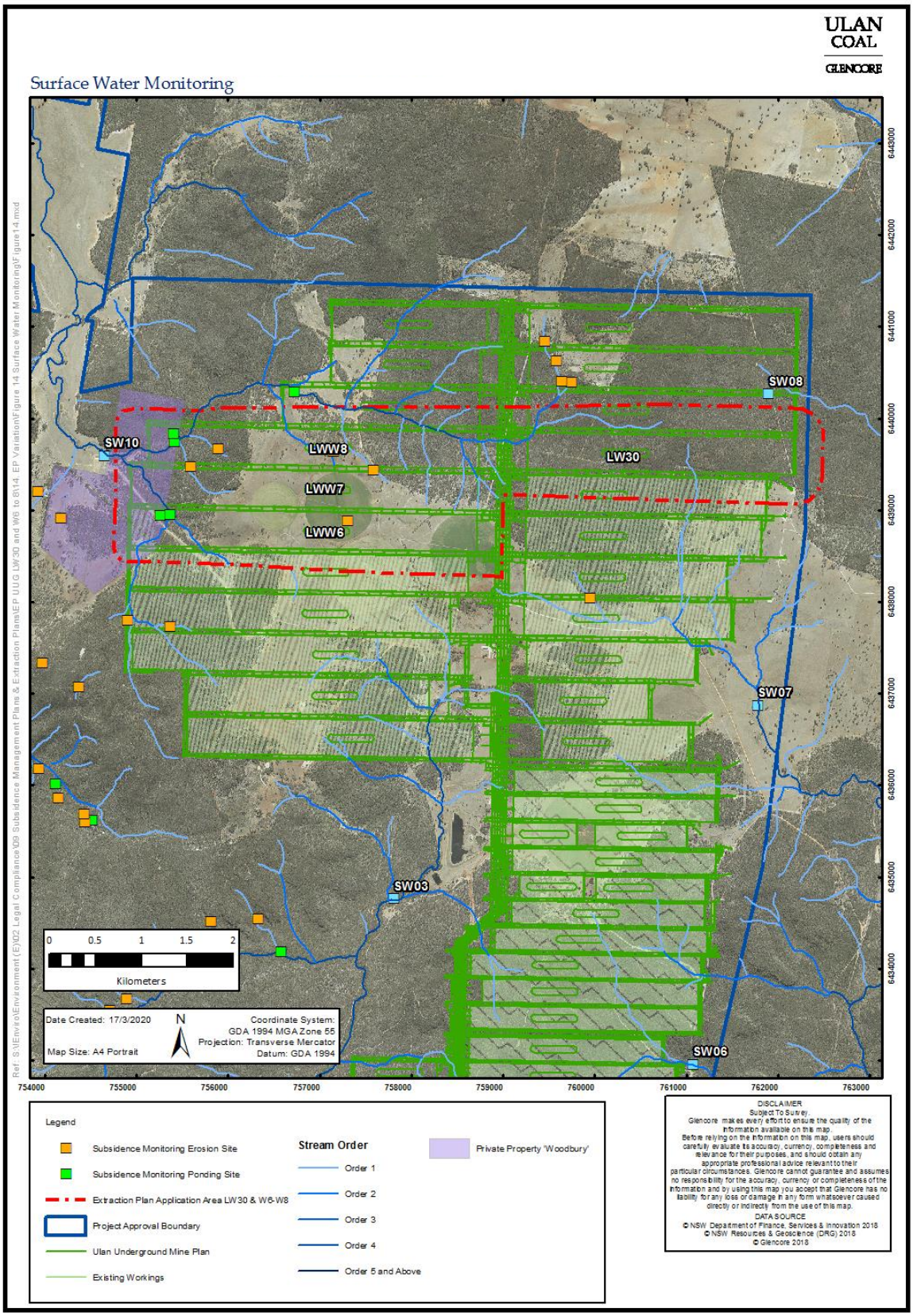
[38] No Inspection of cliff line during mining, no persons (including landholder) to enter the vicinity of this area during active undermining.

[39] Rock Shelters sites Ulan ID #171 & 735 are monitored as control sites to measure the accuracy of subsidence predictions for the secondary extraction of LWW8. ID#735 is not expected to experience subsidence impacts (5%) and ID#171 is predicted to have a 50% subsidence risk of perceptible impact during the extraction of LWW8.

Management Plan	Monitoring Component	Parameters	Location/Network	Monitoring Frequency	Monitoring Type[36]
	Aboriginal Heritage Monitoring on Private Property[40]	• Visual inspections of selected rock shelters within the Application Area	• LWW7-8 – Mona Creek Rock Shelter Sites Ulan ID # 180-184 (Site No. 23-27) • Refer to **Figure 16**	• Pre mining of heritage sites prior to commencement of the relevant longwall panel. • Post mining, within six months of cessation of mining the relevant longwall panel.	EMS EP
	European Heritage	• Visual inspection and photo record	• LWW8 – European Heritage Site CC6 • Refer to **Figure 19**	• Pre-mining inspection • Post mining inspection to document any subsidence impacts to the site (at least 3 months after undermining, within 12 months of undermining).	EP

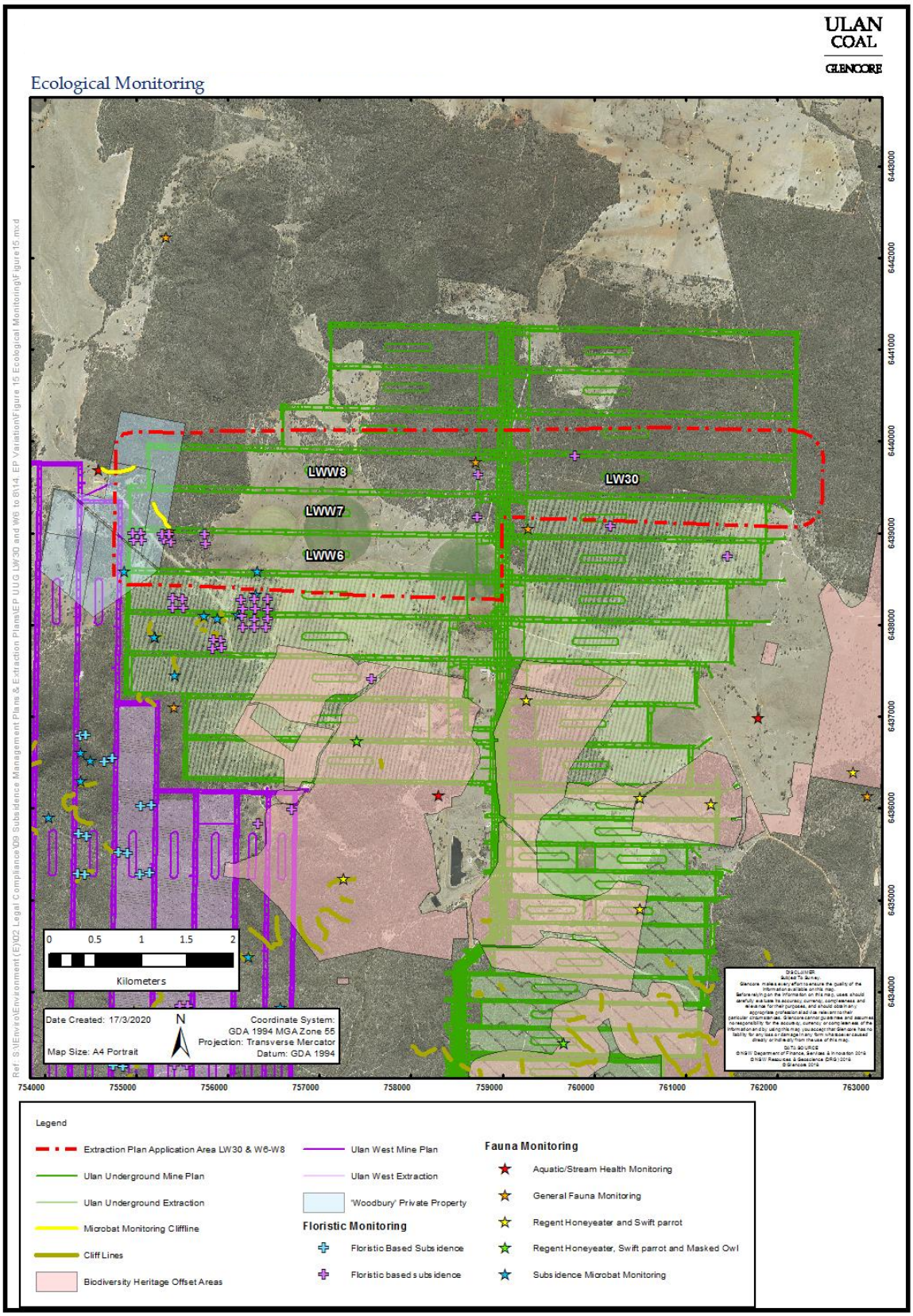
[40] Access to Aboriginal heritage monitoring sites subject to agreement by the Private Landholder.

Figure 14 Surface Water Monitoring



Notes: Potential ponding and erosion sites - Indicative sites identified during EA (Umwelt 2009) sites for monitoring to be finalised during pre-mining inspections.

Figure 15 Ecological Monitoring



Notes: Access to the cliff line for microbat monitoring on Private Property will be subject to approval by the landowner as required in the PPSMP. Additional FBS sites may be established during this Extraction Plan in consultation with UCMPL's ecologist.

