ULAN COAL

GLENCORE

Ulan Coal Modification 6

UNDERGROUND MINING EXTENSION

MODIFICATION REPORT

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umwelt
Environmental & Social Consultants

ULAN COAL MODIFICATION 6 – UNDERGROUND MINING EXTENSION

Modification Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Ulan Coal Mines Pty Limited

Project Director: John Merrell
Project Manager: Kirsty Davies
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This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
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Executive Summary

The Ulan Coal Complex (UCC) is located approximately 38 km north-east of Mudgee and 19 km north-east of Gulgong in New South Wales (NSW). The UCC is owned by Glencore Coal Pty Limited (Glencore) and operated by Ulan Coal Mines Pty Limited (UCMPL), a subsidiary of Glencore. The UCC is situated in a rural area, primarily surrounded by rural landholdings, native bushland and primary industries including agriculture, forestry, mining and extractive industries.

Coal mining has been undertaken in the Ulan area since the 1920s. The UCC currently operates under Project Approval 08_0184 which was approved in 2010. Approved mining operations within the UCC consist of underground mining in the Ulan Underground and Ulan West Underground areas as well as open cut mining, and associated coal handling, processing and transport through to 30 August 2033. The open cut operations are currently in care and maintenance.

UCMPL is proposing a modification to Project Approval 08_0184 to maximise resource recovery from the existing underground mining operations by extending some of the currently approved longwall panels to extract additional coal within existing mining lease and exploration licence areas, and an additional area covered by Exploration Licence (EL) 7542.

The Proposed Modification

The Proposed Modification will not change the currently approved coal extraction rate of up to 20 million tonnes per annum (Mtpa) of product coal and will enable extraction of an additional approximately 25 Mt of product coal and comprises:

- extension of Ulan Underground longwall (LW) panels LWW9 to LWW11 to the west
- widening of Ulan Underground LWW11 by approximately 30 metres
- extension of Ulan West LW9 to LW12 to the north
- the continuation of mining at the UCC for an additional 2 years.

UCMPL is also proposing some minor changes to surface infrastructure to support underground mining activities including provision of:

- three additional ventilation shafts and associated infrastructure corridors
- five additional dewatering bores and associated infrastructure corridors
- an alternate access track
- an infrastructure corridor and service borehole (to deliver gravel and other construction materials and to provide access and power to the underground mine) to the south-west of Ulan West
- other associated infrastructure required to service the approved and proposed underground mining operations.

The Proposed Modification has been designed through a multi-disciplinary social and environmental risk-based approach aimed at maximising resource extraction efficiency and optimising the use of existing site infrastructure, while seeking to minimise impacts on the environment and community. The key learnings from the long history of mining operations at the site, the stakeholder engagement program, and from environmental and social impact assessments, have all been considered in the design of the Proposed Modification.

The NSW Government's 2020 *Strategic Statement on Coal Exploration and Mining in NSW* acknowledges the need to recognise existing industry investment by continuing to consider responsible applications to extend the life of current coal mines. As an established operation with access to significant coal reserves beyond the term of PA 08_0184, the Proposed Modification fits within the plan of action proposed by the NSW Government.

Glencore has stated that it is committed to transitioning to a low-carbon economy, and announced publicly in 2021 that it would continue to responsibly source the commodities that advance everyday life through a unique business model that enables the production, recycling and marketing of the materials needed to decarbonise energy while simultaneously reducing emissions.

During 2021 Glencore strengthened its commitment to reducing its total emissions footprint (Scope 1, 2 and 3) which underpins its ambition to be a net-zero emissions company by 2050. Glencore's focus remains on reducing its total emissions footprint, including Scope 3 emissions, which is critical to achieve the goals of the Paris Agreement. The Proposed Modification and its direct and indirect emissions have been taken into consideration as part of Glencore's broader climate change commitments, and have been included in Glencore's decarbonisation pathway together with their emissions reduction targets.

Stakeholder Engagement

A stakeholder engagement program was undertaken by UCMPL specifically in relation to the Proposed Modification, utilising existing UCMPL consultation mechanisms in addition to specific activities focused on the Proposed Modification.

Due to the ongoing COVID-19 restrictions throughout the duration of the assessment phase of the Proposed Modification, a range of differing engagement mechanisms were implemented to facilitate effective engagement with the community and other stakeholders. Face to face engagement focused on stakeholders within and proximate to the Project Area and the Community Consultative Committee. To facilitate broader community input, newsletters were distributed and included an invitation to contact the Project team for any questions or requests to be involved in the engagement program. A series of meetings were also held with community and special interest groups. A range of engagement processes including meetings, presentations and correspondence were also held with government stakeholders relevant to the Proposed Modification.

A Social Impact Assessment (SIA) for the Proposed Modification has been prepared following the *Social Impact Assessment Guideline for State Significant Projects* (SIA Guideline) (DPIE, 2021). Using a risk-based approach, the SIA has identified that the social impacts from the Proposed Modification are primarily consistent with the approved operations. Given UCMPL's approach to avoiding and minimising impacts, the social impacts of the Proposed Modification have been minimised where practicable through project design and the proposed management and enhancement approaches. The SIA also highlighted a number of positive social impacts associated with the Proposed Modification, including continued employment for the existing workforce and local suppliers, and continued UCMPL investment in the local community.

Environmental, Social and Economic Assessment Outcomes

This Modification Report includes a detailed assessment of the potential environmental, social and economic outcomes of the Proposed Modification and identifies management and mitigation measures that will be implemented to reduce or avoid these impacts. The key assessment findings are summarised in **Table E.1**.

Table E.1 Predicted Impact Summary

Aspect	Impact
Agriculture, soils and land capability	The Proposed Modification will result in approximately 27.4 hectares of surface disturbance associated with supporting infrastructure. The proposed surface infrastructure areas will require minor leveling and soil stripping which will temporarily impact land capability, however, these sites would be rehabilitated to their former land capability post-mining. The majority of the surface in the additional underground mining area is undeveloped bushland with small areas of cleared or semi-cleared land suitable for grazing. Most of the cleared or semi-cleared areas are on land owned by UCMPL. Part of the proposed additional underground mining area is currently used for low intensity grazing. The ability for the land above the proposed additional mining areas to continue to be used for grazing will remain throughout mining and post-subsidence. It is predicted that minor repairs to surface infrastructure such as tracks, fencing and dams will be required, however, this is not predicted to change the land capability classification. The Proposed Modification is not anticipated to materially impact on the agricultural value of the land above the additional underground mining area.
Subsidence	The Proposed Modification will result in an increase of the total area of subsidence affectation associated with the UCC due to the extension of the underground mining operations. The overall subsidence impacts associated with the additional mining area are expected to be consistent with or less than the predictions for the approved operations, the subsidence performance measures outlined in PA 08_0184, and the historic monitoring experience at UCC. Impacts to the areas of land not owned or licensed by UCMPL are expected to be minor and generally imperceptible. There are no significant surface improvements proposed on the areas of private property. There are only minor built features (e.g. farm fences) in the predicted subsidence affection area for the Proposed Modification. Any impacts to natural or built surface and sub-surface features on privately owned or privately licensed Crown Land, are expected to be minor and manageable via provisions in subsidence management plans for private property, public safety, built features and water. Any impacts to natural or built surface and sub-surface features would be managed via provisions in Private Property Subsidence Management Plans (PPSMP) to be developed through consultation with the affected landholder. UCMPL currently operates in accordance with approved Extraction Plans which prescribe the monitoring and management measures to be implemented for each longwall area. Longwall extraction in the additional mining area will be undertaken in accordance with an approved Extraction Plans as required by PA 08_0184. Ongoing subsidence monitoring will be undertaken in a similar manner to the standards detailed in the existing subsidence monitoring programs required by the current Extraction Plans. This will include before, during and after mining survey of monitoring lines, and surface and landscape feature visual monitoring inspections. Subsidence remediation works will be implemented as required in accordance with the Extraction Plans.
Groundwater	A detailed groundwater impact assessment was completed to assess the impact of the Proposed Modification on the groundwater regime, in consideration of the requirements of NSW and Federal Government legislation and policies.

Aspect	Impact
	Groundwater modelling has predicted some changes in the groundwater interception of the underground mining area associated with the additional mining area. This includes an increase in the groundwater drawdown area, reflecting the increase in mining area. The assessment has found, however, that UCMPL currently holds adequate groundwater licence allocations to account for any increases in groundwater take associated with the additional underground mining. Predicted impacts to baseflow in the Talbragar River system from the Proposed Modification will be comparatively small to imperceptible and there is also very low potential for impacts on groundwater quality. Minor incremental impacts are predicted for two of the seven private water supply bores that are already impacted by the approved operations, with no additional bores affected. Management measures are already in place to address any impacts to these bores, Including make good provisions. No high priority Groundwater Dependent Ecosystems (GDEs) have been identified in the UCC area. The Drip, is a natural feature that hosts a localised GDE of vegetation growing on the sandstone cliff face to the east of UCC. The Drip lies approximately 10 km from the Proposed Modification and groundwater modelling indicates that it will not be impacted by the Proposed Modification as it is disconnected from the regional groundwater and exists as a perched, recharge-fed spring system. UCMPL currently operates the UCC under the approved Water Management Plan (WMP) (2021), which describes the management of environmental and community aspects, impacts and performance relevant to the site's water management system. The existing WMP will be updated to accommodate the Proposed Modification and will continue to be implemented.
Surface water and water balance	The UCC operational area exists within a well-regulated water resource management system that has been designed to provide for the sustainable management of the State's water resources. The key findings of the surface water impact assessment include: • No change to flow regimes in Mona Creek and negligible changes to flow regimes in the Talbragar River. • Impacts to flood depths and velocities would not extend beyond the predicted subsidence affectation area and would not impact on current land uses. • Changes to patterns of remnant ponding as a result of subsidence will be typically consistent with impacts approved under current operations. • Increases to flood velocities resulting from subsidence could potentially result in an increase to the erosive potential in the channel of Mona Creek, although this would only occur within landholdings owned by UCMPL and monitoring and mitigation measures are proposed to address this risk. • Negligible impact on ecosystems and downstream users. • Changes to surface infrastructure are not expected to result in appreciable changes to the quantity or quality of surface water. UCMPL will continue to utilise subsidence remediation methods and associated erosion and sediment control measures and monitoring programs to manage potential subsidence impacts on watercourses. The monitoring will inform the need for any remediation measures. Water quality and erosion and sediment control measures proposed to be implemented for the Proposed Modification are consistent with those currently implemented for the existing UCC. The existing WMP includes a surface water monitoring program. The WMP will be updated to include the Proposed Modification, including an additional monitoring point.

Aspect	Impact
Biodiversity	UCMPL has sought to avoid and minimise potential impacts on ecological values throughout the Proposed Modification planning process by maximising the use of existing mining facilities and considering the placement of essential infrastructure to seek to minimise disturbance to native vegetation and habitats. The Proposed Modification would result in some direct impacts on biodiversity values (i.e. loss of native vegetation and fauna habitat through clearing) within the areas associated with the construction of the proposed surface infrastructure (27.4 hectares). Of this area, 9.5 hectares has been assessed as vegetation consistent with the Box Gum Woodland Critically Endangered Ecological Community (CEEC). Potential indirect biodiversity impacts associated with the Proposed Modification largely relate to subsidence due to longwall mining within the additional longwall mining area. Previous predictions for the potential impacts of subsidence on biodiversity at the UCC anticipated that there would not be any impact on the viability of any native vegetation communities as a result of subsidence. These predictions have been confirmed by years of ecological monitoring which has been undertaken within the UCC since 1980, with studies at Ulan West commencing in 2006. These surveys were completed before, during and after underground mining in various locations across the UCC and have not recorded any perceptible change in vegetation health or viability that could be attributed to subsidence. To allow for flexibility in positioning of surface infrastructure (subject to detailed mine planning) the biodiversity assessment also included an options assessment that uses a 'maximum parameters' biodiversity assessment approach which considers a worst-case scenario to provide design flexibility. UCMPL has committed to the design and implementation of a biodiversity mitigation strategy to manage the unavoidable impacts of the Proposed Modification. Specific control measures, as detailed in the existing UCC Biodiversity Management Plan (BMP) (UCMPL, 2019), are integral to the mitigation of impacts on the biodiversity features of the UCC and will be implemented for the Proposed Modification. The biodiversity assessment identifies the biodiversity credits required to offset the impacts of the Proposed Modification and the options for offsetting that will be considered by UCMPL in delivering the required offsets.
Aboriginal cultural heritage	Many archaeological surveys and excavations have been previously undertaken within the UCMPL lease areas and surrounding locality, principally in relation to environmental impact assessments. This body of research has identified numerous archaeological sites and provides a broad understanding of archaeological site patterning in the local area. UCMPL has also established several conservation areas for key Aboriginal cultural heritage sites found within the UCC area. Five Aboriginal sites within the areas of surface infrastructure would be subject to either total or partial impact due to the Proposed Modification. The Aboriginal Cultural Heritage Assessment (ACHA) concluded that these impacts would be minor and can be adequately mitigated using established procedures implemented at UCC including monitoring, surface collection and potential test/salvage excavation, and/or possible relocation. The subsidence impacts on Aboriginal sites associated with the Proposed Modification are expected to be similar to those previously predicted and subsequently observed at UCC, including some subsidence induced impacts e.g. cracking. The Proposed Modification would result in an increase in the probability of perceptible impacts for 48 Aboriginal sites/Potential Archaeological Deposits.

Aspect	Impact
	The Aboriginal cultural heritage assessment was completed in consultation with the registered Aboriginal parties for the Proposed Modification including an engagement program to identify cultural heritage values and issues to be considered in the assessment. The assessment found, considering the predicted impacts on Aboriginal cultural heritage sites and values, that the Proposed Modification would result in an increase in impacts associated with the ongoing cultural and spiritual connection to the land by the north-eastern Wiradjuri and other Aboriginal persons. UCMPL currently implements a comprehensive Heritage Management Plan (HMP) (UCMPL, 2019) in consultation with Aboriginal stakeholders which provides detailed guidance for the management of heritage evidence within the Project Area. The ACHA found that the existing HMP, developed in consultation with Aboriginal stakeholders and regulators, provides sufficient policies and actions for the management of these impacts. The HMP will be updated to include management strategies for individual sites as outlined in the ACHA including monitoring, surface collection and potential test/salvage excavation, further investigation and recording and possible relocation of some sites in consultation with Aboriginal stakeholders.
Historic heritage	As there are no heritage items located within the area of direct impact or subsidence affectation associated with the Proposed Modification, no additional impacts to historic heritage are expected.
Noise	As the Proposed Modification relates primarily to underground coal mining operations, potential noise impacts are associated with the construction and operation of surface infrastructure. The construction noise assessment found that construction activities that occur during recommended standard construction hours (i.e. Monday to Friday 7 am to 6 pm, Saturday 8 am to 1 pm, and no work on Sundays or Public Holidays) are predicted to comply with the Noise Management Levels (NMLs) at all receivers. Occasionally, construction work may be required outside of standard hours. In such instances the adopted NML could be exceeded at one receiver location under standard meteorological conditions and two receiver locations under noise-enhancing meteorological conditions. The management of construction activities will therefore aim to avoid any work outside recommended standard hours, and where this cannot be avoided, construction activities will be carefully managed to avoid impacts. Mitigation measures will include consultation with potentially affected landowners, changes to equipment location/orientation/timing of use, and ongoing monitoring. Once operational, the assessment found that the noise from surface infrastructure is predicted to comply with the noise limits/criteria at all receiver locations during both standard and noise-enhancing meteorological conditions. UCMPL will implement a range of measures during construction of the Proposed Modification to mitigate the potential for noise impacts.

Aspect	Impact
Air quality	As the Proposed Modification relates primarily to underground coal mining operations, potential air quality impacts are associated with the construction and operation of surface infrastructure. During construction, potential air quality impacts are likely to be well within the current impacts of operations and are not predicted to impact on air quality at sensitive receivers. Whilst no adverse impacts are predicted, a range of dust management measures will be implemented during the construction phase to keep dust impacts to a minimum. During mining operations, modelling results indicate that the Proposed Modification is not predicted to cause any exceedances of the NSW Environment Protection Authority (EPA) criterion for particulate matter (as PM_{10}, $PM_{2.5}$ or Total Suspended Particulates), deposited dust or nitrogen dioxide. The existing air quality management measures currently implemented at the UCC will continue to be implemented as part of the Proposed Modification.
Greenhouse gas and energy	The scope 1, 2 and 3 greenhouse gas emissions have been assessed for the Proposed Modification. Greenhouse gas emissions over which UCC has direct operational control (Scope 1 emissions) include those generated by the ventilation system releasing coal mine waste gas (fugitive emissions) and diesel consumption, and these are expected to contribute 0.2% of total emissions from the Proposed Modification. This is mainly due to the relatively low diesel demands of an underground mine and the low fugitive gas content of the UCC coal reserves. Emissions resulting from energy use, produced externally by electricity generators (Scope 2), will contribute approximately 0.4% of total emissions. Indirect emissions that occur at external sources (Scope 3) including product transport and coal consumption, represent 99.4% of the total emissions from the Proposed Modification. The Proposed Modification will result in greenhouse gas emissions in NSW and Australia, however, it is unlikely to materially increase the national or State effort required to reach Australia's and NSW's 2030 greenhouse gas mitigation targets. Further, it is unlikely to limit Australia or NSW achieving their mitigation targets. As part of implementing the Proposed Modification, UCC will seek to mitigate greenhouse gas emissions through ongoing energy efficiency initiatives and optimising productivity. During 2021 Glencore strengthened its commitment to reducing its total emissions footprint which underpins its ambition to be a net-zero emissions company by 2050. The Proposed Modification and its direct and indirect emissions have been taken into consideration as part of Glencore's broader climate change commitments, and have been included in Glencore's decarbonisation pathway together with the emissions reduction targets.
Visual	The visual assessment found that distant views of the proposed surface infrastructure associated with the Proposed Modification would be available to three residences. The proposed infrastructure is not expected to be visually intrusive as it would impact only a small part of the distant viewshed and would be obstructed or screened by vegetation at distances greater than 1.4 km. Infrastructure would be constructed using materials in non-reflective natural tones and would be progressively decommissioned and the areas rehabilitated as soon as practicable once no longer required.

Aspect	Impact
Economics	The Proposed Modification has been assessed to provide a net benefit to NSW, estimated to be $292.6 million in net present value (NPV) terms. The Local Effects Analysis also shows an estimated net benefit of $45.2 million to the Lithgow-Mudgee region in NPV terms. This is driven largely by: • benefits to local workers of $15.4 million in NPV terms, as most of the employees at the UCC live around the Lithgow-Mudgee region • benefits to local suppliers of $29.8 million in NPV terms.

The comprehensive environmental and social impact assessment undertaken for the Proposed Modification has found that with the continued implementation of existing management and mitigation measures and the addition of the new measures identified, the Proposed Modification can proceed within acceptable environmental standards, without significantly increasing the impacts of the approved operations.

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1.0 Introduction

The Ulan Coal Complex (UCC) is located approximately 38 km north-east of Mudgee and 19 km north-east of Gulgong in New South Wales (NSW) (refer to **Figure 1.1**). The UCC is owned by Glencore Coal Pty Limited (Glencore) and operated by Ulan Coal Mines Pty Limited (UCMPL), a subsidiary of Glencore.

Coal mining has been undertaken in the Ulan area since the 1920s. UCMPL was granted its current Project Approval (PA) 08_0184 under the then Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) on 15 November 2010 for the Ulan Coal – Continued Operations Project (UCCO Project). PA 08_0184 provided a single, modern project approval for the ongoing mining operations, which enabled UCMPL to surrender a number of historical development consents previously held for the site. PA 08_0184 has since been modified on six occasions. The UCC also holds approvals 2009/5252 and 2015/7511, issued under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Approved mining operations within the UCC consist of underground mining in the Ulan Underground and Ulan West Underground areas as well as open cut mining, and associated coal handling, processing and transport through to 30 August 2033. The open cut operations are currently in care and maintenance.

UCMPL is proposing a modification to PA 08_0184 to maximise resource recovery from the existing underground mining operations by mining additional coal within existing mining lease and exploration licence areas. In addition to proposing to mine additional resources within existing mining lease areas, UCMPL has determined that there is a valuable mineable resource within Exploration Licence (EL) 7542 and is proposing to access this coal resource by extending the currently approved longwall panels into these areas.

This Modification Report has been prepared to assess the environmental and social impacts of the Proposed Modifications to PA 08_0184 and will accompany a modification application under section 4.55 (2) of the EP&A Act.

1.1 Proposed Modification

The Proposed Modification will maximise resource recovery within the existing mining lease and exploration licence areas by extending currently approved longwall panels into these areas to enable the extraction of an additional approximately 25 million tonnes (Mt) of product coal. The Proposed Modification will not change the current approved coal extraction rate of up to 20 Mt per annum (Mtpa) of product coal.

The Proposed Modification will extend the life of the approved UCC operation by approximately two years allowing mining to continue until August 2035. The UCC will continue to utilise the existing approved mine facilities, including the Coal Handling and Preparation Plant (CHPP) and train loading facilities.

To allow for the proposed extension of the underground mining area, the Proposed Modification includes changes to the surface infrastructure associated with underground operations, including ventilation, power and dewatering infrastructure.

Figure 1.2 illustrates the approved UCC operations and **Figure 1.3** shows the Proposed Modification in relation to the currently approved mining operations at UCC. The currently approved Project Area is proposed to be amended to include EL 7542.

The Proposed Modification comprises:

- extension of Ulan Underground longwall (LW) panels LWW9 to LWW11 to the west
- widening of Ulan Underground LWW11 by approximately 30 metres
- extension of Ulan West LW9 to LW12 to the north.

UCMPL is also proposing some minor changes to surface infrastructure to support underground mining activities including provision of:

- three ventilation shafts and associated infrastructure corridors
- five dewatering bores and associated infrastructure corridors
- an alternate access track
- an infrastructure corridor and service borehole (to deliver gravel and other construction materials and to provide access and power to the underground mine) to the south-west of Ulan West
- other associated infrastructure required to service the approved and proposed underground mining operations.

The Proposed Modification has been designed through a multi-disciplinary social and environmental risk-based approach aimed at maximising resource extraction efficiency and optimising the use of existing site infrastructure, while seeking to minimise impacts on the environment and community. As discussed in later sections of this report, the key learnings from the long history of mining operations at the site, the stakeholder engagement program, and from environmental and social impact assessments, have all been considered in the design of the Proposed Modification.

1.2 The Applicant

UCMPL is the applicant for the Proposed Modification and the operator of the UCC. UCMPL is a wholly owned subsidiary of Glencore.

1.3 Brief History of Operations at Ulan Coal Complex

Mining in the Ulan area has been undertaken since the early 1920s, initially as Ulan No. 1 Colliery Holding for the supply of coal to local markets. The distance to major markets prohibited the continuation of mining and operations ceased. The mine reopened in 1942 and continued operations until 1950. A new mine was developed by Hogan & Gorman in the 1950s further east of the previous mining operations creating the Ulan Colliery Holding No. 2 underground mine to supply coal to a new power station that was built to the north of Ulan Village as well as supplying local markets. This mine is now referred to as Ulan Underground mine. When the power station closed in 1969, mining at Ulan Underground continued on a small scale to supply other domestic markets (Connell Wagner, 1992).

In the late 1970s, Hogan & Gorman registered UCMPL and ownership transferred to White Industries. Part ownership was later transferred to Mitsubishi Operations and NSW State Super Board. An exploration program undertaken in 1976 in the Ulan area proved the existence of extensive coal reserves, and mining operations at the UCC expanded substantially in the 1980s with the establishment of an open cut coal mine. This expansion included the construction of the coal preparation plant and rail loading facility and augmentation of the Ulan Underground in 1982. Traditional bord and pillar underground mining methods were used from the mid-1970s to mid-1980s prior to longwall methods being introduced in 1986 with the commencement of Ulan No. 3. Glencore (formerly Xstrata Coal Pty Limited) purchased 90 per cent of the UCC in 2001. Mining within the open cut continued until mid-2008, when approved reserve recovery areas were exhausted at which time it was placed in care and maintenance. Development of the Ulan West underground commenced in 2011 with longwall mining commencing in 2014.

As detailed in **Section 1.0**, UCMPL was granted PA 08_0184 under Part 3A of the EP&A Act on 15 November 2010 for the UCCO Project. PA 08_0184 has since been modified on six occasions. Approved mining operations at the UCC consist of underground mining in the Ulan Underground and Ulan West Underground areas as well as open cut mining (currently in care and maintenance) with mining permitted to continue until 30 August 2033.

Operations at the UCC are being progressed in accordance with PA 08_0184. The approved UCC operations are shown in **Figure 1.2**.

1.4 Overview of Existing Environment

1.4.1 Environmental Context

The UCC is in the Mid-Western Regional Council Local Government Area (LGA), with the village of Ulan located 1.5 km west of the CHPP. Ulan Village consists of a primary school, two churches, a hotel and Rural Fire Service fire shed. A short and long-term accommodation facility is also located in Ulan Village, targeted at mine workers.

The surface above the proposed additional underground mining area is predominantly native vegetation, with cleared areas associated with historical agricultural activities and ancillary mining activities.

The UCC is located within the headwaters of both the Goulburn River system and the Talbragar River system. The Great Dividing Range separates these catchments, with the Goulburn River system draining east to the Hunter River catchment, and the Talbragar River system draining west to the Macquarie River catchment and eventually into the Murray River. All the tributaries in the approved mining areas are ephemeral by nature. The additional underground mining areas lie within the Mona Creek and Cockabutta Creek catchments (refer to **Section 6.5**). The Mona Creek and Cockabutta Creek catchments are part of the Talbragar River system. Mona Creek is an ephemeral, fourth order watercourse and flows in a north-westerly direction to the Talbragar River. Cockabutta Creek is an ephemeral creek, with a 2nd order and 4th order tributary located within the additional underground mining areas.

Within the UCC, the landform can be characterised into three main groups; broad valley floors, transitional rocky uplands with gentle to medium slopes of less than 10 per cent and steep hills with plateau surfaces (including vertical cliff lines and steep escarpments) (Umwelt, 2009). Landforms within the proposed additional underground mining area are consistent with landforms found in the eastern uplands of the Great Dividing Range, which consist of undulating valley floors to steeper slopes and rocky escarpments (Umwelt, 2015) and western uplands of the Great Dividing Range, where significant clearing within valleys has occurred for agriculture historically, mainly for grazing. The proposed additional underground mining area contains some cliff lines, steep slopes and rocky outcrops, as further discussed in **Section 6.3**.

The key features of the region surrounding the UCC are shown in **Figure 1.4**.

1.4.2 Land Ownership and Land Use

Land ownership within the UCC and surrounds is shown on **Figure 1.5**. As indicated on **Figure 1.5**, UCMPL is a major landholder in the Ulan region. The proposed additional underground mining areas are predominantly owned by UCMPL with parcels of Crown land (licensed to UCMPL) and portions of privately-owned land. The proposed surface infrastructure is predominantly located on UCMPL owned land, with some infrastructure proposed for Crown land.

There are seven private landholders located within the proposed additional underground mining area that may be affected by the proposed mine plan changes. There are no additional private residences within the proposed additional underground mining area.

The broader UCC is situated in a rural area, primarily surrounded by rural landholdings, native bushland and primary industries including agriculture, forestry, mining and extractive industries. The area to the south and south-west is dominated by rural landholdings. Grazing is widespread through the surrounding area.

Current land use within the additional underground mining area includes non-intensive grazing and ancillary mining activities. Large areas of the additional underground mining area include intact vegetation.

Due to the underground nature of the proposed mining activities, parts of the land within the additional underground mining area will continue to be utilised for limited agricultural use, as it is now, and ancillary mining activities.

1.5 Need for the Proposed Modification

The Proposed Modification will provide for the efficient recovery of approximately 25 Mt of additional coal resource at the UCC with minor changes to the currently approved environmental and social impacts.

The Proposed Modification represents the most efficient method of extracting the additional 25 Mt of coal resources to the north of the existing Ulan West operations, and west of the existing Ulan Underground operations. The Proposed Modification represents a relatively small change to the currently approved mine layout and subsequently will result in relatively minor changes to the currently predicted impacts associated with the approved underground operations and surface disturbance. Using the existing mining facilities is the most efficient and economic method for extracting this coal, reducing impacts when compared to a standalone mine to recover this same coal, and providing for an efficient use of this resource for the State of NSW.

While the global pandemic during 2020 subdued global energy demand, world energy demand since then has rebounded strongly, beyond 2019 levels, with a continued demand for fossil fuels particularly in developing countries (International Energy Agency, 2021). Meeting this increased energy demand into the future will require a mix of energy sources, with thermal coal expected to remain a key component of this energy mix within the timeframe of this mine approval (International Energy Agency, 2021) (refer to **Section 2.0** for further detail).

The UCC is well positioned to contribute to meeting this expected demand in the short to medium term and the Project will allow UCC to maximise coal recovery from within existing mining areas, whilst optimising the use of existing infrastructure and efficiently meeting this demand.

The operations at UCC have provided substantial economic benefits at Commonwealth, State, regional and local levels for many decades. The approved UCC will continue to provide substantial economic benefits until August 2033. The Proposed Modification would extend the life of the UCC by an additional two years (to 30 August 2035), which would result in the continued employment of up to 930 positions at UCC, with associated flow on effects for the local and regional communities.

Glencore has stated it is committed to transitioning to a low-carbon economy and has announced publicly that to assist in meeting the growing needs of a lower carbon economy, globally the company aims to prioritise its capital investment to grow production of commodities essential to the energy and mobility transition and to limit its global coal production capacity broadly to current levels. During 2021 Glencore also strengthened its commitment to reducing its total emissions footprint (Scope 1, 2 and 3) which underpins its ambition to be a net-zero emissions company by 2050. The Proposed Modification will extend the life of the existing operation providing production for a further two years. In this regard the Proposed Modification fits within the production cap as per Glencore's commitment as it is focused on sustaining current coal production in order to extend the life of the existing UCC and is not proposing an increase in production. This additional two years of production meets existing market demand for coal from Glencore. The Proposed Modification and its direct and indirect emissions have been taken into consideration as part of Glencore's broader climate change commitments, and have been included in Glencore's decarbonisation pathway and its emissions reduction targets.

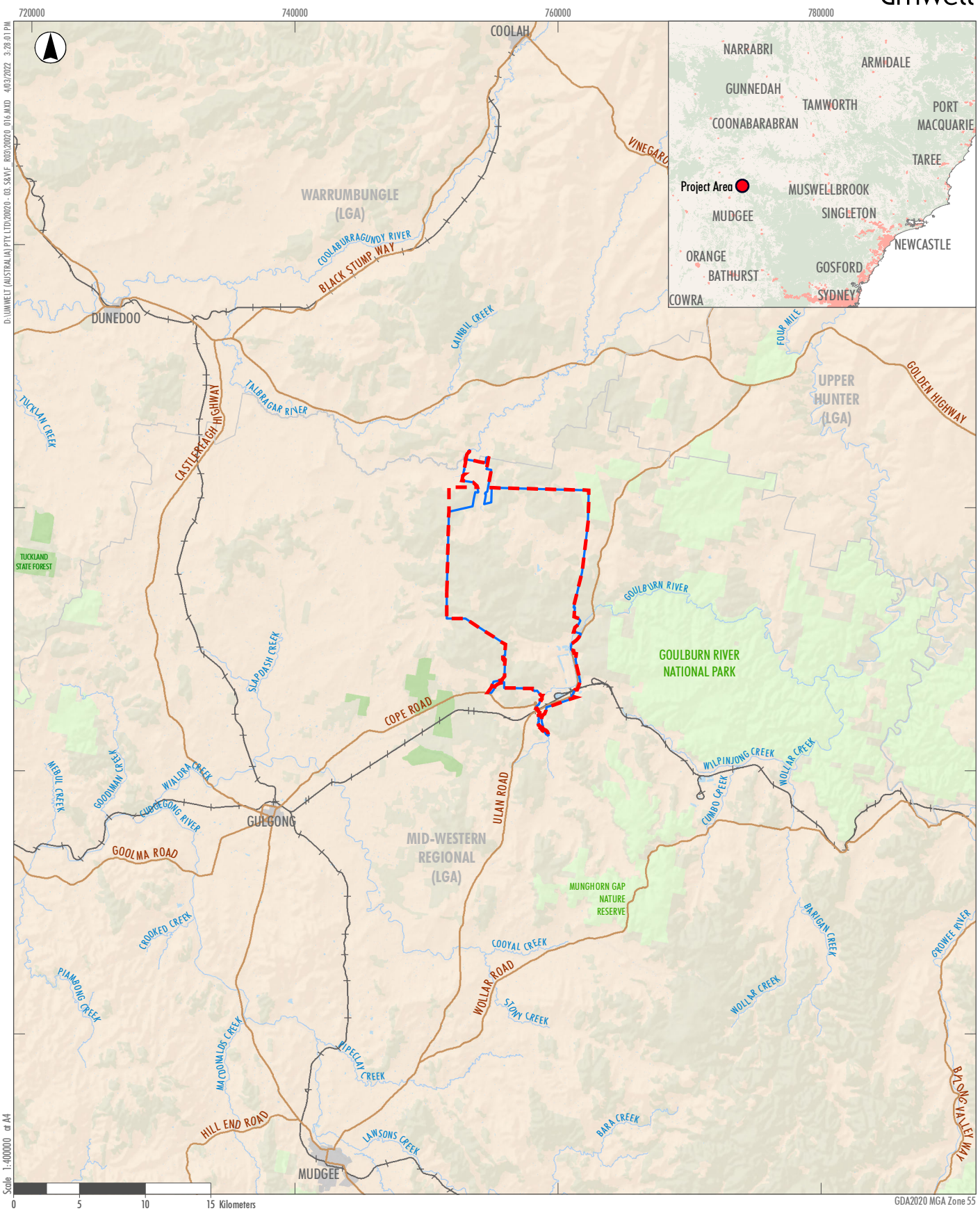
1.6 Alternatives

The main alternative to the Proposed Modification is the option of not proceeding.

Not proceeding would sterilise the resources that would otherwise be accessed through the Proposed Modification. As part of the mine planning process for the Proposed Modification a range of mine plan layouts were considered. The approved mine plan defines the start points for the proposed extension, which considers the nature of the coal resources and other mine planning and geological constraints. The proposed layout is considered to be the optimal layout for efficient recovery of the coal resources based on existing geological information. As part of the implementation of the Proposed Modification and as further information becomes known by UCMPL as the existing approved mining operations approach the underground mining extension area, there may be some refinements to the mine plan such as the end point of the longwall panels or exact location of proposed surface infrastructure. A maximum impact footprint has been assessed in this Modification Report so that the full extent of potential impacts of the Proposed Modification is assessed, however, the actual impacts may be less than what has been assessed. The assessment therefore presents a 'worst-case' assessment of the Proposed Modification.

The Proposed Modification would result in the extraction of an approximate additional 25 Mt of coal resource. The impacts of supplying this coal from within an existing mining area are significantly less than those associated with a new 'greenfield' mine development. The extraction of this coal as an extension and continuation of existing mining operations and utilising existing infrastructure, is substantially more efficient and would result in reduced environmental impacts compared to establishing a new 'greenfield' mine elsewhere, or if the existing operations were closed and then had to be reopened to allow recovery of this resource.

As the coal is extracted via the longwall mining method, the seams must be extracted in sequence and in parallel with the same seams located in the adjacent approved mining area as it is progressed. Any separate future operations would be highly unlikely to be considered commercially viable as the benefits of being able to continue mining within an approved mining area and utilise existing infrastructure may not be available if the Proposed Modification does not proceed.



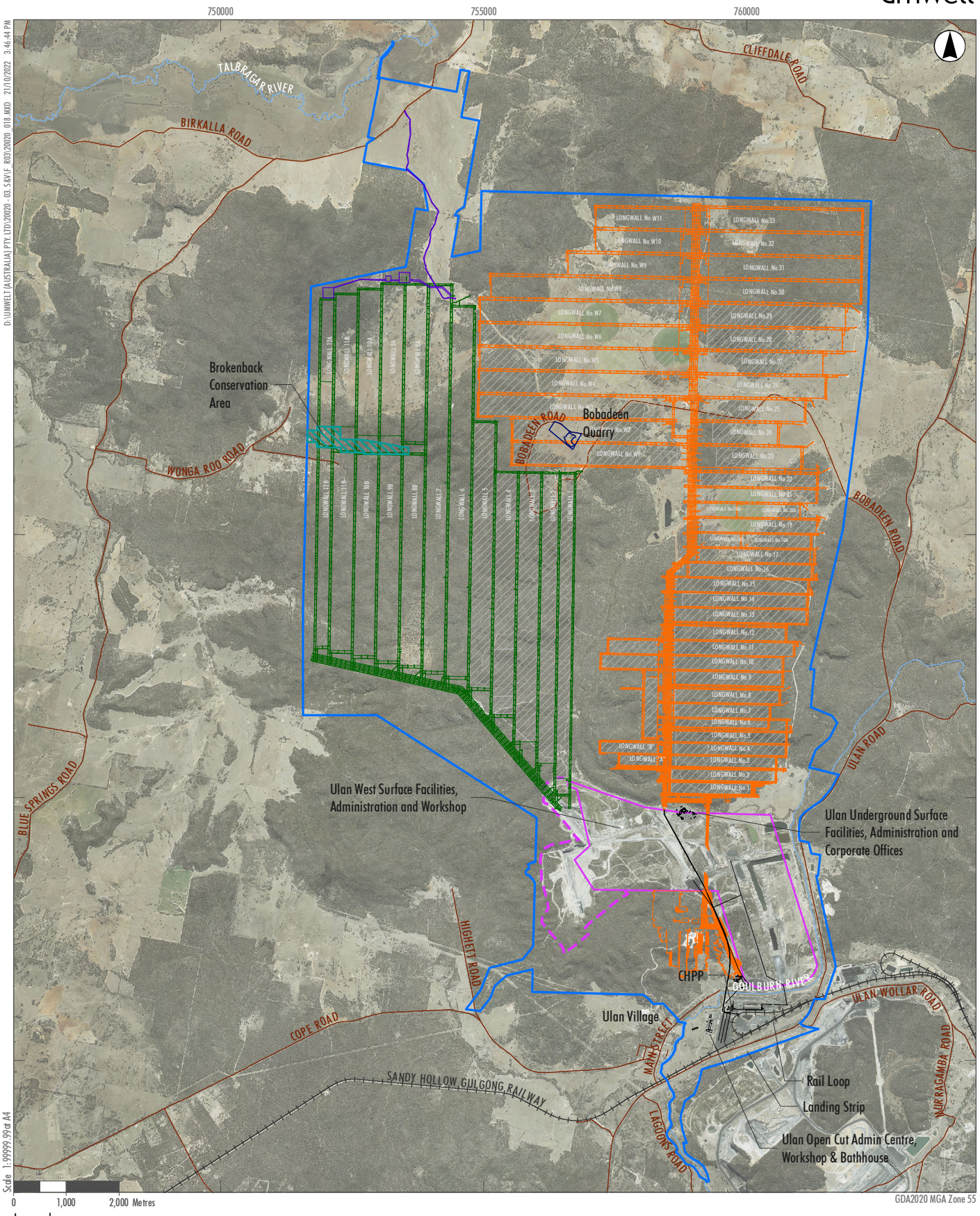
Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Local Government Area (LGA)
- Road
- Railway
- Watercourses
- State Forest
- NPWS Estate
- Native Vegetation

FIGURE 1.1

Locality Map

Image Source: ESRI Basemap Data source: NSW DFSI (2020), Ulan (2020)



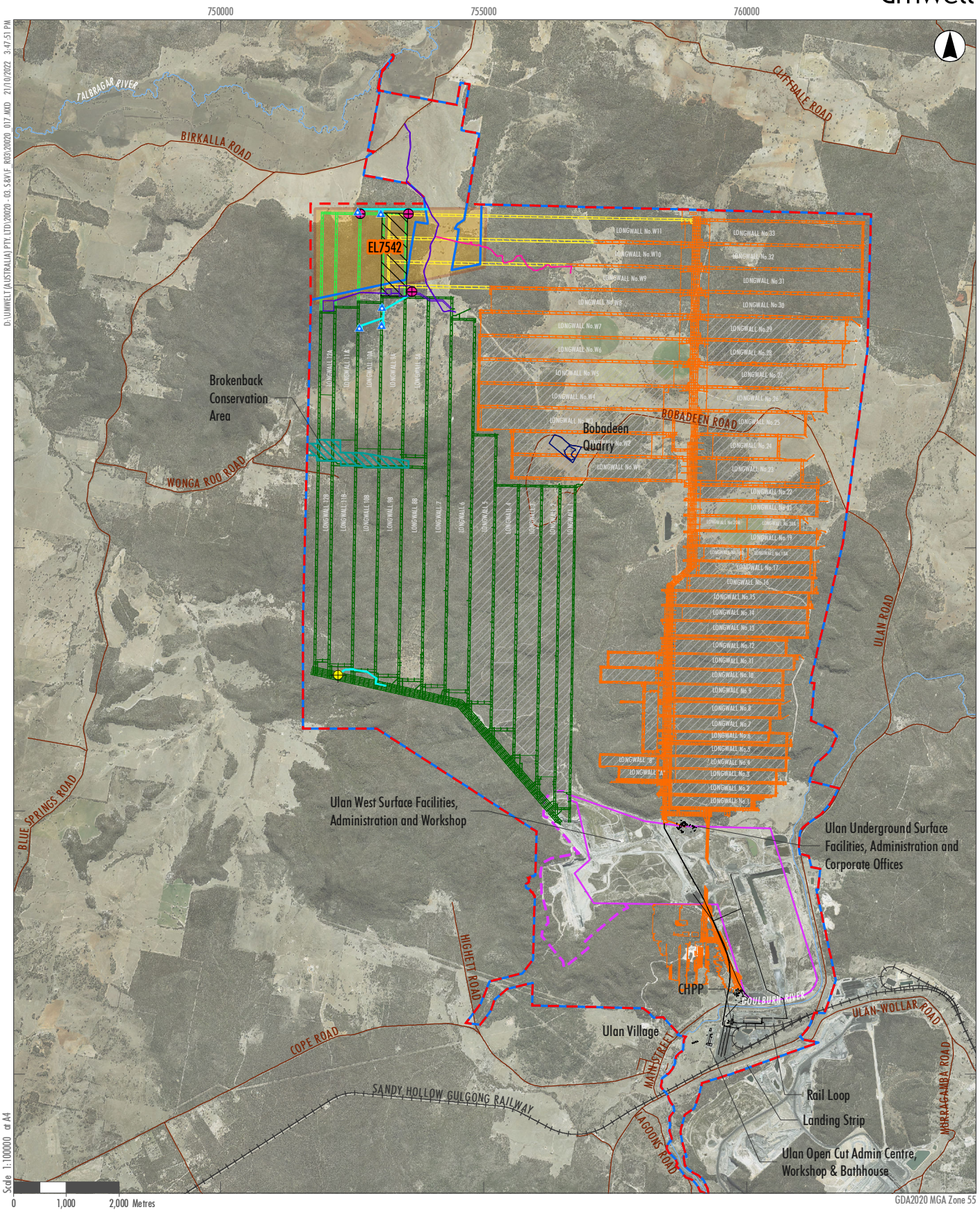
Legend

- Project Approval Boundary
- Brokenback Conservation Area
- Bobadeen Quarry
- Roads
- Railway
- Major Watercourses
- Approved Infrastructure related to Mod 6
- Approved Ulan Underground Mine Plan
- Approved Ulan West Mine Plan
- Previously Mined
- Previous Ulan Open Cut Area
- Approved Ulan Open Cut Extension

FIGURE 1.2

Approved Operations

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)



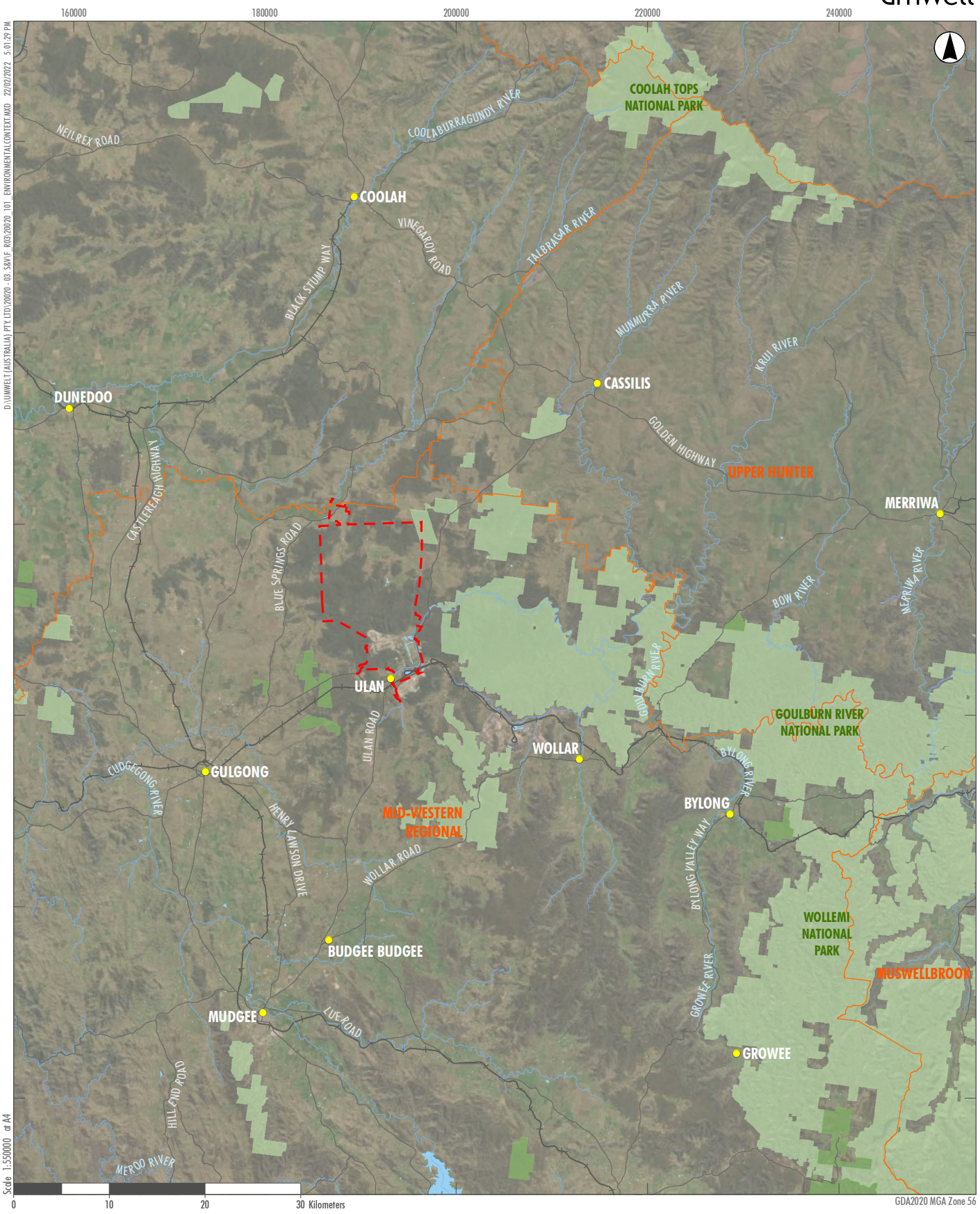
Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Brokenback Conservation Area
- Bobadeen Quarry
- Exploration Lease - EL7542
- Roads
- Railway
- Major Watercourses
- Approved Infrastructure related to Mod 6
- Approved Ulan Underground Mine Plan
- Approved Ulan West Mine Plan
- Previously Mined
- Previous Ulan Open Cut Area
- Approved Ulan Open Cut Extension
- Proposed Borehole
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Access Track Corridor
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- Longwall Option Area

FIGURE 1.3

Proposed Modification

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)



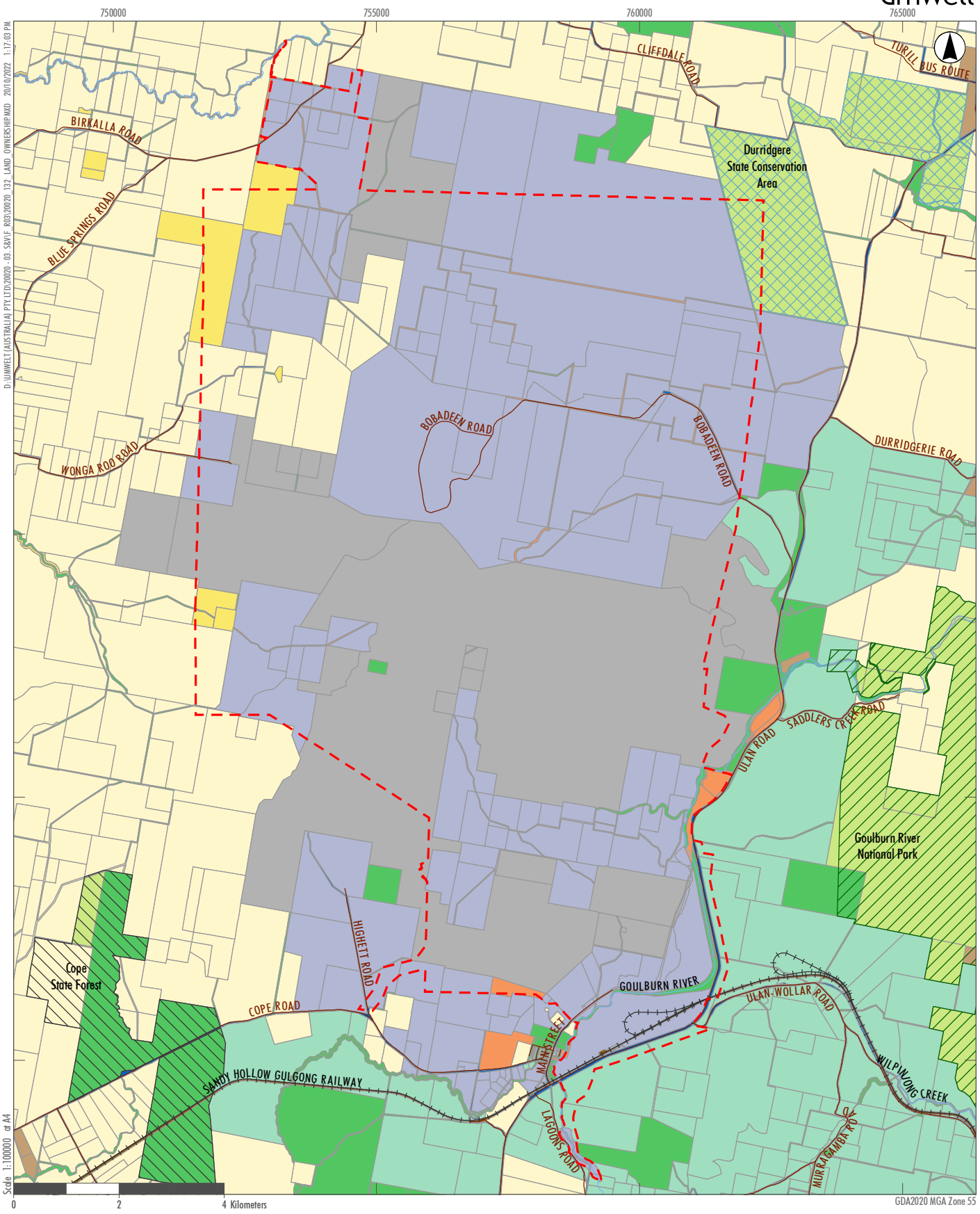
Legend

- Proposed Project Approval Boundary
- Local Goverment Boundary
- NSW State Forests
- NSW National Parks
- Road
- Creeks/ Rivers
- Railway

FIGURE 1.4

Environmental Context

Image Source: ESRI Basemap (2021) Data source: Glencore (2020); NSW DFSI (2021)



Legend

- Proposed Project Approval Boundary
- Roads
- Railway
- Major Watercourses
- State Forest
- National Park
- State Conservation Area

Land Ownership

- Crown
- Freehold
- Local Government Authority
- NSW Government
- Other Mine Owned
- Private
- Railway
- The State of NSW
- UCMPL Land Leased
- UCMPL Mining Leasehold
- UCMPL Owned Land
- Unknown

FIGURE 1.5

Land Ownership

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)

2.0 Strategic Context

2.1 Strategic and Regional Context

As identified by the NSW Government's 2020 *Strategic Statement on Coal Exploration and Mining in NSW* (NSW Strategic Statement) coal mining is an important industry for NSW and will continue as such for the next few decades. Coal mining is a significant source of direct and indirect jobs in regional NSW and underpins many local economies.

The NSW Strategic Statement acknowledges the need to recognise existing industry investment by continuing to consider responsible applications to extend the life of current coal mines. As an established operation with access to significant coal reserves beyond the term of PA 08_0184, the Proposed Modification fits within the plan of action proposed in the NSW Strategic Statement for supporting responsible coal production.

The NSW Strategic Statement recognises that the use of thermal coal will decline in NSW over the coming decades as aging coal-fired infrastructure is replaced with other forms of energy generation, however it also acknowledges that ending or reducing NSW thermal coal exports while there is still strong long-term global demand would likely have little or no impact on global carbon emissions. On this basis, the Proposed Modification is appropriately placed to continue to meet this existing global demand in line with the NSW Strategic Statement.

As an established underground operation, the proposed expansion of mining at UCC will also fit within the NSW Strategic Statement's plan for reducing the impact of mining on environmental and social outcomes, particularly in relation to its reduced air, noise, biodiversity, visual and other impacts in comparison to open cut coal mining operations.

The Proposed Modification also meets the policy aims of *State Environmental Planning Policy (Resources and Energy) 2021* by demonstrating a continued ability to mine the state's resources in an environmentally and socially acceptable manner through the implementation of design features, operational controls and safeguards to minimise adverse effects on the surrounding environment (refer to **Section 4.2.2**).

The continued importance of mining to the Central West and Orana region of NSW is also recognised in the Central West and Orana Regional Plan 2036, which promotes further development of the renewable energy, mining, health and education sectors to unlock economic potential and drive diversification across the region (NSW Government, 2017). Direction 8 of the Regional Plan aims to sustainably manage mineral resources and seeks to identify opportunities that enable productive use of the land without sterilising the potential of the underlying resource. Approved underground operations at UCC currently co-exist with agricultural enterprises, resulting in the delivery of diversified economic benefits to the region.

Despite only accounting for less than 1% of the total land area, mining is a key driver in the growing population and economy of the Mid-Western Regional LGA. Mining is the top employment industry with employment in the sector increasing since 2006, and in 2016 mining represented approximately 15% of all employment in Mid-Western Regional LGA (ABS, 2016). According to the NSW Mineral Council's 2020 Annual Expenditure Survey (NSW Minerals Council, 2021) mining also represents over half of the Gross Regional Product (GRP) of the Mid-Western Regional LGA.

The Mid-Western Regional Council's Towards 2030 Community Plan outlines the strategic direction for the LGA and includes the delivery of a prosperous and diversified economy as one of its five goals. The Plan recognises the need to attract new industries while retaining those already existing to provide this economic diversity.

2.2 Existing Mining Operations

UCMPL was granted PA 08_0184 under the then Part 3A of the EP&A Act on 15 November 2010 for the UCCO Project. Approved mining operations at the UCC are shown on **Figure 1.2** and consist of underground mining in the Ulan Underground and Ulan West Underground mining areas. Mining within the open cut continued until mid-2008 and has been in care and maintenance since 2016.

Following the approval of PA 08_0184, there have been six approved modifications to the Project Approval, as summarised in **Table 2.1**.

Table 2.1 Approved Modifications to Project Approval 08_0184

Modification	Description of Modification
MOD 1 (December 2011)	• Longwall extraction in North 1 Mining Area. • Modification of the approved Ulan Underground and Ulan West plans. • Construction and operation of a Concrete Batch Plant.
MOD 2 (May 2012)	• Modification of Ulan West LW1-5. • Removal of restrictions on construction blasts. • Minor amendments to European and natural heritage sites where blasting performance measures are applicable.
MOD 3 (March 2016)	• Modification of the approved Ulan West mine plan (re-orientating the main headings and the extension of seven longwalls).
MOD 4 (July 2019)	• Conceptual changes to the approved mine plans at both Ulan Underground and Ulan West to enable longwall panels to be both lengthened and widened, providing access to additional coal reserves.
MOD 5 (August 2020)	• Minor modification to amend misdescription of longwall recovery positions within Ulan West LW6-8.
MOD 7 (March 2022)	• Modification to permit the use of an alternative biodiversity offset site.

PA 08_0184 as modified, provides for:

- mining operations at the UCC until 30 August 2033
- longwall mining of Ulan Underground
- longwall mining of Ulan West Underground
- open cut operations over a 239-hectare area
- CHPP and rail loadout facilities with total coal production capacity of 20 Mtpa product coal
- continued use of existing surface facilities and ancillary activities, and construction and use of approved and new surface facilities and ancillary activities to support the abovementioned operations.

The UCC currently operates 24 hours per day, seven days per week, including construction and maintenance activities. Coal extracted at the UCC is processed at the CHPP (apart from low ash coal that bypasses the CHPP), stockpiled and loaded via the dedicated UCC rail loading facility for transport by rail to domestic markets or to the Port of Newcastle. Most of the coal is sold to the thermal coal export market.

Appendix 1 provides the schedule of lands, incorporating the Proposed Modification.

Environmental Management

UCMPL has a comprehensive Environmental Management System in place for the existing operations that has been refined over the many years of operations to appropriately address the environmental and social aspects of the mining operation. The UCC Environmental Management System includes environmental management plans and procedures that have been developed to satisfy the requirements of relevant legislative requirements and Glencore policies, and to drive environmental and social performance. These documents provide the strategic context for the environmental and social management of the UCC.

The Ulan Coal Environmental Management Strategy documents and implements the systems and processes in place to provide for effective environmental and social management across the UCC, and aims to:

- ensure adherence to statutory requirements, including regulatory approvals and licences
- comply with applicable legislation, standards, codes and other external requirements
- align UCMPL's operating philosophy with the Glencore Health, Safety, Environment and Community (HSEC) framework and the principles of ISO14001
- manage and minimise environmental impacts.

UCMPL has a number of environmental management plans that have been prepared to assist in the management of key environmental issues. Many these plans have been prepared to satisfy the requirements of PA 08_0184 and have therefore been prepared in consultation with relevant government agencies and approved for implementation by the Department of Planning and Environment (DPE). The environmental management plans will be updated to address issues specific to the Proposed Modification, where relevant, should the Proposed Modification be approved.

The key existing management plans for the UCC that will assist in the management of mining operations undertaken as part of the Proposed Modification include:

- Biodiversity Management Plan
- Bushfire Management Plan
- Air Quality and Greenhouse Gas Management Plan
- Noise Management Plan
- Heritage Management Plan
- Water Management Plan
- Groundwater Monitoring Program

- Surface Water Monitoring Program
- Surface Water and Groundwater Response Plan
- Waste Management Plan.

Details of how these plans will be applied to the Proposed Modification are discussed in the relevant environmental assessment section of this report (refer to **Section 6.0**). **Appendix 2** provides a summary of management and mitigation measures for the Proposed Modification.

3.0 Proposed Modification

UCMPL is proposing a modification to PA 08_0184 to maximise resource recovery from the existing underground mining operations within existing mining lease and exploration licence areas. In addition to identifying additional mineable resources within existing mining lease areas, UCMPL has determined that there is a valuable mineable resource within EL 7542 and is seeking to modify the current Project Approval to enable access to this coal resource by extending the longwall panels in these areas (refer to **Figure 1.3**).

The Proposed Modification will maintain the currently approved coal extraction rate of up to 20 Mtpa of product coal and will enable extraction of an additional approximately 25 Mt of product coal.

The Proposed Modification comprises:

- extension of Ulan Underground panels LWW9 to LWW11 to the west
- widening of Ulan Underground LWW11 by approximately 30 metres
- extension of Ulan West LW9 to LW12 to the north.

UCMPL is also proposing some minor changes to surface infrastructure to support underground mining activities, including provision of the following additional infrastructure items:

- three ventilation shafts and associated infrastructure corridors
- five dewatering bores and associated infrastructure corridors
- an alternate access track
- an infrastructure corridor and service borehole (to deliver gravel and other construction materials, and to provide access and power to the underground mine) to the south-west of Ulan West
- other associated infrastructure required to service the approved and proposed underground mining operations.

A comparison between the approved development under PA 08_0184 and the Proposed Modification is provided in **Table 3.1**. **Section 3.1** to **Section 3.6** provide further detail on those aspects of the Proposed Modification which differ to the approved development.

Appendix 1 provides a full schedule of lands for the approved Project and the Proposed Modification.

Table 3.1 Comparison of PA 08_184 and the Proposed Modification

Key Project Component	Approved Development (PA 08_184)	Proposed Modification
Mine life	Mining operations until 30 August 2033	Extension of life of mine until 30 August 2035 (an additional two years)
Limits of extraction	20 million tonnes of coal per annum (including maximum of 4.1 Mtpa ROM from Open Cut)	No change to existing extraction rate Additional approximately 25 Mt of product coal from the Proposed Modification
Operating hours	24 hours per day, 7 days per week	No change
Project boundary	As per PA 08_0184 (refer to **Figure 1.1**)	Extension of Project Approval Boundary to include the northern part of EL 7542 (refer to **Figure 1.3**)
Mine plan	As per PA 08_0184 (refer to **Figure 1.2**)	Extension of Ulan Underground LWW9 to LWW11, and Ulan West LW9 to LW12 Widening of Ulan Underground LWW11 Refer to **Figure 1.3**
Mining method	Retreat longwall method	No change
Surface infrastructure	As per PA 08_0184	Minor additions and changes to infrastructure including dewatering bores, ventilation shafts and associated infrastructure to accommodate the proposed mine plan
Coal Handling and Preparation Plant	As per PA 08_0184 (refer to **Figure 1.2**)	No change
Coal transportation	All coal transported from the site by rail. No more than 10 laden trains leave the site each day	No change
Workforce numbers	Approximately 930 people (UCC)	No change

3.1 Conceptual Mine Plan

The Proposed Modification extends the existing longwall panels in sections of both the Ulan West Underground and the Ulan Underground operations, in addition to widening LWW11 within the Ulan Underground. The proposed conceptual underground mine plan is shown in **Figure 1.3**.

There is an area within EL 7542 from which the coal may be extracted by either Ulan West Underground or Ulan Underground depending on timing of operations and mining conditions. The area referred to as the 'Longwall Option Area' is shown on **Figure 3.1**. The coal in the Longwall Option Area may be extracted by either a northern extension of Ulan West Underground LW9 (Base Case) or a western extension of Ulan Underground LWW9, 10 and 11 (Flexibility Option) (refer to **Figure 3.1**). Relevant assessments have considered both mining options in assessing potential impacts so that the range of potential impacts that could occur during the extraction of the coal in this Longwall Option Area have been considered. Details of the final mine plans in the Longwall Option Area will be included in the Extraction Plan required under the Project Approval.