Figure 16 Heritage Monitoring

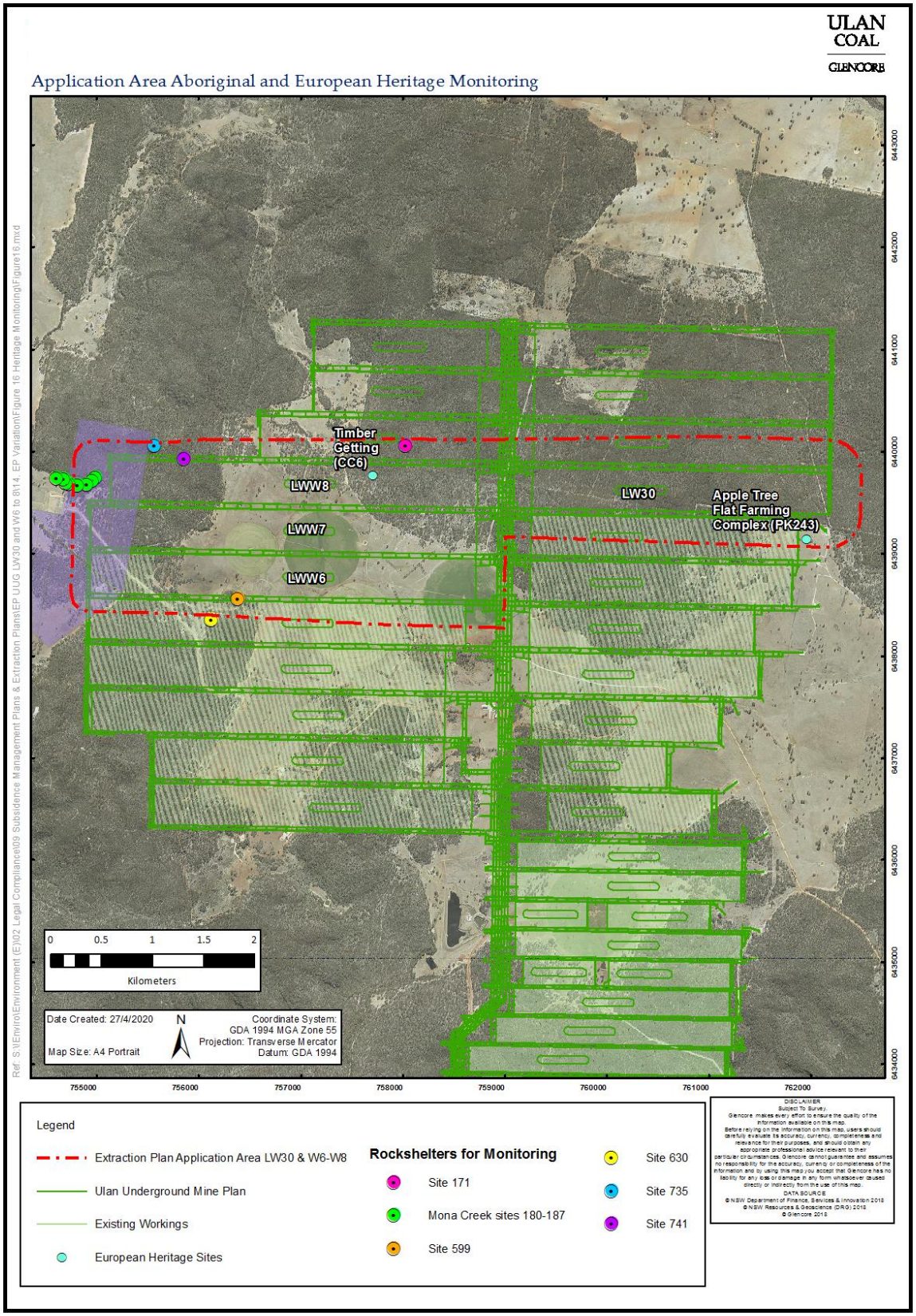


Figure 17 Private Bore and Groundwater Monitoring

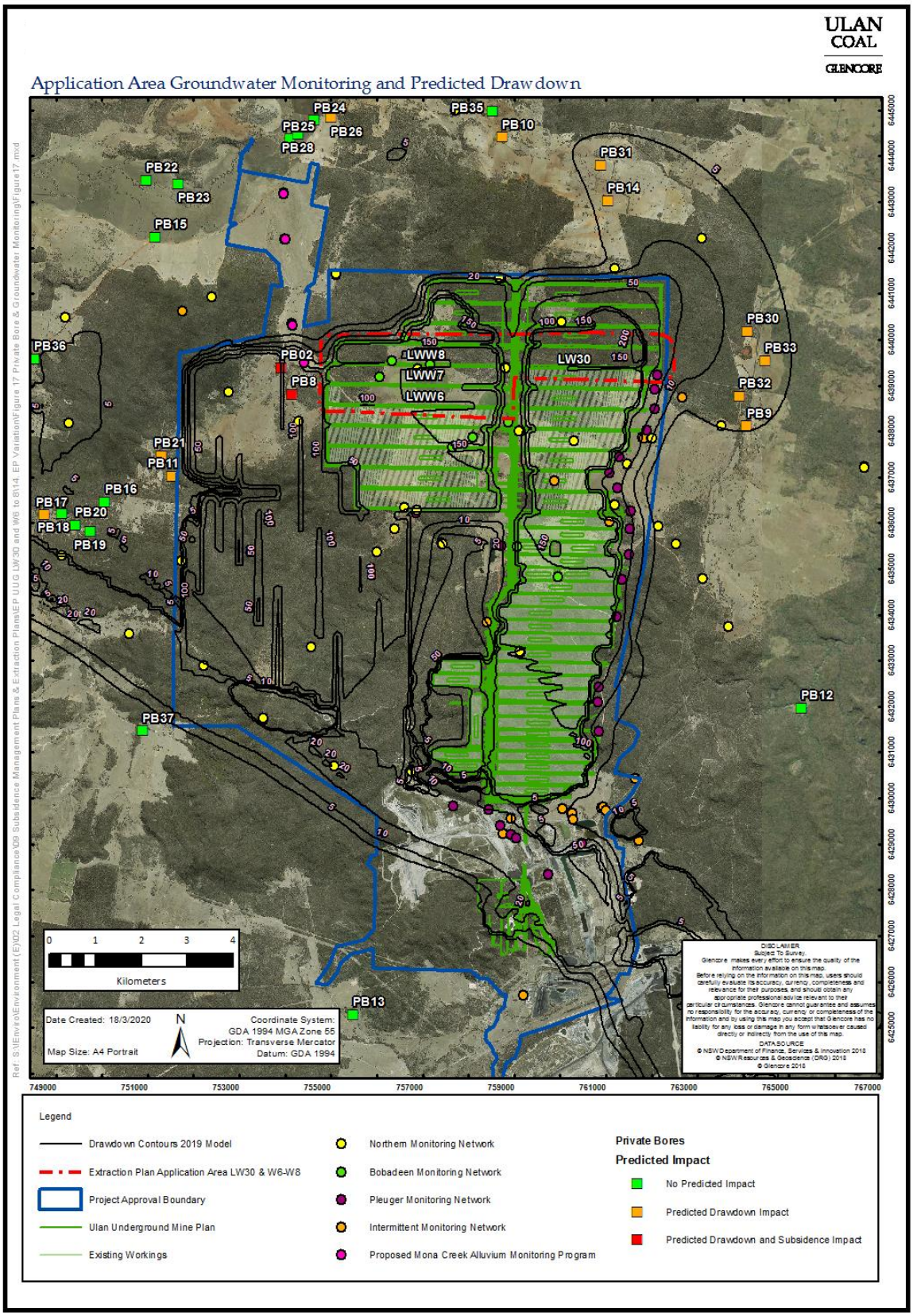


Figure 18 Land and Public Safety Feature Monitoring

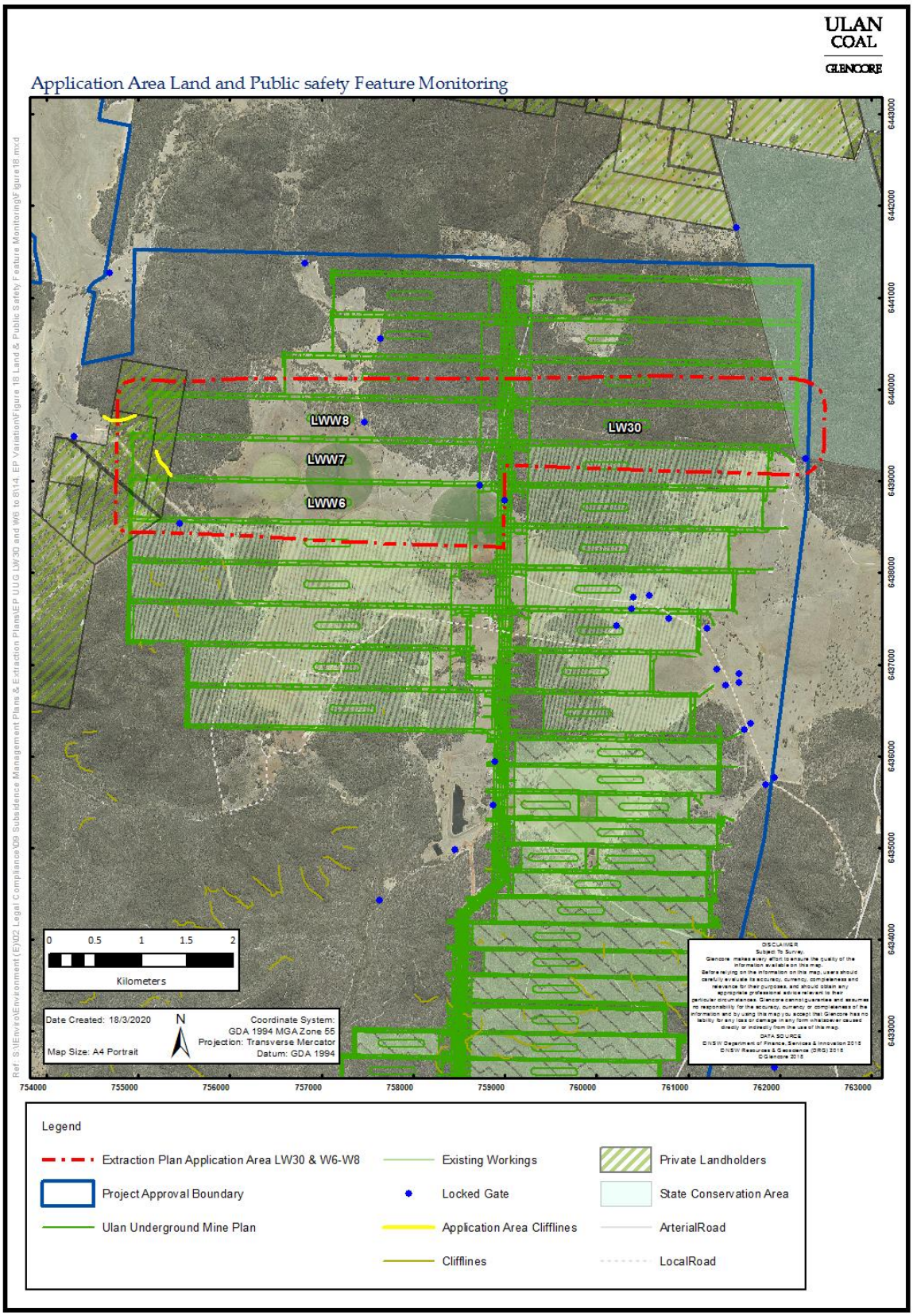
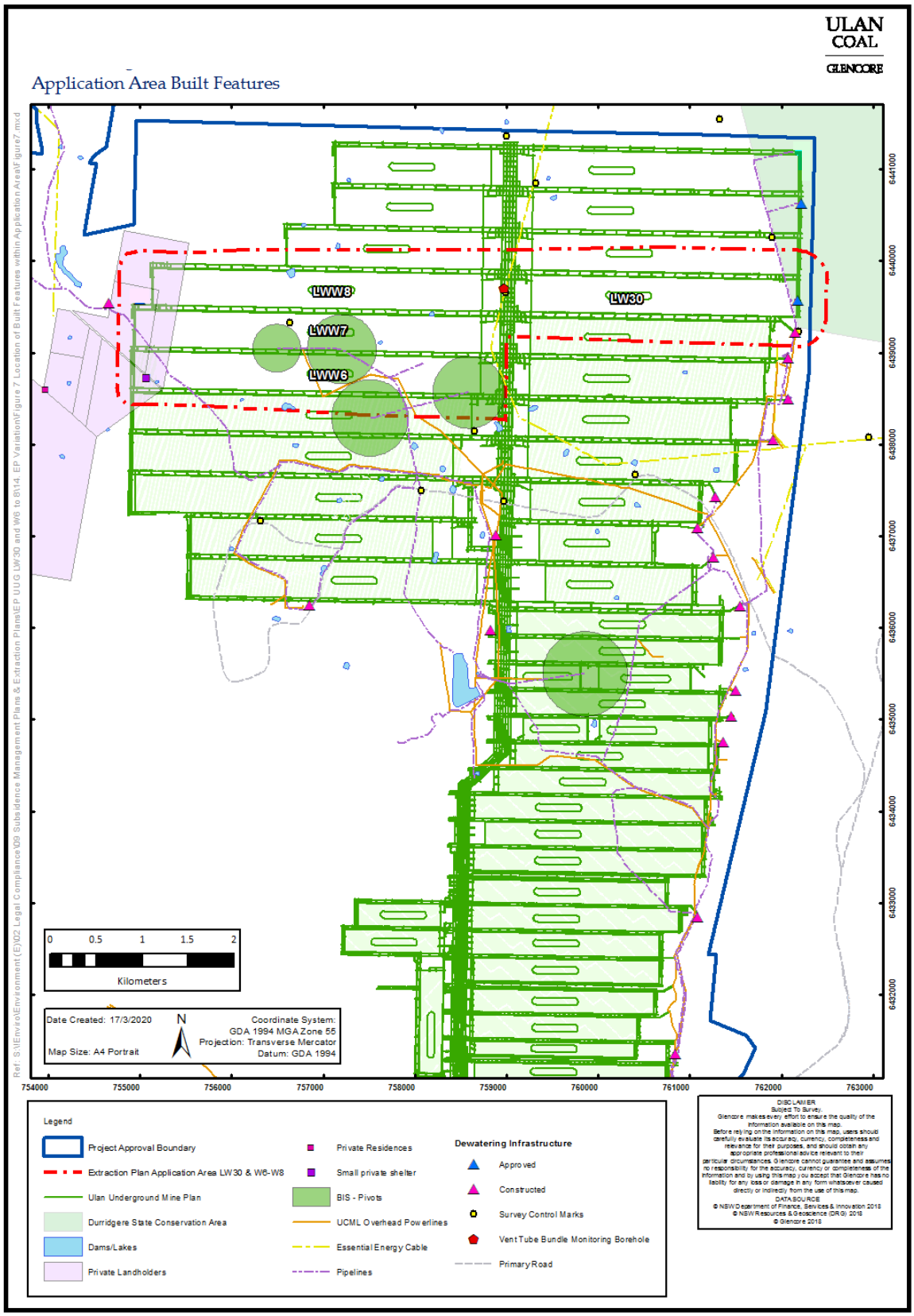


Figure 19 Built Features Monitoring



3.8 Rehabilitation Management

The purpose of the Rehabilitation Management Plan for Longwalls 30 & LWW6-LWW8 (RMP LW30 & LWW6-LWW8) (**Appendix H**) is to outline the rehabilitation management strategies to be implemented for the management of subsidence induced impacts on surface features from the proposed secondary extraction within the Application Area.

The scope of the RMP LW30 & LWW6-LWW8 applies to surface features within the Application Area potentially impacted by subsidence a result of longwall mining (**Figures 8 to 12**).

The RMP LW30 & LWW6-LWW8 references key relevant components of the existing approved Mining Operations Plan (MOP[41]).

Section 4 and Section 5 of the MOP are prepared to satisfy Condition 57, Schedule 3 of PA08_0184 for the preparation of a Rehabilitation Management Plan (RMP). The Ulan Coal Mine Complex Integrated MOP outlines remediation of subsidence related cracking.