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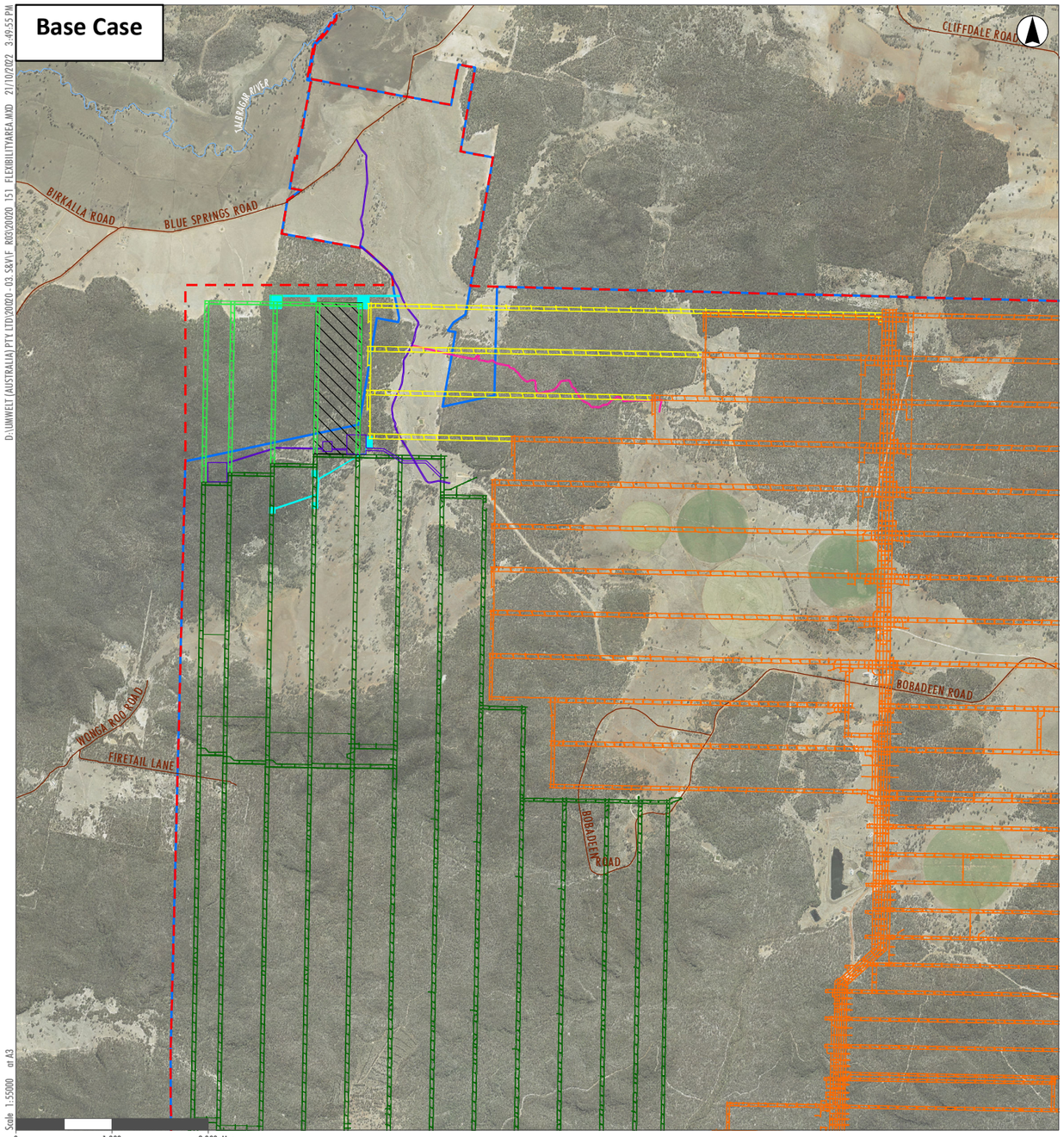
Base Case



Scale 1:55000 at A3

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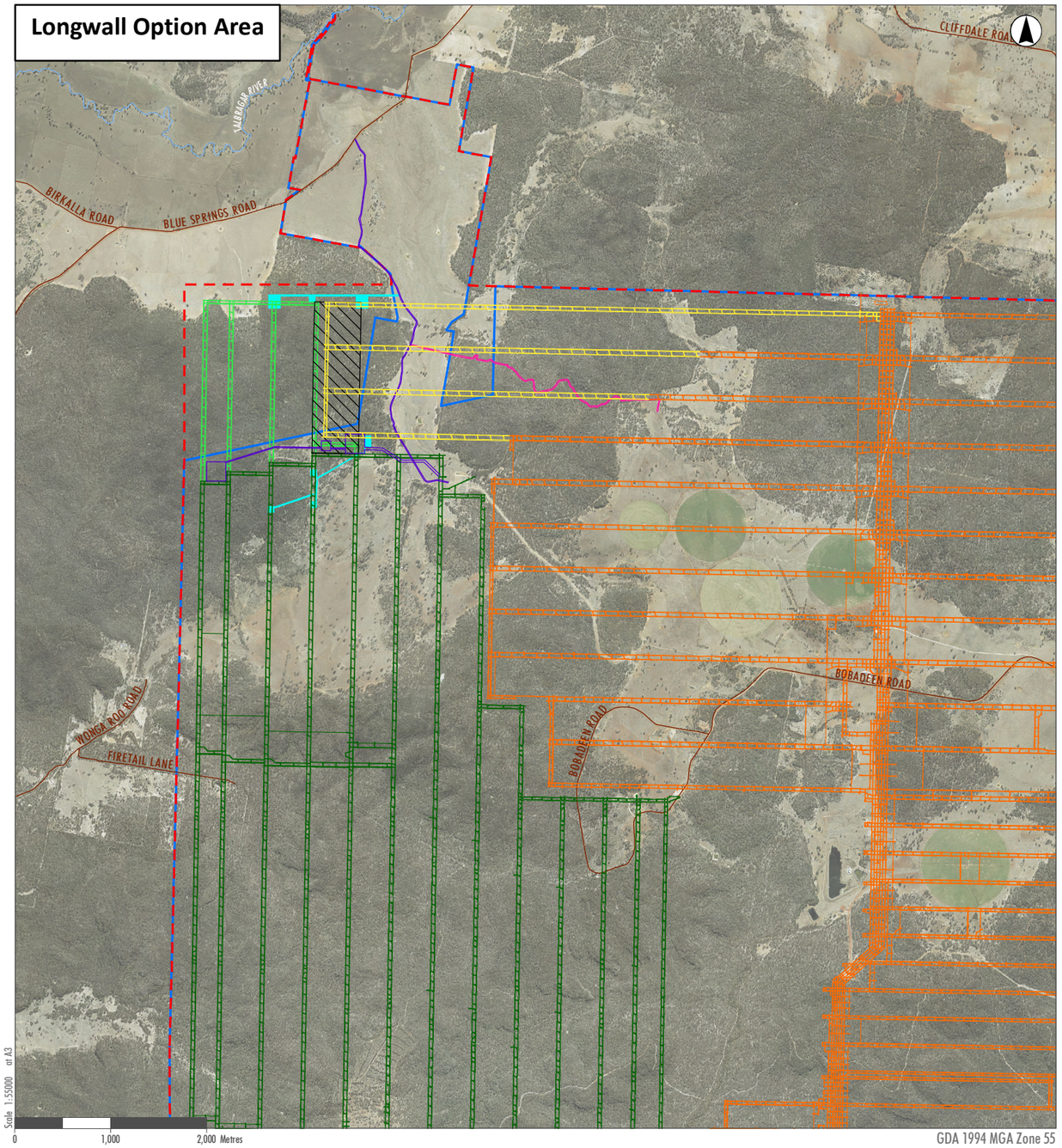
Longwall Option Area



Scale 1:55000 at A3

0 1,000 2,000 Metres

GDA 1994 MGA Zone 55

Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Roads
- Railway
- Major Watercourses
- Approved Infrastructure related to Mod 6
- Approved Ulan Underground Mine Plan
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- Approved Ulan West Mine Plan
- Proposed Access Track
- Proposed Infrastructure
- Longwall Option Area

FIGURE 3.1

Mine Plan Longwall Option Area

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)

Underground mining at the UCC will continue to be via retreat longwall mining method. Mining within the Ulan Underground progresses in northerly direction (i.e. LWW1 to LWW11) while mining in the Ulan West Underground progresses in a westerly direction (i.e. LW1 to LW12). Both underground operations are mining concurrently.

The Proposed Modification will not result in any impact to the Brokenback Conservation Area within the Ulan West Underground operation. The Brokenback Conservation Area is located across five longwall panels, Ulan West LW8 to LW12, as shown on **Figure 1.3**, and is protected from subsidence impacts by a barrier. As a result, the Brokenback Conservation Area is not directly undermined. The conservation values of the area, including cliff lines that contain rock shelters that are significant from both a cultural heritage perspective and as significant habitat for cave dwelling bats, will continue to be protected in a manner consistent with the existing Project Approval requirements.

The conceptual mine plan which forms the basis of this assessment has been designed in consideration of current mining techniques and technologies and is based on UCMPL's current understanding of local geology. Mining operations are, however, dynamic and the specific mine plan layout, timing and sequence shown in the indicative mine plan may be subject to changes due to, for example, economic conditions, technological advances and operational needs or as further geological and geotechnical data is gathered.

3.2 Surface Infrastructure

As a result of the proposed changes to the mine plan, the location of approved ventilation and dewatering infrastructure will need to be modified to align with the proposed changes to the longwall locations. Further ventilation infrastructure will also be required in order to safely and efficiently operate the underground mining operations.

UCMPL has developed conceptual infrastructure layouts which have been assessed as part of this Modification Report, however, it is acknowledged that the detailed design including final location of infrastructure is subject to further exploration and detailed mine planning. To retain flexibility in the location of surface infrastructure proposed, a maximum parameters assessment has also been completed to accommodate the worst-case potential impacts as part of the biodiversity assessment. Further details are provided in **Section 6.6**.

3.2.1 Ventilation Shafts and Service Boreholes

There are currently a series of ventilation shaft sites, service borehole sites and dewatering borehole sites approved across the UCC (refer to **Figure 1.2**). These facilities are essential for the safe and efficient operation of the mine providing for adequate underground ventilation and removal of water to provide safe working conditions. Service boreholes are used to efficiently provide construction material (e.g. gravel) to the underground workings from the surface and/or for other mining related purposes such as providing access, materials and power to the underground workings.

The Proposed Modification includes the provision of an additional three ventilation shafts and associated infrastructure corridors, five dewatering boreholes and associated infrastructure, access tracks, an infrastructure corridor and drop borehole (to provide materials, access and power to the underground workings) to the south-west of Ulan West (refer to **Figure 1.3**) and associated infrastructure, as required.

There will be no substantial change to constructed or approved ventilation shafts, service boreholes and dewatering boreholes.

The conceptual locations of the proposed ventilation shafts are shown in **Figure 1.3**. UCMPL has designed the ventilation infrastructure to avoid significant environmental features, where practicable, including threatened ecological communities and Aboriginal archaeological sites. These shafts will be required at the end of longwall panels and so should the longwall panel finish location be shortened based on detailed geology and mine planning as the mine progresses, the locations will be adjusted to match, but the overall design will be consistent with the concept. The relevant assessments have considered the potential reasonable worst-case impacts for the Proposed Modification and in some cases are conservative, such as the biodiversity assessment (refer to **Section 6.6**). UCMPL will seek to minimise or avoid impacts through the detailed design process where practicable.

Construction of the proposed ventilation shafts will require a construction footprint of approximately 120 metres by 120 metres. The footprint of the ventilation shafts during operation, once construction activity areas have been rehabilitated, is smaller with areas not required for operations rehabilitated. Following completion of mining within the longwall subject to ventilation, the shafts will be decommissioned to maintain underground safety by preventing unwanted air from entering the goaf, being the portion of the longwall panel that has been mined and subsided. Upon decommissioning of the ventilation infrastructure site, the disturbance footprint will be rehabilitated in accordance with UCMPL's approved rehabilitation strategies.

Upcast ventilation shafts (where air drawn through the mine moves up the shaft and into the atmosphere) will include the installation of fans and associated infrastructure. The fan modules will extract air from the underground mining areas via the ventilation shafts to maintain safe underground conditions. Downcast sites operate without fan infrastructure and will provide fresh air to the mine ventilation system to maintain suitable ventilation underground.

The duration of construction-related disturbance for each ventilation shaft will be in the order of five to seven months, with the timing of the works directly linked to the progression of underground mining.

3.2.2 Dewatering Bores

The Proposed Modification includes the drilling and installation of an additional five dewatering bores and associated infrastructure corridors up to 40 metres in width, housing power transmission lines, transformers, water pipelines and access tracks (refer to **Figure 1.3**). Water is pumped from the dewatering bores and integrated into the existing UCC water management system via overland pipelines.

The footprint of the dewatering bore compounds will be approximately 90 metres by 90 metres during construction. The footprint of the dewatering bores during operation, once construction activity areas have been rehabilitated, is smaller as areas not required for operations are rehabilitated.

3.2.3 Supporting Infrastructure

To facilitate development of the proposed additional ventilation and other infrastructure, ancillary infrastructure is required for both construction and operation. Ancillary infrastructure will include, but not be limited to:

- access tracks
- water supply pipelines
- electricity transmission lines
- communication and monitoring services
- other associated infrastructure required to service the approved and proposed underground mining operations.

Proposed supporting infrastructure has been assessed as being located within approved disturbance areas or located within the proposed infrastructure corridors (refer to **Figure 1.3**). The final locations of surface infrastructure may potentially be outside the conceptual corridors, as shown on **Figure 1.3**. The biodiversity assessment has considered a 'maximum parameters' approach for potential alternate layouts (refer to **Section 3.3**). UCMPL will ensure that the impacts associated with the final surface infrastructure locations will be the same or less than those assessed within the biodiversity assessment (refer to **Section 6.6**).

The proposed infrastructure corridors are aligned to appropriately service the location of main headings and end of longwall panels. Refinements to the conceptual infrastructure corridor design may be required during the detailed design phase of the Proposed Modification. Where the conceptual location of surface infrastructure is required to be moved as an outcome of the detailed design process, the infrastructure corridor will be aligned to these locations. In finalising the detailed infrastructure design, they will be located such that the impacts associated with the final design and location are the same or less than those assessed in this Modification Report.

As outlined in **Table 3.1**, there are no changes to other surface infrastructure as a result of the Proposed Modification.

Installation of ventilation shafts and dewatering bores will require construction of hardstand areas using the necessary earthmoving equipment and use of mulchers for vegetation clearance. The ventilation shaft construction process requires a continuous supply of water to support shaft stability during ventilation shaft boring. Process water for the boring operations will be sourced primarily from groundwater make during the construction process, with additional water to be supplemented from the UCC water management system. The water pipelines established to supply water will be above ground and co-located with the infrastructure corridors and/or access tracks.

Power supply for the modified ventilation and electrical services infrastructure requires alterations to the configuration of electricity transmission lines and construction of electrical transformers. The proposed transmission infrastructure will include both 66 kV and 11 kV transmission lines. The alignment of electricity transmission lines will be located within the proposed infrastructure corridors (refer to **Figure 1.3**).

The construction process will include appropriate pre-clearance inspections in accordance with the relevant environmental management plans, specifically the Heritage Management Plan and Biodiversity Management Plan, so that surface disturbance and environmental impact are minimised as far as practicable and in accordance with the requirements of PA 08_0184.

3.3 Additional Disturbance Area

The Proposed Modification is seeking approval for additional disturbance of approximately 27.4 ha to accommodate the proposed changes to surface infrastructure required (refer to **Section 3.2**), referred to as the proposed additional disturbance area. The proposed additional disturbance area is shown on **Figure 1.3**.

As discussed above, the final location of infrastructure is subject to further exploration and detailed mine planning. As such, the final location of proposed infrastructure may differ from that shown in **Figure 1.3**. In order to provide flexibility for the positioning of infrastructure to service the proposed additional underground mining, a maximum parameters approach has been assessed as part of the biodiversity assessment. It is acknowledged that the final location of infrastructure is subject to further exploration and detailed mine planning, and may vary from the conceptual design shown in this Modification Report. Surface infrastructure is required to be located in relation to the underground mining layout, for example a dewatering bore is located at the end of the longwall panel. If there is a change to the length of longwall panels, the supporting infrastructure needs to be located at the end of the revised longwall panel.

To provide the assessment of the necessary flexibility for infrastructure locations, UCMPL has identified contingency infrastructure locations that have been considered in the maximum parameters assessment as part of the biodiversity assessment for the Proposed Modification. The total potential 'maximum parameters' footprint of direct impacts on vegetation and habitats that may occur is 54.7 ha, which has captured the largest potential impact across each of the various plant community types (PCTs) in the additional underground mining area. This assessment is therefore conservative and, whilst this impact area has been assessed, the development is not intended to result in the removal of 54.7 ha of native vegetation. The final locations of surface infrastructure may potentially be outside the corridors assessed for biodiversity impact purposes as part of the maximum parameters approach. UCMPL will ensure, by undertaking a due diligence exercise prior to establishment of the surface infrastructure, that the impacts associated with the final surface infrastructure locations will be the same or less (when considering impacts to PCTs, threatened species, heritage and other environmental values) than those assessed within this Modification Report.

The proposed process for the confirmation and retirement of biodiversity credits is further detailed in **Section 6.6**.

3.4 Borrow Pit Activities

To allow for the construction of infrastructure associated with the Proposed Modification and the approved operations, UCMPL is seeking approval to allow for borrow pits at the UCC. The borrow pits would be minor excavations within the approved disturbance footprint to source hard rock materials for the use in construction of roadways and other construction activities at the UCC.

The borrow pits would be minor in nature and would not result in any greater environmental impact than approved by PA 08_0184 (as modified) and would be managed to achieve compliance with all conditions within UCMPL's approvals, including PA_0184 and EPL 394. Materials sourced from borrow pits would be used at the UCC only. It is anticipated the maximum volume of material to be sourced from the borrow pits would be approximately 10,000 m^3 within any single infrastructure pad or access road, with a maximum of approximately 25,000 m^3 across the UCC in any year. Material extracted would be cut and fill only and there would be no processing of material prior to reuse (no crushing/grinding/separating). Any materials sourced from a borrow pit would not be sold or used for any other external purpose. All associated areas would be rehabilitated when no longer required in accordance with UCMPL's current rehabilitation strategy.

3.5 Drilling Activities

Drilling will continue to be undertaken within the Proposed Project Approval Boundary (refer to **Figure 1.3**) to obtain further information regarding the resources to be mined, as well as define geological and geotechnical information relevant to the mining and construction activities. Additional drill holes to install groundwater and gas monitoring bores may also be required.

Construction, sealing and decommissioning of boreholes will be in accordance with relevant standards and guidelines published by the Department of Regional NSW Mining, Exploration and Geoscience (MEG) and in force at the time. Where required, monitoring bores will be licensed under the *Water Management Act 2000*, depending on the aquifers being intersected and monitored.

Drilling for exploration and installation of groundwater monitoring will be undertaken in accordance with the applicable Exploration Licence, Mining Lease or Project Approval. Surface disturbance associated with drilling and groundwater monitoring will be minimised as far as practicable and will be subject to due diligence processes. Drill cuttings, including liquid and solid components, generated from onsite and offsite drilling and exploration activities undertaken by UCMPL will be disposed of onsite, pending waste classification.

3.6 Operational Workforce and Hours of Operation

There will be no change to the approved UCC workforce of approximately 930 employees as a result of the Proposed Modification. The Proposed Modification would provide for up to an additional two years employment at the UCC.

Mining operations will continue 24 hours per day, seven days per week.

4.0 Planning Considerations

This section discusses the application of the various Commonwealth and State environmental and planning legislation and policies that are relevant to the Proposed Modification.

4.1 Commonwealth Legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the primary environmental and planning regulatory instrument relevant to the Proposed Modification at the Commonwealth level.

Under the EPBC Act, approval from the Commonwealth Minister for the Environment and Water is required for any action that may have a significant impact on Matters of National Environmental Significance (MNES).

MNES are identified in the following categories:

- World Heritage Properties
- National Heritage Places
- Wetlands of International Importance (lister under the Ramsar Convention)
- threatened species and ecological communities
- migratory species protected under international agreements
- nuclear actions (including uranium mines)
- the Great Barrier Reef Marine Park
- Commonwealth land, marine areas and reserves
- a water resource, in relation to a coal seam gas development and large coal mining development.

If an 'activity' is likely to have a significant impact on a MNES then it may be a 'controlled action' and require approval from the Commonwealth Minister for the Environment and Water. To obtain approval from the Minister, a proposed action must be referred to the Minister via the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). The purpose of a referral is to enable the Minister to decide whether the proposed action will need assessment and approval under the EPBC Act.

The UCC currently operates under EPBC Approvals EPBC 2009/5252 and EPBC 2015/7511 (granted in 2010 and 2016 respectively). It should be noted that Modification 4 was determined to be not a controlled action under the EPBC Act (EPBC 2018/8337) on 31 January 2019.

The components of the Proposed Modification that are not covered under current approvals were referred under the EPBC Act. The referral specifically covers:

- additional underground mining areas for Ulan Underground and Ulan West Underground
- additional disturbance to accommodate minor changes to surface infrastructure to support underground mining activities.

On 12 September 2022, the Proposed Modification, as referred under the EPBC Act, was determined to be a controlled action (EPBC 2022/09292) requiring assessment and approval under the EPBC Act due to controlling provisions related to listed threatened species and communities, and impacts to a water resource.

The Proposed Modification will be assessed under the Bilateral Agreement made under section 45 of the EPBC Act between the Commonwealth of Australia and NSW.

A copy of the determination is provided in **Appendix 3**. A summary of potential impacts on MNES is provided in **Section 7.0**.

4.1.2 Native Title Act 1993

The Commonwealth *Native Title Act 1993* (Native Title Act) recognises and protects native title. The main objects of the Native Title Act are:

a. to provide for the recognition and protection of native title

b. to establish ways in which future dealings affecting native title may proceed and to set standards for those dealings

c. to establish a mechanism for determining claims to native title

d. to provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title.

The Native Title Act is administered by the National Native Title Tribunal (the Tribunal). The Tribunal is responsible for maintaining a register of native title claimants and bodies to whom native title rights have been granted. These native title holders and claimants must be consulted prior to the granting of a mining lease over land to which the native title claim or right applies. This process is designed to ensure that Indigenous people who have an interest in the land (or any part thereof) have the opportunity to express this interest formally, and to negotiate with the government and the applicant about the proposed grant or renewal, or consent to access native title land. The Native Title Act prescribes that native title can be extinguished under certain circumstances, including the granting of freehold land.

The NSW *Mining Act 1992* must be administered in accordance with the Native Title Act. As such, native title holders and claimants must be provided with the 'right to negotiate' in relation to the grant and some renewals of exploration and mining titles.

There are two Native Title claimants over the Ulan area, Warrabinga-Wiradjuri #7 and the Gomeroi People. When UCMPL seeks to undertake a 'future act' in this area (such as applying for a new mining lease for the Proposed Modification), the Right to Negotiate process will be initiated by the issue of a section 29 Notice under the Native Title Act. The Native Title claimants will then have the opportunity to register as Native Title parties and UCMPL will engage in negotiations in accordance with the process set out in the Native Title Act.

4.2 New South Wales Legislation

4.2.1 Environmental Planning and Assessment Act 1979

The Proposed Modification seeks to modify PA 08_0184 pursuant to section 4.55 of the EP&A Act. As a State Significant Development (SSD), the Minister for Planning and Homes, or their delegate, will be the consent authority.

Modifications sought under section 4.55 must be substantially the same development for which the original consent was granted. The Proposed Modification is considered to be substantially the same development as that approved under PA 01_0184 as:

- The overall nature of the development remains unchanged.
- There is no proposed change in annual production rates, mining method, transportation, CHPP and key infrastructure.
- The majority of the key project components remain unchanged from that which is currently approved, as outlined in **Table 3.1**.
- As outlined in **Section 6.0** there are no substantive changes to environmental impacts. The Proposed Modification can be undertaken in accordance with the approved environmental impact criteria contained in the current conditions of PA 08_0184.

Furthermore, consultation with DPE confirmed that section 4.55 of the EP&A Act is the appropriate approval pathway for the Proposed Modification (refer to correspondence in **Appendix 4**).

Other NSW legislation applicable to the Proposed Modification is discussed in **Appendix 5**.

4.2.1.1 Permissibility

The UCC, including the additional land subject to the Proposed Modification, is located wholly within the area to which the *Mid-Western Regional Local Environmental Plan 2012* (Mid-Western Regional LEP) applies. The land which is the subject of the proposed additional underground mining area is within the Mid-Western Regional LEP zones RU1 – Primary Production and C3 – Environmental Management. Underground mining is permitted with consent in the RU1 – Primary Production Zone but prohibited in the E3 – Environmental Management Zone.

Section 2.9 of *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and Energy SEPP) provides that development for the purposes of underground mining may be carried out on any land with development consent. The Resources and Energy SEPP prevails over the Mid-Western Regional LEP (refer to Section 2.6 of the Resources and Energy SEPP) and therefore the Proposed Modification is permissible with development consent.

4.2.1.2 Assessment Requirements

Under section 4.55(2) of the EP&A Act in determining an application for the modification of development consent, the consent authority must take into consideration such of the matters referred to in section 4.15(1). These matters for consideration by the consent authority and the sections where they are addressed in this Modification Report are provided in **Table 4.1**. **Section 6.0** includes an assessment of relevant environmental impacts associated with the Proposed Modification to determine the level of assessment required.

Table 4.1 Section 4.15 Matters for Consideration

Matters for Consideration	Relevant Section
(i) any environmental planning instrument, and	**Section 4.2.2**.
(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority, and	**Section 4.2.2**.
(iii) any development control plan, and	Not applicable based on SSD provisions.
(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and	UCMPL has an existing voluntary planning agreement in place with Mid-Western Regional Council.
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),	Not applicable.
(v) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,	**Section 6.0**.
(vi) the suitability of the site for the development,	**Section 1.4**, **Section 6.0** and **Section 8.2**.
(vii) any submissions made in accordance with this Act or the regulations,	Not applicable to Modification Report. Submissions will occur post lodgement.
(viii) the public interest.	**Section 5.0** and **Section 6.13**.

This Modification Report has also been prepared in consideration of the factors identified in section 4.55 of the EP&A Act and Clause 115 of the *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation).

Appendix 5 contains consolidated information on the statutory approvals required for the Proposed Modification under sections 4.41 and 4.42 of the EP&A Act and under other NSW legislation.

4.2.2 Environmental Planning Instruments

The environmental planning instruments applicable to the Proposed Modification are discussed in the following sections.

4.2.2.1 Mid-Western Regional Local Environmental Plan 2012

The Proposed Modification is located within the Mid-Western Regional LGA and is subject to the Mid-Western Regional LEP 2012. As discussed in **Section 4.2.1**, the Proposed Modification is within the RU1 – Primary Production and C3 – Environmental Management zones.

The Proposed Modification is considered to be consistent with the objectives of the RU1 – Primary Production zoning through its:

- focus on maximising resource extraction efficiency and optimising the use of existing mining infrastructure, and
- avoidance of future possible sterilisation of the coal resource.

The objectives of the C3 – Environmental Management zoning is to protect, manage and restore ecological, cultural and aesthetic values whilst providing for a limited range of development that does not have an adverse effect on those values. The UCC has a long history of mining in the area while managing ecological, cultural and aesthetic values. Whilst some development activity will occur, with the implementation of continuing and proposed mitigation, management and offset measures, it is considered that the Proposed Modification is not inconsistent with the objectives of the C3 – Environmental Management zoning.

4.2.2.2 State Environmental Planning Policies

The following State Environmental Planning Policies (SEPP) are relevant to the consideration of the Proposed Modification.

State Environmental Planning Policy (Planning Systems) 2021

Chapter 2 of *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) identifies state and regional development to which the SSD assessment and determination process under Part 4 of the EP&A Act applies. The Proposed Modification is for the purpose of coal mining and is therefore SSD as defined by the provisions of this chapter and requires development consent under Part 4 of the EP&A Act.

Pursuant to section 2.7(3) the Independent Planning Commission (IPC) is the consent authority for applications to modify a development consent where the applicant has disclosed a reportable political donation under section 10.4 of the Act in connection with the modification application. Otherwise the Minister for Planning and Homes (or their delegate) is the consent authority for all other modification applications (section 4.5(a) of the EP&A Act).

State Environmental Planning Policy (Resources and Energy) 2021

Chapter 2 of *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and Energy SEPP) regulates the permissibility and assessment requirements for mining, petroleum production and extractive industries and related development.

Part 2.3 of the Resources and Energy SEPP requires specific matters to be considered in relation to development applications for mining development or applications that will affect existing or proposed mining operations. Section 2.16 of the Resources and Energy SEPP identifies non-discretionary development standards for mining and provides that the consent authority cannot impose more onerous standards in any approval in relation to the matters covered by the development standard. The prescribed criteria are summarised in **Appendix 5** with the relevant assessment outcomes noted for each criterion.

Section 2.17 of the Resources and Energy SEPP requires the consent authority to consider the compatibility of proposed mining developments with existing land uses in the area. The additional underground mining area primarily comprises vegetated areas with some cleared areas mainly associated with the tributary of Mona Creek (refer to **Figure 1.3**). The surrounding area includes approved underground mining, areas of native vegetation and agricultural activities with rural residences. The main land use in the area surrounding the additional underground mining area is mining activities with the Proposed Modification representing a continuation of underground mining areas into adjacent areas.

Given the underground nature of the Proposed Modification, it has been designed with consideration of maintaining compatibility with surrounding land uses and minimal environmental impact. The compatibility of the approved operations and the Proposed Modification with the surrounding land uses is considered in more detail in **Section 6.0** and **Section 7.0**.

Section 2.18 of the Resources and Energy SEPP requires the consent authority to have regard to the NSW Voluntary Land Acquisition and Mitigation Policy (VLAMP). The assessments described in **Section 6.0** of this report have indicated that the air quality and noise impacts associated with the Proposed Modification are generally consistent with those of the approved operations. The Proposed Modification does not result in impacts above criteria that would trigger the provisions of the VLAMP.

Section 2.19 of the Resources and Energy SEPP requires the consent authority to consider the potential impact of proposed mining developments on other mining, petroleum production or extractive industry projects or potential resources. The Moolarben Coal Mine is located directly to the east of the UCC and the Wilpinjong Coal Mine is located approximately 7 km to the south-east. The geology within the Project Approval boundary is well understood and the mine design aims to optimise resource recovery and to minimise the potential sterilisation of known coal resources in the area, without adversely impacting the adjoining mining operations. Other activities in the area surrounding the UCC include quarrying operations of the Ulan Quarry (operated by Ulan Stone), Bobadeen Quarry (operated by UCMPL) and agricultural activities such as grazing and cropping.

The Proposed Modification will not adversely impact on the Moolarben or Wilpinjong mining operations. UCMPL will continue to consult with neighbouring mining operations regarding matters such as any interaction issues and management of cumulative impacts. The Proposed Modification will not adversely impact on any other extractive industry operations or known extractive material resources.

Section 2.20 of the Resources and Energy SEPP requires the consent authority to consider the impact of a proposed mining project on the natural resources and whether specific environmental management conditions (relating to water resources, biodiversity and greenhouse gas emissions) should be imposed on the development if approved. The Proposed Modification's potential impact on natural resources is dealt with in detail in **Section 6.0** (specifically **Section 6.2** (agriculture, soils and land capability), **Section 6.4** and **Section 6.5** (water resources) and **Section 6.11** (greenhouse gas and energy)) and specific commitments regarding the management of potential environmental impacts are contained in **Appendix 2**.

Section 2.22 of the Resources and Energy SEPP requires the consent authority to consider whether or not the mining development under consideration should be subject to conditions restricting the use of public roads for product transport or other mining related traffic. All product coal from the Proposed Modification will be transported to markets by rail hence this section is not applicable.

Section 2.23 of the Resources and Energy SEPP requires the consent authority to have regard to whether or not to impose specific conditions regarding the rehabilitation of land affected by the proposed mining development. Upon decommissioning of the UCC, rehabilitation of disturbance will be undertaken in accordance with UCMPL's approved rehabilitation strategies and UCC currently has conditions regulating the rehabilitation of the site which will apply to the Proposed Modification.

Gateway Process

Part 2.4 of the Resources and Energy SEPP, together with Clause 50A of the EP&A Regulation, provide for the implementation of the NSW Government's Strategic Regional Land Use Plan (SRLUP). The Gateway Process applies for projects located within Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Cluster land (CIC land).

Of relevance to the Proposed Modification, the Gateway process applies to SSD located wholly or partially on BSAL that requires a new mining lease. Part of the Proposed Modification is located on land which will require conversion from an exploration licence to a mining lease, and as a result the SRLUP applies to this area.

A Site Verification Report was prepared for the Proposed Modification over the BSAL assessment area (an area totalling 987 ha, including the Proposed Modification area which will be subject to a new mining lease, as well as the required 100 m buffer). The BSAL site verification assessment identified that there was no BSAL in this area.

A Site Verification Certificate (SVC) was issued by DPIE (now DPE) on 5 July 2021 confirming that there was no BSAL within the BSAL assessment area.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapters 3 and 4 of *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) aim to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

Chapter 3 applies to the RU1, RU2 and RU3 zones across 74 non-metropolitan LGAs, including the Mid-Western Regional LGA. Chapter 4 applies across all zones in the Sydney Metropolitan and Central Coast LGAs and to zones other than RU1, RU2 and RU3 for the remaining 74 LGAs.

Chapters 3 and 4 apply to the extent that the Proposed Modification is located within an LGA listed in the SEPP, and a consent authority is restricted from granting development consent for proposals on land identified as core koala habitat without the preparation of a plan of management. Chapter 3 applies to land zoned RU1 – Primary Production while Chapter 4 applies to the areas zoned C3 – Environmental Management.

A biodiversity assessment (refer to **Section 6.6**) has been prepared for the Proposed Modification. While the direct impact area of the Proposed Modification contains a number of feed tree species for koalas, no individuals or signs of koala presence were recorded during three seasons of surveys conducted over 2020/2021 (refer to **Section 6.6** and **Appendix 11**). The direct impact area of the Proposed Modification is not considered to comprise important habitat for the koala. Consequently, the requirement for preparation of a koala plan of management does not apply.

State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 3 of *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) requires a consent authority to consider whether an industrial development is a potentially hazardous industry or a potentially offensive industry. A hazard assessment is completed for potentially hazardous developments to assist the consent authority to determine acceptability.

The approved operations do not constitute a hazardous or offensive development. As the Proposed Modification is a continuation of the approved operations and there are no material changes to the nature of the existing activities or materials used at the site, a preliminary hazard analysis is not required.

Chapter 4 of the Resilience and Hazards SEPP aims to provide a state-wide planning approach to the remediation of contaminated land and to reduce the risk of harm to human health and the environment by consideration of contaminated land as part of the planning process. Under Section 4.6 of the Resilience and Hazards SEPP, a consent authority must not consent to the carrying out of development on land unless it has considered any potential contamination issues. A review of the contaminated land register undertaken for the Modification Report confirmed that there are no known or registered contamination sites within the additional disturbance area or additional underground mining area.

4.2.3 Relevant Strategic Policies

4.2.3.1 Upper Hunter Strategic Regional Land Use Plan

The Upper Hunter SRLUP aims to protect the State's agricultural land and sustainable management of natural resources, while maintaining a commitment to strong economic growth through investment and development in regional areas. The Upper Hunter SRLUP requires the assessment of impacts from mining and coal seam gas development on land identified as being strategic agricultural land. Because of the significant mining activity within the Bylong-Wollar-Ulan corridor, part of the Mid-Western Regional LGA subject to such activities is considered in the Upper Hunter SRLUP.

As discussed in **Section 4.2.2.2**, the Proposed Modification requires a new mining lease and therefore Part 2.4 of the Resources and Energy SEPP must be considered. A SVC was issued by the former DPIE for the BSAL assessment area confirming there was no BSAL or CICs present.

The Upper Hunter SRLUP also requires all development applications for mining development that is SSD, and which would potentially impact on agricultural resources and industries, to be accompanied by an Agricultural Impact Statement (AIS). An AIS has been prepared for the Proposed Modification (refer to **Section 6.2**).

4.2.3.2 NSW Aquifer Interference Policy

The NSW Aquifer Interference Policy (AIP) clarifies the requirements for obtaining water licences for aquifer interference activities under NSW water legislation and establishes and objectively defines considerations in assessing whether more than minimal impacts might occur to a key water-dependent asset.

The AIP requires that, where mining will result in a loss of water from an overlying source covered by a water sharing plan (WSP), a water access licence is required under the WM Act to account for this loss of water. In addition, the AIP requires proponents of mining projects to provide estimates of all quantities of water likely to be taken from any water source during and following cessation of the activity, and all predicted impacts associated with the activity.

The AIP also requires that potential impacts of the Proposed Modification on groundwater sources, including groundwater users and groundwater dependent ecosystems (GDEs), be assessed against the minimal impact considerations. If the predicted impacts are less than the Level 1 minimal impact considerations, then these impacts will be considered as acceptable.

Potential groundwater impacts associated with the Proposed Modification are discussed in **Section 6.4**.

4.2.3.3 Central West and Orana Regional Plan

The Central West and Orana Regional Plan 2036 is a 20-year blueprint for the future of the Central West and Orana region. The vision of the plan is to create a leading diverse economy with a focus on healthy environments and communities, diverse heritage, quality transport and infrastructure networks.

The Orana region's mining sector includes coal mining concentrated around Lithgow and Mudgee, with the Mid-Western Regional LGA's top economic opportunities identified as mining, agribusiness and tourism. The Proposed Modification will continue to contribute economically to the mineral and energy resources sectors of the Mid-Western Regional LGA.

Economic impacts and benefits associated with the Proposed Modification are assessed in **Section 6.14**.

5.0 Stakeholder Engagement

UCMPL has an established relationship with the surrounding community and other stakeholders and has implemented a process for ongoing engagement regarding its mining operations. UCMPL is committed to working with the community to ensure they can continue to coexist.

A stakeholder engagement program was undertaken by UCMPL specifically in relation to the Proposed Modification. The stakeholder engagement program for the Proposed Modification utilised existing UCMPL consultation mechanisms in addition to specific activities focused on the Proposed Modification, as outlined below.

5.1 Community Consultation

UCMPL has an ongoing community engagement program which includes regular engagement with both individuals and groups from the local and regional communities via a range of mechanisms including:

- regular newsletters to update the community on operations and UCMPL initiatives
- meetings with individuals and/or groups as required/requested, including any meetings required in response to complaints
- regular meetings with the UCC Community Consultative Committee (CCC). The CCC is made up of seven community representatives, one Mid-Western Regional Council representative and UCMPL representatives.

Consultation was impacted by ongoing COVID-19 restrictions throughout the duration of the assessment phase of the Proposed Modification. Face to face consultation focused on stakeholders within and adjacent to the Project Area and the CCC. For broader community input, the newsletters requested that residents contact the Project team if they had any questions or would like to be involved in the SIA engagement program. A series of interviews were also held with community and special interest groups.

The key stakeholder engagement activities undertaken for the Proposed Modification are outlined in **Table 5.1**.

Table 5.1 Community Consultation

Activity	Date	Details
Newsletters	February 2021	Newsletters distributed to 157 households and businesses in the wider community with details of the Proposed Modification and contact details for the project team.
	December 2021	Newsletters distributed to 143 households and businesses in the wider community with draft outcomes of environmental assessment for the Proposed Modification.
	March 2022	Newsletters distributed to 224 households and businesses in the wider community with updates to the progress of the Proposed Modification.
	August 2022	Newsletters distributed to 223 households and businesses in the wider community with further updates to the progress of the Proposed Modification.
SIA Interviews/ Personal meetings	Round 1 – December 2020– January 2021	Individual meetings, held via telephone, videoconference and face-to-face (depending on the COVID-19 restrictions in place at the time), utilising a semi-structured interview guide to inform the SIA. Participants included near neighbours being landholders within and adjacent to the Project Area.
	Round 2 – December 2021– February 2022	Individual meetings, held via telephone, videoconference and face-to-face (depending on the COVID-19 restrictions in place at the time), utilising a semi-structured interview guide to inform the SIA. Participants included near neighbours, community and special interest groups and local businesses and service providers.
CCC	26 November 2020	Presentation, introduction and discussion on the Proposed Modification. CCC members were provided with an offer to be included in consultation for the SIA.
	18 March 2021	Presentation and status update on the Proposed Modification. Stakeholder engagement completed and upcoming consultation was discussed.
	3 June 2021	Presentation and status update on the Proposed Modification. CCC members advised anyone seeking information should contact the project team or UCMPL Environment and Community Team.
	23 September 2021	Presentation of draft assessment outcomes for the Proposed Modification to the CCC.
	24 March 2022	Presentation and status update on the Proposed Modification.
	30 June 2022	Presentation and status update on the Proposed Modification.
	29 September 2022	Presentation and status update on the Proposed Modification, including how members can access and comment on the application during the exhibition period.

Based on consultation, the key likely and perceived social impacts included:

- increase in anxiety and stress as a result of the Proposed Modification
- impacts to water availability
- potential impacts to physical health
- release of greenhouse gas emissions
- potential impacts on rural properties
- changes to surroundings impacting on the rural landscape, enjoyment of the natural environment and sense of community and place
- continued employment for the existing workforce and local suppliers
- continued investment in the local community resulting in improvement to community infrastructure / services.

Further details are provided in **Section 6.13**.

5.2 Government Consultation

UCMPL has also undertaken a range of government consultation related to the Proposed Modification as detailed in **Table 5.2** below.

Table 5.2 Government Consultation

Agency	Date	Activity	Details
DPE	15 October 2020	Meeting	Discussion regarding the Proposed Modification and the approval pathway.
DPE	13 November 2020	Letter	UCMPL provided a letter to DPE outlining the Proposed Modification seeking confirmation of the proposed approval pathway and scope of technical studies.
Mid-Western Regional Council (MWRC)	14 January 2021	Meeting	Discussion on the Proposed Modification, including planning pathway and environmental assessments.
Environment Protection Agency (EPA)	20 January 2021	Meeting	Update on the Proposed Modification.
Crown Lands	21 January 2021	Email	Introduction to Proposed Modification and clarification of issues raised concerning land ownership.
Natural Resources Access Regulator (NRAR)	21 January 2021	Email	Introduction to Proposed Modification, offered meeting declined.

Agency	Date	Activity	Details
Biodiversity Conservation Division (BCD)	29 January 2021	Meeting	Introduction to the Proposed Modification and proposed assessment approach.
Resource Regulator	29 January 2021	Email	Introduction to the Proposed Modification and proposed assessment approach.
DPE	12 May 2021	Email	Application for a Site Verification Certificate.
DCCEEW	28 May 2021	Meeting	Discussion regarding the Proposed Modification and the EPBC referral.
DPE	9 July 2021	Letter	Issue of Site Verification Certificate.
Department of Regional NSW – Mining, Exploration and Geosciences	14 October 2021	Meeting	Discussion regarding environmental assessment outcomes for the Proposed Modification, mining lease applications and the approval process.
DPE	2 November 2021	Meeting	Discussion on approach to biodiversity assessment in relation to maximum parameters approach.
BCD	3 November 2021	Meeting	Discussion on approach to biodiversity assessment in relation to maximum parameters approach.
EPA	18 November 2021	Meeting	Discussion on environmental assessment outcomes for the Proposed Modification.
DCCEEW	19 November 2021	Meeting	Providing an update on the Proposed Modification and the proposed maximum parameters approach.
BCD	24 November 2021	Briefing note	Confirmation of preferred approach to biodiversity assessment for the Proposed Modification.
DPE and BCD	1 December 2021	Meeting	Follow up discussion regarding proposed biodiversity assessment approach.
Department of Regional NSW – Mining, Exploration and Geosciences	25 January 2022	Meeting	Discussion regarding royalties and target markets, geotechnical assessment, life of mine schedule, mineral resources and ore reserves.
Heritage NSW	28 February 2022	Email	Request for a meeting to discuss outcomes of the heritage assessments and proposed management approach.
DCCEEW / Office of Water Science (OWS)	10 March 2022	Meeting	EPBC pre-referral meeting to discuss the groundwater model and surface water impact assessment components of the EPBC referral.
Heritage NSW	13 March 2022	Email	Confirmation of heritage assessment methods and proposed management approach.

Agency	Date	Activity	Details
DPE	27 June 2022	Meeting	Discussion regarding flexibility in mine design to allow for either mining area to extract the coal associated with LW9.
DPE	15 July 2022	Email	Confirmation of nominated assessment pathway.
DCCEEW	18 July 2022	Email	Correspondence regarding submission and subsequent receipt of the EPBC referral.
Department of Regional NSW – Mining, Exploration and Geosciences	1 September 2022	Meeting	Proposed mining lease application.
DCCEEW	14 September 2022	Email	Correspondence regarding EPBC referral process and timing of receipt of EPBC referral SEARs.
DPE	30 September 2022	Email	Receipt of EPBC supplementary SEARs.
Crown Lands	19 October 2022	Email	Update to Crown Lands on Modification Report and MLA.

5.3 Aboriginal Community Consultation

UCMPL has a well-established relationship with the local Aboriginal community through ongoing implementation of its existing Heritage Management Plan (HMP). For this Proposed Modification, whilst Aboriginal community consultation in relation to the Proposed Modification assessment could have occurred with the existing registered Aboriginal stakeholders for UCMPL, consistent with Section 3.1 (Aboriginal Community Involvement) of the HMP, UCMPL elected to implement a process of consultation with the Aboriginal community which enabled all interested Aboriginal parties to have the opportunity to be involved in the consultation process. The registration process was undertaken consistent with *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010c).

Ten organisations and individuals registered as Registered Aboriginal Parties (RAPs) for the Proposed Modification. Further discussion regarding the consultation process with the RAPs for the Proposed Modification is included in **Section 6.7**.

6.0 Assessment of Impacts

6.1 Preliminary Environmental Assessment

A preliminary environmental assessment was completed for the Proposed Modification to identify the environmental aspects that could potentially be impacted by the proposal, and which required further detailed assessment as part of this Modification Report. The findings of the preliminary environmental assessment are provided in **Table 6.1**.

Table 6.1 Preliminary Environmental Assessment Considerations

Aspect	Potential Impact	Further Assessment required?
Agriculture, soils and land capability	The approved mine plan and additional underground mining area are located within Class 5 and 6 lands. There is no BSAL located within the approved UCC mine plan or the additional underground mining area. Underground mining within the UCC is not anticipated to materially impact on the agricultural value of the land within the Proposed Modification area, however a land and soil capability impact assessment and agricultural impact assessment have been undertaken (refer to **Appendix 6**) to confirm impacts, as required by the Upper Hunter SRLUP (refer to **Section 4.2.3.1**).	Yes, refer to **Section 6.2**
Subsidence	The Proposed Modification will result in a change to the dimensions of the approved longwalls and subsequently, changes to the current predicted subsidence levels. A subsidence assessment has been undertaken for the Proposed Modification (refer to **Appendix 7**).	Yes, refer to **Section 6.3**
Groundwater	The Proposed Modification will include an extension of the currently approved underground mining area and hence has the potential to result in an increase to the groundwater impacts associated with the UCC. A detailed groundwater assessment has been undertaken for the Proposed Modification (refer to **Appendix 8**).	Yes, refer to **Section 6.4**
Surface water and water balance	The Proposed Modification will result in a change to the subsidence profile within the existing Ulan West and Ulan Underground mine plans, potentially affecting surface water flows. A surface water assessment and water balance have been prepared for the Proposed Modification (refer to **Appendix 9** and **Appendix 10**).	Yes, refer to **Section 6.5**
Biodiversity	The Proposed Modification includes underground mining in an additional area which has not been previously assessed for biodiversity values. Further, the proposed clearing of up to 27.4 hectares for associated supporting infrastructure will be required. A detailed assessment of biodiversity impacts has been undertaken for the Proposed Modification (refer to **Appendix 11**).	Yes, refer to **Section 6.6**

Aspect	Potential Impact	Further Assessment required?
Aboriginal cultural heritage	The Proposed Modification includes underground mining in an additional area which has not been previously assessed for Aboriginal cultural heritage values. Changes to the subsidence profile associated with the proposed mining changes may also result in changes to the predicted impacts to known sites. A detailed Aboriginal Cultural Heritage Assessment and separate assessment of Aboriginal cultural values have been undertaken for the Proposed Modification (refer to **Appendix 12**).	Yes, refer to **Section 6.7**
Historic heritage	The Proposed Modification includes underground mining in an additional area which has not been previously assessed for historic heritage values. An assessment of impacts to historic heritage is provided in **Section 6.8**.	Yes, refer to **Section 6.8**
Noise	There is limited potential for changes to noise impacts due to the proposed extension to underground mining operations, however the proposed construction of surface infrastructure and changes to locations of ventilation fans may cause noise impacts. A noise impact assessment has been undertaken for the Proposed Modification (refer to **Appendix 13**).	Yes, refer to **Section 6.9**
Blasting	There are no changes to blasting associated with the Proposed Modification.	No
Air quality	Potential air quality impacts may occur during the construction of surface infrastructure associated with the Proposed Modification. Changes to underground operations are not expected to result in additional air quality impacts. An air quality assessment has been undertaken for the Proposed Modification (refer to **Appendix 14**).	Yes, refer to **Section 6.10**
Greenhouse gas and energy	The Proposed Modification will add an additional two years to the current mine life and extract an additional approximately 25 Mt of product coal. A greenhouse gas and energy assessment has been undertaken for the Proposed Modification (refer to **Appendix 15**).	Yes, refer to **Section 6.11**
Visual	There is limited potential for visual impacts as the Proposed Modification primarily relates to changes to underground mining. Potential impacts to visual amenity will be limited to the presence of additional surface infrastructure, and are considered to be low given the location of the infrastructure relative to the surrounding areas.	Yes, refer to **Section 6.12**
Social	There are no proposed changes to workforce numbers or operating hours associated with the Proposed Modification, however, the life of the operation will increase by two years and there will be some changes to the operation and impacts on nearby private land holdings. A social impact assessment has been completed for the Proposed Modification (refer to **Appendix 16**).	Yes, refer to **Section 6.13**

Aspect	Potential Impact	Further Assessment required?
Economics	The scale and intensity of the Proposed Modification is consistent with the existing operations. The proposed extraction of an additional approximately 25 Mt of product coal will add two years to the mine life. An economic assessment has been undertaken for the Proposed Modification (refer to **Appendix 17**).	Yes, refer to **Section 6.14**
Traffic	Workforce numbers, operating hours, product volumes and transport methods and routes will remain consistent with currently approved operations, therefore traffic impacts associated with the Proposed Modification are expected to be unchanged. Traffic increases associated with the construction of surface infrastructure for the Proposed Modification will be minor and temporary. Traffic impacts associated with the additional two years of operations resulting from the Proposed Modification are expected to be consistent with the existing approved development and as such no further assessment of traffic impacts has been undertaken.	No

6.2 Agriculture, Soils and Land Capability

A Soils and Land Impact Assessment (SLIA) was prepared for the Proposed Modification by Minesoils Pty Ltd. This section contains an overview of the main findings. The full SLIA is included as **Appendix 6**, and provides further detail on:

- soils
- land capability
- recommendations to mitigate soil erosion and sedimentation associated with the Proposed Modification, and
- an Agricultural Impact Statement (AIS) to assess potential impacts to agricultural resources and industries.

6.2.1 Regional Mapping

6.2.1.1 Soil Landscapes

Soil landscapes within the UCC are mapped on the Soil Landscapes of the Dubbo 1:250,000 Sheet (Murphy and Lawrie, 1998) and include:

- Turill – comprised of earthy sands
- Ulan – comprised of yellow podzolics and soloths
- Goonoo – comprised of earthy/siliceous sands and earths
- Lees Pinch – comprised of shallow, sandy soils
- Munghorn Plateau – comprised of siliceous sands and shallow soils with some peat in depressions.

These soil landscapes generally have low to very low fertility, low to very low water holding capacity and more specifically, the Turill and Goonoo landscapes have a high to very high erosion hazard.

6.2.1.2 Land and Soil Capability Classes

The NSW regional maps of Land and Soil Capability (LSC) use the biophysical features of the land and soil to derive detailed ratings for a range of land and soil hazards. The LSC scheme consists of eight classes, which classify the land based on the severity of long-term limitations. Class 1 land has an extremely high capability for all rural land uses and land management practices, while Class 8 land is considered incapable of sustaining any land use apart from nature conservation.

Regional mapping indicates that the Proposed Modification occurs on areas of Class 5 and Class 6 lands, which have high to very high limitations for high impact land uses. According to the Land and Soil Capability Assessment Scheme (Second Approximation) (OEH, 2012) (LSC Guideline), careful management of limitations is required to prevent long-term and/or severe land and environmental degradation on land of these classes. Class 5 land is generally suitable for grazing with some limitations, or very occasional cultivation for pasture establishment. Class 6 land is suited to less productive grazing, forestry and nature conservation (OEH, 2012).

A detailed site-specific assessment of land and soil capability and potential impacts associated with the additional underground mining area is provided in **Section 6.2.3**.

6.2.2 Soil Survey Results

Minesoils undertook a fieldwork program to provide site-specific soil survey information to inform a more detailed land capability impact assessment for the Proposed Modification. Details of the survey program, sampling and analysis are provided in the SLIA in **Appendix 6**.

Soil survey results identified two dominant soil units and a minor soil unit within the additional underground mining area (refer to Figure 8 of **Appendix 6**), being:

- Sodosol/Chromosol Complex – consisting of clear or abrupt texture-contrast soils with varying degrees of sodicity in the subsoils. Typically, the more sodic soils were found in the lower parts of the landform such as the open drainage lines and flats. The Chromosol soils were typically associated with the mid and upper slopes. The soil unit included areas cleared for grazing, and areas of dense bushland.
- Tenosols – these were light textured, weak structured, uniform soils, with deeper profiles typically located on the lower landforms whilst shallow soils overlayed sandstone bedrock on upper slopes and crests.
- Dermosols – these soils were found in relation to two separate basalt intrusions which appear to have influenced the soil type in these small areas.

6.2.3 Land and Soil Capability Impact Assessment

The classification of LSC within the additional underground mining area was undertaken in accordance with the LSC Guideline. This scheme uses information on the biophysical features of the land and soil to assess eight hazards:

- water erosion
- wind erosion
- soil structure decline
- soil acidification
- salinity
- water logging
- shallow soils and rockiness
- mass movement.

Based on information obtained during the soil survey, 24 sites were assessed and classified into LSC classes, which ranged from Class 4 (moderately capable for a range of land uses but limited by soil structure and acidity and by the small scale of the area of this Class compared to surrounding poorer quality land) to Class 7 (rock outcrop areas). The LSC classes are shown in Figure 9 of **Appendix 6**.

The subsidence impacts detailed in the Subsidence Assessment (refer to **Section 6.3**) for the proposed longwall panels indicates the predicted subsidence ranges from 2.1 m over the shallower areas where overburden depth is 100 m, and 1.7 m for the deeper areas where overburden depth is 250 m. The impacts on LSC Classes 4 to 7 at these depths is considered very low. The ability for the land to continue to be used for grazing with appropriate management will remain throughout mining and post subsidence. It is predicted that minor repairs to surface infrastructure such as tracks, fencing and dams will be required, however this does not change the LSC classification.

The drainage lines located within the subsidence area are considered ephemeral and only flow following rainfall events before drying up. Whilst there are predicted to be impacts on ponding locations and speed of drying, as well as potential higher risk erosion sites due to the subsidence, the assessment found that these are not considered significant enough to impact the overall LSC categories for the subsidence impact zone.

The proposed surface infrastructure sites will require minor landform modification (leveling) and soil stripping, which will impact the LSC class for the proposed surface disturbance areas. The LSC classes within the proposed surface infrastructure areas that will be temporarily impacted currently consist of:

- 3.3 ha of LSC 4
- 28.3 ha of LSC 5
- 2.4 ha of LSC 7.

The LSC class within these minor areas will be considered LSC Class 8 which is not suitable for agriculture, due to mining related facilities being operational. Following the end of life for these facilities, decommissioning, demolition and removal will allow for the disturbance areas to be re-graded (if required) and stored topsoil to be replaced and rehabilitated with either native vegetation or improved pastures depending on the surrounding land use. Therefore, the long term LSC post-decommissioning of surface infrastructure is expected to be unchanged from the pre-mining LSC class.

6.2.4 Soil Management

Based on the assessment of the existing site conditions, UCMPL has committed to the following management and mitigation strategies to reduce the potential for degradation of soils within the proposed surface infrastructure disturbance areas:

- Areas for long-term soil stockpiles will be planned and designated adjacent to the disturbance area or within a short haul distance for rehabilitation at a later date and will not be placed near drainage lines.
- Material will be stripped to the depths required for engineered stability of surface infrastructure, separating topsoil (generally up to 0.2 m) and subsoil, subject to any further field investigations during construction activities. Soil will preferably be stripped in a slightly moist condition, and not in either excessively dry or wet conditions. Whilst construction schedules dictate stripping times, consideration will be given to near term weather forecasts.
- Treatment options for the amelioration of sodic soils will include the application of gypsum, lime or organic matter, or a combination of these materials.
- The surface of long-term soil stockpiles will be slightly roughened to promote infiltration and minimise erosion until vegetation is established.
- Where possible, stockpiles will have a maximum height of 3 m. Clayey soils will be stored in lower stockpiles for shorter periods of time compared to coarser textured sandy soils.
- Stockpiles will be seeded and fertilised as soon as possible using an annual cover crop.
- An inventory of available soil will be maintained to ensure adequate topsoil materials are available for planned rehabilitation activities.
- Thorough seedbed preparation will be undertaken to ensure optimum establishment and growth of vegetation.

Predicated surface disturbances in subsidence areas are considered minor and easily reparable in the context of impacts on soils and land capability, and within the scope of impacts seen in previous subsidence areas at UCC. There are no necessary land or soil preparations required prior to subsidence, however, regular monitoring of active subsidence areas will be undertaken in line with current practices. Repairs to surface cracks that interrupt drainage flow and risk accelerating erosion will be addressed as a high priority.

6.2.5 Agricultural Impact Assessment

An AIS was prepared by Minesoils in accordance with the SRLUP (NSW Department of Trade, Investment, Regional Infrastructure and Services, 2012) and in consideration of the agricultural impact risk ranking methodology outlined in the *Agricultural Impact Statement Technical Notes* (NSW Department of Primary Industries, 2013).

The AIS identified a number of potential risks to agricultural production associated with the Proposed Modification and assessed the level of risk associated with each, with outcomes presented in **Table 6.2**.

Table 6.2 Agricultural Risk Ranking Matrix

Potential Risk	Control Measures	Risk Assessment
Decreased productivity of agricultural land	• Monitoring of active operations and resulting subsidence and Trigger Action Response Plans (TARPs) in place. • The proposed activities are not located on or near strategic agricultural land. • Rehabilitation of subsidence impacted areas to a condition consistent with pre-disturbance land uses. • Water make up agreements and management plan triggered if impacts experienced (refer to **Section 6.4** and **Section 6.5**).	Low
Changes to potential agricultural land uses	• Rehabilitation of subsidence impacted areas to a condition consistent with pre-disturbance land uses. • Majority of soil and land characteristics will remain unchanged following subsidence.	Low
Groundwater drawdown potential	• Water will be sourced directly from the existing licensed water supply sources at the UCC. • Water make up agreements and management plan triggered if impacts experienced.	Low
Contamination of water and land resources	• Erosion and sediment control with micro rehabilitation of subsidence impacted areas to a pre mining condition and surface water runoff direction/ catchment flow consistent with pre-disturbance landform. • Environmental monitoring program already exists at UCC including TARPs. • Modelling of impacts consistent with those previously experienced on site.	Low
Dust generation	• Enforcement of speed limits on all access tracks to reduce the dust generated. • Rehabilitation of disturbed areas to a condition consistent with pre-disturbance land uses. • Environmental monitoring for air quality currently in place at UCC.	Low

Potential Risk	Control Measures	Risk Assessment
Land compaction	• Use of existing access tracks where possible and using shortest practicable route to minimise environmental impacts for new access tracks. • Not expected to occur as modelling indicates consistent impacts as previously experienced on site at UCC.	Low
Noise generation	• UCMPL will regularly consult with landholders and lessees throughout the duration of operations at the UCC. • Environmental monitoring for noise currently in place at UCC.	Low
Spread of weeds	• Use of existing access tracks where practicable. • Before being used on-site, all machinery will be inspected and cleaned where required to minimise the spread of weeds.	Low
Limited success of rehabilitation	• Monitoring and prioritised response times for subsidence rehabilitation where surface water is expected to be impacted. • Monitoring and prioritised response times for subsidence rehabilitation where agricultural infrastructure such as fencing or roadways are impacted.	Low

Based on the risk assessment results, the AIS concluded that the Proposed Modification would have a low risk of impact to agricultural resources. Furthermore, the Proposed Modification is not anticipated to have any impact on existing agricultural enterprises conducted within the Project Area or the surrounding locality. As such, the AIS concludes that impacts to agricultural enterprises in the locality and the region would also be insignificant.

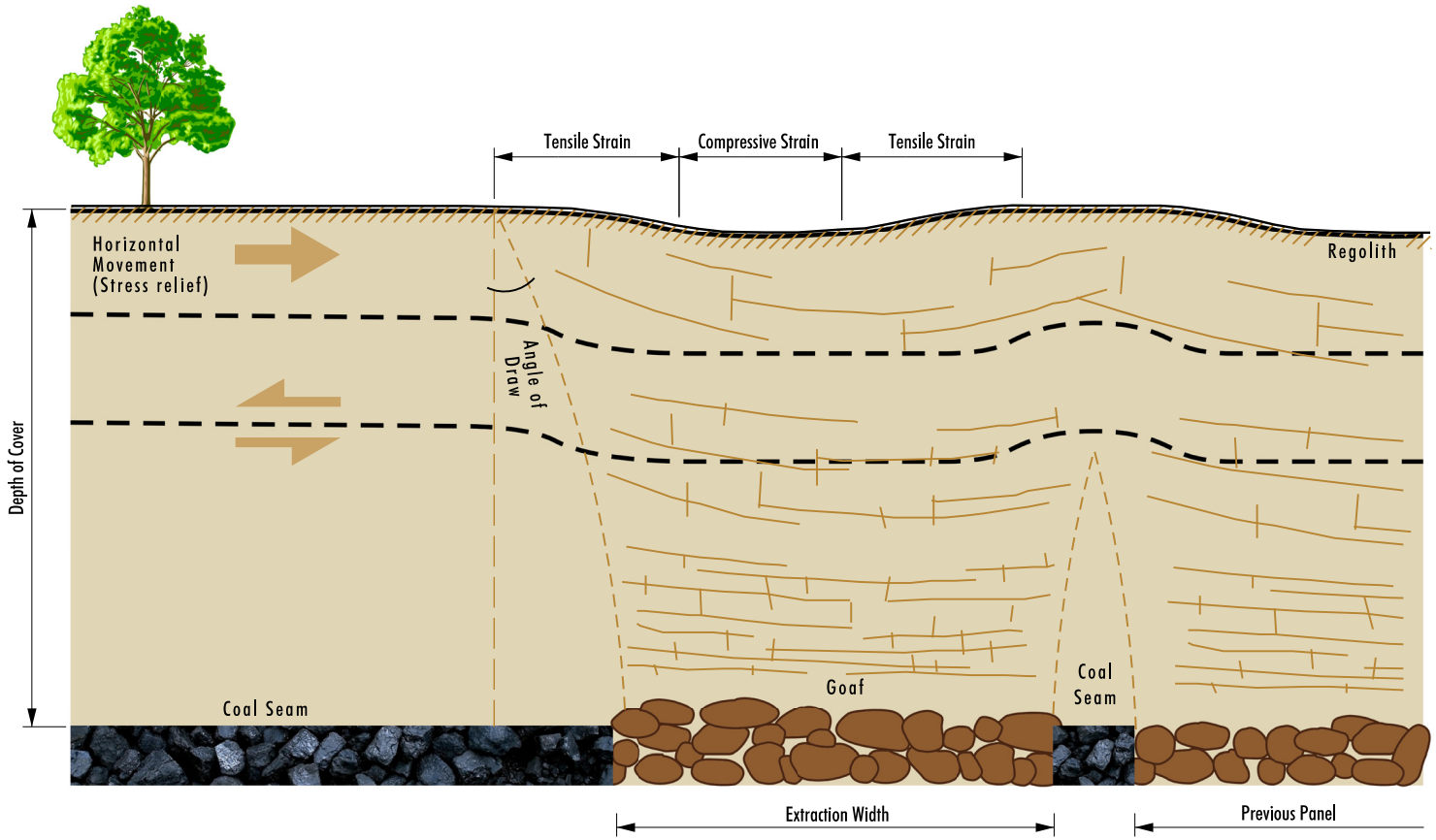
6.3 Subsidence

SCT Operations Pty Ltd (SCT) has undertaken an assessment of the potential subsidence impacts of the Proposed Modification compared to the subsidence impact predictions for the approved operations. The Subsidence Assessment is provided in **Appendix 7** while this section provides an overview of the main findings.

6.3.1 Subsidence Processes

Longwall mining is a form of underground coal mining where coal is removed from a selected mining horizon within the coal seam. Longwall panels are mined sequentially with adjacent panels separated by a barrier of coal that is permanently left behind called chain pillars.

As longwall mining progresses underground the area behind the mining face, i.e. the goaf, increases. The roof behind the face is allowed to collapse into the void created by the mining equipment extracting the coal causing the overlying rock to fracture and settle, i.e. subside. This settlement progresses up through the overlying strata resulting in subsidence of the ground surface immediately above and surrounding the longwall panels (refer to **Figure 6.1**).



Cross-section of Subsidence Profile
(Not to Scale)

FIGURE 6.1

Typical Subsidence Profile

Note: Not to Scale
Source: SCT Operation PTY Limited, 2009
File Name (A4): R03/20020_142.dgn

6.3.2 Subsidence Prediction Methodology

The approach to estimating the subsidence effects of the Proposed Modification was based on a review of previous site experience over more than 40 longwall panels at the UCC. This method is an empirical approach suitable for providing a reasonable estimate of the upper limit of key subsidence parameters.

The estimates incorporate improved understanding of subsidence behaviour based on the monitoring conducted since the original UCCO Project assessment was prepared. Recognition of natural variation is also considered.

Although actual vertical subsidence is expected to be generally less than the upper limits, upper limit estimates of subsidence movements are considered appropriate to use for impact assessment purposes.

6.3.3 Subsidence Predictions

Estimates of conventional subsidence effects for the additional underground mining areas are consistent with the range of values previously forecast at similar overburden depths for the approved operations and subsidence management or extraction plan assessments at the UCC.

The area predicted to be affected by subsidence due to the Proposed Modification is shown in **Figure 6.2**. The subsidence affectation area is bounded by the angle of draw that has been determined to capture all conventional subsidence impacts (i.e. the angle of the line connecting the edge of the goaf and the limit of subsidence at the surface). The primary subsidence parameters for conventional subsidence behaviour over the Proposed Modification longwall extension areas are listed in **Table 6.3**. The overburden depth varies from approximately 130 m to 250 m for the proposed additional underground mining area. **Table 6.3** details the range in overburden depth for the proposed additional underground mining area.

Table 6.3 Estimated Primary Subsidence Parameters

Subsidence Parameters	Overburden Depth	
	130 m	250 m
Vertical subsidence (m)	2.1	1.7
Tilt (mm/m)	85	40
Compression strain (mm/m)	35	20
Tensile strain (mm/m)	25	15

It is recognised that unconventional subsidence movements associated with steps, compression overrides or ripples and valley closure may locally exceed the values presented in **Table 6.3**. These phenomena are generally localised and can be easily identified. The impacts of any locally higher values of tilt and strain associated with these phenomena are not expected to be particularly significant in the proposed underground mining area associated with the Proposed Modification.