The key subsidence impacts that may have potential consequences on land, requiring rehabilitation, associated with the extraction of RMP LW30 & LWW6-LWW8 within the Application Area include surface cracking, possible steps, overrides and erosion holes[42].

3.8.1 Rehabilitation Management Measures

The need to address and remediate subsidence impacts will be assessed on a case by case basis. The decision to remediate subsidence impacts will take into consideration accessibility, potential risks to public, employee and contractor safety and the environment. If assessments determine subsidence cracking does not present a safety risk or risk to the environment, the crack will be left to self-remediate to prevent further clearing/disturbance works associated with the remediation. If assessments determine subsidence cracking requires remediation, the method of remediation will be selected to minimise the potential disturbance to the surrounding environment.

Prior to the commencement of subsidence remediation works, a Ground Disturbance Permit (GDP) must be completed, in accordance with the EMS to identify any potential environmental and heritage issues (e.g. threatened flora and fauna, Aboriginal archaeology sites) and ensure the works are undertaken with minimal environmental impact.

Section 4.1 of the RMP LW30 & LWW6-LWW8 describes surface features within the Application Area, their respective rehabilitation objectives and references the proposed rehabilitation strategy as provided by the relevant component management plan.

[41] The current MOP was approved on 16 September 2017 and expires in 30 November 2024. A new MOP will be prepared and submitted for approval prior to the MOP expiry date.

[42] A coincidence of mining induced cracking at the commencement of LWW5, a drainage line and recent heavy rainfall events, approximately 14 months after the area was mined led to flow into subsidence cracks and localised erosion of surface soils.

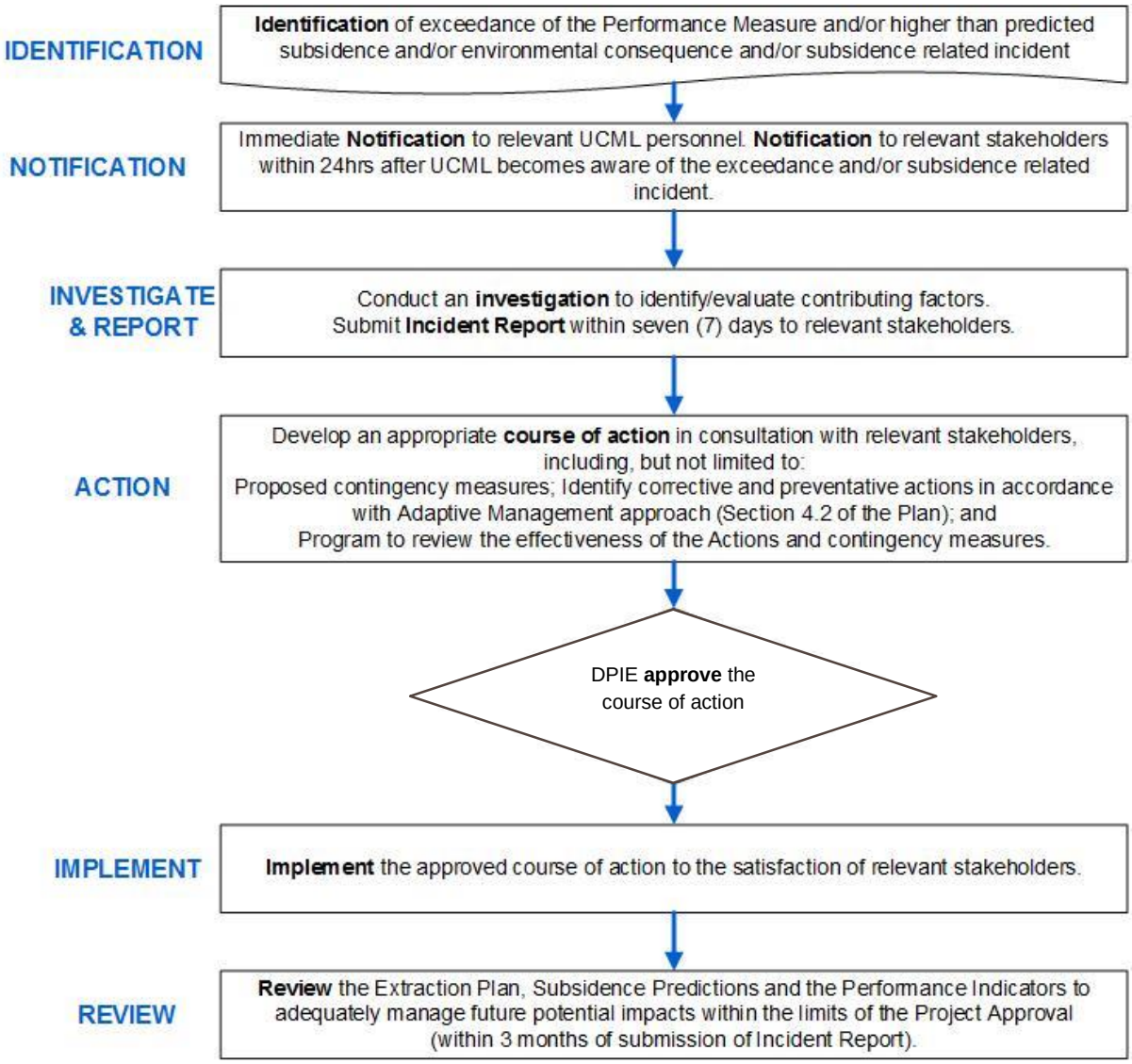
4 Implementation

4.1 Contingency (Incident) Response

In the event the performance measures in **Table 14** are considered to have been exceeded, or are likely to be exceeded or higher than predicted subsidence or a subsidence related incident has occurred, UCMPL will implement the following Contingency Plan as displayed in **Figure 20**.

Responsibilities during contingency response are outlined in **Sections 4.3 & 4.7**, to identify actions, levels of responsibility and reporting requirements of UCMPL personnel.

Figure 20 Contingency Plan



4.1.2 Trigger Action Response Plan

Specific trigger action response plans (TARPs) have been developed for each relevant component management plan, in the event that the subsidence monitoring identifies a possible exceedance of a subsidence performance measure.

The TARPs outline how the various predicted subsidence impacts, monitoring components, performance measures and responsibilities are structured to achieve compliance with the relevant statutory requirements and the framework for management to implement contingency actions. As this Extraction Plan is reviewed and revised, each TARP will be assessed for adequacy and refined as required.

4.2 Adaptive Management

An adaptive management approach has been adopted by the Ulan Coal Mine Complex; this approach involves regular reviewing and evaluating the effectiveness of management strategies, as identified in **Section 3** of this Extraction Plan.

The regular reviewing and evaluating the effectiveness of management strategies includes analysis of all subsidence monitoring data against predicted impacts, performance indicators and performance measures (**Section 4.5**). The review process also includes, but is not limited to:

- Engaging a subsidence geotechnical consultant to review monitoring results against predictions;
- Engaging other specialists, for example groundwater and surface water, heritage and ecological specialists, to review monitoring results and assist development of adapt management strategies as required; and
- Adapt remediation and land management measures to reduce impacts on subsequent longwalls.

If required, the review process as outlined in **Section 4.5** and **Section 4.6** may require a revision of this Extraction Plan and its component management plans. Any revised management strategies to improve performance, particularly following an exceedance of a subsidence impact performance measure and/or an unexpected subsidence impact and/or subsidence related incident, will be undertaken in consultation with relevant government agencies.

4.3 Reporting Framework

This section of the Extraction Plan describes the external reporting framework for the secondary extraction within the Application Area. The key elements of the reporting framework, as required by the *Draft Extraction Plan Guidelines*, include:

- Incident Reporting;
- Annual Reporting[43]; and
- Annual Review.

Table 28 provides the detailed reporting framework[44], including which government stakeholders will receive copies of each report and the method of distribution. **Attachment 4** provides a list of key stakeholders for the government departments.

[43] *Draft Extraction Plan Guidelines* outline requirement for six-monthly reporting, however a lesser frequency can be negotiated with DPIE where subsidence impacts and environmental consequences at the mine are relatively rare and benign in character. UCMPL propose to conduct annual reporting which will align with the due date for the Annual Review 31st march each year.

[44] The reporting frequency proposed by the Extraction Plan is consistent with the current reporting requirements approved under the Extraction Plan Approval for Ulan West Longwalls LW1 – LW6

Table 28 Summary of Reporting Framework

Report	Frequency	Distribution	Distribution Method	Responsibility
Incident Reporting (Letter report)	As Required (see **Section 4.3.1** of the Extraction Plan)	• DPIE (Manager – Mining Projects) • DPIE-RR (Subsidence Executive Officer) • MSA (District Manager) • DPI-Water (Senior Water Regulation Officer)	Electronic copy sent by email	General Manager
Annual Review **(incorporating the Annual Report)**	Annually (For the period 01 January to 31 December) Submitted by the 31 March each year.	• DPIE (Manager – Mining Projects) • DPIIE_RR (Principal Subsidence Engineer) • DPIE-Water (Senior Water Regulation Officer) • EPA (Ulan Coal general contact) • OEH (Ulan Coal general contact) • Mid-Western Regional Council (General Manager) • CCC Members	1 hard copy with 1 electronic copy sent to each department and CCC member by Australia Post	Environment and Community Manager

4.3.1 Incident Report

UCMPL will notify the government agencies, as identified in **Table 28**, within 24 hours of occurrence or identification of a subsidence incident caused by longwall mining within the Application Area, including:

- A potential exceedance of a subsidence impact performance measures as identified in **Table 13**;
- Any subsidence impacts adverse to the groundwater and/or the natural environment which may be affected by longwall mining;
- Any observed subsidence impacts adverse to the serviceability and/or safety of infrastructure and other built features that may be affected by longwall mining;
- Any significant unpredicted and/or higher than predicted subsidence (as identified in **Section 2.5.3**) and/or abnormalities in subsidence development in any surface areas that may be affected by longwall mining;
- Any adverse subsidence impacts reported by an external stakeholder (outside of predictions in any relevant agreed PPSMP); and
- Any other relevant information requiring prompt notification.

Within 7 days of the incident notification, Ulan Coal will prepare and submit an Incident Report to the relevant stakeholders identified in **Table 28**, which will include the following details:

- The date, time and nature of the exceedance/incident;
- Identify the likely cause of the exceedance/incident;
- Description of the response action that has been undertaken to date; and
- Description of the proposed management measures to address the exceedance/incident.

Community complaints or enquires received will be managed in accordance with **Section 4.4.**

Further details regarding environmental incident[45] management and response are provided in Section 3.5.7 of the EMS.

4.3.2 Annual Review and Report

UCMPL will prepare the Annual Review (AR) in accordance with the requirements of PA 08_0184, by the end of March each year. The reporting period for the AR is 01 January to 31 December. The AR will:

- Describe the development (including any rehabilitation) that was carried out in the past year, and the development that is proposed to be carried out over the next year;
- Include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria
  - the monitoring results of previous years
  - the relevant predictions in the EA
- Identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;
- Identify any trends in the monitoring data over the life of the project;
- Identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
- Describe what measures will be implemented over the next year to improve the environmental performance of the project.

[45] Under Part 5.7 of the *Protection of the Environment Operations Act 1997* (POEO Act) the occupier of premises, the employer or any person carrying on the activity which causes a **pollution incident** must **immediately notify** each relevant authority when material harm to the environment is caused or threatened. Section 3.5.9.1 of the Ulan Coal EMS (ULNCX-111515275-870) outlines clearly the Notification Protocol process in the event a pollution incident is potentially causing or threatening to cause material harm to the environment.

- Report on compliance with Water Allocation Licence conditions including any losses from surface cracking.

UCMPL will prepare an Annual Report for submission to the Secretary as part of the AR by the end of March each year. This Annual Report must provide:

- A summary of the subsidence and environmental monitoring results for the year;
- An analysis of these monitoring results against the relevant:
  - Impact assessment criteria;
  - Monitoring results from previous panels; and
  - Predictions in the SMP.
- A review of any trends in the monitoring results over the life of the activity; and
- A description of actions taken to ensure adequate management of any potential subsidence impacts due to longwall mining.

As required by the *Extraction Plan Guidelines*, the AR will include a summary of subsidence effects and a summary of the consolidated subsidence monitoring results.

4.4 Community Complaints

Community complaints management includes receipt of complaints, investigation, implementation of appropriate remedial action, and feedback to the complainant as well as communication to site management or personnel and notification to external bodies, where necessary.

UCMPL maintain a 24 hour, 7 day a week community and employee information telephone line 1800 647 630 and email address UlanCommunity@glencore.com.au to:

- Manage complaints received by the Ulan Coal Mine Complex that may be a result of mining and/or associated activities conducted within land owned or managed by Ulan Coal; and
- Provide access and incident information to employees during emergency situations

Access to the Community Complaints Register is via the Ulan Coal website at http://www.ulancoal.com.au. Details of community complaints are also reported in the AR.