Estimates of conventional subsidence effects for the additional underground mining areas are consistent with the range of values previously forecast and experienced at similar overburden depths for the approved operations. Over most of the Proposed Modification extension areas, vertical subsidence is expected to be less than about 1.8 m for a 3.0 m mining height, with maximum subsidence typically in the range of 1.3 to 1.7 m.

Maximum vertical subsidence of up to 2.1 m is forecast for the shallowest areas of the proposed additional underground mining area. The shallowest areas are located above the northern ends of Longwall 11A and 12A.

Maximum vertical subsidence of up to 1.9 m is forecast for the Mona Creek valley above Longwalls W9 to W11, where the overburden thickness is approximately 145 m and includes up to 20 m of alluvium/ colluvium at the surface along this fourth order section of Mona Creek.

The approach to estimating subsidence effects used in this assessment is based on a review of previous experience over more than 40 longwall panels at the UCC. Measured subsidence at the UCC has generally been within predicted subsidence levels providing a high level of confidence in the subsidence predictions for the additional underground mining area. Although actual vertical subsidence is expected to be generally less than the upper limit estimates of subsidence movements, these upper estimates are considered appropriate to use for assessment purposes. As an example, **Table 6.4** shows that primary subsidence parameters measured over Longwall 6 at Ulan West and over Longwall W6 at Ulan Underground during 2021 are all less than the maximum forecast in the Extraction Plans.

Table 6.4 Summary of Subsidence Impacts, 2021 Reporting Period

Subsidence Parameters	Ulan West (D Line)		Ulan Underground (H Line)	
	Measured	Forecast	Measured	Forecast
Vertical subsidence (m)	1.29	1.6	1.30	1.7
Tilt (mm/m)	21	40	11	50
Compression strain (mm/m)	4	20	3	20
Tensile strain (mm/m)	9	15	4	15

Subsidence over each panel is likely to be substantially complete once the panel has been mined, however additional vertical subsidence of up to a few hundred millimetres is expected when the adjacent longwall panel is mined, mainly close to the inter-panel chain pillars.

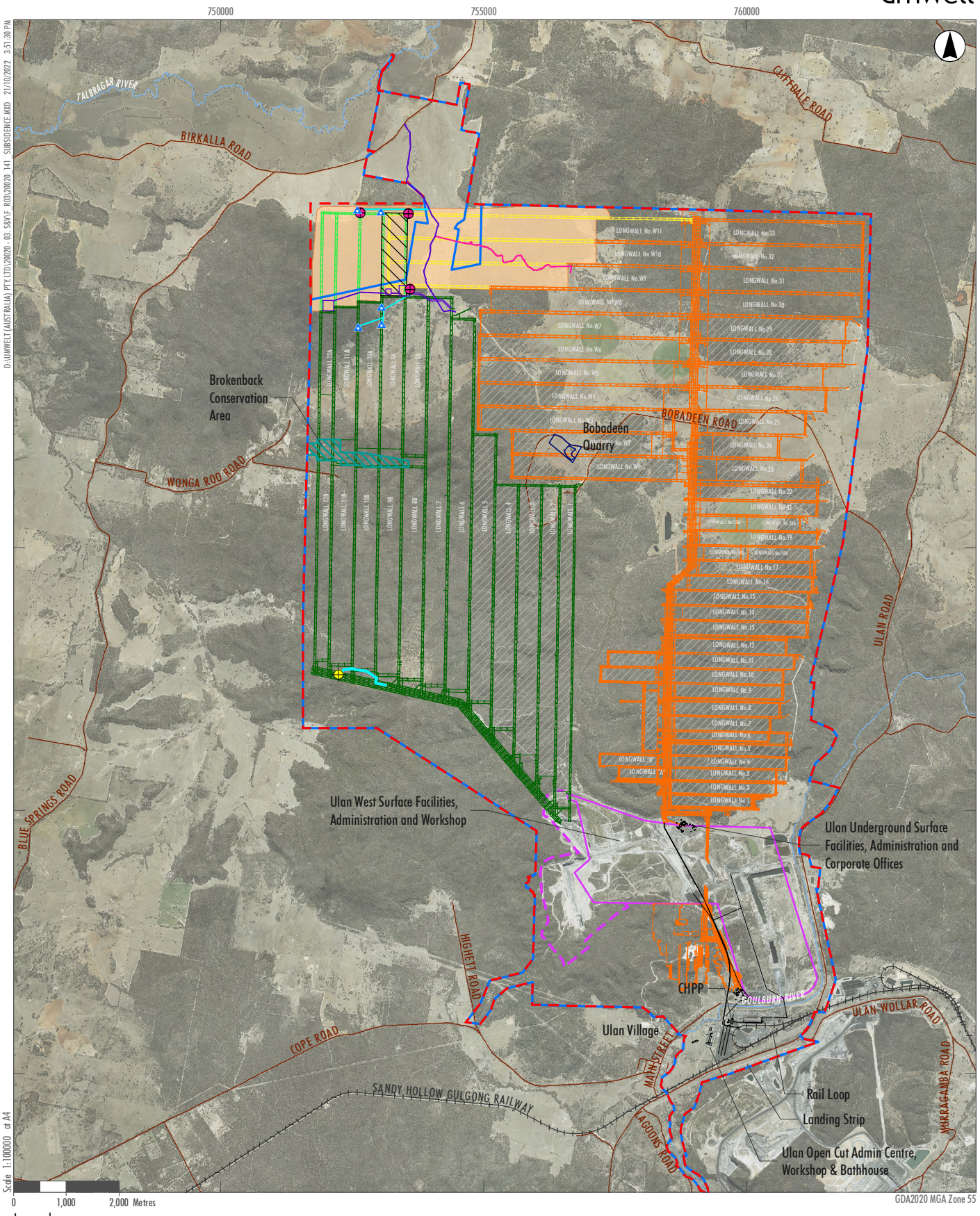
6.3.4 Subsidence Impact Assessment

Subsidence impact assessment involves using the subsidence predictions to forecast the level of impact on natural and human-made surface features within the subsidence affectation area. A comprehensive review of all relevant natural features, archaeological sites and items of surface infrastructure potentially impacted by subsidence has been completed with detailed subsidence predictions and impact assessment provided for each aspect (refer to **Appendix 7**).

The majority of the surface within the additional longwall mining area is freehold land owned by UCMPL or Crown Land licensed by UCMPL. The remainder is Crown Land, privately licensed Crown Land or private property. There are no significant surface improvements proposed on the areas of private property. The majority of the surface is undeveloped bushland with small areas of cleared or semi-cleared land suitable for grazing. Most of the cleared or semi-cleared areas are on land owned by UCMPL.

Impacts to the areas of land not owned or licensed by UCMPL above the Proposed Modification extension areas, are expected to be minor and generally imperceptible. Any impacts to natural or built surface and sub-surface features on privately owned or privately licensed Crown Land, are expected to be minor and manageable via provisions in subsidence management plans for private property, public safety, built features and water. Private Property Subsidence Management Plans (PPSMP) for each individual private property are required to be developed through consultation and agreement with the affected landholders. In addition landowners have an ability to claim compensation in relation to subsidence under the *Coal Mine Subsidence Compensation Act 2017* (NSW). Under section 12 of that Act the proprietor of an active coal mine is required to determine claims for compensation arising from their mining activities.

Overall subsidence impacts are expected to be consistent with or less than the predictions for the approved operations, subsidence performance measures outlined in PA 08_0184, and the monitoring experience since PA 08_0184 was granted regardless of the mine plan option. **Table 6.5** below summarises the subsidence performance measures for the approved operation, as outlined in Table 14 of Section 24 from Schedule 3 of PA 08_0184, and the expected compliance from the Proposed Modification should these performance measures be applied to the Proposed Modification.



Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Brokenback Conservation Area
- Bobadeen Quarry
- Roads
- Railway
- Major Watercourses
- Approved Ulan Underground Mine Plan
- Approved Ulan West Mine Plan
- Previously Mined
- Previous Ulan Open Cut Area
- Approved Ulan Open Cut Extension
- Longwall Option Area
- Approved Infrastructure related to Mod 6
- Proposed Borehole
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Access Track Corridor
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- Subsidence Affectation Area

FIGURE 6.2

Predicted Subsidence Affectation Area

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)

Table 6.5 PA 08_0184 Subsidence Performance Measures

Existing Subsidence Performance Measure		Status of Compliance for Proposed Modification
Water		
Ulan, Mona and Cockabutta Creeks	No greater environmental consequences than predicted in the EA	Compliance expected. Proposed mining is not within the Ulan and Cockabutta Creek catchments. No change to forecast of impacts or consequences for Mona Creek expected from additional underground mining associated with the Proposed Modification.
Biodiversity		
Threatened species, populations, habitat or ecological communities	Negligible impact	Compliance expected. No change to forecast of maximum effects or impacts expected from additional underground mining associated with the Proposed Modification.
Land		
Cliffs in the Brokenback Conservation Area (BBCA)	Nil environmental consequences	Compliance expected. Proposed Modification maintains the BBCA. No change to forecast of impacts or environmental consequences to BBCA expected from additional underground mining associated with the Proposed Modification.
Other Cliffs	Minor environmental consequences	Compliance expected. No change to forecast of impacts or consequences expected from additional underground mining associated with the Proposed Modification.
Heritage		
Aboriginal Sites	Nil impact in the BBCA, Grinding Groove Conservation Areas; or on Mona Creek Rock Shelter sites	Compliance expected. No change to forecast of maximum effects or impacts expected sites within the approved mining areas from additional underground mining associated with the Proposed Modification. No change to BBCA as a result of the Proposed Modification. Mining remote from Grinding Groove Conservation Areas and Mona Creek Rock Shelter sites so no impact expected.
Talbragar Fish Fossil Reserve	Negligible impact	Compliance expected. No impact expected from the Proposed Modification as the reserve is not located in the additional underground mining area. No change to forecast of maximum effects or impacts expected from additional underground mining associated with the Proposed Modification.

Existing Subsidence Performance Measure		Status of Compliance for Proposed Modification
Other Heritage Sites	No greater impact than predicted in EA	Compliance expected. No change to forecast of maximum effects or impacts expected from additional underground mining associated with the Proposed Modification on previously approved sites. Additional sites will be impacted due to the Proposed Modification (refer to **Section 6.7**).
Built Features		
All built features	Safe, serviceable and repairable unless the owner agrees otherwise in writing	Compliance expected. Impacts managed via provisions of Built Features Management Plan (BFMP) and, following development of PPSMP in consultation with the landholder.
Public Safety		
Public Safety	No additional risk due to mining	Compliance expected. Impacts managed via Public Safety Management Plan (PSMP) and PPSMP.

6.3.5 Monitoring and Management

UCMPL currently operates in accordance with approved Extraction Plans which prescribe the monitoring and management measures to be implemented for each longwall area. Longwall extraction in the additional mining area will be undertaken in accordance with an approved Extraction Plan as required by PA 08_0184.

Ongoing subsidence monitoring in a similar manner to the standards detailed in the existing subsidence monitoring programs required by the current Extraction Plans will be undertaken, including before, during and after mining survey of monitoring lines and surface and landscape feature visual monitoring inspections.

As per the UCCO Project, a Private Property Subsidence Management Plan will be prepared for the additional private landholding in the additional underground mining area and in consultation with the landowner. The plan will include requirements for:

- assessing private infrastructure and land prior to mining to establish baseline condition
- notifying landowners of the advance mining schedule for each longwall
- providing landowners with revised subsidence predictions, based on a comparison of actual versus predicted subsidence levels
- a monitoring program for assessment of subsidence impacts
- a schedule for repair works to private infrastructure, if required
- provision for compensation to the landowner, if required.

The Subsidence Assessment concluded that additional subsidence monitoring lines are not required for the Proposed Modification, unless the previously recommended new cross-panel subsidence monitoring line for LW7 to LW12 at Ulan West Underground is not able to be established and monitored through agreement with the private property landholder. If agreement for this additional line is not able to be reached, then the Subsidence Assessment recommends a new east-west line over the centre of the proposed extension areas of Longwall W9 (or W10) and across Longwalls 9A-12A through the undeveloped native vegetation environment on UCML and Crown Land.

6.4 Groundwater

A detailed Groundwater Impact Assessment (GIA) was undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) to identify and assess the impacts of the Proposed Modification on the groundwater regime and identified water-dependent assets. The report is included as **Appendix 8**, with a summary of the key assessment findings included below. Additional information relating to specific matters raised by the Commonwealth DCCEEW in relation to MNES are addressed in an additional report provided by AGE, which is also included in **Appendix 8**.

Assessment was undertaken with reference to the WM Act and associated Water Sharing Plans (WSPs), NSW Aquifer Interference Policy (AIP) (2012), SRLUP (2012), POEO Act and the EPBC Act and guidelines. The GIA expands upon previous groundwater assessments undertaken in 2016 and 2018, with a sound understanding of the local groundwater regime and mining impacts existing with the long history of mining and groundwater investigations at the site.

6.4.1 Groundwater Resources

There are three primary groundwater units across the Project Area:

- Unconsolidated alluvial sediments occurring along the creek lines associated with tributaries of the Talbragar and Goulburn Rivers. The tributary of most relevance to the Proposed Modification is Mona Creek, an ephemeral creek system which is part of the Talbragar River system. While broad scale geological mapping identifies the Mona Creek floodplain as dominated by alluvial sediments, recent detailed characterisation work undertaken for the Proposed Modification has identified that these sediments are colluvial in nature. The limited permeability and porosity within the Mona Creek valley sediments means the material readily absorbs rainfall, resulting in perched groundwater systems forming on top of the underlying lower permeability bedrock. The silt and clay bound nature of the Mona Creek valley sediments means the perched groundwater systems are ephemeral and slowly drain into the underlying bedrock and downgradient to the north over time. Any areas of cleaner sand and gravel are not well connected which serves to slow the movement of groundwater.

- Shallow regolith and near surface weathered rock profiles which can host unconfined groundwater during extended wet periods when the recharge rate exceeds the rate of downward or lateral flow.

- Triassic, Jurassic and Permian sedimentary bedrock formations which contain the coal seams targeted by mining. The Ulan Seam is identified as the main water bearing zone within the Permian strata as the nature of the coal allows the horizontal movement of water more freely than the other Permian units. The Triassic and Jurassic sandstones overlying the Permian coal measures are more porous and permeable.

Salinity is the key restriction on beneficial use of groundwater at the UCC, as it falls between the brackish and moderately saline classifications. Much of it is unsuitable for sensitive uses such as human consumption and irrigation without additional treatment, although may be tolerated by stock or used to irrigate salt-tolerant crops.

6.4.2 Groundwater Modelling

A three-dimensional numerical groundwater flow model was developed using the MODFLOW-USG software to assess the impacts the Proposed Modification. The model was based on previous models developed at UCC, but updated for the Proposed Modification. The updated model was also extended spatially by 25 km to the north and the east, to provide improved coverage to assess the Proposed Modification.

The objectives of the modelling were to:

- predict groundwater inflow into the underground mine based on the approved mine plan
- simulate and predict the extent and area of influence of mining on the water table and deeper groundwater pressures
- predict the loss and/or water take from the water bearing units on site for licensing estimates, including losses to baseflow.

The groundwater model, including the calibration and sensitivity analysis was peer-reviewed by EMM Consulting (EMM). The peer review indicates that '*the final groundwater impact assessment and supporting numerical groundwater flow modelling are broadly fit for purpose and meet the requirements of the NSW and Commonwealth Governments*' (refer to **Appendix 8**).

6.4.3 Impact Assessment

The WM Act and the AIP require all groundwater taken (either directly from the Permian groundwater system or indirectly from the Quaternary alluvium and rivers due to depressurisation of the underlying system) to be accounted for by Water Access Licences (WALs). Groundwater intercepted from the mining area is considered a direct take (or incidental take) from the Permian groundwater system, whilst the changes in flow occurring within the Quaternary alluvium and rivers resulting from depressurisation of the underlying Permian is considered an indirect or passive take of water.

The groundwater model was used to estimate the take from the water sources associated with the various Water Sharing Plans (WSPs) covering the UCC area.

The predicted impacts of the Proposed Modification on groundwater are described below.

Water Licensing

Peak simulated inflows from the North Coast Fractured and Porous Rock – Sydney Basin – North Coast Groundwater Source with the Proposed Modification remain the same as the approved historical peak for UCC, for which UCMPL/Glencore has sufficient licensing capacity across its operations.

Peak simulated inflows from the NSW Murray-Darling Basin Porous Rock Groundwater Source with the Proposed Modification will increase by 2,735 ML/year to a peak of 8,339 ML/year in 2026/27 and then reduce as the Ulan Seam becomes increasingly unsaturated at the end of mining and the groundwater system reaches a new equilibrium. UCMPL currently holds licences for 6,950 units of water allocation in this source. If the ML/unit share in that water source decreases below 1.2 ahead of 2026/27 (currently 1.25 ML/unit), UCMPL will need to acquire licence allocation in the NSW Murray Darling Porous Rock – Sydney Basin MDB Groundwater Source to support the extraction associated with the Proposed Modification.

Predicted peak indirect takes from the Jurassic sediments (Oxley Basin) with the Proposed Modification increase by less than 1 ML/year above approved peaks. The 2021 upgrade of the groundwater model included additional layers that made prediction of inflows from the Jurassic sediments possible.

The peak take for the Talbragar alluvial groundwater source with the Proposed Modification is 2.45 ML/year at the completion of mining (in comparison to the approved mining peak of 2.33 ML/year). This is predicted to increase to a peak take of 13.86 ML/year post-mining before reducing to a long term gain of 4.4 ML/year. UCMPL holds sufficient allocation in the Macquarie Bogan Unregulated Rivers Water Sources 2012 – Upper Talbragar River Water Source to account for the predicted baseflow reduction. Likewise, the predicted peak take from the Macquarie Castlereagh Groundwater Sources Order 2020 – Talbragar Alluvial Groundwater Source will be covered by the current entitlement held by UCMPL. The passive take occurs over a large area and thus impacts on baseflows or changes to the persistence of pools are unlikely to be observable.

Predicted peak indirect take from the Upper Goulburn River water source with the Proposed Modification remains the same as the approved mining peak for UCC at 122.6 ML/year. Post mining the take from the Upper Goulburn water source is predicted to decrease to 86.97 ML/year due to continued propagation of drawdown as mine workings and the fracture zone rewet. Further into the future, an increase in baseflow over the pre mining conditions for the Upper Goulburn water source of 133 ML/year is predicted to occur. UCMPL currently holds adequate entitlement in this water source for predicted take.

Water supply bores

Predicted impacts to private water supply bores as a result of the Proposed Modification are minor incremental changes to two of the seven bores that are already impacted by the approved operations. The increase in drawdown resulting from the Proposed Modification ranges from 0.01 m to 0.18 m.

Post mining there are an additional 11 private bores that are predicted to be impacted by 2 or more metres due to the combined UCC operations, however, all impacted bores are predicted to recover higher than the pre-mining water levels into the future.

Annual voluntary monitoring of groundwater levels and water quality for privately owned bores is undertaken for potentially impacted private bores. Where drawdown at private bores is greater than 2 m, 'make good' measures apply under the existing conditions of consent where UCMPL refurbishes the bore to address the supply change, or provides an alternative water supply.

Baseflow impacts

Modelling of the Proposed Modification predicts the peak impact on the baseflow for the Talbragar River system (and its tributaries) is a 7.6% increase (approximately 2.2 ML/year or 0.006 ML/day) in intercepted baseflow over the approved level. The total baseflow for the Talbragar River and its tributaries is predicted to be over 3,726 ML/year (10.2 ML/day), making the predicted impact from Proposed Modification comparatively small to imperceptible (0.06% of baseflow).

The Goulburn River system is not expected to be impacted by the Proposed Modification given its location, and no impacts on baseflows in this system are predicted.

Groundwater quality

The alluvium, regolith and Triassic overburden are the primary source of recharge waters to the deeper Permian coal measure sequences at the UCC. In the longer term and on cessation of mining, groundwater will continue to migrate downwards through the subsidence zone to the goaf zone and mined area. This influx of relatively low salinity water will gradually flood and fill the mined workings. As there are no open cut voids associated with the Proposed Modification there will be no evaporative concentration of salts in groundwaters stored within the underground workings and therefore there is no mechanism for significant changes to groundwater salinity due to mining.

The groundwater assessment found that there is no permanent flow of groundwater into Mona Creek that occurs within the Proposed Modification area and therefore no mechanism for groundwater changes to impact upon surface water quality or shallow groundwater quality. The Proposed Modification relates to an underground mine with no significant excavation and therefore no exposure of acid-generating materials and no mechanism for the release of heavy metals. Organic chemicals will be used in the Proposed Modification, but these are common fuels, oils and greases which are typically biodegradable and not persistent. Therefore, the groundwater assessment concluded that the available information indicates the nature of the Proposed Modification means the potential for a significant impact on groundwater quality is very low.

Groundwater Dependent Ecosystems

No high priority Groundwater Dependent Ecosystems (GDEs) have been identified in WSPs covering the UCC. Riparian vegetation present in areas of UCC is not anticipated to be impacted by the Proposed Modification. The only creek system potentially impacted by the Proposed Modification is Mona Creek where riparian vegetation has largely been cleared for agricultural purposes in the areas where longwall panels are proposed. Cockabutta Creek will not be impacted by the Proposed Modification and baseflow impacts to the Talbragar River are unlikely to be observable.

'The Drip' is a natural feature that hosts a localised GDE on a sandstone cliff face approximately 2 km east of the UCC longwall footprint and 10 km from the Proposed Modification, on the opposite side of UCC. The GWIA discusses that it appears that the Drip may be formed by perched localised groundwater discharge that is sustained by rainfall recharge to the Triassic Quartzose sandstone units that overly the Illawarra Coal Measures. Depressurisation of the Triassic strata has already occurred at UCC due to mining, however monitoring data collected in accordance with PA 08_0184 indicates that the aquifer system associated with The Drip is generally isolated from the broader Triassic layers (AGE, 2019). Numerical modelling undertaken for the Proposed Modification also supports this and indicates that The Drip will not be impacted by the Proposed Modification as it is disconnected from the regional groundwater and exists as a perched recharge fed spring system.

Cumulative impacts

Modelling shows that the Proposed Modification has minimal additional impacts to those of the approved operation at the UCC and there is minimal interaction with neighbouring Moolarben Coal mine, hence there is no potential for significant cumulative groundwater impacts.

6.4.4 Monitoring and Management

UCMPL currently operates the UCC under the approved Water Management Plan (WMP) (2021), which describes the management of environmental and community aspects, impacts and performance relevant to the site's water management system. The WMP includes a detailed Groundwater Management Plan (GWMP) (2019) which outlines a monitoring program to collect data on groundwater levels and quality to allow actual impacts to the local groundwater system to be compared to the predictions of previous environmental assessments. Monitoring piezometers are located both within and outside the approved mining boundary and previously mined areas to address the following elements of both the alluvial and hardrock/coal aquifers:

- groundwater inflows to open cut pit and underground mine workings
- groundwater levels and groundwater quality
- seepage/leachate from the mine water management system
- baseflows in watercourses
- monitoring of 'The Drip'.

In addition to the groundwater monitoring network, annual voluntary monitoring of groundwater levels and water quality for privately-owned bores within the area is undertaken. This monitoring program extends to approximately 12 km away from the approved mine footprint.

If an exceedance of any groundwater impact assessment criteria is identified, then the Surface Water and Groundwater Response Plan (SWGWRP) is activated to provide appropriate TARPs. The SWGWRP provides response protocols for the following events:

- impact assessment criteria (trigger level) exceedance
- Environment Protection Licence (EPL 394) criteria exceedance (non-compliance)
- surface water and groundwater impacts on adjacent private landowners
- variations from the predictions made in the groundwater model
- potential impacts on GDEs
- unauthorised off-site discharges
- environmental incident i.e. unforeseen hazard, unplanned event or unauthorised discharge
- community complaints (relating to surface water and groundwater)
- potential make good provision.

The existing WMP will be updated to accommodate the Proposed Modification and will continue to be implemented.

6.5 Surface Water

A Surface Water Impact Assessment was prepared by Engeny Water Management (Engeny) to assess the potential surface water impacts of the Proposed Modification. The full report is contained in **Appendix 9** and the assessment and key findings are summarised in this section.

A water balance assessment was also undertaken for the Proposed Modification to assess the potential impact of the Proposed Modification on water make and water demand. The full report is provided in **Appendix 10** and a summary of key findings is provided in **Section 6.5.4**.

6.5.1 Regulatory Context

The UCC operational area exists within a well-regulated water resource management system that has been designed to provide for the sustainable management of the State's water resources. This includes licensing of allowable water take with consideration of environmental flow requirements of watercourses and the needs of other water users; control of water pollution, including management of sustainable salt loads associated with all water sources, including mine water discharges; and guidelines that govern the appropriate design of water management systems for mines to provide for appropriate water quality in accordance with EPL requirements.

The key Act that provides the regulatory framework for water management in NSW is the Water Management (WM) Act. The POEO Act is the key piece of environment protection legislation that regulates pollution control (including water pollution) in NSW.

The Proposed Modification was also assessed against the relevant requirements of the following water planning policies, plans and legislation:

- Water Reporting Requirements for Mines (NSW Office of Water (NOW), 2009).
- Guidelines for Management of Stream/Aquifer Systems in Coal Mining Developments – Hunter Region (Department of Water and Energy (DWE), undated).
- River Hydrology and Energy Relationships – Design Notes for the Mining Industry (DWE, 2007).
- EPBC Act.
- Significant Impact Guidelines 1.3: Coal Seam Gas and Large Coal Mining Developments – Impacts on Water Resources (Commonwealth of Australia, 2013).

6.5.2 Surface Water Context

The UCC is located within the headwaters of both the Goulburn River system and the Talbragar River system (refer to Figure 3.1 of **Appendix 9**). The catchments for these river systems are separated by the Great Dividing Range, with the Goulburn River system draining east into the Hunter River catchment, and the Talbragar River system draining west to the Macquarie River catchment and eventually into the Murray-Darling River System. All the tributaries in the approved mining areas draining to the Goulburn River and Talbragar River are ephemeral by nature.

The additional underground mining area lies within the Mona Creek catchment. Mona Creek is part of the Talbragar River system and mostly farmland. The beds and banks of the creek are in generally good condition with some isolated areas of erosion, despite including soils typically associated with high erosion hazard.

The regions downstream of the UCC are primarily forested within the Goulburn River catchment but also include irrigated pasture/fodder crops within the Talbragar River catchment. Irrigation water along the Talbragar River is primarily sourced from the river, when flowing, and alluvial systems. No private landholders have been identified using the surface waters of Mona Creek within or downstream of the area of additional underground mining associated with the Proposed Modification, except for stock access via basic landholder rights.

The water management system at the UCC consists of clean water (i.e. water from undisturbed and/or rehabilitated areas), dirty water (i.e. water from active overburden emplacement areas or areas which are partially rehabilitated) and mine water (i.e. water from coal stockpiles areas, water from mining areas etc.) systems. The infrastructure associated with these systems includes:

- mine dewatering systems
- water storages
- the Bobadeen Irrigation Scheme (BIS)
- water treatment facilities
- sedimentation and retention basins
- settling and tailings ponds
- clean water diversion drains and dirty water catch drains
- levee banks and earth bunding around stockpiles
- hardstand areas
- re-fuelling areas.

The mining operations are dewatered by pumping mine water to the surface, where it is stored in either Bobadeen Dam (in the north) or the East Pit (in the south). Surface runoff water from operational areas, plus surplus water from various site process (e.g. from CHPP) are also directed into the East Pit.

The water is then processed through Water Treatment Facilities, comprising various filtration technologies (microfiltration, ultra-filtration and reverse osmosis), to produce a supply of clean, relatively low salinity water.

This clean water is then blended with raw water sources (as required) to produce blended water products of different qualities suitable for various applications including:

- discharge to Ulan Creek/Goulburn River
- irrigation through the BIS
- process water supply to site and to the CHPP
- dust suppression on haul roads and other operational areas
- water sharing with Moolarben Coal Operations.

The quality of the various water storages is controlled to meet the quality requirements (both licence and operational) for each particular application. Full details of the UCC water management system are outlined in the Water Management Plan (Glencore, 2021).

6.5.3 Impact Assessment

The predicted impacts of the Proposed Modification on surface water are described below.

Catchment areas

A review of the catchment boundaries was undertaken using the predicted subsidence contours. No measurable changes to catchment boundaries were identified as a result of predicted subsidence.

Flow regimes

Flow regimes in the river and creek systems which are expected to be impacted by the Proposed Modification were modelled to assess the impact of any potential reduction in baseflows. The estimated baseflow loss provided by the GIA (refer to **Appendix 8**) was applied to the calibrated models to assess any impacts on baseflows in affected rivers and creeks.

For two of the modelled locations on the Talbragar River (i.e. SW09 and Dunedoo), the model indicates no increase to the estimated frequency of no flow periods and no increase in average annual dry days (defined as flows less than 0.1 ML/day) as a result of the Proposed Modification. For the third modelled location on the Talbragar River (i.e. Elong Elong), the model indicates negligible impact to the estimated frequency of no flow periods and no increase in average annual dry days as a result of the Proposed Modification.

As a result of the predicted subsidence impacts there are no predicted changes to catchment areas in Mona Creek or baseflow to the creek system (refer to **Section 6.4** and **Appendix 8**). As such, the Proposed Modification is not expected to have any impact on streamflow sequences in Mona Creek.

Flooding

A flood impact assessment was undertaken using a TUFLOW model with two landform scenarios representing the two options for mining as described in **Section 3.0** using subsidence data provided by SCT. Flood modelling generally found that the modelled impacts to flood depths and velocities would not extend beyond the predicted vertical subsidence affectation area and were generally consistent between both the base case and flexibility option.

The hydraulic modelling results indicate that the predicted subsidence generally causes:

- pooling on the upstream side of each chain pillar due to the localised flattening of the floodplain, and
- decreases to the flood depth downstream of each chain pillar due to the localised steepening of the floodplain.

For the 1% Annual Exceedance Probability (AEP) (sometimes referred to as the 1 in 100 year event) the modelling indicates localised flood depths of up to 3.4 m within the Mona Creek channel above the proposed longwall extensions under existing conditions. These depths are predicted to increase to 4.3 m in localised areas as a result of the Proposed Modification, primarily within UCMPL owned land and not impact on current land uses.

Model results from both mine plan options for the Proposed Modification show that, immediately downstream of the farm dam on Mona Creek, flood flows are concentrated into the channel due to changes in the level of a spill point into an old channel. This has the effect of removing a breakout path across the grassed floodplain area in all modelled events up to and including the 0.1% AEP event (1 in 1,000 year event). This breakout path is across grassed areas and has been formed due to the construction of a farm dam.

A comparison of modelling results for the approved and proposed subsidence within the main channel of Mona Creek indicates that the duration of flooding is unlikely to substantially change as a result of the Proposed Modification. The modelling indicates that flood durations are estimated to decrease by about 5 minutes for the 1% AEP flood event under the base case option, but increase by about 5 minutes for the 1% AEP flood event under the flexibility option (i.e. mining the Longwall Option Area via Ulan Underground).

Modelled results on watercourse stability, using the 50% AEP event, show there will be changes to velocities in the channel of Mona Creek, including:

- increase of approximately 1 to 1.1 m/s downstream of proposed chain pillars compared to approved conditions
- decrease in velocities of approximately 1.2 to 1.5 m/s predicted in areas of the channel where the floodplain is flattening due to predicted subsidence
- a higher decrease is predicted at a maximum of approximately 2.9 m/s to 3.1 m/s within the predicted subsidence area of the Ulan Underground LWW9 extension.

Modelling indicates that the channel of Mona Creek is currently subject to erosive conditions during flood events, although field inspections indicate only minimal undercutting of the banks and a potentially mobile bed. The modelled increases to velocities and tractive stresses in the channel resulting from subsidence could potentially result in an increase to the erosive potential in the channel of Mona Creek. Areas within the channel at risk of potential erosion all occur within landholdings owned by UCMPL. Due to the increased risk of erosion, monitoring of creek stability will continue to be undertaken by UCMPL. Additionally, minor in-channel works may be required to prevent scouring. The need for any such works will be determined through monitoring implemented as part of the Extraction Plan process for longwalls mining underneath Mona Creek (refer to **Section 6.5.5** for additional detail on proposed mitigation measures).

Remnant Ponding

Remnant ponding analysis considers any changes in the areas that could potentially hold water following rainfall events based on survey data and subsidence predictions.

The analysis found that the predicted subsidence associated with the two flexibility options for the Proposed Modification result in patterns of remnant ponding that are typically contained within the channel or in predominantly cleared grazing land which is consistent with the approved subsidence impacts experienced at the UCC. Several additional areas within and adjacent to Mona Creek have been identified as potential remnant ponding areas based on review of the modelling and topographic survey data, however, site inspections indicate that water does not generally pond in the majority of currently predicted remnant ponding areas as the soils are sandy and relatively free draining, or the landform is too steep.