Further details regarding community complaint management are described in Section 3.5.5 of the EMS.

4.5 Review of the Extraction Plan

Ongoing monitoring and evaluating the performance of this Extraction Plan will be undertaken, and revised if necessary, in accordance with Section 4.6 of the EMS. The evaluation of performance during the review process (see **Section 4.2**) will examine any unpredicted subsidence impacts and/or environmental consequences, exceedance of performance measures and implementation of Contingency Plans.

This Extraction Plan and its component management plans will be reviewed and revised if necessary if there is a significant change in the operation that may affect the environment and or community.

As required by Condition 4, Schedule 5 of PA08_0184, Ulan Coal shall review, and if necessary revise, the strategies, Extraction Plans, and programs required under this approval to the satisfaction of the Secretary, within 3 months of:

- The submission of the Annual Environment Review;
- The submission of an incident report;
- The submission of an audit report; and
- Any modification to the conditions of this project approval, (unless the conditions require otherwise)

The Environment and Community Manager (or delegate) will undertake the review of this Extraction Plan. Substantive changes made to this Extraction Plan as a result of the review will be made in consultation with DPIE and DPIE-RR.

A copy of the revised Extraction Plan will be supplied to the Secretary of DPIE for approval, and supplied to the DPIE-RR and other relevant government stakeholders.

This Extraction Plan will reflect changes in statutory requirements, technology and operational procedures. Updated versions of the approved Extraction Plan and its component management plans will be made publicly available on the website http://www.ulancoal.com.au.

4.6 Review of Other Management Plans

Ongoing monitoring and evaluating the performance of the EMS and environmental management plans will be undertaken, and revised if necessary, in accordance with Section 4.6 of the EMS.

The review process for the EMS and environmental management plans will be consistent with the processes described in **Section 4.5** of this Extraction Plan. Revised management plans will be submitted for approval to the DPIE[46]. Approved revised management plans for the Ulan Coal Mine Complex will apply to the Application Area, including any revision to monitoring programs.

4.7 Key Responsibilities

Key responsibilities for this Extraction Plan and the component management plans are summarised in **Table 29**.

Table 29 Key Responsibilities for this Extraction Plan

Responsibility	Accountabilities
Operations Manager **(Ulan Underground)**	• Authorise the Extraction Plan and approve appropriate resources for the implementation of this Extraction Plan; and • Authorise internal and external reporting requirements of this Extraction Plan.
Technical Services Manager **(Ulan Underground)**	• Ensure the Subsidence Monitoring Program and this Extraction Plan are implemented; • Ensure monitoring and required under the Subsidence Effects Monitoring Program and this Extraction Plan are carried out within specified timeframes, are adequately checked and processed and are prepared to the required standard; and • Ensure appropriate controls are in place to manage subsidence impacts upon surface operational infrastructure.
Environment and Community Manager	• Review this Extraction Plan in accordance with **Section 4.5** and **Section 4.6** and other legal requirements and operation standards; • Ensure the effective implementation of strategies designed to reduce impacts from the operation; • Ensure any potential or actual issue is reported in accordance with the Extraction Plan and other legal requirements and corporate standards; • Review and prepare internal and external reports as identified in the reporting framework; • Approve subsequent revisions of this Extraction Plan; • Instigate response in the event the performance indicators, TARP and/or Contingency Plan are triggered; and • Allocate resources for monitoring and review of subsidence monitoring survey results.
Environment and Community Coordinator	• Implement monitoring programs as required by this Extraction Plan and conduct analysis of results against performance indicators as described in this Extraction Plan; • Prepare this Extraction Plan and subsequent revisions for approval by the Environment and Community Manager; • Assist in the preparation of reports as identified in reporting framework; and

[46] In accordance with Condition 14, Schedule 2 of PA _0184 and Condition 4 of Schedule 5.

Responsibility	Accountabilities
	• Assess any triggers as described in performance indicators and provide advice to implementation of TARPS and the Contingency Extraction Plan.
Environment and Community Officer	• Assist the Environment and Community Coordinator in the implementation of monitoring programs and analysis of results against performance indicators as described in this Extraction Plan; • Assist in the preparation of reports as identified in reporting framework; and • Assist the Environment and Community Coordinator in the assessment of triggers as described in performance indicators and provide advice to implementation of TARPS and the Contingency Plan.
Mine Surveyor **(Ulan Underground)**	• Undertake subsidence effects monitoring as required by this Extraction Plan and to the required survey standard within the specified timeframes and ensure data are adequately checked, processed and recorded.
All employees and contractors	• Comply with all requirements of this Extraction Plan; • Undertake all works in accordance with this Extraction Plan and all other Ulan Coal Mine Complex systems; • Report all potential environmental incidents to their supervisor immediately; and • Seek Ground Disturbance Permits (GDP) approval from the Environment and Community Manager prior to any surface disturbance activities.
Maintenance and Engineering Manager **(Ulan Underground)**	• Develop specific subsidence management strategies for UCMPL owned infrastructure following pre-mining risk assessment of potential subsidence impacts. • Incorporated the above management strategies into the maintenance management system for the relevant timeframe of potential subsidence impact.
Electrical Superintendent **(Ulan Surface Operations)**	• Implement work orders from the maintenance management system in relation to power line inspections and subsidence management of UCMPL owned power lines. • Ensure appropriate repairs to UCMPL owned power lines as result of subsidence are undertaken in a timely manner.
Water Manager/Superintendent **(Ulan Surface Operations)**	• Implement work orders from the maintenance management system in relation to pipeline inspections and subsidence management of UCMPL owned pipelines. • Ensure appropriate repairs to UCMPL owned pipelines as result of subsidence are undertaken in a timely manner.

5 Document Information

Relevant legislation, standards and other reference information must be regularly reviewed and monitored for updates and should be included in the site management system. Related documents and reference information in this section provides the linkage and source to develop and maintain site compliance information

5.1 Definitions and Glossary

5.1.1 Definitions

Table 30 Definitions

Term	Definition
AR	Annual Review
BFMP LW30 & LWW6-LWW8	Built Features Management Plan for Longwalls 30 & LWW6-LWW8
BMP LW30 & LWW6-LWW8	Biodiversity Management Plan for Longwalls 30 & LWW6-LWW8
CCC	Community Consultation Committee
CRRP	Coal Resource Recovery Plan
DPIE	Department of Planning, Infrastructure and Environment
DPIE	Department of Planning, Industry and Environment (Formally known as Department of Planning, Infrastructure and Environment)
DPIE-RR	Department of Planning, Industry and Environment – Resource Regulator
DPI	Department of Primary Industries (part of DoI)
DPI-Water	Department of Primary Industries –Water , now Natural Resources Access Regulator Department of Industry, Lands and Water (formally NSW Office of Water – NOW)
DRE	Division of Resources and Energy (a division of DPIE)
DRG	Division of Resources and Geosciences (a division of DPIE)
EA	Environmental Assessment
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EPA	NSW Environmental Protection Authority
EPL	Environment Protection Licence
HMP LW30 & LWW6-LWW8	Heritage Management Plan for Longwalls 30 & LWW6-LWW8
LMP LW30 & LWW6-WLW8	Land Management Plan for Longwalls 30 & LWW6-LWW8
LW	Longwall
MG	Maingate
ML	Mining Lease
MOP	Mining Operations Plan
MSA	Mine Subsidence Advisory
Mtpa	million tonnes per annum
NOW	NSW Office of Water (now DPI - Water)
OEH	Office of Environment and Heritage
PPSMP	Private Property Subsidence Management Plan
PSE	Principle Subsidence Engineer
PSMP LW30 &LWW6-LWW8	Public Safety Management Plan for Longwalls 30 & LWW6-LWW8
RMP LW30 & LWW6-LWW8	Rehabilitation Management Plan Longwalls 30 & LWW6-LWW8
ROM	Run of mine
SCT	SCT Operations Pty Ltd
Secondary Extraction	Longwall mining of coal from the Ulan Seam
SMP LW30 & LWW6-LWW8	Subsidence Monitoring Program for Longwalls 30 & LWW6-LWW8
TARP	Trigger Action Response Plan
TG	Tailgate
Ulan Coal	The collective operations UUG, Ulan West and the Surface Operations
Ulan Coal Mines Pty Limited (UCMPL)	The legal entity operating the UCMPL Mine Complex
UUG	Ulan Underground Operations
WMP LW30 & WLW6-LWW8	Water Management Plan for Longwalls 30 & LWW6-LWW8

5.1.2 Glossary

Table 31 Glossary

Term	Definition
Adaptive Management	Adaptive management includes monitoring subsidence impacts and subsidence effects and, based on the results, modifying the mining plan as mining proceeds to ensure that the effects, impacts and/or associated environmental consequences remain within predicted and designated ranges and in compliance with the conditions of the Project Approval.
Aquifer	A sub-surface rock formation containing water in recoverable quantities
Built Features	Includes any building or work erected or constructed on land, and includes dwellings and infrastructure such as any formed road, street, path, walk, or driveway; any pipeline, water, sewer, telephone, gas or other service main.
Cover depth	The depth of coal seam from the ground surface (m).
Environmental consequences	Environmental consequences of Subsidence Impacts, including: damage to infrastructure, buildings and residential dwellings; loss of surface flows to the subsurface; loss of standing pools; adverse water quality impacts; development of iron bacterial mats; cliff falls; rock falls, damage to Aboriginal heritage sites; impacts on aquatic ecology; ponding; etc.
Far-field subsidence	Mining-induced movements of the ground surface in areas where vertical subsidence is less than 20 mm.
First workings	Workings which establish access to the coal resource area and which do not result in surface subsidence. First workings do not include longwall extraction of coal.
Goaf	The mined-out area into which the immediate roof strata break.
Mitigation Measures	Subsidence management measures which aim to reduce subsidence impacts, usually implemented prior to or during mining.
Remediation Measures	Subsidence management measures which aim to repair any adverse effects of subsidence, usually implemented after mining.
Risk	The chance of something happening that will have an impact upon objectives. It is measured in terms of consequence and likelihood.
Safe, Serviceable and Repairable	Safe means no danger to users who are present, serviceable means available for its intended use, and repairable means damaged components can be repaired economically.
Second Workings	Extraction of coal by longwall mining that may result in surface subsidence.
Strain	The change in the horizontal distance between two points at the surface and is typically expressed in units of mm/m. *Tensile strain* is an increase in the distance between two points (i.e. stretching) and *compressive strain* is a decrease in distance (i.e. squeezing).
Subsidence or subsidence effects	Deformation of the ground mass due to mining, including all mining induced ground movements, including both vertical and horizontal displacement, tilt, strain and curvature.
Subsidence impacts	Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure and upsidence and surface depressions or troughs.
Tilt	The change in the slope of a land surface as a result of differential subsidence and is expressed in units of millim per metre (mm/m) or a change in grade where 1 mm/m = 0.1%.
Vertical subsidence	Vertical downward movements of the ground surface caused by underground coal mining.

5.2 Reference Information

Reference information, listed in **Table 32** below, is information that is directly related to the development of this document or referenced from within this document.

Table 32 Reference Information

Reference	Title
Legislation	• *Protection of the Environment Operations Act 1997* • *Environmental Planning and Assessment Act 1979* • *Environment Protection and Biodiversity Conservation Act 1999* • *Mining Act 1992* • *Work Health and Safety Act 2011* • *Work Health and Safety Regulation 2011* • *Work Health and Safety (Mines) Act 2013* • *Work Health and Safety (Mines) Regulation 2014* • *Water Management Act 2000* • *Crown Lands Act 1989* • *National Parks and Wildlife Act 1974* • *Coal Mine Subsidence Compensation Act 2017*
Guidelines	• *Guideline for Applications for Subsidence Management Approvals* (2003) • *Draft Guidelines for the Preparation of Extraction Plans (2015) Version 5*
Ulan Coal Mines Pty Limited	• ULNCX-111515275-95 Heritage Management Plan • ULNCX-111515275-99 Water Management Plan • ULNCX-111515275-224 Erosion and Sediment Control Plan • Biodiversity Management Plan & Offset Management Program • ULNCX-111515275-2049 Bushfire Management Plan • ULNCX-111515275-870 Environmental Management Strategy • ULN SD PLN 0055 Surface Water Monitoring Program • ULN SD PLN 0056 Groundwater Monitoring Program • ULN SD PLN 0057 Surface Water and Groundwater Response Plan • ULNCX-111515275-1785 Aboriginal Conservation Management Plan • ULN SD PLN 0093 Bobadeen Homestead Conservation Management Plan • ULNCX-111515275-223 Subsidence Management and Extraction Plan (UUG LW27-29 & W3-W5) • ULNCX-111515275-2811 Ulan West Extraction Plan For Longwalls LW1 to LW6
Other	• Umwelt (Australia) Pty Ltd, 2009. *UCMPL– Continued Operations Environmental Assessment* • Umwelt (Australia) Pty Ltd, 2012. *Modification to Continued Operations, Ulan West Mine Extraction Plan (Approved Panels 1 -4) Environmental Assessment* • Umwelt (Australia) Pty Ltd, 2015. *Modification to Continued Operations, Ulan West Modification Environmental Assessment* • AXYS Consulting, 2016. *Extraction Plan (EP) for the Mining of UUG Longwalls 30 and W6 to W8* • SCT Operation Pty Ltd, 2016. *Subsidence Assessment for Extraction Plan LW30 and LWW6-LWW8 at Ulan Underground Mine* • Mackie Environmental Research (MER) Pty Ltd 2016. *Review of groundwater Impacts: Extraction Plan for Underground 3* • Umwelt (Australia) Pty Ltd, 2016. *Review of Subsidence Impacts on Surface Water UUG Longwall 30 & W6-W8.* • Eco Logical Australia Pty Ltd, 2016. *Flora and Fauna Impact Review for UUG Extraction Plan* • *South East Archaeology, 2016. Ulan Coal Mines limited, Central tablelands of new south wales: Report on aboriginal heritage for Ulan underground mine Longwall panels 30 and west 6 – 8 Extraction plan* • Eco Logical Australia Pty Ltd, 2018. *Ulan Continued Operations Project - Modification 4 Longwall Optimisation Project* • SCT Operation Pty Ltd 2019. *Subsidence Assessment for Amendment to LW30 & LWW6 – LWW8 Extraction Plan*

5.3 Change Information

Full details of the document history are recorded in the document control register, by version. A summary of the revision history is provided in **Table 33** below.

Table 33 Change Information

Version	Date	Review team (consultation)	Change Summary
0.1	October 2016	Tara Stokes, Robyn Stoney, Ben Anderson	Document Development
0.2	October 2017	Jessica Southgate	Document formatting updated in accordance with Dept. of Planning feedback. Included statement of commitments summary.
1.0	May 2019	Robyn Stoney, Lucy Stuart and Brad Tanswell	Review and update in response to feedback received from DPIE, DPI Water and OEH in October 2018
2.0	August 2019	Tara Stokes	Updated correspondence for DPIE Approval of plan 19/08/2019.
3.0	April 2020	Stephen Bragg, Lucy Stuart, Robyn Stoney	This EP was amended regarding extension of longwall panels to align with the approved MOD 4 and recently revised BMP.
4.0	December 2020	Robyn Stoney, Lucy Stuart, Stephen Bragg	This EP was resubmitted on the 21/12/2020 to address the requirements from the DPIE Water feeback

Attachments

A.2 Attachment 1 – Regulatory Requirements

Table 34 Extraction Plan Requirements Checklist

Extraction Plan Guideline	Section Detail	Section Addressed
1. Title Block	A title block should be included at the beginning of the Extraction Plan, which contains the: • name of the applicant company; • name of mine; • development consent and mining lease reference numbers; • Extraction Plan title, date and reference number; • The signature(s) of person(s) taking responsibility for the accuracy and comprehensiveness of the information contained within the plan, including an authorised representative of the lease holder and the mine manager (for the purposes of relevant safety legislation).	Page 7
2. Development	The process of development of the Extraction Plan should be described. Most importantly, this section should address consultation undertaken by the Applicant with affected agencies and other key stakeholders. This section should also describe the process of reviewing and updating the predictions of subsidence effects, subsidence impacts and environmental consequences	Section 2 Section 2.5
3. Overview	The overview section is an essential introduction to the Extraction Plan. It should accurately describe: • mine planning and design • subsidence predictions • performance objectives and other regulatory requirements • subsidence management strategies and measures	Section 1.6 Section 2.5 Section 1.5, 2.5.4 Section 3
4. Key Component Plans	The main body of the Extraction Plan primarily comprises a set of six key component plans. It is appropriate that these are presented in a particular order, even if some of the later plans deserve a particular priority due to local circumstances (e.g. the Built Features or Heritage Management Plans). The preferred order for these component plans is as follows: • Water Management Plan; • Land Management Plan; • Biodiversity Management Plan; • Heritage Management Plan; • Built Features Management Plan; and • Public Safety Management Plan. Risk Assessment: All six key component plans should give appropriate consideration to risk assessment and risk management.	Appendix A-F Section 3 Section 2.4
5. Subsidence Monitoring Program	The key component plans should be followed by a Subsidence Monitoring Program which consolidates the above mentioned component plans and the subsidence effects monitoring program.	Section 3.7
6. Implementation	This section of the Extraction Plan should address all key elements of how the plan is going to be implemented, including reporting, regular review and key responsibilities. This section should follow the structure set out below: • Reporting Framework; • Review of the Extraction Plan; • Review of other Management Plans; and • Key Responsibilities	Section 4
7. Graphical Plans	The following plans are required as part of the application: • **Plan 1** • **Plan 2** • **Plan 3** • **Plan 4** • **Plan 5** • **Plan 6** • **Plan 7** • **Plan 8**	Appendix I
8. Attachments to the Extraction Plan	All other material necessary to support the Extraction Plan should be included as Attachments or Appendices.	Technical Reports 1 – 6 Appendix A - K

A.3 Attachment 2 – Consultation

Agency/ Date	Document and Section	Comments	UCMPL Response
DRG **24 February 2017**	**All**	Summarised: As the EP is potentially not in final form it is not proposed to make any formal expression of satisfaction with respect to the Subsidence related plans until such time as it is confirmed that the plans are final, and are marked thus. However from an initial perusal of the submitted drafts the subsidence engineer has not identified any major issues of concern which cannot be addressed after final submission of the EP and formal request for expression of satisfaction. Rehabilitation: DRG will provide an expression of satisfaction recommendation for the rehabilitation plan. Please advise if DPE seek DRGs comment in relation to a Resource Recovery Plan as the conditions of the consent do not appear to call for DRE input into any recovery plan.	Revised plans are forwarded as 'final' and will be sent to DRG as well as DPE UCMPL is not required to prepare a Resource Recovery Plan
OEH **24 February 2017**	**Appendix C: Biodiversity Management Plan Longwall 30 & LWW6-W8**	The extraction plan should identify how an appropriate amount of data will be collected for statistical analysis. The statistical tests to be undertaken should also be identified.	The performance indicators were reviewed applying the SMART principle (specific, measureable, achievable, realistic and timely). The indicators no longer rely on a statistical analysis, rather they are measured by a >10 per cent negative movement over two or more monitoring periods.
	BMP LW30 & W6-W8 Section 3.3	The term 'declining trend' should be clarified as to how many observations over a defined period of time would be accepted as a trend.	The BMP LW30 & W6-W8 has been updated to reflect the following definition of a declining trend: A declining trend is a negative movement in species richness score or abundance observations over two or more monitoring periods outside of normal seasonal fluctuations.
	BMP LW30 & W6-W8 Table 5	That the monitoring program listed as Table 5 is amended to reflect the approved monitoring program as identified in Section 8.3 of the Biodiversity Management Plan (dated 11 November 2015).	The monitoring program identified in Table 5 reflects the draft Biodiversity Management Plan (BMP) submitted to DPIE for approval in June 2016. It is anticipated that approval for this management plan would be received prior to the commencement of mining within the Extraction Plan area (due to commence in March 2020). The Aquatic/Stream Health Monitoring Program will occur annually. Targeted Subsidence impact monitoring for cave dwelling micro-bat species as well as monitoring of some control sites will continue to occur annually as proposed in the BMP LW30 & W6-W8. Floristic Based Subsidence Monitoring sites will continue to be monitored twice per year as proposed in the BMP LW30 & W6-W8.

Agency/ Date	Document and Section	Comments	UCMPL Response
			Feral Pest Monitoring will be undertaken annually. Monitoring which is proposed to remain biennial in accordance with the draft BMP LW30 & W6-W8 and the draft BMP submitted to DPIE are; • Woodland Bird Surveys; • Acoustic Bird Detection for Swift Parrot, regent Honeyeater and Masked Owl; • Microbat Monitoring at sites outside the area of undermining, and • Floristic Monitoring at sites outside of the area of undermining. Annual monitoring of these programs has occurred in the past as per the current approved BMP (dated 11 November 2015), this was revised to biennial in line with recommendations from Eco Logical Australia on the basis that annual monitoring was providing consistent results. If changes are detected between monitoring campaigns in the future the Performance Indicators will be triggered and the TARP activated which will require a review of monitoring frequency.
EPA **24 February 2017**	**Review of subsidence impacts on Surface Water UUG Longwall 30 &LWW6-W8**	In relation to the Review of Subsidence Impacts, the EPA notes there have been no changes to surface water quality in Ulan, Mona, Curra and Bobadeen Creeks with respect of TSS and there is no greater impact beyond that previously predicted. The creek stability assessment for Ulan and Bobadeen Creeks undertaken in 2015 identified 3 active erosion sites within the subsidence impact zone of Bobadeen Creek and 21 were identified in Ulan Creek. The assessment indicates there was no visible signs of subsidence impact within the creek lines and erosion was most likely attributed to natural processes such as high flow events. These results are generally consistent with the 2014 assessment. The assessment does not indicate when the 2015 was conducted and why the results of a 2016 survey were not utilised for the assessment. The EPA recommends that the Department of Planning and Environment (DPE) request the proponent provides justification for not utilising 2016 data in its assessment, should it have been available.	Creek Stability Assessments are conducted annually for the Ulan Complex; the 2016 Creek Stability Assessments were conducted in December 2016 after the submission of the draft Extraction Plan LW30 & W6-W8. The 2016 Creek Stability Assessment concluded there was no visible signs of subsidence impact within the creek lines. This report is Attachment G of the 2016 Annual Review available on the UCMPL website at http://www.ulancoal.com.au/EN/ReportsandPublications/Pages/AnnualEnvironmentalManagementReport.aspx
	Appendix A: Water Management Plan Longwall 30 & LWW6-W8 **Section 4.2.2**	Section 4.2.2 of the Water Management Plan provides that stream health monitoring is to be conducted every 2 years with the results to be utilised to determine if a response is required in accordance with the Trigger Action Response Plan (TARP). The EPA considers that a frequency of 2 years between sampling events is insufficient to adequately determine trends and if a response is required, in a timely manner. The EPA recommends that the stream health assessment be conducted at least yearly and be conducted at a similar time of the year.	Stream health assessments will be conducted annually and will take place at a similar time each year. The Extraction Plan LW30 & W6-W8 and WMP LW30 & W6-W8 have been updated as such.

<table>
<tr><th>Agency/ Date</th><th>Document and Section</th><th>Comments</th><th>UCMPL Response</th></tr>
<tr><td>DPI Water

6 March 2017</td><td>WMP LW30 & W6-W8</td><td>It is noted that reference is made throughout the Extraction Plan and the Water Management Plan (WMP) regarding licensing of the consolidated and sedimentary aquifers to the east of the Great Dividing Range as occurring under the Water Act 1912. It should be considered that on 1 July 2016 the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016 was gazetted. As such 20BL173821 was converted to 20AL214787 with 7060 shares within the Oxley Basin Coast Groundwater Source.</td><td>Section 2.3 of the WMP LW30 & W6-W8 updated to reflect current water licences held by UCMPL and allocations held.</td></tr>
<tr><td></td><td>WMP LW30 & W6-W8 Section 2.3.2.1</td><td>Section 3.2.21 of the WMP should be updated to reflect current advice in the letter from Department of Planning & Environment, dated 6 February 2017. This letter states that discharge into the Goulburn River does not remove the obligation of acquiring the appropriate Water Access Licence (WAL) under the Water Management Act 2000 to account for baseflow loss. It is important to note that the proponent currently has a meeting scheduled with DPI Water on 17 March 2017 to discuss this matter.</td><td>Section 2.3.2.1 of the WMP LW30 & W6-W8 updated to reflect consultation
<table>
<tr><th>Water Licence</th><th>Water sharing plan, source and management zone (as applicable)</th><th>Entitlement (Shares)</th><th>Shares in ML for 2016 Water Year</th><th>Passive take / outflows</th><th>Active pumping</th><th>TOTAL</th></tr>
<tr><td>WAL19047

(20WA209953)69</td><td>Moolarben Creek Dam / Pump / Water Supply

Upper Goulburn River Water source</td><td>600</td><td>600</td><td>205.19*</td><td>2.442</td><td>207.6</td></tr>
</table>
undertaken with NSW DPI-Water.

At the 17 March 2017 meeting with DPI-Water, UCMPL raised the question of using existing Water Licence WAL19047 for the Upper Goulburn River Water source with a current allocation of 600 Shares to offset baseflow losses to the Goulburn River.