Water quality

It is considered that the predicted subsidence impacts as a result of the Proposed Modification will not result in any substantial changes to watercourse stability relative to the current approved impacts. UCMPL proposes to continue to monitor all second order and higher order watercourses for potential impacts. Any remediation works required would be undertaken to maintain channel grades and take into consideration channel stabilities and existing channel characteristics. Potential short-term impacts on water quality as a result of remediation works would be mitigated through the use of erosion and sediment control measures.

Proposed modifications to surface infrastructure are not expected to result in appreciable changes to the quantity or quality of surface water and will be managed by controls implemented through the construction and operational phases via the existing Water Management Plan.

As negligible changes to the baseflows in the Talbragar River system are predicted for the Proposed Modification, associated changes to water quality (based on historical data analysis) are also not predicted as a result of the Proposed Modification.

Riparian and ecological values

The Surface Water Impact Assessment found that the predicted changes to flow regimes both during and following the Proposed Modification are predicted to be negligible in the context of ephemeral streams and the Talbragar River. The changes to flow regimes are also considered to be negligible on a regional scale. The assessment concluded that the Proposed Modification is consequently considered likely to have negligible impact on ecosystems and downstream users as the predicted impact is within the natural variation of the existing creek systems.

Water users

The Proposed Modification is not expected to have an impact on basic landholder rights as predictions show no change to baseflows in Mona Creek.

Based on the subsidence assessments, the Surface Water Impact Assessment identified that there is limited potential for minor runoff capture during the time between mining and the completion of any required subsidence remediation works. The potential volume and duration of capture is considered minimal due to the limited upslope catchment areas, the short sections of creek that are affected at one time, and routine monitoring to identify works areas promptly for progressive remediation as required.

The potential surface water take and downstream impacts following subsidence, in both watercourses and out of channel areas, is expected to be negligible. This assessment is based on consideration of the potential for impact on watercourses as a result of:

- remnant ponding, both in and out of drainage lines
- surface cracking
- consideration of catchment boundaries
- watercourse stability.

As such, the Surface Water Impact Assessment concluded that the Proposed Modification will not adversely impact on the potential use of water for downstream users or basic landholder rights on local creek systems or rivers.

Cumulative impacts

The Surface Water Impact Assessment found that the Proposed Modification is considered to have negligible impacts on surface water quantity and quality to downstream catchment areas. No other mining operations have surface or underground operations in the Mona Creek catchment area. The assessments undertaken to consider the potential impacts of the Proposed Modification on flow regimes, flooding, remnant ponding and water quality all consider the existing mining impacts, including the currently approved impacts. As such, the impacts associated with the Proposed Modification are considered to be the same as the cumulative surface water impacts for the Mona Creek catchment.

Climate change impacts

A climate change assessment was undertaken to understand the sensitivity of streamflow and flood impacts to climate change, using climate projections provided on the Climate Change in Australia website and methodologies outlined in the Climate Change in Australia Technical Report (CSIRO and Bureau of Meteorology, 2015). Projected changes to the storm rainfall intensity were obtained for the Representative Concentration Pathway 4.5 (RCP 4.5) emission scenarios and modelled for mean predictions for 2050 and 2090.

In terms of flow regimes, the modelling indicates no impact to the estimated frequency of no flow periods and no increase in average annual dry days (defined as flows less than 0.1 ML/day) in the Talbragar River at both SW09 and Dunedoo as a result of the Proposed Modification, relative to the currently approved mining operations for the climate change scenarios. The impacts indicated in the modelling are associated with the existing approved mine plan.

For the modelled 1% AEP flood event, results showed that the modelled depths and velocities do not extend beyond the predicted vertical subsidence affected area, which is consistent with the original model results (baseline results). An increase in flood extent, compared to the baseline results, has been observed with the RCP 4.5 emission scenarios applied. This displays, that with climate change accounted for, flooding impacts are predicted to worsen in the future. This is shown to be the case under all landform options: i.e. existing approved conditions and both of the modelled Proposed Modification options. While the predicted flooding extent increases under a climate change scenario, the overall conclusions of the flooding impact assessment for the Proposed Modification do not change.

6.5.4 Water Balance

Hydro Engineering & Consulting Pty Ltd (HEC) has developed an operational water and salinity balance model of the UCC. To assess the potential impacts of the Proposed Modification, this model has been modified to simulate the future predicted water balance for the UCC with the Proposed Modification, using future production and forecast underground groundwater inflow data provided by UCMPL. The HEC report is contained in **Appendix 10**, with a summary of the key findings provided below.

Groundwater inflow provides the greatest average water inflow to the UCC, accounting for just under three quarters of total inflows, followed by rainfall runoff. Average groundwater inflow is forecast to increase slightly as a result of the Proposed Modification.

The UCC has historically operated in surplus (i.e. water make exceeding site water demands) with significant groundwater inflows to the underground mines. As a result, there has been an emphasis on irrigation, water treatment in the existing water treatment facilities (WTFs) and licensed discharge. The largest average outflow of water from the UCC comprises licensed discharge from WTFs, accounting for just under three quarters of total outflows and this is predicted to increase slightly as a result of the Proposed Modification.

Total stored water volumes are predicted to increase, mainly as a result of increased groundwater inflows with the Proposed Modification. The majority of the forecast water storage at the UCC would be stored in the East Pit which has more than adequate capacity to store the volumes required. The predicted water storage volume results in a secure water supply for the Proposed Modification, with no shortfalls predicted.

The existing WMS is sufficient to manage the additional groundwater inflows and the minor increase in discharge would still be within existing EPL limits.

The UCC water balance will continue to be managed in accordance with the existing WMP, including the ongoing use of water treatment plants to treat water prior to discharge.

6.5.5 Mitigation, Monitoring and Management

UCMPL will continue to utilise subsidence remediation methods and associated erosion and sediment control measures and monitoring programs to manage potential subsidence impacts on watercourses. The monitoring will inform the need for any remediation measures.

Watercourse subsidence remediation measures, if required, may include both hard and soft remediation options. The remediation approach will consider the creek bank stability as well as vegetation areas and runoff flow paths. Hard options may include rock armouring of the bed and/or bank, as well as managing bank slopes. Soft options may include revegetation of banks.

For all watercourse remediation works, suitable erosion and sediment control measures will be designed and constructed to a standard consistent with:

- Managing Urban Stormwater: Soils and Construction (the Blue Book) Volume 1 (Landcom, 2004) and Volume 2E Mines and Quarries (NSW Department of Environment and Climate Change, 2008).
- Draft Guidelines for the Design of Stable Drainage Lines on Rehabilitated Minesites in the Hunter Coalfields (NSW Department of Infrastructure, Planning and Natural Resources, undated).

Water quality and erosion and sediment control measures proposed to be implemented for the Proposed Modification are consistent with those included in the existing UCC WMP (Glencore, 2021) and include:

- clear identification and limiting of areas to be disturbed
- construction of erosion and sediment control measures prior to the commencement of any substantial construction works
- construction and regular maintenance of sediment fences downslope of disturbed areas
- soil amelioration, as required, to minimise potential erosion of disturbed or rehabilitated areas
- regular monitoring and maintenance of erosion controls works and rehabilitation areas
- prompt revegetation/surfacing of areas as soon as earthworks are complete.

The existing WMP includes a surface water monitoring program. The current gauge located on Mona Creek (SW10) will be undermined by the Proposed Modification. It is proposed that an additional monitoring point will be added downstream of subsidence impacted areas (potentially immediately upstream of Blue Springs Road) to continue to monitor potential water quality impacts in Mona Creek. The location of this replacement gauge will be determined as part of the updates to the WMP.

6.6 Biodiversity

A Biodiversity Development Assessment Report (BDAR) was prepared by Umwelt (refer to **Appendix 11**) to assess the impacts of the Proposed Modification using the NSW Biodiversity Assessment Method (BAM) (DPIE 2020) in accordance with the *Biodiversity Conservation Act 2016* (BC Act). A summary of key findings is presented below.

The BDAR was prepared in accordance with the BAM to:

- describe the existing biodiversity environment
- identify flora and fauna species and ecological communities that have the potential to be impacted by the Proposed Modification
- determine the presence or likelihood of occurrence of threatened flora and fauna species and populations and threatened ecological communities (TECs) listed under the BC Act and the EPBC Act
- calculate the offset requirements for biodiversity impacts associated with the Proposed Modification
- describe the proposed offset strategy for the Proposed Modification.

6.6.1 Development Footprint and Maximum Parameters Area

The BAM requires the definition and assessment of the direct impact area for a development, referred to as the Development Footprint. The Development Footprint for the Proposed Modification is 27.4 ha and includes all areas that will be directly impacted by surface infrastructure based on the current conceptual project design (refer to **Figure 1.3**). The Development Footprint includes proposed surface infrastructure (dewatering bores and ventilation shafts) and ancillary services associated with the proposed longwall mining operations. There are four separate areas of the Development Footprint as shown on **Figure 6.3**.

The Potential Indirect Impact Area is approximately 852.9 ha and is the area that has potential for subsidence impacts due to the additional area of underground mining associated with the Proposed Modification, as shown in **Figure 6.2** (the maximum subsidence affectation area).

As outlined in **Section 3.2**, UCMPL has developed a conceptual surface infrastructure layout to be assessed as the Development Footprint (as shown in **Figure 6.6**), however, it is acknowledged that the detailed design including final location of infrastructure is subject to further exploration and detailed mine planning, and may be subject to change as part of implementing the mine plan. This is consistent with the needs of an underground mining operation where geological variations and other detailed design considerations affect the final locations of infrastructure above underground mining areas. UCMPL is therefore seeking some flexibility for the final positioning of surface infrastructure and ancillary services.

Acknowledging this need for flexibility, and in order to establish a worst-case or 'maximum parameters' impact footprint for the biodiversity assessment, UCMPL has confirmed a number of additional infrastructure contingency options over the proposed additional mining area to allow for a worst-case assessment. It should be noted that these contingency options are not intended to be layouts for potential future construction, but to provide for a conservative assessment of the scale of potential impacts that could occur as part of the Proposed Modification. The final design of the layout and location of surface infrastructure will be determined as part of project implementation.

To provide for the maximum parameters assessment, nine contingency layout options for the Ulan West surface infrastructure (potentially to replace the current 'Area 1') and four options for the Ulan Underground surface infrastructure (potentially to replace one part of the current 'Area 3') have been developed, as well as a buffer to the proposed access track (Area 2) which allows for flexibility in the alignment of the track to allow the 'maximum parameters' to be defined. Importantly, the maximum parameters approach uses the infrastructure contingency options to consider the worst-case direct impact area for each Plant Community Type (PCT) and TEC. That is, the highest level of direct impact that would occur for each entity, rather than a cumulative assessment of all options. The infrastructure contingency footprint options used in the maximum parameters assessment are provided on **Figure 6.4**.

The approach taken for the maximum parameters assessment, as determined through consultation with DPE, the Biodiversity Conservation and Science (BCS) division and DCCEEW, is as follows:

1. The indicative Development Footprint has been assessed and credits calculated in the usual manner in accordance with the BAM.

2. In addition, a maximum parameters assessment has been completed considering the infrastructure contingency options provided by UCMPL. The maximum impacts of the combination of the indicative Development Footprint layout and each of the contingency options have been determined for ecosystem and species credits (impact areas defined and credits calculated).

3. Should the Proposed Modification be approved, the final infrastructure locations will be determined once the mine plan has been finalised and will be micro-sited to avoid disturbance to biodiversity values where practicable. As such the final locations may potentially be outside the corridor assessed for biodiversity impact purposes as part of the maximum parameters approach. A biodiversity due diligence exercise will be conducted for each stage of construction and UCMPL will ensure that the biodiversity impacts associated with the final infrastructure locations will be the same or less than those assessed under the maximum parameters assessment.

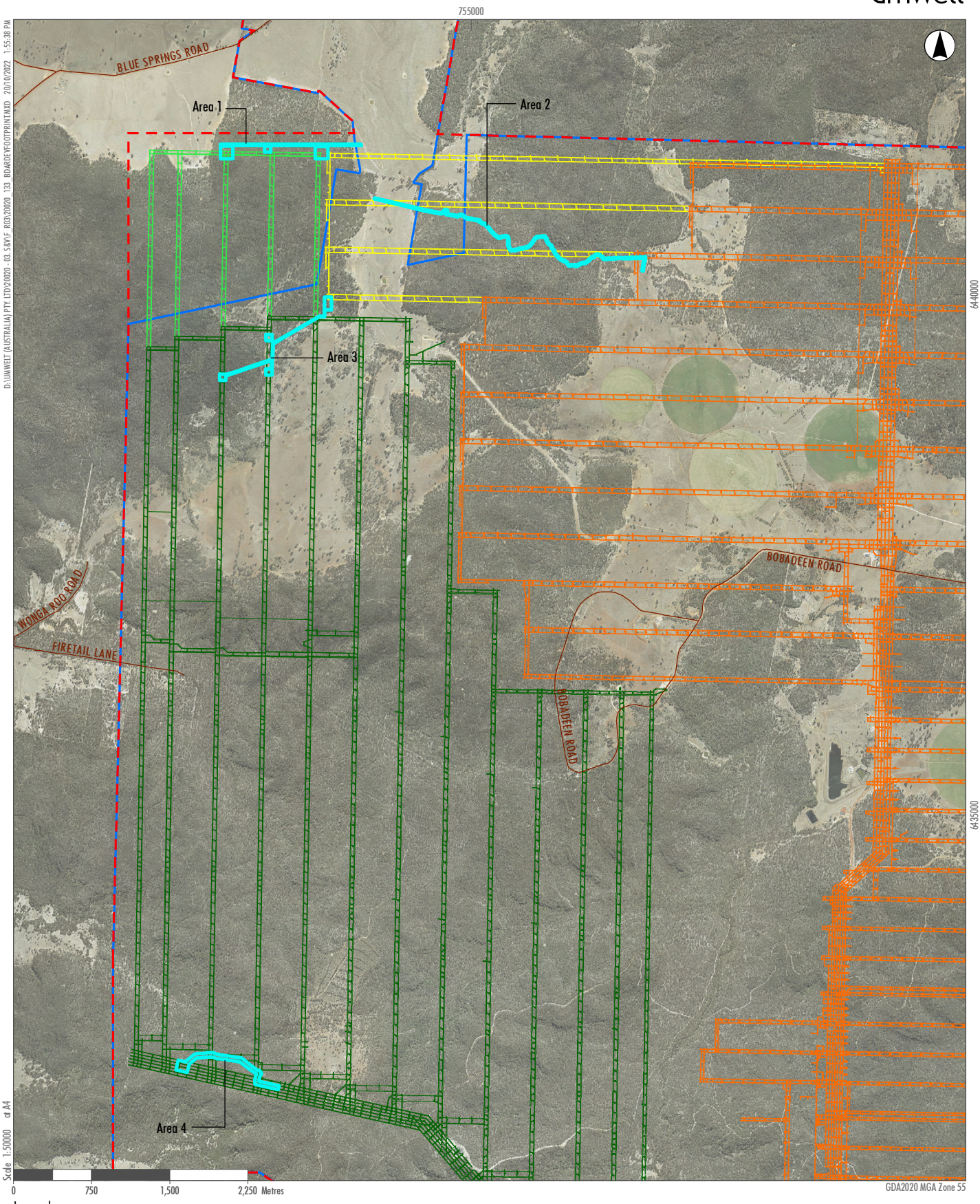
4. The Biodiversity Management Plan (BMP) will be updated to include the final credits required to be retired for each stage of development, based on the credit per hectare calculated in the maximum parameters assessment. Where the updates to the layout and recalculation of final BAM credits can be done using existing BAM survey data this will occur. Should the footprint vary sufficiently to require additional BAM data collection, this data would be collected so that the BAM minimum requirements are met. An updated BAM calculator would be prepared, and the outcomes consulted with BCS and documented in the BMP. This would ensure that the credits retired are based on the final detailed design. Credits would then be retired as per the BMP (based on the final detailed design) with updates to the BMP to be made before each stage of surface development and approved by DPE.

Importantly, the maximum parameters approach uses the infrastructure contingency options to consider the worst-case direct impact area for each PCT/CEEC, i.e. the highest level of direct impact that would occur for each PCT, rather than a cumulative assessment of all options. Credits have been generated for the PCTs impacted along with the same threatened species used in the assessment of the Development Footprint (refer to **Section 6.6.6**).

6.6.2 Methodology

The BDAR was prepared in accordance with the BAM and the Biodiversity Assessment Method Operational Manual – Stage 1 (DPIE, 2020). Broadly, the methods undertaken in preparing the BDAR were:

- Landscape features and site context – desktop review of appropriate data sources including relevant mapping products, aerial photography and GIS layers in accordance with Section 3.1 of the BAM.
- Native vegetation assessment – including literature and database review, digital aerial photo interpretation, floristic and vegetation integrity surveys, and meandering transects to inform vegetation mapping, PCT allocation and TEC delineation.
- Threatened species assessment – including literature and database review, ecosystem-credit and species-credit species assessments, tree hollow assessments, spotlighting and call playback, and microbat surveys.
- Further detail regarding the methodology is included in the BDAR (refer to **Appendix 11**).



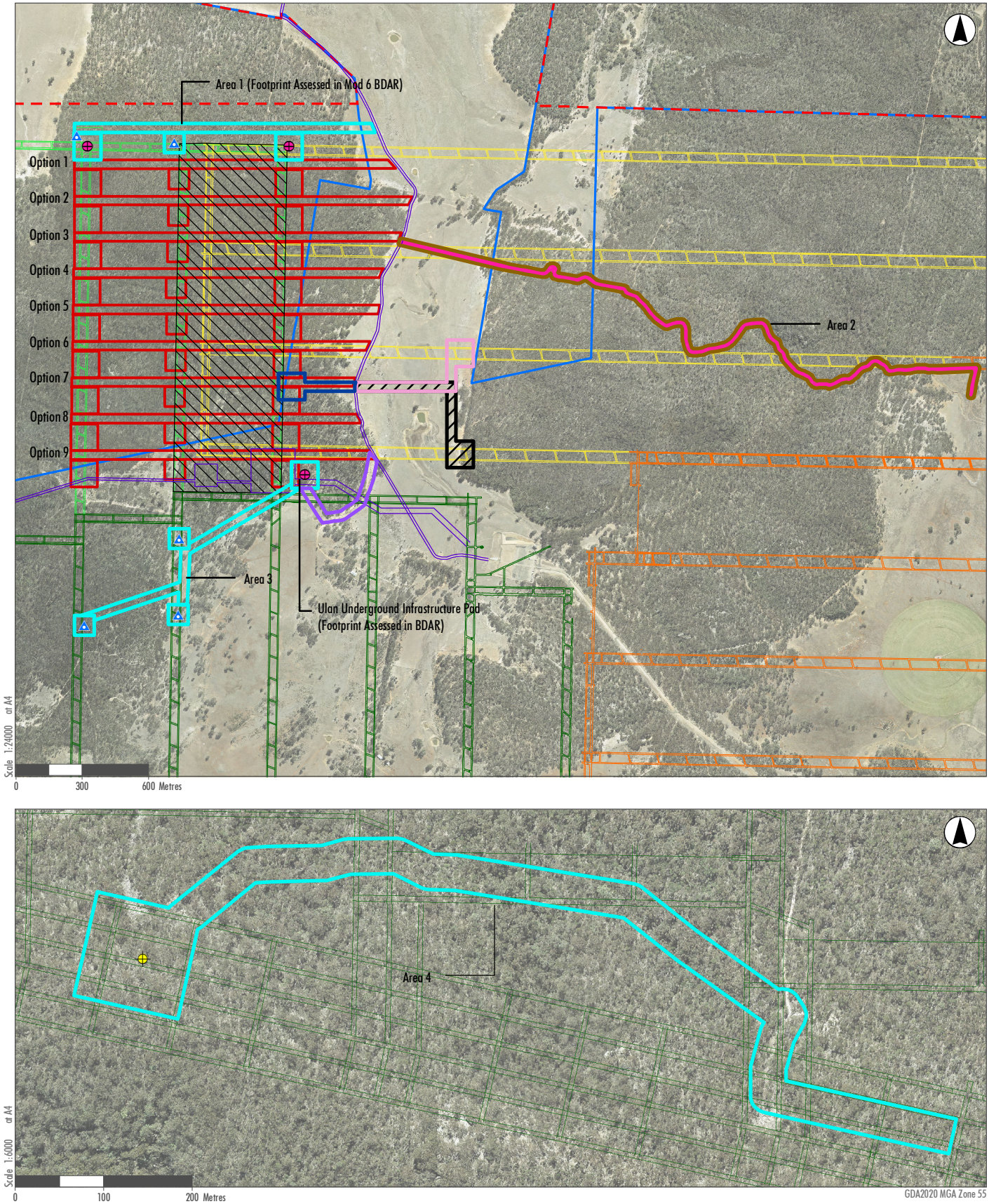
Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Approved Ulan Underground Mine Plan
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- Approved Ulan West Mine Plan
- BDAR Development Footprint

FIGURE 6.3

BDAR Development Footprint

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)



GDA2020 MGA Zone 55

Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Approved Ulan Underground Mine Plan
- Approved Ulan West Mine Plan
- Approved Infrastructure related to Mod 6
- Proposed Borehole
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure (Footprint Assessed in Mod 6 BDAR)
- Proposed Access Track Corridor
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- Ulan West Infrastructure Options
- Proposed Access Track Corridor Buffer

Ulan Underground Infrastructure Pad Options

- Area A
- Area B
- Area C
- Area D
- Longwall Option Area

FIGURE 6.4

Maximum Parameters Area

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)

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6.6.3 Results

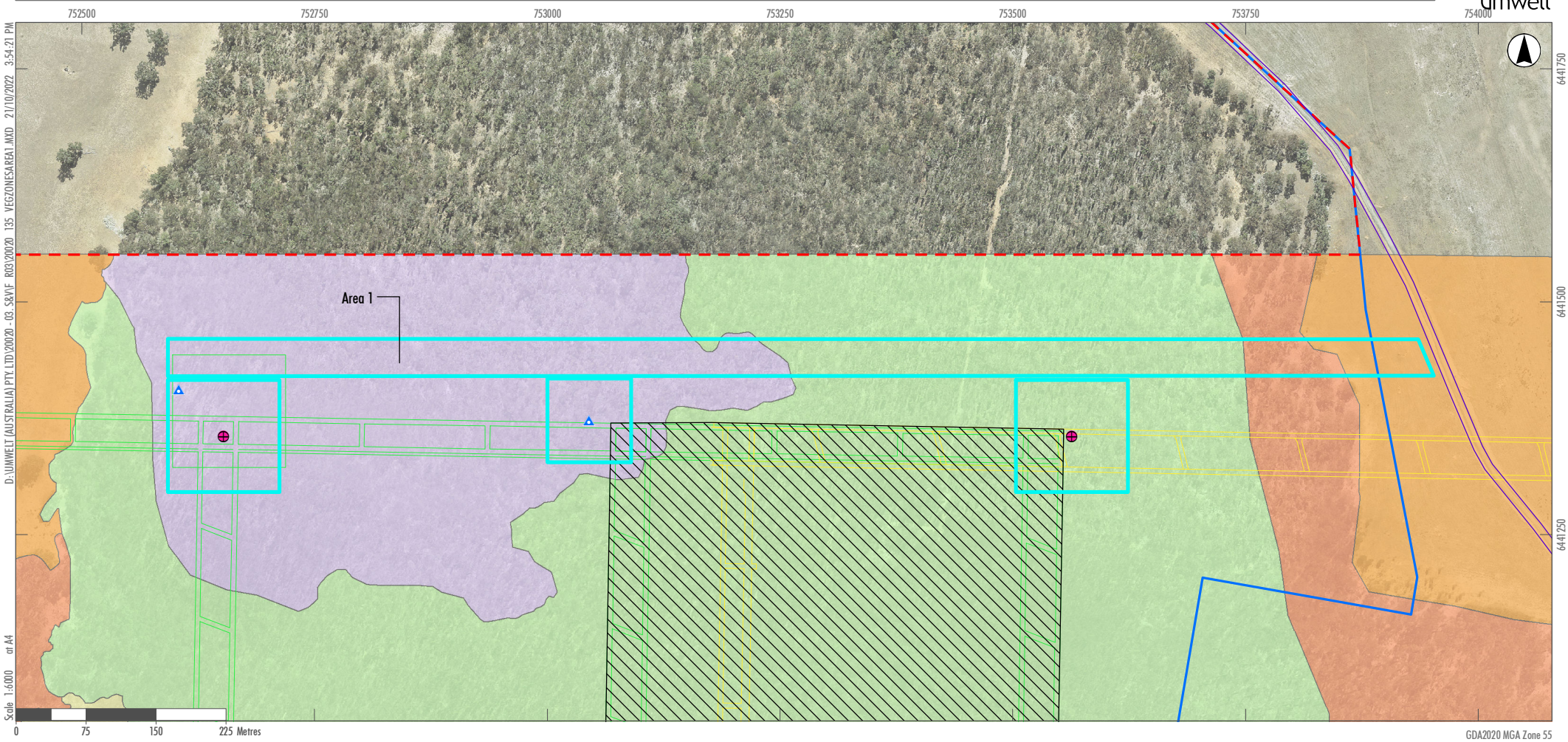
The following sections provide a summary of the key biodiversity values for the Proposed Modification.

6.6.3.1 Native Vegetation Assessment

Surveys of the Development Footprint identified six PCTs which have been split into eight vegetation zones based on condition classes as described in **Table 6.5**. The vegetation zones for each area of the Development Footprint are shown in **Figure 6.5**, **Figure 6.6**, **Figure 6.7** and **Figure 6.8**. Five of the eight vegetation zones were found to conform to the State and Commonwealth listed CEEC White Box – Yellow Box – Blakely's Red Gum Woodland (Box Gum Woodland CEEC). The area of each vegetation zone within the Development Footprint that is considered to comprise the White Box CEEC is also provided in **Table 6.6**.

Table 6.6 PCTs, Vegetation Zones and CEEC Within the Development Footprint

Zone	PCT Name	Condition Class	Area (ha)	Area CEEC (ha)
1	PCT 281 Rough-barked apple - red gum - yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South-Western Slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	0.3	0.3
2	PCT 281 Rough-barked apple - red gum - yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South-Western Slopes Bioregion and Brigalow Belt South Bioregion	Intact	1.0	1.0
3	PCT 476 Narrow-leaved wattle low open forest / very tall shrubland on ridges in northern NSW South-Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Intact	4.8	-
4	PCT 478 Red ironbark - black cypress pine - stringybark +/- narrow-leaved wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	Intact	3.4	-
5	PCT 479 Narrow-leaved ironbark- black cypress pine - stringybark +/- grey gum +/- narrow-leaved wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Intact	9.7	-
6	PCT 481 Rough-barked apple - Blakely's red gum - narrow-leaved stringybark +/- grey gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region	Derived Native Grassland	2.7	2.7
7	PCT 481 Rough-barked apple - Blakely's red gum - narrow-leaved stringybark +/- grey gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region	Intact	3.4	3.4
8	PCT 618 White box x grey box - red gum - rough-barked apple grassy woodland on rich soils on hills in the Upper Hunter Valley	Thinned	2.1	2.1
Total			**27.4**	**9.5**



Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Approved Infrastructure related to Mod 6
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- Longwall Option Area

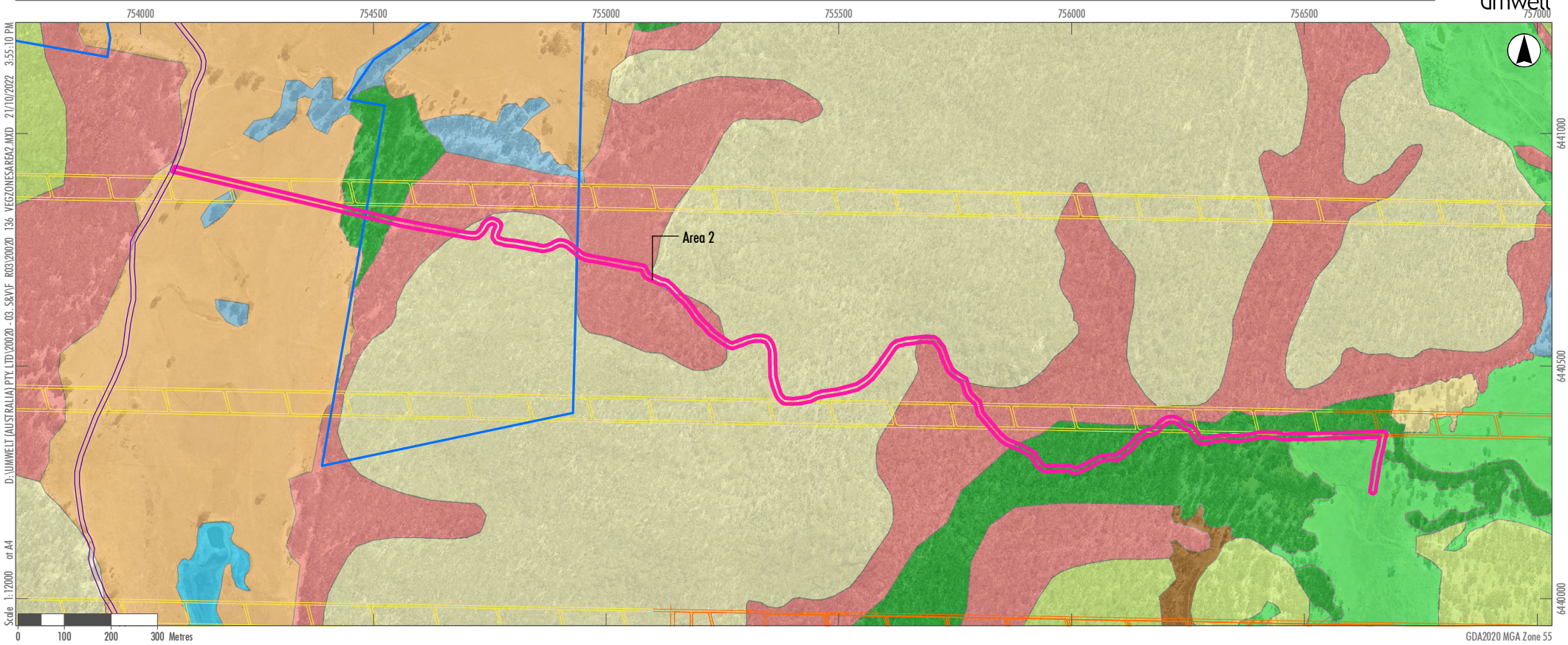
Vegetation Zones

- 476 - Narrow-leaved Wattle low open forest / very tall shrubland on ridges in northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion - Intact
- 478 - Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion - Intact
- 479 - Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion - Intact
- 481 - Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region - Derived Native Grassland
- 481 - Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region - Intact

FIGURE 6.5

Vegetation Zones in the Development Footprint (Area 1)

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)



Legend

- Project Approval Boundary
- Approved Infrastructure related to Mod 6
- Proposed Access Track Corridor
- Approved Ulan Underground Mine Plan
- Proposed Ulan Underground Mine Plan Modification