Further information on current usage of the licence shares including evaporation of Moolarben Dam and riparian flows as required by the licence conditions was requested by DPI-Water. This information was included in the 2016 Annual Review (page 69) and is provided below.

A total of 207.6 ML of entitlement under water access licence WAL19047 was used during the reporting period (extraction limit of 600ML). Usages included 2.442 ML being extracted from Moolarben Creek Dam/Pump, 144.92ML of water was released as flow through the dam wall as per the conditions of the license and 42.02ML being evaporated from the Moolarben Dam during the reporting period. UCMPL proposed that it would be</td></tr>
</table>

Agency/ Date	Document and Section	Comments	UCMPL Response
			reasonable that 18.25ML of the remaining 410.62ML is allocated to offset baseflow losses to the Upper Goulburn River Water Source.
	WMP LW30 & W6-W8 Section 2.1	It is also noted that the proponent may have a shortfall in required WAL and actual WAL for this underground mining program. It is recognised that this will also be discussed at the meeting on 17 March 2017, thus the Extraction Plan should be updated to reflect ongoing consultation with DPI Water to ensure the site is appropriately licensed. To assist in this transparency, the WMP should be updated to include the relevant WAL held in relation to extraction of LW30 and LWW6-W8.	Consultation with DPI-Water updated in Section 2.1 of the Extraction Plan. The WMP LW30 & W6-W8 be updated to include reference to the relevant WAL/s held in relation to the extraction of LW30 and LWW6-W8: 20AL214787 for dewatering in the Oxley Basin Coast Groundwater Source, 7060 shares: • WAL27887** for dewatering in the Sydney Basin of the Murray Darling Basin Groundwater Source, 750 shares; • WAL37192 for dewatering in the Sydney Basin of the Murray Darling Basin Groundwater Source, 704 shares; • WAL36667 for dewatering in the Sydney Basin of the Murray Darling Basin Groundwater Source, 0 shares; Additional allocations (4031 shares) for the Sydney Basin Murray Darling Basin water sources relating to *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources 2011* have been secured as part of the controlled Allocation Order. **Extraction of water allocated to Wallerawang Collieries Limited by WAL27887 will be undertaken by UCMPL, facilitated under the NSW Office of Water '*Application to change water access licence*' process
	Appendix J: Private Property Subsidence Management Plan	Appendix J 'Woodbury' Private Property Subsidence Management Plan should include detail of proposed monitoring of water storages, particularly Dam 4. It is understood that there may also be a bore on this property; this should be shown on a figure within Appendix J. To assist with review of this plan the cadastre reference should also be provided. The WMP refers to private bores shown in Figure 15, however the WMP does not include this figure. It is recommended this figure be added and further detail incorporated regarding compensatory water supply arrangements and make good provisions for these users. Detail should also be included for any make good provisions negotiated for the "Woodbury" property. It is recommended that where access is permitted, private bores be surveyed for both ground levels and headworks. Also further detail should be provided regarding impacts on PB9, PB11, PB14, PB21, PB30 and PB32. This should include detail of current bore depth, water level and predicted level of drawdown.	Appendix J 'Woodbury' Private Property Subsidence Management Plan has been updated for the Extraction of LWW5 and UWO LW6 in consultation with the property owner. These updates will be incorporated into the LWW6 PPSMP and developed in consultation with the property owner. WMP LW30 & W6-W8 reference to Figure 15 has been corrected to Figure 3 and Private Bore labels added. The WMP LW30 & W6-W8 has been updated to include a section on compensatory water supply arrangements and make good provisions for private bore owners potentially impacted by groundwater drawdown. Appendix J 'Woodbury' Private Property Subsidence Management Plan Section 4.3.3 Compensatory Water Supply Agreement states that UCMPL will have in place a legally binding Alternative Water Supply Agreement with the landholder (which was drafted and provided to the landholder for review prior to submission of the draft extraction plan). The Alternative Water Supply Agreement has also been formally agreed with the Woodbury property.

<table>
<tr><th>Agency/ Date</th><th>Document and Section</th><th>Comments</th><th>UCMPL Response</th></tr>
<tr><td></td><td></td><td></td><td>UCMPL will survey the Private Bores monitored during the 2017 annual private bore survey in order to obtain RLs and calculate standing water levels. It is noted that UCMPL do not control the use of these bores and therefore it is possible that bores are surveyed following use prior to recharge to standing water level.
The following table of Private Bores predicted to be impacted with the predicted level of drawdown has been added to the WMP LW30 & W6-W8:

<table>
<tr><th>Private Bore Number from Groundwater Monitoring Program</th><th>Predicted Level of drawdown 2009 Model (m)</th><th>To be undermined</th></tr>
<tr><td>PB2</td><td>40</td><td>Yes</td></tr>
<tr><td>PB8</td><td>80</td><td>Yes</td></tr>
<tr><td>PB9</td><td>2</td><td>No</td></tr>
<tr><td>PB11</td><td>5</td><td>No</td></tr>
<tr><td>PB14</td><td>2</td><td>No</td></tr>
<tr><td>PB21</td><td>5</td><td>No</td></tr>
<tr><td>PB30</td><td>2</td><td>No</td></tr>
<tr><td>PB32</td><td>2</td><td>No</td></tr>
</table>
</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Ulan Underground Extraction Plan LW30 W6-W8 and

WMP LW30 & W6-W8</td><td>It is recommended that the Ponding and Erosion monitoring as noted in Table 27 of the Extraction Plan occur both annually and pre and post mining</td><td>Ponding and Erosion monitoring in Table 28 of the Extraction Plan and Table 4 of the WMP LW30 & W6-W8 has been adjusted to occur ‘annually, pre and post mining’.</td></tr>
<tr><td></td><td></td><td>Annual reporting on Mona Creek should include information on flow events following a significant rain event</td><td>Mona Creek surface water monitoring station SW10 has an automatic water sampler with flow detection. When flow in the creek line is detected a water sample is automatically taken. The sample is then collected by UCMPL and sent to the laboratory for analysis for the following parameters: pH, EC, TSS, TDS and Turbidity.
A summary of these results is provided in the Annual Review.
The Annual Review 2018 will include a summary of flow events recorded at flow gauging stations in creek lines, including Mona Creek.</td></tr>
<tr><td></td><td>Ulan Underground Extraction Plan</td><td>Section 4.3.3 of the Extraction Plan should state that the AEMR must report on compliance with WAL conditions. This should also address whether any surface cracking has caused loss of surface water and if so identify under which WAL this loss was accounted by.</td><td>Section 4.3.3 of the Extraction Plan updated to reflect reporting on compliance with WAL conditions including any losses from surface cracking. Compliance with WAL conditions and shares was provided in the 2016 Annual Review.</td></tr>
</table>

Agency/ Date	Document and Section	Comments	UCMPL Response
	LW30 W6-W8 Section 4.3.3		Where surface cracking is identified in creek lines or tributary flow lines an estimate of surface water loss to the underground, based on rainfall and previous flow monitoring data, will be provided in the Annual Review. The estimated surface water loss will be accounted in the relevant WAL and recorded in the Annual Review. No surface cracking was identified in creek lines or tributary flow lines in 2016.
	Appendix A Water Management Plan LW30 & W6-W8	Table 7 (Trigger Action Response Plan) should detail notification to DPI Water for level 1 and level 2 exceedances and proposed remediation and make good measures to be implemented following such exceedances.	Table 8 of WMP LW30 & W6-W8 updated to include notification to relevant government regulators (including DPI Water) under the Action component of the TARP for level 2 exceedances. Level 1 exceedances are exceedances of the performance indicators, which are a trigger for further investigation and assessment of cause/s to determine if the reason for the exceedance is due to mining within the application area. If this is confirmed to be the case the exceedance would now become a level 2 exceedance requiring notification to DPI-Water. All TARP triggers and investigations conducted will be reported in the Annual Report for the Extraction Plan LW30 & W6-W8 which will form part of the Annual review.
	Surface Water Monitoring Program (ULN SD PLN 0055)	It is recommended that stream health monitoring occur annually and be reported within the Annual Environmental Management Report (AEMR) this should include reporting on the condition of riparian vegetation and red gum forest and include recommendations for remediation when required in accordance with DPI Water Guidelines for Controlled Activities on Waterfront Land (2012). Such recommendations should also be included in the AEMR regarding stream stability and proposed erosion control measures.	Stream Health Monitoring has been adjusted to occur Annually in the Surface Water Monitoring Program (ULN SD PLN 0055), Biodiversity Management Plan (ULNCX-111515275-225), Extraction Plan LW30 & LWW6-W8 and Water Management Plan LW30 & LWW6-W8. Reporting on Stream Health Monitoring will be reported annually in the Annual Review, this will include an assessment of riparian vegetation at the monitoring locations. A floristic based monitoring site will be established within Blakelys Red Gum Open Forest within the Extraction Plan Application Area. The results of this monitoring will be available in the Annual Review. A summary of subsidence remediation activities completed and those outstanding at the end of the reporting year will be included in the Annual Review.
	Groundwater Monitoring Program (ULN SD PLN 0056)	The AEMR should include metered records of all water use on site and measure all inflows observed underground, noting the locations of significant underground seeps and their association with any identified geological structural features. This should be presented with detail on underground water take, gauging locations and information of underground groundwater storage. This should also be described in the Extraction Plan.	Section 4.2.3 of Extraction Plan WMP LW30 & W6-W8 updated with further details of water measurement process at Ulan. Section 4.2.6 of the Groundwater Monitoring Program specifies a summary of water management issues will be provided in the Annual Review (AR). This summary will include, but not be limited to, the following: • summary/analysis of groundwater monitoring results; • any variances from groundwater model predictions; • any notifications or complaints received from private landowners relating to groundwater issues; and • any actions required to be taken to mitigate groundwater impacts on privately owned bores.

Agency/ Date	Document and Section	Comments	UCMPL Response
			A summary of the site water balance is included in the Annual Review (AR) including groundwater inflows and groundwater extraction by metered records. The AR specifies groundwater extracted against current licences and allocations. Reporting for the Extraction Plan will be undertaken consistent with the above requirements from the Groundwater Monitoring Program and Water Management Plan.
		'The Drip' is a groundwater dependent feature. The following recommendations are made to assist in differentiating between climate and mine related impacts.	The EA (Umwelt 2009) Groundwater Assessment (MER, 2009) identified that no impacts are predicted to occur to 'The Drip' as a result of UCMPL mining operations which are moving northward and westward away from the feature. 'The Drip' feature is not anticipated to be impacted by mining within the Extraction Plan area and therefore is not included in the WMP LW30 & W6-W8. The Drip monitoring program is outlined in Section 4.1.9 of the Groundwater Monitoring Program (ULN SD PLN 0056).
		Flow gauges should be installed on the Goulburn River both up and downstream of 'the Drip'	Flow gauges are not proposed for install due to numerous vectors impacting on the Drip site. Data from flow gauges would be subject to noise and inefficiencies making it unfeasible for purpose.
		Further information is required regarding pools on ephemeral streams emanating from the mine site towards the general vicinity of 'the Drip' on the Goulburn River and monitor water levels in these pools.	• Flow monitoring gauging stations with automatic grab samplers are installed in Spring Gully (SW06), Bobadeen Creek (SW07) and Curra Creek. These are monitored for flow and sampled if flow is present following any >30mm rainfall events. These results will be reported in the UCMPL Annual Review 2018. • Semi-permanent water pools will be monitored via the ponding monitoring methodology with Extraction plan areas pre and post mining. No such pools exist within Curra Creek in the Extraction Plan LW30 & W6-W8 Application Area. Hydro geochemical monitoring was implemented at 'The Drip' in 2012 to provide information about the water source.
		A cluster of monitoring bores should be drilled into multiple aquifers at the closest practical location to 'the Drip'. This site should be between the mine site and this feature. Aquifer testing should be conducted and automatic water level loggers installed for each aquifer monitored. Commentary should be included justifying the proposed location and discussion regarding the limitations to this monitoring.	• In late 2015, a Vibrating Wireline Piezometer (VWP) consisting of 8 transducers was installed approximately 400m north of the Drip. The purpose of this VWP is to gain a further understanding of the recharge source of the Drip. Pore pressure readings will be recorded daily using a data logger and will be analysed on a 3 monthly basis, as part of the Northern Monitoring Network. Commentary regarding selection of the location has been added to the GWMP during the Annual Review of Management Plans to be submitted to DPIE by the end of June 2017. Monitoring of 'The Drip' will be undertaken in accordance with the Groundwater Monitoring Program with these results reported in the Annual Review.

Agency/ Date	Document and Section	Comments	UCMPL Response
		A hydrogeological discussion should be included regarding the anomalous drawdown results observed on the drawdown maps to the south of 'the Drip'.	The drawdown contours referred to were provided in the EA (Umwelt 2009) Groundwater Assessment (MER, 2009). For further detail on methodology and predictions please refer to this report available on the UCMPL Website at http://www.ulancoal.com.au/EN/OperatingApprovals/Pages/MajorApprovals
		Further definition of the catchment areas for both surface and groundwater sources following towards 'the Drip' and the Goulburn River should be provided to assist in informing required monitoring.	• Surface Water Catchment Boundaries are provided in Figure 2.3 of the Water Management Plan (ULNCX-111515275-99). These will also be included in the Surface Water Monitoring Program (ULN SD PLN 0055) during the Annual Review of Management Plans to be submitted to DPIE by the end of June 2017. Catchment boundaries for groundwater sources has been included in the Water Management Plan (ULNCX-111515275-99) and Groundwater Monitoring Program (ULN SD PLN 0056) during the Annual Review of Management Plans that were submitted to DPIE at the end of June 2017.
		Geological cross-sections depicting hydrological features, including along the groundwater flow path from areas of maximum drawdown towards 'the Drip' and the Goulburn River should be provided. This should be sufficiently detailed to create an understanding of how each aquifer and surface water body interact with these features.	Relevant Geological Cross Sections have been included in the Groundwater Monitoring Program (ULN SD PLN 0056) during the Annual Review of Management Plans to be submitted to DPIE by the end of June 2019.
		It is recommended that key monitoring bores being monitored quarterly have automatic water level loggers installed.	Approximately half of the monitored bores across the breadth of the regional monitoring network are equipped with loggers. The piezometer wells contribute to the water chemistry section of the program. The wells were not constructed suitable to be retrofitted with logging technology and would require re-drilling and subsequently high financial costs to retrofit. Wells installed without loggers may be frequently dipped if needed to investigate water level changes.
	Water Management Plan (ULN SD PLN 0017)	All incident reports and submission of the AEMR to DPI Water must occur electronically to water.referrals@dpi.nsw.gov.au.	Acknowledged, UCMPL will make a footnote to this effect in the Water Management Plan (ULNCX-111515275-99).
	Groundwater Monitoring Program (ULN SD PLN 0056)	It is recommended that Glencore consider the installation of a Class A Evaporation Pan and rainfall gauge or provide justification for alternative physics based methods for calculating groundwater recharge.	UCMPL plan to use daily pan evaporation from the SILO Data Drill for the water balance model. The Data Drill is a system which provides synthetic data sets for a specified point by interpolation between surrounding point records held by the Bureau of Meteorology https://www.longpaddock.qld.gov.au/silo/datadrill/). The Data Drill interpolates between actual stations. The nearest stations to Ulan are at Scone SCS (112 km NE) and Wellington (83km SW). The daily maintenance and installation of an evaporation pan is not considered to be warranted.

Agency/ Date	Document and Section	Comments	UCMPL Response
DPE **3 October 2017**	**Entire Document**	There are errors in most management plans, including incorrect cross references and automatic cross-referencing. For example cross reference to "Section 0" occurs throughout the EP and the Rehabilitation Management Plan has "Error! Reference source not found". Some sections are also incorrectly numbered. Check the entire document for these errors and update	The plans are updated. Unfortunately it is a fault in these types of documents, that are templates from a document control server that the 'error source reference not found' may occur when the document is saved to any new folder. When the document is finalised and uploaded onto the server the glitches are resolved, so the final document would not have any of these errors.
		Include all changes proposed in response to input from by OEH, EPA and DPI Water	Updated Appendix A: WMP LW30 W6-W8, Appendix C MBP LW30 W6-W8, Appendix F: PSM LW30 W6-W8, Appendix J: Woodbury PPSMP and UUGEP LW30 W6-W8 to reflect comments made by OEH, EPA, DPI—Water and DPE. Changes (UCMPL responses to comments) coloured by: OEH Orange type EPA Purple type DPI Water Blue type DPE Red type All of the type will be converted to black text in the final version of the document
	UUEP LW30 W6-W8	Include a summary of the commitments in the EA and cross reference where they have been managed within the EP	Summary table of statement of commitments included in UUEP LW30 W6-W8.
	Ulan Underground Extraction Plan LW30 W6-W8 Section 2.1.1	Update consultation section to include the tables provided in correspondence to the Department [DPE] dated 22 May and 18 May	Table 7 Summary of Consultation with Government Agencies updated to include correspondence from DPE dated 18 May and 22 May 2017
	Public Safety Management Plan	Review Table 5 of the public safety management Plan and add details for the timing and frequency of all inspections	Inspections to occur monthly from commencement of longwall to six months post mining for Roads and Tracks and General Surface on UCMPL land and on Durridgere State Conservation Area, and inspection schedule proposed for private property, though this is dependent on agreement of the private property owner.
OEH 25 September 2018	**BMP**	The SMART targets for monitoring should be provided before the management plan is finalised	Targets revised in the BMP, these were updated previously but were lost in a versioning problem, they are now re-entered
DPI Water **12 October 2018**	**WMP and GWMP**	Provide strategy for achievement of necessary water allocations for the life of mine proposed water extraction The proponent must install a Class A Evaporation Pan and rainfall gauge to appropriate standards as part of the broader water monitoring program	Water allocations were secured for the life of mine water extraction in Jan 2019. The water licences are updated in the water management plan. The letter on the 6 March 2017 'recommended that Glencore *consider* the installation of a Class A Evaporation Pan and rainfall gauge *or* provide justification for alternative physics based methods for calculating groundwater recharge.' UCMPL has reviewed the alternative physics based methods and has integrated the Penman-Monteith

Agency/ Date	Document and Section	Comments	UCMPL Response
		The proponent must establish flow monitoring points upstream and downstream of 'The Drip' (and incorporate this into the ongoing monitoring program) unless it is either physically not possible to do so, or there is risk for an unacceptable environmental impact to occur. In such circumstances the proponent must provide documented justification and photographic evidence demonstrating why the additional monitoring cannot be achieved.	Evapotranspiration (FAO-56 Method) [47], which uses measured solar radiation, in the weather station. The Class A Pan Evaporation system is being considered, in discussion with DPI Water. UCMPL commissioned an investigation by a qualified hydrogeologist which demonstrates why the additional monitoring cannot be achieved, including photographic evidence. The Drip is located in the Goulburn River National Park. The feature "drips" into a wide section of the Goulburn River which has many flow paths and multiple rocky outcrops making the installation of flow monitors impractical. The "drips" generally fall onto outcropping rocks and add to small pools of water which form from the surrounding catchment. The volume of water produced from the 'Drips' is orders of magnitude less than other variability in the system and changes in 'Drip' flows could not be discerned from other noise in the data. Flow metres immediately at the Drip would detract from the aesthetics of the area and have a negative impact on the National Park without scientific gain.
DPIE **19 August 2019**	**Ulan Underground Extraction Plan LW30 W6-W8**	Approval of Extraction Plan- Letter attached below	

[47] United Nations Food and Agriculture Organization (FAO) Penman and Monteith (1990) Irrigation and Drainage Paper No. 56 cited in https://www.mdba.gov.au/sites/default/files/pubs/sa-crop-evapotranspiration-guidelines-1998_0.PDF and Lincoln Zotarelli, Michael D. Dukes, Consuelo C. Romero, Kati W. Migliaccio, and Kelly T. Morgan (2Step by Step Calculation of the Penman-Monteith Evapotranspiration (FAO-56 Method).

ULAN
COAL
GLENCORE

20 June 2016

The Secretary
NSW Department of Planning and Environment
23-33 Bridge Street
SYDNEY NSW 2000

Attention: Stephen O'Donoghue

Seq: 43/16

Dear Mr O'Donoghue,

Ulan No.3 Underground Extraction Plan Longwall Panels 30 & West 6 to West 8
Endorsement of Qualified & Experienced Specialists

Ulan Coal Mines Limited (UCML) is preparing an Extraction Plan for longwall panels 30 and W6 to W8 within the Ulan No.3 Underground Mine.

In accordance with Condition 26 (a) of Project Approval 08_0184, UCML seeks the endorsement of the Director-General for the following qualified and experienced specialists to assist UCML in the preparation of the Extraction Plan.

Strata Control Technology
Strata Control Technology (SCT) is a leading mining engineering and strata control company and has been integral in the monitoring and management of subsidence effects and impacts at the Ulan Complex since 1990. These activities have been under the supervision and direction of Dr Ken Mills (B.E Hons Ph.D), a Senior Geotechnical Engineer with SCT. A personal resume for Dr Ken Mills is available upon request.

Dr Mills will be responsible for developing and preparing:

- Revised predictions of potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, as required by Condition (e); and
- A Subsidence Monitoring Program required within part of Condition 26 (g), including a program for collecting baseline data for future extraction plans as required in Condition 26 (h).

SCT has developed an extensive subsidence monitoring database (including the introduction and continued operation of 400m wide longwalls) which has been used to predict subsidence behaviour across the Ulan Complex. Dr Mills' relevant experience in subsidence monitoring and management at the Ulan Complex includes:

- Subsidence Assessment for Proposed Ulan West Modification LW 3 to 12 (2015)
- Revised EP for Ulan West Longwalls 1-4 (2015)
- Longwalls 1 & 2 EP for Ulan West (2013)
- Ulan No 3 Underground SMP Application LW W2 - W3 (2007)
- Ulan No 3 Underground SMP Application LW23-26 & W1 (2005)
- Subsidence Monitoring Programs for Longwall 23 – 26 & W1 and W2 – W3
- Subsidence Assessment Report, UCCO Environmental Assessment (2009)
- End of Panel Reports (LW23, 24, 25, W1, W2)

Private Mail Bag 3006, Mudgee, NSW 2850
4505 Ulan Road, Ulan, NSW 2850
T + 61 2 6372 5000 F + 61 2 6372 5533 www.glencore.com

Ulan Coal Mines Ltd ABN 80 000 189 248
Manager of the Ulan Joint Venture

Planning Services
Resource Assessments
Contact: Matthew Riley
Tel: 9228 6339
Email: matthew.riley@planning.nsw.gov.au

Ms Robyn Stoney
Environment and Community Manager
Ulan Coal Mines Limited
Private Mail Bag 3006
MUDGEE NSW 2850

Dear Ms Stoney

Ulan Coal Mine (08_0184)
Approval of Extraction Plan Team

I refer to your letter dated 20 June 2016, requesting the endorsement of a team of suitably qualified and experienced persons to prepare an Extraction Plan required under condition 26 of the Project Approval for the Ulan Coal Mine (08_0184).

The Department has reviewed the information you provided, and is satisfied that the nominated team is suitably qualified and experienced.

Consequently, the Secretary approves the following persons to prepare the plan:

- Dr Ken Mills – Strata Control Technology;
- Dr Colin Mackie – Mackie Environmental Research;
- Peter Kuskie – South East Archaeology;
- Susan Shield – Umwelt (Australia);
- Daniel Magdi – Eco Logical Australia; and
- Stephen Bragg – Pacific Environment.

If you wish to discuss the matter further, please contact Matthew Riley on 9228 6339.

Yours sincerely

27/6/16

Stephen O'Donoghue
A/Director
Resource Assessments
As nominee of the Secretary

23-33 Bridge Street Sydney NSW 2000 | GPO Box 39 Sydney NSW 2001
www.planning.nsw.gov.au

Planning & Assessment
Energy & Resources
Contact: Paul Freeman
Tel: 9274 6587
Email: paul.freeman@planning.nsw.gov.au

Mr Charlie Allan
General Manager
Ulan Coal Mine
Private Mail Bag 3006
Mudgee NSW 2850

Via email: robyn.stoney@glencore.com.au

Dear Mr Allan

Ulan Coal Project (08_0184) – Extraction Plan for Longwalls 30 and W6-W8

I refer to your email dated 29 May 2019 enclosing the Extraction Plan for Longwalls 30 and W6-W8 at the Ulan Coal Mine in accordance with condition 26 of Schedule 3 of project approval 08_0184.

The Department has carefully considered the Extraction Plan and its component plans, and notes that advice provided by the Department and relevant Government agencies has been considered in the final version of the documents.

The Department is satisfied that the Extraction Plan meets the relevant conditions of approval. I wish to inform you that the Secretary has approved the Extraction Plan for Longwalls 30 and W6-W8 accordance with condition 26 of Schedule 3 of project approval 08_0184.

I would appreciate it if you could place the Extraction Plan and related component plans on the project website as soon as possible.

If you wish to discuss the matter further, please contact Paul Freeman on 9274 6587.

Yours sincerely

19/8/19

Steve O'Donoghue
Director
Resource Assessments
as nominee of the Secretary

320 Street Sydney NSW 2000 | GPO Box 39 Sydney NSW 2001
www.dpie.nsw.gov.au

NSW GOVERNMENT

Resources Regulator

FORM EAMS generic v1.3

Our ref: MAAG0008527
LETT0005221

Department of Planning, Industry and Environment
Locked Bag 5022
Parramatta NSW 2124
Attn: Gen Lucas

Dear Gen Lucas

I refer to the Department of Planning, Industry & Environment's (DPIE) request for advice received on 17 September 2020 in relation to the Ulan Coal Mine - Expansion - Extraction Plan LW30 & LWW6-LWW8 (MP08_0184-PA-51). The Extraction Plan has been amended to cover Mod 4 to MP08_0184-PA-51 which comprised minor lengthening of LW 30, LWW7 & LWW8.