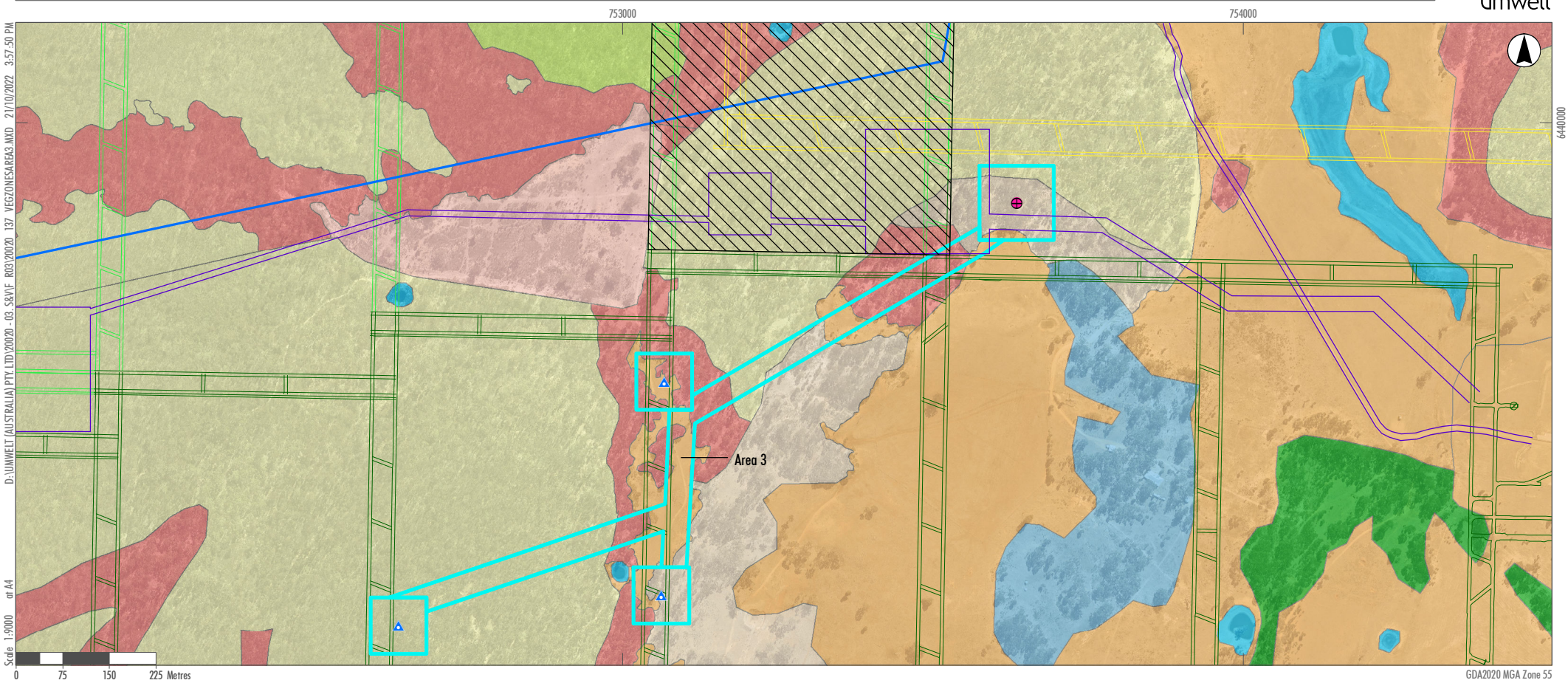
Vegetation Zones

- 281 - Rough-barked Apple - red gum - yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion - Intact
- 281 - Rough-barked Apple - red gum - yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion - Derived Native Grassland
- 281 - Rough-barked Apple - red gum - yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion - Thinned
- 478 - Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion - Intact
- 478 - Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion - Regenerating
- 479 - Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion - Intact
- 481 - Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region - Derived Native Grassland
- 481 - Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region - Intact
- 481 - Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region - Thinned
- Water

FIGURE 6.6

Vegetation Zones in the Development Footprint (Area 2)

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)



Legend

- Project Approval Boundary
- Approved Ulan West Mine Plan
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- Longwall Option Area
- Approved Infrastructure related to Mod 6

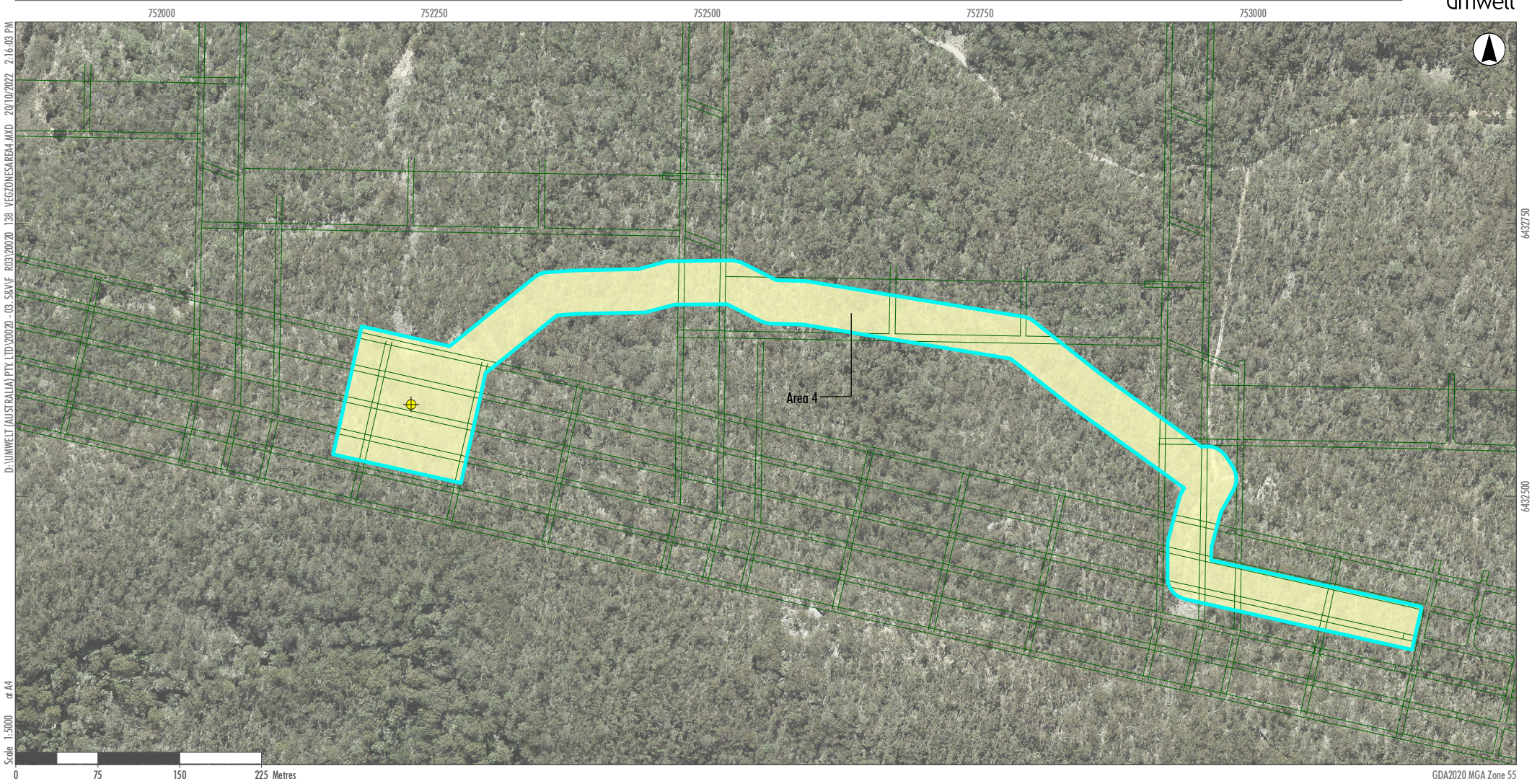
Vegetation Zones

- 281 - Rough-barked Apple - red gum - yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion - Intact
- 478 - Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion - Intact
- 479 - Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion - Intact
- 481 - Rough-barked Apple - Blakelys Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on in the southern Brigalow Belt South Bioregion and Upper Hunter region - Regeneration
- 481 - Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region - Derived Native Grassland
- 481 - Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region - Intact
- 481 - Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region - Thinned
- 618 - White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley - Thinned
- Water

FIGURE 6.7

Vegetation Zones in the Development Footprint (Area 3)

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)



Legend

- Approved Ulan West Mine Plan
- Proposed Borehole
- Proposed Infrastructure

Vegetation Zones

- 479 - Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion - Intact

FIGURE 6.8

Vegetation Zones in the Development Footprint (Area 4)

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)

Similarly, an assessment of PCTs and the occurrence of CEECs has been undertaken for the Maximum Parameters Area, and the results are shown in **Table 6.7** and Figure 6.3 of the BDAR (refer to **Appendix 11**). Six of the ten vegetation zones mapped within the Maximum Parameters Area conform to the State and Commonwealth listed Box Gum Woodland CEEC. It should be reiterated that the results for the Maximum Parameters Area consider the worst-case direct impact area for each PCT and CEEC, that is, the highest level of direct impact that would occur for each zone.

Table 6.7 PCTs, Vegetation Zones and CEEC Within the Maximum Parameters Area

Zone	PCT Name	Condition Class	Area (ha)	Area CEEC (ha)
1	PCT 281 Rough-barked Apple - red gum - yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South-Western Slopes Bioregion and Brigalow Belt South Bioregion	Derived Native Grassland	0.7	0.7
2	PCT 281 Rough-barked Apple - red gum - yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South-Western Slopes Bioregion and Brigalow Belt South Bioregion	Intact	2.7	2.7
3	PCT 476 Narrow-leaved Wattle low open forest / very tall shrubland on ridges in northern NSW South-Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Intact	4.8	-
4	PCT 478 Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	Intact	8.4	-
5	PCT 479 Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Intact	17.4	-
6	PCT 481 Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region	Derived Native Grassland	7.2	7.2
7	PCT 481 Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region	Intact	10.4	10.4
8	PCT 481 Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region	Thinned	0.6	0.6
9	PCT 618 White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	Thinned	2.1	2.1
10	PCT 481 Rough-barked Apple - Blakely's Red Gum - Narrow-leaved Stringybark +/- Grey Gum sandstone riparian grass fern open forest on the southern Brigalow Belt South Bioregion and Upper Hunter region	Regeneration	0.4	0.4
Total			**54.7**	**24.1**

6.6.3.2 Threatened Species

The NSW BAM categorises threatened species as either ecosystem-credit species or species-credit species. Credits are required for impacts on species-credit species but not for ecosystem-credit species as they are considered to be already covered by credits generated for impacts on native vegetation. The BAM calculator used for the BDAR predicts the species-credit species that may occur, and requires consideration of these species in the assessment.

Targeted species-credit surveys were undertaken across the Development Footprint for those species-credit species predicted to occur by the BAM calculator and/or the literature review. Only one of the predicted species-credit species (little eagle, *Hieraaetus morphoides*) was recorded within the Development Footprint however this was a non-breeding record so no species credits have been generated. Three species-credit species were recorded in the wider Potential Indirect Impact Area, however species credits are only required for those species if breeding habitat is confirmed. No breeding habitat was confirmed during targeted surveys however species habitat polygons were prepared for the large-eared pied bat (*Chalinolobus dwyeri*), and eastern cave bat (*Vespadelus troughtoni*) based on potential breeding habitat only.

Comprehensive targeted candidate species surveys were not undertaken within the Maximum Parameters areas, and therefore some predicted species-credit species that occur in vegetation zones that fall within the Maximum Parameters areas have been assumed present and credits generated.

6.6.4 Impact Assessment

Direct Impacts

The Proposed Modification would result in direct impacts on biodiversity values within the Development Footprint associated with the construction of the proposed surface infrastructure. Direct impacts include the loss of native vegetation and fauna habitats as a result of clearing works for the surface infrastructure. It has been assumed for assessment purposes that all vegetation within the 27.4 ha Development Footprint would be removed. Where practicable, infrastructure areas would be rehabilitated, in accordance with UCC approved rehabilitation strategies, when no longer required.

The Proposed Modification would result in direct impacts to 27.4 ha of native vegetation communities and 2.6 ha of species-credit species habitat within the Development Footprint.

As indicated in **Table 6.6**, under the Maximum Parameters assessment, the Proposed Modification has been assessed as potentially having a direct impact of up to 54.7 ha of native vegetation communities. This Maximum Parameters assessment is conservative as it takes the worst-case impact on any particular vegetation zone and totals them and therefore, whilst this impact area has been assessed, the development will not ultimately result in the removal of 54.7 ha of native vegetation.

Indirect Impacts

Indirect biodiversity impacts associated with the Proposed Modification largely relate to subsidence due to longwall mining and the potential for it to impact on biodiversity values. In addition, some minor indirect impacts associated with habitat connectivity and cumulative habitat loss, fugitive light emissions, air quality, noise, weeds and feral animals, and groundwater and water quality impacts have been assessed.

For the Proposed Modification, the Potential Indirect Impact Area associated with longwall mining covers an area of approximately 853 hectares. The indirect impacts predicted for the Proposed Modification are not expected to result in any perceptible change in the condition or viability of native vegetation and habitats and are not expected to result in loss of vegetation in terms of direct tree failure or death. Subsidence is not expected to cause significant cracking or alteration to hydrology such that would result in material impacts on vegetation.

Previous predictions for the potential impacts of subsidence on biodiversity at the UCC also anticipated that there would not be any impact on the viability of any native vegetation communities as a result of subsidence. These predictions have been confirmed by years of ecological monitoring which has been undertaken within the UCC since 1980, with studies at Ulan West commencing in 2006. These surveys were completed before, during and after underground mining in various locations across the UCC and have not recorded any perceptible change in vegetation health or viability that could be attributed to subsidence.

Further to this, Eco Logical Australia undertook a detailed study of vegetation communities up to 20 years post-mining in 2015, with the aim of determining whether longwall mine-related subsidence at UCC has had an impact upon the condition of vegetation communities on-site. The study found no statistically significant difference between vegetation communities where mining had previously occurred and vegetation communities remote to mining (Eco Logical, 2015).

Impacts on Microbat Species

There is potential for impacts to cliff line landforms that occur within the subsidence affection area for the Proposed Modification. These cliff line landforms have potential to support breeding habitat for threatened microbat species.

Extensive survey and monitoring of microbats within the UCC to date has indicated that subsidence impacts on caves have had no perceptible impact on bat activity, despite a previous cave collapse event in April 2020. No maternity roosts for any threatened bat species were recorded within the subsidence affection area for the Proposed Modification, however if one were to occur there is some potential, albeit very low, that cave collapse could occur, based on the previous event.

UCMPL has confirmed that based on a potential risk of damage to cave-roosting bat species, close monitoring of impact areas will continue to be undertaken so that any changes are detected as soon as possible and can be addressed through implementation of management and mitigation measures. Pre-mining monitoring will be undertaken in potential cliff line habitats within the subsidence affection area for the Proposed Modification to investigate potential cave roosts and therefore to prioritise ongoing monitoring focus.

6.6.5 Avoidance and Mitigation

UCMPL has sought to avoid and minimise potential impacts on ecological values throughout the Proposed Modification planning process by maximising the use of existing mining facilities and considering the placement of essential infrastructure to seek to minimise disturbance to native vegetation and habitats. Areas proposed to be directly impacted for surface infrastructure have been sited to limit disturbance as far as practicable via use of existing disturbed or cleared areas where they exist. This involved siting proposed surface infrastructure based on the findings of ecological and other field assessment work.

In undertaking the additional Maximum Parameters assessment, multiple siting options for surface infrastructure have been investigated to determine the worst-case scenario in terms of direct impacts to biodiversity. This additional assessment has been undertaken as part of the BDAR to give the NSW and Commonwealth government agencies further confidence that UCMPL is aware of the full extent of potential biodiversity impacts that may occur as a result of the Proposed Modification, noting that these impacts would be refined and offset as required throughout the life of the operation. By doing so, and in undertaking any additional survey and assessment of each site required at the post-approval stage, final placement decisions will be very well informed and will seek to avoid and/or minimise known impacts on biodiversity values, in particular with respect to the Box Gum Woodland CEEC, cliff line habitats for bats and hollow-bearing trees.

UCMPL has committed to the design and implementation of a comprehensive biodiversity mitigation strategy to manage the unavoidable impacts of the Proposed Modification. The following specific control measures, as detailed in the existing approved UCC BMP (UCMPL, 2019), are considered to be integral to the mitigation of impacts on the biodiversity features of the UCC and will be implemented for the Proposed Modification:

- monitoring and reporting of subsidence impacts
- performance measures, triggers and contingency measures for impacts relating to subsidence
- disease management and hygiene controls
- salvage of biodiversity features for habitat augmentation
- revegetation methodologies (in the event that vegetation is impacted by subsidence)
- creek and drainage line remediation
- weed and vertebrate pest management
- erosion, sediment and soil management
- dust minimisation and suppression measures
- environmental management measures to minimise the potential for indirect impacts
- workforce education and training.

Should the Proposed Modification be approved, UCMPL will update the existing Biodiversity Management Plan (BMP) in accordance with any relevant development consent requirements. In accordance with the BMP, UCMPL will continue to undertake pre-mining inspections of the cliff lines within the predicted subsidence affection areas at least two years prior to undermining to identify any large-eared pied bat maternity roosts and establish monitoring sites. If a maternity roost is identified through these detailed surveys, mitigation and management requirements will be determined in consultation with an appropriate expert and relevant authorities. Micro-bat monitoring is undertaken during and two years post-longwall extraction and the monitoring sites chosen from the pre-mining cliff line assessment for each longwall panel and this process will continue with the Proposed Modification.

6.6.6 Biodiversity Credit Impact Summary

Following the application of appropriate avoidance and mitigation measures, the BAM assessment identified the following biodiversity credits are required to offset the biodiversity impacts of the Proposed Modification (noting that the likely total credit retirement obligations as confirmed for each stage of development are likely to be less than the credits listed below given the BAM has been undertaken on the basis of maximum parameters or worst-case assessment).

Development Footprint:

- 602 ecosystem credits for seven PCTs
- 58 large-eared pied-bat (*Chalinolobus dwyeri*) credits
- 58 eastern cave bat (*Vespadelus troughtoni*) credits.

Maximum Parameters Area:

- 1,229 ecosystem credits for six PCTs
- 101 Ausfelds wattle (*Acacia ausfeldii*) species credits
- 168 pink-tailed legless lizard (*Aprasia parapulchella*) species credits
- 84 gang-gang cockatoo (*Callocephalon fimbriatum*) species credits
- 151 large-eared pied-bat (*Chalinolobus dwyeri*) credits
- 1,266 *Commersonia procumbens* species credits
- 63 little eagle (*Hieraaetus morphoides*) species credits
- 126 square-tailed kite (*Lophoictinia isura*) species credits
- 690 barking owl (*Ninox connivens*) credits
- 84 powerful owl (*Ninox strenua*) species credits
- 101 Tarengo leek orchid (*Prasophyllum petilum*) species credits
- 546 *Tylophora linearis* credits
- 84 masked owl (*Tyto novaehollandiae*) species credits
- 151 eastern cave bat (*Vespadelus troughtoni*) credits.

6.6.7 Biodiversity Offset Strategy

UCMPL is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Proposed Modification.

UCMPL has, where possible, altered the Proposed Modification to avoid and minimise ecological impacts in the planning stage, and a range of impact mitigation strategies have been included to mitigate the impact on ecological values prior to the consideration of offsetting requirements. The PCTs and species-credit species requiring offset for the Proposed Modification, as calculated in accordance with the BAM are identified in **Section 6.6.6**.

UCMPL is currently considering the merits of all options available under the Biodiversity Offset Scheme (BOS) to satisfy the offsetting requirements for the Proposed Modification. The offset options available under the BC Act and BC Regulation include:

- land based offsets through the establishment of new Stewardship Sites or by retiring credits from existing Stewardship Sites
- purchasing credits from the market, and/or
- paying into the Biodiversity Conservation Fund.

The biodiversity offset strategy will be developed in consultation with the BCS and DPE and outlined in the updated Biodiversity Management Plan (BMP) and will be based on the credits required to be retired to offset the impacts of the Proposed Modification as specified above, pending confirmation of final infrastructure footprints. A staged approach to offsetting is proposed, whereby offset credits are retired in line with the progression of surface impacts. This allows the opportunity to reduce the impact footprint as far as practicable once final design work is complete and therefore reduce biodiversity impacts and the resulting offset liability prior to the clearance impacts for the surface infrastructure. Credits would be retired as per the BMP (based on the final detailed design) with updates to the BMP to be made before each stage of surface development and approved by DPE. As a result, the total number of credits to be retired for the Proposed Modification may be less than the number of credits listed in **Section 6.6.6** above.

6.7 Aboriginal Cultural Heritage

The Project Area is located within the traditional lands of the north-eastern Wiradjuri people. UCMPL have a long-standing working relationship with the RAPs in relation to the management of cultural values across the UCC.

South East Archaeology Pty Ltd (SEA) undertook an Aboriginal Cultural Heritage Assessment (ACHA) for the Proposed Modification which is included in **Appendix 12**. Subsequent to the completion of the ACHA, minor amendments to the surface infrastructure components of the Proposed Modification necessitated the production of two additional ACHA Addendum reports, which are also contained in **Appendix 12**.
A summary of the key findings of all reports is presented in this section.

6.7.1 Previous Aboriginal Heritage Studies

Many archaeological surveys and excavations have been previously undertaken within the UCMPL lease areas and surrounding locality, principally in relation to environmental impact assessments. This body of research has identified numerous archaeological sites and provides a broad understanding of archaeological site patterning in the local area.

Past heritage investigations at UCMPL have led to the recording of the Aboriginal sites/Potential Archaeological Deposits (PADs) in the UCMPL Aboriginal Site Database, which documents all known Aboriginal sites within the UCCO Project Area.

The ACHA includes an overview of the extensive history of past archaeological research undertaken within the Proposed Modification investigation area, a summary of key information on investigation types and area, and the number of recorded archaeological sites.

As discussed in the ACHA, archaeological investigations at the UCC and in the nearby Wilpinjong and Moolarben coal leases, and elsewhere in the locality have resulted in the identification of a large number of rock shelter sites with archaeological deposits and/or rock art or grinding grooves, along with many shelters with potential deposits. The large numbers of shelter sites partly reflect the focus of the underground mining related surveys, with these identified in isolated rock formations (such as boulders and pagodas) and more commonly along more extensive rock formations (such as scarps and cliffs).

The shelter sites vary widely in terms of topographical context (e.g. distance to watercourse, size/order of watercourse and aspect), contents, nature (e.g. size of shelter and extent of habitable floor area) and research potential (e.g. depth and extent of potential artefact deposits). Apart from several major sites such as the "Hands on Rock" complex, rock art occurs relatively infrequently in the recorded shelters and tends to comprise red ochre hand stencils (Kuskie, 2009). Numerous open artefact occurrences have also been identified in the locality and represent the most commonly identified form of archaeological evidence. The numbers of artefacts vary from minor scatters and numerous isolated finds, for which details have not often been recorded in earlier studies, to dense concentrations of lithic material with hundreds of artefacts present. A conservative conclusion is that artefact evidence is distributed in a widespread manner across the locality, in generally low densities equating to background discard (manuport and artefactual material which is insufficient either in number or in association with other material to suggest focused activity in a particular location; Rich 1993, Kuskie and Kamminga 2000), with occasional higher densities representing more focused occupation (such as encampments, or events of longer duration or involving larger numbers of people) or repeated occupation in favourable environmental contexts.

6.7.2 Aboriginal Heritage Context

The Project Area, and proposed additional mining area, lies within the north-eastern portion of the territory of the Wiradjuri people as defined by Tindale (1974) and Horton (1994), close to the boundary with the Kamilaroi to the north and the Geawegal and Wonnarua further to the east.

A wide variety of resources were available in the past to local Aboriginal people. Evidence suggests that the diet of the local Aboriginal people would have included amongst other foods, possum, kangaroo, wallaby, wombat, kangaroo rat, platypus, lizards, snakes, goanna, tortoise, fish, mussels, crayfish, various birds, insects and various plants (Pearson, 1981). More than 20 species of native mammals, various reptiles and over 100 species of native birds have been recorded at Ulan, many of which would have been utilised as food resources.

On a local scale, the large number of archaeological studies undertaken within the vicinity of the investigation area provides a sound understanding of the nature and distribution of archaeological sites within the area. The material culture of the local Aboriginal population would have included a range of items related to subsistence, cultural and social activities, and shelter. However, in the archaeological record, few of these items are preserved. Stone, bone and shell are the materials most frequently represented in archaeological sites.

The ACHA describes how the influx of non-indigenous people into the region had profound effects upon the Wiradjuri people, as the newcomers sought to gain the land for agricultural and pastoral utilisation and later for mining the valuable mineral resources present. Evidence suggests that in the Ulan area, fighting between non-indigenous and Aboriginal people occurred in the 1820s as settlers sought to establish grazing runs, with hostilities peaking between 1824 and 1826 (Haglund, 1999). The dramatic increase in the number of non-indigenous people around Mudgee, Bathurst and Gulgong from the 1850s to the 1870s, during the gold rush, resulted in the displacement of the Aboriginal people and further incidents of warfare (Burless, 1997).

Despite this, the Wiradjuri people survived. A vibrant Aboriginal population remains in the region today and takes an active interest in the management of their heritage. Ongoing involvement of the Aboriginal community in the management of heritage at the UCC has been a core element of the HMP and this is proposed to continue.

Three Conservation Areas have been established within the mining lease area specifically for the protection of Aboriginal heritage, being:

- Brokenback Conservation Area
- Valley Way Grinding Groove Conservation Area
- Bobadeen Grinding Groove Conservation Area.

The Brokenback Conservation Area and two Grinding Groove Conservation Areas have been established to protect specific Aboriginal heritage sites and are managed in accordance with an Aboriginal Conservation Management Plan prepared in consultation with the registered Aboriginal stakeholders.

The three sites provide for the conservation of high significance sites, including rock shelters (with art), grinding grooves, PAD and/or artefacts, grinding grooves and open artefact sites.

6.7.3 Aboriginal Community Consultation

As described in **Section 5.3**, the ACHA for the Proposed Modification involved a comprehensive program of consultation with the Aboriginal community that complies with the policy requirements of Heritage NSW. These requirements are specified in *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (NSW Department of Environment, Climate Change and Water (DECCW), 2010) and involve the procedures summarised below:

- Aboriginal parties with an interest were identified and provided with the opportunity to be involved in the assessment.
- Detailed information was provided to RAPs about the Proposed Modification and they were consulted about the proposed heritage impact assessment process and survey methodology.
- Representatives of the RAPs participated in the field surveys and information gathered was included in the draft ACHA. Copies of the draft ACHA were then provided to each RAP with a request for comment.
- The final ACHA was prepared and incorporated the input of RAPs.

To consult more widely with the RAPs regarding cultural knowledge and values specific to the Proposed Modification area, prior to completion of the ACHA, Australian Cultural Heritage Management (Victoria) Pty Ltd (ACHM) was engaged to undertake further consultation with indigenous stakeholders to augment the content of the ACHA report and produced a supplementary assessment of intangible cultural heritage values. A range of workshop, video conference, telephone and email consultation with the RAPs was undertaken (refer to **Appendix 12**).

6.7.4 Survey Methodology

The detailed ACHA methodology was finalised in consultation with the RAPs and designed to meet relevant guidelines.

Following desktop searches of the Heritage NSW AHIMS and the UCMPL Aboriginal Site Database to document all known Aboriginal sites/PADs within the Proposed Modification investigation area (including areas both within and outside of the Project Area), a total of approximately 825 ha (84% of the heritage survey investigation area) was subject to detailed archaeological sampling over 25 days in October and November 2020 and January 2021. It should be noted that since the surveys were undertaken, the extent of the Proposed Modification was changed to incorporate minor amendments to surface infrastructure and a reduction in the extent of proposed longwall mining in relation to LWW12. As a result, the area of potential impacts has been reduced relative to the area surveyed.

Further details on survey methodology are provided in the ACHA in **Appendix 12**.

6.7.5 Results

During the surveys, an additional 51 Aboriginal sites/PADs, comprising of 26 artefact scatters, 12 isolated finds, seven rock shelters with artefacts, three potential grinding grooves, two rock shelters with PADs and one rock shelter with art were recorded within the investigation area. Comprehensive descriptions and locations of all newly identified Aboriginal sites and PADs recorded during the survey are presented in the ACHA (refer to **Appendix 12**). These site types are consistent with those previously recorded at UCC and surrounding areas. In total, 219 identified Aboriginal sites/PADs are known to occur within the investigation area for the Proposed Modification, predominantly open artefact sites, representing 70% of the total, but also rock shelters with PADs and/or artefacts, art or grinding grooves (28% of the total) (refer to **Appendix 12**).The Aboriginal stakeholders also identified contemporary values/associations with the investigation area, and as a result UCMPL engaged ACHM to produce a separate assessment to discuss the impacts of the Proposed Modification on intangible cultural heritage values (as described in **Section 6.7.5.1**).

The survey results support the predictive model that there remains potential for additional open artefact evidence to occur within the investigation area. In most of the surveyed area, this evidence is likely to comprise a low to very low-density sub-surface deposit of artefacts, consistent with the survey results and generally representing background discard. However, around Mona Creek located in the north-central and north-eastern portion of the investigation area and an un-named watercourse in the western portion, there is moderate to high potential for numerous more artefacts and sub-surface deposits to be located which may be of research value.

6.7.5.1 Cultural Heritage Values

Discussions with the RAPs provided the following feedback in relation to the contemporary social, cultural and aesthetic values for the Project Area:

- several individuals noted the importance of 'country' and their spiritual connections
- the Mona Creek area is considered highly significant in terms of traditional stories and knowledge which have been handed down verbally over generations
- the Mona Creek area and some higher vantage points provide sensory scenic values
- the proposed additional underground mining area holds social, spiritual and cultural values in the form of song lines
- native grasses, flax lilies and eucalypt trees traditionally provided various resources and medicines within the proposed additional underground mining area
- fauna that traditionally provided resources within the proposed additional underground mining area include possums, bees for honey, birds, fish and 'slipperys' (eel-like fish), crayfish and reeds.

6.7.5.2 Assessment of Significance

The appropriate management of cultural heritage items is usually determined on the basis of their assessed significance as well as the likely impacts of any proposed developments. Cultural, scientific, aesthetic, and historic significance are identified as baseline elements of significance assessment, and it is through the combination of these elements that the overall cultural heritage values of a site, place or area are resolved.

The significance of over 1,000 recorded Aboriginal heritage sites/PADs within the UCCO Project Area have previously been assessed in relation to the criteria outlined above. A number of these Aboriginal sites/PADs are also relevant to the Proposed Modification.

The ACHA assessed the significance of the Aboriginal sites, cultural areas/values and PADs within the Proposed Modification investigation area in relation to criteria derived from the International Council on Monuments and Sites (ICOMOS) *Burra Charter* (refer to **Appendix 12**).

The potential grinding groove sites require more detailed assessment before the nature of their origin can be conclusively established and their significance assessed, with these works proposed to be undertaken under the HMP. As part of the ACHA, a conservative worst-case assessment was undertaken to ensure that an appropriate assessment of these sites was undertaken and that the full extent of potential impacts was assessed.

As a result of the significance assessment, 59.1% of the 66 sites within the Proposed Modification investigation area were assessed as being of low significance within a local context. Of the remainder, 9.1% of sites were assessed as being of low to possibly moderate significance, 24.2% were of moderate or potentially moderate significance and 1.5% were of moderate to high significance. No sites were assessed as being of high significance. It is noted that the Proposed Modification investigation area covers an area larger than the proposed additional underground mining area and not all sites will be impacted by the Proposed Modification (refer to **Section 6.7.6** below for further detail on impacted sites).

It is noted that *all* Aboriginal heritage is of interest and contemporary value to the Aboriginal community. Aboriginal heritage evidence represents a tangible link with traditional past and with the lifestyle and values of community ancestors. It is accepted that the Aboriginal cultural heritage sites discussed within the ACHA are part of the Aboriginal cultural landscape of the area, and that they are all linked and collectively tell an important story about the Aboriginal use of the area. As a result, they are all significant and valued by Aboriginal people and should ideally be protected in the view of the RAPs. As part of the Proposed Modification there will, however, be some impacts and therefore appropriate mitigation and management measures have been identified in the ACHA to address these impacts.

6.7.6 Impact Assessment

The impacts of the Proposed Modification on Aboriginal heritage (comprising the identified Aboriginal objects, the potential resource and cultural values) can potentially manifest itself in two distinct ways:

- direct impacts from surface infrastructure
- indirect impacts to the ground surface through underground mining induced subsidence.

6.7.6.1 Potential Direct Surface Impacts

The Proposed Modification would result in additional surface impact areas associated with proposed surface infrastructure (refer to **Figure 1.3**). The zone of increased surface impacts measures approximately 27.4 ha.

Five Aboriginal sites are located within the areas of increased surface impacts from the Proposed Modification (refer to **Table 6.8**). All of these sites are artefact scatters and they range in significance from low to moderate-high.

Table 6.8 Potential Surface Impacts to Identified Aboriginal Heritage Sites/PADs

Site ID#	Significance[1]	Type of harm	Degree of harm	Consequence of harm	Potential impacts
783	Moderate-high	Direct	Partial	Partial loss of value	Increase due to Proposed Modification
784	Moderate	Direct	Partial	Partial loss of value	Increase due to Proposed Modification
785	Moderate	Direct	Partial	Partial loss of value	Increase due to Proposed Modification
804	Moderate-high	Direct	Total	Total loss of value	Increase due to Proposed Modification
1660	Potentially moderate	Direct	Partial	Partial loss of value	Increase due to Proposed Modification

Notes: [1] Several Aboriginal stakeholders have expressed the view that all sites/places are of high cultural significance and make no differentiation on the comparative level of value between any site or place. This is acknowledged and respected.

With respect to the identified Aboriginal sites located within the surface impact area, the Proposed Modification would result in an increase of surface impacts to five open artefact sites. One site of moderate to high significance would be subject to total impact under the Proposed Modification (ID# 804) and the other four sites would only be partially impacted, including impacts to relatively small portions of the sites ID# 783, 784, 785 and 1660. Site ID#804 is located within the footprint of the proposed ventilation shaft at the northern end of Ulan West Longwall 8A (refer to **Figure 1.3**). While the location of this infrastructure is generally determined by the underground mine plan, it is acknowledged that final location of infrastructure is subject to further detailed mine planning, and may be subject to change as part of implementing the mine plan. Any refinements to infrastructure locations will seek to avoid archaeological sites as far as practicable. Should avoidance not be possible, the management strategy recommended by the ACHA for site ID# 804 is for surface collection if future impacts cannot be avoided. This strategy would assist in mitigating the direct and total impacts anticipated to occur from the Proposed Modification to this site of heritage significance. The ACHA states that excavation of site ID# 804 is not warranted, as the site is not anticipated to host a deposit of research value.