The Resources Regulator has reviewed the Extraction Plan and is of the view that the modified mine plan does not materially change the health & safety risk due to subsidence at the site to that subject to the already approved Extraction Plan.

It should be noted that the amended secondary extraction mine layout is subject to a High Risk Activity Notification under Clause 33 of Work Health and Safety (Mines and Petroleum Sites) Regulation 2014. Work health and safety risks dues subsidence will be regulated under WHS laws generally, and in particular the aforementioned clause and Clause 67 of the same regulation.

Should the mine operator choose to use any aspect of the Extraction Plan for the purposes of a High Risk Activity Notification for longwall extraction they must ensure consistency with the abovementioned WHS laws.

If you require additional information, please contact the Resources Regulator on 1300 814 609 or via email at nswresourcesregulator@service-now.com.

Yours sincerely,

Matthew Newton
Principal Inspector Environment & Rehab
Resources Regulator

6 November 2020

Resources Regulator
516 High Street MAITLAND NSW 2320 Australia I PO Box 344 HRMC NSW 2310 Australia
Tel: 1300 814 609

NSW GOVERNMENT Department of Industry

Contact: Jane Curran
Email: jane.curran@nrar.nsw.gov.au

Robyn Stoney
Private Mail Bag 3006
Mudgee NSW 2850

Our ref: OUT20/15949, V15/3875-4#87

email: lucy.stuart@glencore.com.au

cc'd: Jack.Turner@planning.nsw.gov.au

Dear Lucy,

17 December 2020

Re: Ulan Coal – Amended Expansion Extraction Plan and associated plans for long walls 30, LWW6-LWW8

Thank you for giving the Department of Planning, Industry and Environment – Water (DPIE-Water) the opportunity to review the amended expansion extraction plan and associated plans for long walls 30, LWW 6 – LWW 8.

The DPIE-Water recommends the following.

Prior to approval

1. Licencing
   - Provide a breakdown of the peak annual groundwater flow being incidentally taken / dewatered; for each of the groundwater sources to be intersected by the project including breakdown by management zone where applicable

2. Site Water Balance

The proponent should present an amended site water balance which demonstrates predicted and actual inflows and take of groundwater from each water source - including management zones if applicable – considered essential to demonstrate compliance with the AIP and WMA.

3. The Drip

In addition to current pore pressure and water quality monitoring, the proponent should commit to undertaking and reporting of regular visual inspection and qualitative assessments of the 'The Drip' flows for the purpose of determining any or no impacts due to mining activities

Not required prior to approval

4. Mona Creek Alluvium Monitoring

Level 11 Macquarie Tower, 10 Valentine Ave, Parramatta NSW 2150 | Locked Bag 5123 Parramatta NSW 2124
e: nrar.servicedesk@dpie.nsw.gov.au | https://www.industry.nsw.gov.au

2

The proponent should install the proposed monitoring bores and VWP, as per Enclosure 1, as soon as practical in order to meet the requirement of a minimum two years of temporal and spatial baseline data.

5. Evaporation Monitoring

Install a class A Evaporation Pan on site.

6. UCMPL Environmental Management Plan Documents
   - Assessment Criteria and TARPs should be updated to include additional monitoring points
   - The proponent should update the relevant UCMPL environmental management plan documents (Water Management Plan, Groundwater Monitoring Program, Surface Water Monitoring Program etc.) to align with amendments to the Extraction Plan for LW30 and LWW6-8 and related sub-plans, and the recommendations provided in this assessment (eg. adjusted drawdown contours, additional monitoring points, assessment criteria, and TARPs).

Should you have any further queries in relation to this submission please do not hesitate to contact the Natural Resources Access Regulator's Service Support Team at nrar.servicedesk@dpie.nsw.gov.au.

Yours sincerely

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A.4 Attachment 3 – Program to Collect Baseline Data for Future Extraction Plans

The monitoring proposed to be undertaken to collect baseline data for future Extraction Plans is summarised in **Table 35**. With the proposed installation of groundwater monitoring sites, additional floristic monitoring plots, proposed rock shelter sampling strategy and additional surface water monitoring sites, UCMPL considers that the proposed monitoring program will be adequate to collect sufficient baseline data for use in future Extraction Plans.

Table 35 Summary of Monitoring Programs to Collect Baseline Data

Aspects for Future Extraction Plans	Existing & Proposed Monitoring Programs	UCMPL Document Reference
Subsidence	• Proposed subsidence monitoring in accordance with the Subsidence Monitoring Program for Longwalls 30 & LWW6-LWW8 (SMP LW30 & LWW6-LWW8) • Existing subsidence monitoring undertaken in accordance with the Subsidence Monitoring Programs for UUG and Ulan West. • Subsidence monitoring has been conducted routinely at the UCMPL Mine Complex since the commencement of longwall mining in 1986 and provides a strong basis for predicting future subsidence. • Subsidence predictions over Longwalls 30 & LWW6-LWW8 at UUG are based mainly on the results of previous monitoring for UUG. • The subsidence monitoring data collected during extraction of LW30 & W6-W8 will be used to validate revised subsidence predictions for future Extraction Plans. • It is considered that the existing & proposed subsidence monitoring programs are adequate to collect sufficient subsidence data for use in future Extraction Plans.	• SMP LW30 & LWW6-LWW8 • Subsidence Monitoring Program – UUG (ULN SD PLN 0061) • Appendix G: Subsidence Monitoring Program Longwalls 1 to 6 (ULN SD ANN 0064)

Groundwater	• Groundwater monitoring (groundwater level and quality) undertaken in accordance with the Groundwater Monitoring Program (GWMP).
	• Proposed groundwater monitoring in accordance with the Water Management Extraction Plan for Longwalls 30 & LWW6-LWW8 (WMP LW30 & LWW6-LWW8).
	• The GWMP establishes the monitoring and reporting requirements for the UCMPL Mine Complex:
	  ○ to enable groundwater extraction volumes to be reported against the relevant water licences
	  ○ for regional groundwater systems, in order to:
	  – establish trends in groundwater levels
	  – compare monitoring results with predicted groundwater depressurisation and associated groundwater inflows
	  – assess and quantify any potential impact on private licensed bores
	• This GWMP includes monitoring of the following elements of the alluvial and hardrock/coal measures aquifers in the UCMPL Mine Complex region:
	  ○ alluvial, Triassic, coal seam and interburden aquifers;
	  ○ baseflows to the Goulburn and Talbragar Rivers and associated creeks;
	  ○ any groundwater bores, springs and seeps on privately owned land; &
	  ○ „The Drip", a groundwater dependant natural site of cultural significance, to the east of the UCMPL Mine Complex.
	• It is considered that the existing & proposed groundwater monitoring programs are adequate to collect sufficient groundwater data for use in future Extraction Plans.
		• WMP LW30 & LWW6-LWW8
		• Groundwater Monitoring Program – (ULN SD PLN 0056)
		• Water Management Plan (ULN PLN 0017)
		• Appendix A: Water Management Plan Longwalls 1 to 6 (ULN SD ANN 0058)

Surface Water	• Surface water monitoring (flow, quality and geomorphology) undertaken in accordance with the Surface Water Monitoring Program. • Proposed surface water monitoring in accordance with the WMP LW30 & LWW6-LWW8. • The SWMP has been developed to ensure compliance with the conditions of the Project Approval. • The SWMP details the program for the UCMPL Mine Complex to measure and assess changes in stream health (including base flows) and channel stability that could be attributable to the operations mining activities and establishes the monitoring and reporting requirements to enable water quality and quantity	• WMP LW30 & LWW6-LWW8 • Surface Water Monitoring Program – (ULN SD PLN 0055) • Water Management Plan (ULN PLN 0017)

Aspects for Future Extraction Plans	Existing & Proposed Monitoring Programs	UCMPL Document Reference

	trends to be reported against Environment Protection License (EPL) 394 conditions.
	• The objectives of the SWMP are to:
	  ○ detail the integrated surface water monitoring strategy for the UCMPL Mine Complex;
	  ○ provide detailed historical baseline data on surface water quality in creeks, diversion channels and other waterbodies that could potentially be affected by UCMPL Mine Complex operations;
	  ○ provide methods to monitor and assess stream health and channel stability in creeks and diversion channels;
	  ○ provide methods to monitor and assess the operations" impacts on baseflows in the Goulburn River and the Talbragar River; and
	  ○ outline relevant surface water and stream health impact assessment criteria and establish a protocol for the assessment and response to monitoring data.
	• Monitor the effectiveness of the Erosion and Sediment Control Plan (ULN SD PLN 0025) as it relates to water quality.
	• Provide methods to assess compliance with conditions of the Project Approval and EPL 394 and also legislation relating to surface waters.
	• Outline the reporting requirements for the results of the monitoring program.
	• It is considered that the existing & proposed surface water monitoring programs are adequate to collect sufficient baseline surface water data for use in future Extraction Plans.
		• Appendix A: Water Management Plan Longwalls 1 to 6 (ULN SD ANN 0058)

Biodiversity	• Monitoring of biodiversity at the UCMPL Mine Complex is undertaken in accordance with the Biodiversity Management Plan (BMP). • Proposed biodiversity monitoring in accordance with the Biodiversity Management Extraction Plan for Longwalls 30 & LWW6-LWW8 (BMP LW30 & LWW6-LWW8). • The purpose of the BMP is to describe the ecological management strategies, procedures, controls and monitoring programs that are to be implemented for the management of flora and fauna within the Project Area, as described in the *UCMPL Continued Operations Environmental Assessment* (EA 2009). • Biodiversity monitoring data collected will be used to validate predicted environmental consequences on biodiversity for future Extraction Plans. • If this validation finds environmental consequences have exceeded those predicted, the monitoring data would be used to provide revised predictions of environmental consequences. • It is considered that the existing & proposed biodiversity monitoring programs are adequate to collect sufficient baseline biodiversity data for use in future Extraction Plans.	• BMP LW30 & LWW6-LWW8 • Biodiversity Management Plan – (ULN SD PLN 0055) • Offset Management Program (Appendix B of BMP)
Land	• Monitoring of subsidence impacts to land in general in accordance with the Land Management Plan for Longwalls 30 & LWW6-LWW8 (LMP LW30 & LWW6-LWW8). • The purpose of LMP LW30 & LWW6-LWW8 outlines the management strategies, controls and monitoring programs to be implemented for the management of general surface features regarding potential environmental impacts from the proposed secondary extraction workings as described in the Extraction Plan within the Application Area. • The monitoring conducted in accordance with the LMP LW30 & LWW6-LWW8 will be used in the review of observed subsidence impacts for future Extraction Plans. • It is considered that the proposed land monitoring program will be adequate to collect sufficient baseline data for use in future Extraction Plans.	• LMP LW30 & LWW6-LWW8
Aboriginal Heritage **& European Heritage**	• Monitoring of heritage (both Aboriginal & European) at the UCMPL Mine Complex is undertaken in accordance with the Heritage Management Plan (HMP), Heritage Management Plan – Ulan West LW1-4, and HMP LW30 & LWW6-LWW8. • Heritage monitoring in accordance with the HMP LW30 & LWW6-LWW8 includes Aboriginal Rock Shelter Test Excavation Sampling Strategy, as prepared by South East Archaeology (SEA). • The scope of the HMP outlines:	• HMP LW30 & LWW6-LWW8 • Appendix E: Heritage Management Plan Longwalls 1-6 SD ANN 0062) • Heritage Management

Aspects for Future Extraction Plans	Existing & Proposed Monitoring Programs	UCMPL Document Reference
	○ Establishes policies and actions for compliance with the EPBC Act, Heritage Act, NP&W Act and EP&A Act, PA 08_0184 and EPBC Approval; ○ Defines procedures in relation to the management and mitigation of Project impacts on Aboriginal, European and natural heritage; ○ Defines responsibilities of personnel; ○ Establishes key performance indicators; ○ Facilitates a process of communication and decision-making; and ○ Assists UCMPL to meet legal and ethical obligations in relation to Aboriginal heritage, the Aboriginal community, European and natural heritage. • It is considered that the proposed land monitoring program will be adequate to collect sufficient baseline data for use in future Extraction Plans.	Plan – (ULN SD PLN 0013) • Management Strategies for Aboriginal Sites – (ULN SD ANN 0048) • UCMPL Continued Operations – *Aboriginal Rock Shelter Test Excavation Sampling Strategy*

A.5 Attachment 4 – Contact Details

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