As a result, the potential increase in surface impacts associated with the Proposed Modification was assessed by the ACHA as minor in extent and can be adequately mitigated consistent with established procedures (refer to **Section 6.7.7** for detail on proposed mitigation and management).

6.7.6.2 Potential subsidence impacts

The primary potential impacts of the approved operations and the Proposed Modification on Aboriginal heritage relate to underground mining induced subsidence. The subsidence impacts and consequences associated with the Proposed Modification are expected to be similar to those previously predicted and subsequently observed, and compliant with the subsidence performance measures within PA 08_0184, including some subsidence induced impacts e.g. cracking.

Excluding artefact scatters and isolated finds (as subsidence associated with the Proposed Modification will have no material impact on these site types), a total of 66 Aboriginal sites/PADs susceptible to subsidence related impacts are known to occur within the zone of potential subsidence impacts (refer to **Appendix 12**). These sites/PADs include rock shelters, potential grinding grooves, an ochre quarry and a possible stone arrangement.

The assessment of potential subsidence impacts for each site relates to the potential for rock falls and the probability of 'perceptible impacts', that is, any changes in the rock formations that are associated with mining activity and subsidence movements. Such impacts may include cracking, shear movements, perceptible disturbance of rock formations and rock falls. The level of impact will be dependent on the nature of the archaeological site and the levels of subsidence experienced (i.e. greater levels of subsidence increases ground movements and the potential for disturbance to sites) and an assessment of the probability of perceptible impacts has been completed as part of the ACHA.

Material changes relate to where the potential impacts from subsidence have moved a site above or below the 10% threshold of probability of perceptible impacts (consistent with previous assessments for UCC and monitoring observations to date). The Proposed Modification would result in a material increase in the probability of perceptible impacts for 48 Aboriginal sites/PADs (which include grinding grooves, an ochre quarry and rock shelters with art, artefacts and PADs) and an increase in impacts associated with the ongoing cultural and spiritual connection to the land and resources of the area by the north-eastern Wiradjuri and other Aboriginal persons.

Significantly, however, no impacts are predicted to any other Aboriginal sites of high heritage significance, the Mona Creek rock shelter sites (ID# 180-187) or the Brokenback Back Conservation Area or Grinding Groove Conservation Area. Many of the Aboriginal sites/PADs that may be susceptible to an increase in subsidence impacts are of low heritage significance. However, it is noted that several Aboriginal stakeholders have expressed the view that all of the sites/places are of high cultural significance, and this is acknowledged and respected.

6.7.6.3 Cumulative Impacts

The assessment of cumulative impacts or impacts within a regional context remains unchanged from the assessment completed for the UCCO Project. This assessment found the impacts of the overall UCCO Project would be relatively low within a regional context prior to, and very low after, the implementation of mitigation measures, including when considered in combination with other mining projects in the region such as Moolarben and Wilpinjong (Kuskie, 2009).

In a broader regional context the ACHA concluded that the cumulative impacts of the Proposed Modification in combination with the overall UCCO Project would remain relatively low subject to the implementation of appropriate management and mitigation measures as is proposed.

6.7.7 Management and Mitigation

UCMPL currently implements a comprehensive HMP which provides detailed guidance for the management of heritage evidence within the Project Area. The ACHA found that the HMP, developed in consultation with Aboriginal stakeholders and regulators, provides sufficient policies and actions for the management of Aboriginal heritage for the Proposed Modification.

The following Aboriginal heritage management and mitigation measures are proposed:

- provisions relating to Aboriginal heritage in the HMP for the approved operations will continue to be implemented, including the continued involvement of the Aboriginal community in all aspects of decision-making in relation to their heritage, continued protection and management of existing heritage conservation areas and Aboriginal heritage sites, and continued heritage awareness training for employees and contractors
- management strategies for individual sites as outlined in the ACHA including monitoring, surface collection and potential test/salvage excavation, further investigation and recording and possible relocation of some sites
- inclusion of additional RAPs identified through the consultation process for the Proposed Modification and specification of the involvement of these additional RAPs in all heritage matters associated with the Proposed Modification
- heritage survey prior to any impacts for the areas not previously sampled
- addition of sites to the UCMPL Aboriginal Site Database
- revision of the HMP to consider the Proposed Modification, should the Proposed Modification be approved
- addressing additional issues raised by RAPs during the course of the most recent investigations at future Heritage Review meetings, including potential expansion of the monitoring program, use of three-dimensional photography and/or scanning of potentially impacted sites, and potential opportunities for UCMPL to assist with broader cultural heritage actions to benefit the Aboriginal community.

As outlined in **Section 6.6.1**, UCMPL has developed a conceptual surface infrastructure layout to be assessed, however, it is acknowledged that the detailed design including final location of infrastructure is subject to further exploration and detailed mine planning, and may be subject to change as part of implementing the mine. This is consistent with the needs of an underground mining operation where geological variations and other detailed design considerations affect the final locations of infrastructure above underground mining areas. Any refinements to infrastructure locations will seek to avoid archaeological sites as far as practicable. Where required, further due diligence assessment will be undertaken and any impacts to sites or values will be managed in accordance with the HMP, consistent with current practice at UCC.

6.8 Historic Heritage

The Project Area, including the additional underground mining area, is typical of a rural landscape within the Central Tablelands of NSW. The history of the area from the mid nineteenth century, including the arrival of Europeans and subsequent use as cleared pastoral and agricultural land, through to its exploitation for timber and mineral resources, is reflected in the low potential of the historic archaeological resource and in the evidence of houses and other structures/shelters and former timber getting sites present within the local area.

The European heritage resource of the Project Area generally reflects the documented history and pattern of settlement of the area, which indicates that the land has predominantly been utilised by graziers, agriculturalists, timber getters and miners from the mid nineteenth century. The identified and potential heritage components of the Project Area are of no significance and have no research potential (UCMPL, 2009).

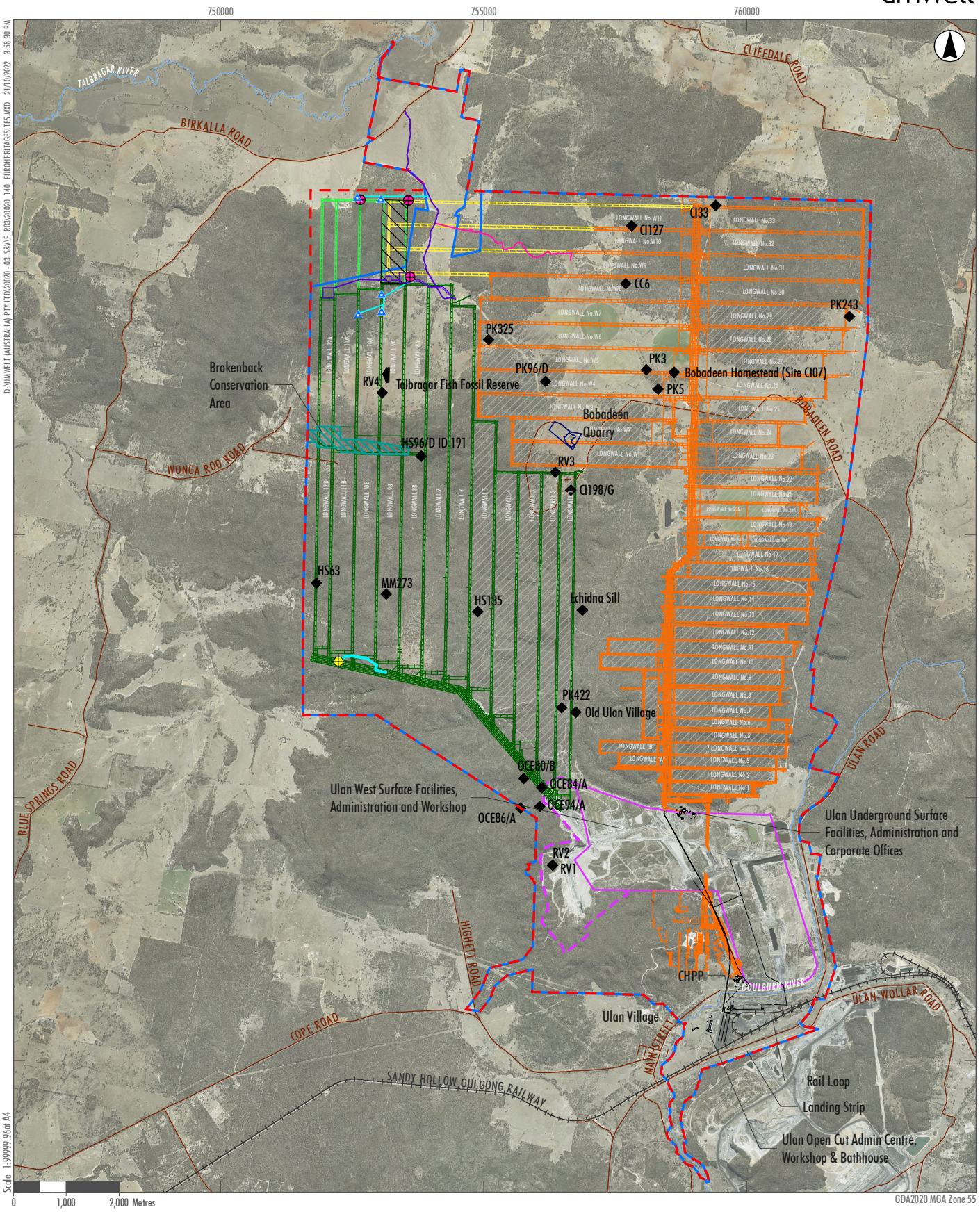
The are no known European heritage sites located within the proposed additional underground mining area (refer to **Figure 6.9**).

6.8.1 Impact Assessment

As no heritage items are located within the area of direct impact or subsidence affectation associated with the Proposed Modification, no impacts to historic heritage are expected as a result of the Proposed Modification.

6.8.2 Management and Mitigation

The HMP (UCMPL, 2019) will remain in effect should the Proposed Modification be approved. The current version of the HMP contains management commitments in relation to an unexpected finds protocol which will continue to be applied to the Proposed Modification.



Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Brokenback Conservation Area
- Bobadeen Quarry
- Roads
- Railway
- Major Watercourses
- Approved Infrastructure related to Mod 6
- Approved Ulan West Mine Plan
- Approved Ulan Underground Mine Plan
- Proposed Ulan Underground Mine Plan Modification
- Previously Mined
- Previous Ulan Open Cut Area
- Approved Ulan Open Cut Extension
- Longwall Option Area
- Proposed Borehole
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Access Track Corridor
- Proposed Ulan West Underground Mine Plan Modification
- Heritage Sites

FIGURE 6.9

Known European Heritage Sites

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)

6.9 Noise

A Noise Impact Assessment (NIA) has been prepared for the Proposed Modification in accordance with the requirements of the NSW Noise Policy for Industry (NPfI) (NSW Environment Protection Authority (EPA, 2017), Interim Construction Noise Guideline (ICNG) (NSW Department of Planning and Environment, 2009) and in consideration of the NSW Voluntary Land Acquisition and Mitigation Policy (VLAMP) (NSW Government, 2018) and the EPA's Draft Construction Noise Guideline (EPA, 2020). The NIA is provided in **Appendix 13** and a summary of findings is provided below.

6.9.1 Assessment Methodology and Criteria

The NIA included predicting noise levels from the Proposed Modification's construction and operational phases at the potentially affected receivers using noise modelling software. The locations of the potentially affected receivers considered in the NIA are shown in **Figure 6.10**. There is also one private property (Lot 72, DP750742) potentially affected by the Proposed Modification from a noise perspective that does not contain a residential dwelling. For this property, noise contours were used to determine noise impacts.

In accordance with the NPfI, an analysis of meteorological data was used to determine if adverse meteorological conditions warranted further assessment in the NIA. The analysis identified the presence of a range of conditions that could enhance the propagation of noise from the Proposed Modification towards sensitive noise receivers. The potential noise-enhancing conditions considered in the NIA are as follows:

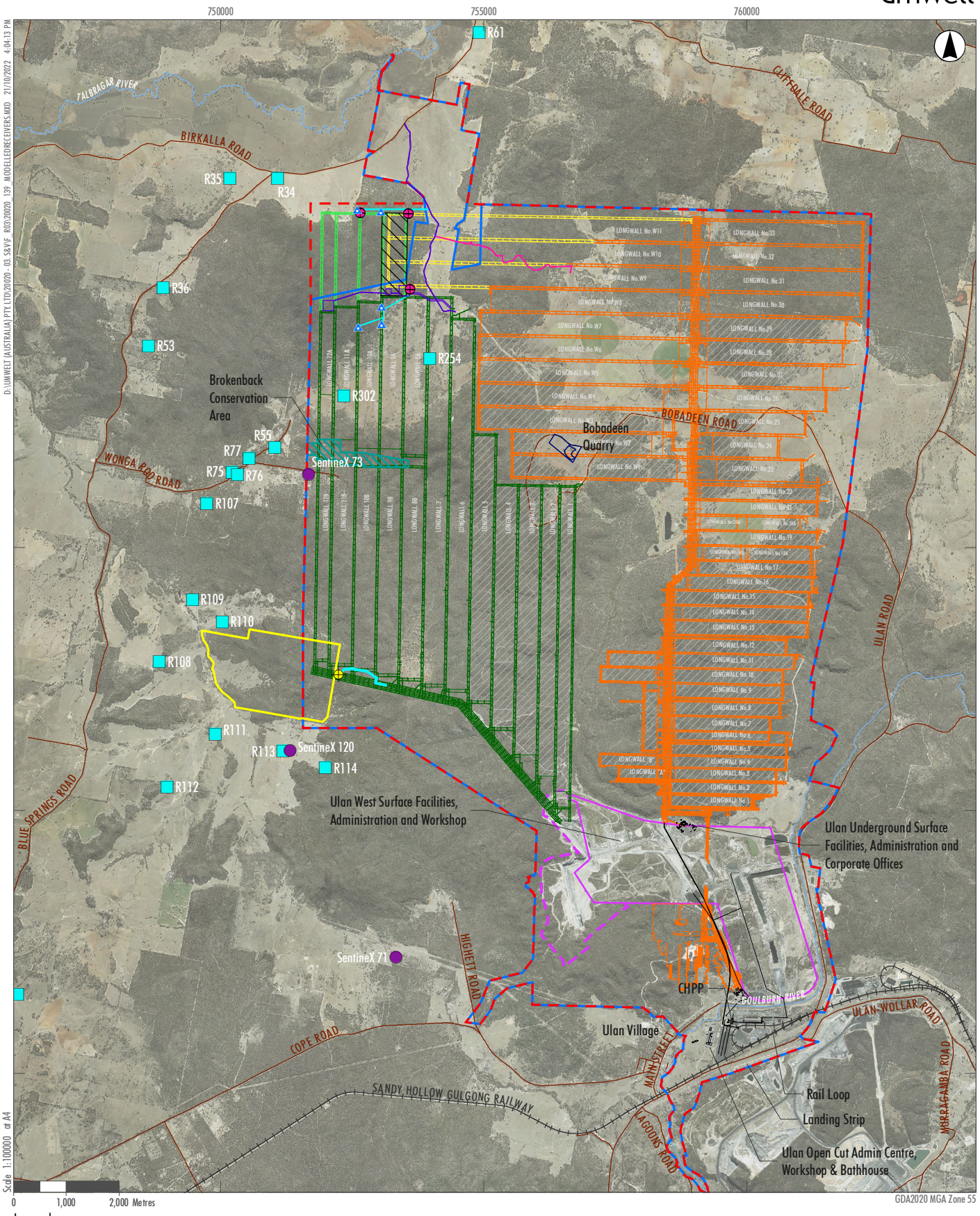
- summer nights: ENE to E winds at 3 m/s
- autumn and spring evenings: SW to W winds at 3 m/s
- autumn and spring nights: SSW to W winds at 3 m/s
- winter evening/nights: SSW to W winds at 3 m/s plus F-class atmospheric stability weather conditions.

6.9.1.1 Construction noise

Noise Management Levels (NML) for the assessment of construction noise were determined based on assumed minimum background noise levels (or Rating Background Level (RBL)) for rural areas (i.e. 35 dB(A) for the day and 30 dB(A) for the evening and night periods). The resulting NML for the assessment of construction noise at all receivers are shown in **Table 6.9**.

Table 6.9 Noise Management Levels

Time of day	Noise Management Level (NML) $L_{Aeq,15minute}$
Recommended Standard Hours Monday to Friday – 7 am to 6 pm Saturday – 8 am to 1 pm No work on Sundays or Public Holidays	Noise affected RBL + 10 = 35 + 10 = 45 dB(A)
	Highly noise affected 75 dB(A)
Outside recommended standard hours	Noise affected RBL + 5 = 30 + 5 = 35 dB(A)



Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Brokenback Conservation Area
- Bobadeen Quarry
- Modelled Receiver Locations
- Unattended Noise Monitoring Location
- Roads
- Railway
- Major Watercourses
- Lot 72 DP750742
- Approved Ulan Underground Mine Plan
- Approved Ulan West Mine Plan
- Previously Mined
- Previous Ulan Open Cut Area
- Approved Ulan Open Cut Extension
- Approved Infrastructure related to Mod 6
- Proposed Vent Shaft
- Proposed Borehole
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Access Track Corridor
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- Longwall Option Area

FIGURE 6.10

Modelled Noise Receiver Locations

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)

6.9.1.2 Operational Noise

The NIA assessed predicted noise impacts against both the existing noise criteria for UCC and against project noise trigger levels established in accordance with Section 2 of the NPfI. Further discussion of the project noise trigger levels is provided in the NIA with the existing UCC noise criteria discussed below.

The existing noise criteria for UCC, being the criteria from Table 2 of Schedule 3 of PA 08_0184 and noise limits from Section L5 of EPL 394, are reproduced in **Table 6.10** and **Table 6.11** respectively. It should be noted that some of these criteria are not applicable to this assessment, either because the property has since been purchased by UCMPL or because it will not be impacted by noise generated by the Proposed Modification (based on distance/topography and as confirmed by noise monitoring data).

Table 6.10 PA 08_0184 Operational Noise Criteria, dB(A)

Location	Day (LAeq,15minute)	Evening (LAeq,15minute)	Night (LAeq,15minute)	Night (LA1,1minute)
Condition 2 – Noise criteria				
R254 (EPL Point 24, NM7)	38	38	37	45
R57 [1] (EPL Point 25, NM8)	37	37	36	45
All privately-owned land	35	35	35	45
Ulan Public School [2] (EPL Point 26, NM4)	35	35	35	-
Condition 2A – Construction of the surface facilities associated with MOD 4				
R39 (EPL Point 36) [3] R40 (EPL Point 37) [3]	41	38	38	52
All privately-owned land	40	35	35	52

Notes: [1] *Mine owned.*
[2] *Noise criteria is internal and only applies when in use.*
[3] *Noise limits only apply during the construction of surface facilities associated with MOD 4.*

Table 6.11 EPL 394 Noise Limits, dB(A)

Location	Day (LAeq,15minute)	Evening (LAeq,15minute)	Night (LAeq,15minute)	Night (LA1,1minute)
EPL Point 24 (NM7, R254)	38	38	37	45
EPL Point 25 [1] (NM8, R57)	37	37	36	45
EPL Point 26 [2] (Ulan Public School)	35	35	-	-
EPL Point 36 [3] (R39)	41	38	38	52
EPL Point 37 [3] (R40)	41	38	38	52
EPL Point 38 (All privately-owned land)	35	35	35	45
EPL Point 39 [3] (All privately-owned land)	40	35	35	52

Notes: [1] *Mine owned.*
[2] *Noise limit is internal and only applies when in use.*
[3] *Noise limits only apply during the construction of the surface facilities associated with MOD 4.*

The noise limits set out in EPL 394 apply under all meteorological conditions except wind speeds greater than 3 metres/second at 10 metres above ground level or Class F stability conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or Class G stability conditions.

Operational noise was also assessed against the noise acquisition criteria and cumulative noise criteria, with these criteria outlined in the NIA.

6.9.2 Predicted Noise Impacts

6.9.2.1 Construction

The construction noise assessment results indicate that the construction activities that occur during the recommended standard construction hours will comply with the adopted NML of 45 dB(A) under standard meteorological conditions at all receivers. Under the NPfI an assessment of the noise impacts during noise-enhancing conditions was not required as these conditions are not common during standard construction hours. Notwithstanding this, the management of the construction activities should aim to mitigate noise impacts during noise-enhancing conditions, when they occur.

Construction activities that occur outside of recommended standard construction hours were assessed under both standard meteorological conditions and noise-enhancing meteorological conditions, as the analysis of the meteorological data indicated that wind effects and temperature inversions that enhance noise propagation are a feature of the area during the evening and night time.

The results indicate that activities associated with the construction of the fan shafts outside recommended standard construction hours could exceed the adopted NML of 35 dB(A) at one receiver location (R254) under standard meteorological conditions and two receiver locations (R34 and R254) under the noise-enhancing meteorological conditions. The potential exceedance at R34 during noise enhancing meteorological conditions is associated with easterly wind conditions during summer nights. The potential exceedance at R254 could occur during calm conditions, during inversion conditions and when the wind is from the east-north-east.

The management of construction activities should aim to avoid any work outside recommended standard hours. Where this cannot be avoided, the noise impact of the construction activities will need to be carefully managed during noise-enhancing meteorological conditions to avoid potential noise impacts. Mitigation and management measures are further discussed in **Section 6.9.3**.

6.9.2.2 Operations

The operational noise assessment results indicate that the operational phase scenarios assessed (which consider the sequential operation of ventilation fans) will comply with the noise limits/criteria at all receiver locations during both standard and noise-enhancing meteorological conditions.

Predicted noise contours from the worst-case operational phase noise scenario to the private vacant property at Lot 72 DP750742 do not exceed the existing noise acquisition criteria over more than 25% of the property.

The Proposed Modification is not predicted to exceed the equivalent 15-minute project amenity noise level of 38 dB(A) at any receiver. As stated by the NPfI, where a project can achieve the project amenity noise level no further consideration of cumulative industrial noise is required as the project is considered unlikely to result in adverse cumulative noise impacts.

6.9.3 Mitigation and Management

6.9.3.1 Construction

Construction work for much of the Proposed Modification will be scheduled, where practicable, to be conducted within the ICNG recommended standard construction hours. However, due to the nature of the construction activities for the ventilation fan shafts and dewatering boreholes, construction work may be required outside of standard hours.

UCMPL prepared a Surface Infrastructure Construction Noise Management Plan (CNMP) for the construction of the surface infrastructure for Modification 4. The mitigation and management measures outlined in the Modification 4 CNMP have been reviewed and are considered appropriate for implementation during construction of the Proposed Modification. These measures include the following controls:

- consultation with landowners and regulators
- consideration of the timing of construction activities and impacts upon cumulative noise generated at neighbouring properties
- notification to stakeholders of the timing of the commencement and finish of the construction noise period
- mitigation measures to be implemented and learnings from the previous construction campaign such as equipment location and orientation, and the use of temporary noise screens, where required
- modelling results of the effectiveness of the proposed measures
- measures to manage any potential residual exceedances, including:
    - noise monitoring - targeted attended monitoring, or if required, real-time monitoring with triggers for response
    - a TARP related to monitoring results that triggers further noise management controls.
- management of noise levels in accordance with any private noise agreements for alternative criteria that have been reached with a landholder following consultation.

Further noise management controls will be implemented at construction sites, as required, including:

- modification or pausing of construction activities during specific adverse meteorological conditions, particularly in the evening/night time, which may include operating only one or two items of plant
- programming the noisiest construction activities to occur during the day
- modification of equipment layout and the use of portable noise barriers around noise-generating equipment.

6.9.3.2 Operations

Noise monitoring and management at the UCC will continue in accordance with the approved Noise Management Plan (UCMPL, 2020). The current noise monitoring program includes a combination of attended and unattended (or real-time) noise monitoring and is considered to be appropriate for the Proposed Modification.

While operational noise levels are not predicted to exceed the noise limits/criteria at any receiver locations, it is recommended the enclosure around the power borehole substation (modelled as a 15 MVA transformer) is oriented to reduce the transmission of noise to the west of the installation.

6.10 Air Quality

A comprehensive Air Quality Impact Assessment (AQIA) of potential air quality impacts associated with the Proposed Modification was prepared by Jacobs Group (Australia) Pty Limited (Jacobs). A summary of the key findings is provided in this section and the full report is provided in **Appendix 14**.

A key consideration of the project design was to continue to operate the UCC in accordance with relevant air quality criteria. UCMPL implements a range of proactive and reactive air quality emission management measures, implemented as part of the existing approved Air Quality Management Plan (AQMP), which will continue to be implemented as part of the Proposed Modification.

6.10.1 Potential Air Quality Issues

Emissions to air at the UCC may arise from a variety of activities including coal handling, coal processing, wind erosion from exposed areas and venting of air from the underground operations. The Proposed Modification will involve minor changes to surface infrastructure, and in terms of the potential to affect current air quality outcomes, the most significant change will be the construction and operation of three ventilation shafts, and associated infrastructure corridors, to the north-west of the existing project approval boundary.

The potential air quality issues associated with the Proposed Modification have been identified as:

- dust arising due to the Proposed Modification (during both construction and operation), that is, particulate matter in the form of:
    - Total Suspended Particulates (TSP)
    - Particulate Matter with equivalent aerodynamic diameter of 10 microns or less (PM_{10})
    - Particulate Matter with equivalent aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$)
    - Deposited dust.
- diesel exhaust (PM_{10}, $PM_{2.5}$ and nitrogen dioxide (NO_2)) from plant and equipment at the UCC.

6.10.2 Air Quality Criteria

The predicted air quality impacts from the Proposed Modification have been assessed against the air quality criteria set by the EPA as part of the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (Approved Methods) (EPA, 2022).

The criteria are outlined in **Table 6.12** and apply to sensitive receptors such as privately owned residences. The air quality emissions criteria for the existing approved development, as prescribed in PA 08_0184 are also included in **Table 6.12** for comparison.

Table 6.12 EPA Air Quality Assessment Criteria

Air quality indicator	Averaging time	EPA Criterion	PA 08_0184 Criterion
Particulate matter (PM_{10})	24-hour	50 µg/m^3	50 µg/m^3
	Annual	25 µg/m^3	30 µg/m^3
Particulate matter ($PM_{2.5}$)	24-hour	25 µg/m^3	N/A
	Annual	8 µg/m^3	N/A
Particulate matter (TSP)	Annual	90 µg/m^3	90 µg/m^3
Deposited dust	Annual (maximum increase)	2 g/m^2/month	2 g/m^2/month
	Annual (maximum total)	4 g/m^2/month	4 g/m^2/month
Nitrogen dioxide (NO_2)	1-hour	164 µg/m^3	N/A
	Annual	31 µg/m^3	N/A

Source: Table 7.1 of the Approved Methods (EPA, 2022).
PA08_0184, Schedule 3, condition 19.

The EPA air quality assessment criteria relate to the total concentration of air pollutant in the air (that is, cumulative) and not only the contribution from a project. Therefore, consideration of background levels and other industrial sources needs to be made when using these criteria to assess the potential impacts.

In situations where background levels are elevated, the proponent must "demonstrate that no additional exceedances of the impact assessment criteria will occur as a result of the proposed activity and that best management practices will be implemented to minimise emissions of air pollutants as far as is practical" (EPA, 2022).

As indicated above, the criteria in the existing Project Approval differ from those in the Approved Methods as the update to the Approved Methods occurred after granting of the Project Approval. The Proposed Modification has been assessed against the current criteria detailed in the Approved Methods.

The AQIA also considered the VLAMP (NSW Government, 2018) which provides the NSW Government's policy for voluntary mitigation and land acquisition to address dust (particulate matter) impacts from state significant mining, petroleum and extractive industry developments.

6.10.3 Existing Environment

The AQIA included a review of the local meteorological and ambient air quality conditions in the vicinity of the Proposed Modification with the objective of identifying any existing air quality issues and meteorological conditions which would typically influence the local air quality conditions. The review considered data collected from existing meteorological and air quality monitoring networks in the area surrounding UCC as shown in Figure 3 of **Appendix 14**.

The following conclusions were made from the review of local meteorological and ambient air quality monitoring data:

- The patterns of wind in the vicinity of UCC (i.e. most common winds arising from the east or west) reflect the influences of the local topographical environment and do not vary significantly from year to year.
- There was a deterioration in air quality conditions in many parts of NSW, including the Central Tablelands, between 2017 and 2019 due to the influence of drought, dust storms and bushfires. These conditions led to increases in the number of days when the 24-hour average PM_{10} concentration exceeded 50 µg/m^3, and increases in the annual average PM_{10} concentrations.
- No known monitoring of $PM_{2.5}$ is conducted in the vicinity of the UCC. The closest air quality monitoring stations which record concentrations of $PM_{2.5}$, and with publicly available data, are located at Bathurst, Orange and Muswellbrook. These monitoring sites are all located close to regional population centres, and display $PM_{2.5}$ concentrations that approach, and sometimes exceed, EPA assessment criteria, largely due to the influence of domestic heating in winter. Therefore, none of these sites would measure $PM_{2.5}$ concentrations that are representative of levels in the vicinity of the UCC.
- Measured TSP, dust deposition and NO_2 levels from 2015 to 2020 have all been below relevant criteria.
- UCMPL has complied with the air quality criteria specified in PA 08_0184 in all of the past six years.

6.10.4 Assessment Methodology

The AQIA was undertaken in accordance with the EPA's Approved Methods (EPA, 2022), which specifies how assessments based on the use of air dispersion models should be undertaken.

The most significant emission to air from the Proposed Modification will be dust (particulate matter) due to material handling, transport and processing. Total dust emissions have been estimated for a worst-case operational scenario using the material handling schedule, equipment listing and mine plans combined with relevant emissions factors.

Emissions from diesel exhausts were also assessed, although they were deemed a lower air quality impact risk due to the relatively few emission sources involved and the large distances between sources and sensitive receptors. Regardless, a review of the potential impacts of such emissions from the Proposed Modification was undertaken, including modelling to quantify impacts in terms of NO_2 and PM_{10}.

Further details on the air quality assessment methodology, including model calibration, emission calculations and assumptions are provided in **Appendix 14**.

6.10.5 Assessment of Impacts

6.10.5.1 Construction

The potential significance and impacts of construction dust have been determined from a qualitative review, taking into consideration the intensity, scale, location and duration of the proposed works.

Air quality impacts during construction would largely result from dust generated from work associated with additional infrastructure and upgrades to existing infrastructure that would be required to support the Proposed Modification. Construction and upgrades of infrastructure would occur in parallel with ongoing mining operations.

The specific quantities of materials to be handled during construction are expected to be orders of magnitude lower than the 20 Mtpa of coal handled during existing operations. This means that emissions (as particulate matter) from construction works will also be orders of magnitude lower than the emissions that have been quantified and assessed for operations. Therefore, the potential air quality impacts of the construction works are likely to be well within the impacts of operations and construction works are not predicted to impact on air quality at sensitive receivers.

Although adverse impacts are not predicted, exposed areas will be stabilised as quickly as possible and appropriate dust suppression methods (such as the use of water carts, definition of trafficked areas, imposition of vehicle speed limits and constraints on work during unfavourable weather conditions) will be used to keep dust impacts to a minimum.

6.10.5.2 Mining Dust

As outlined in the sections below, the predicted dust emissions from the UCC with the Proposed Modification is predicted to meet all relevant dust (particulate matter) criteria.

Particulate Matter (as PM_{10})

The EPA does not prescribe a project-only criterion for 24-hour average PM_{10}, however the 24-hour average PM_{10} concentration is applied as an incremental criterion in the VLAMP, for the purposes of determining land acquisition. Modelling indicates that the project-specific contribution of the UCC (with the Proposed Modification) at maximum production will not exceed a 24-hour average PM_{10} concentration of 50 µg/m^3 at any sensitive receptor.

The cumulative 24-hour average and annual average PM_{10} concentrations were also assessed. The EPA's criteria for both 24-hour average and annual average PM_{10} concentrations relate to the total concentration in the air and not just the contribution from the UCC (with the Proposed Modification). Modelling results indicated that the Proposed Modification will not cause exceedances of the EPA criterion for 24-hour average PM_{10} (50 µg/m^3) at any sensitive receptors. The modelling results also indicate that the Proposed Modification will not cause exceedances of the EPA criterion for annual average PM_{10} (25 µg/m^3) at any sensitive receptor.

Particulate Matter (as $PM_{2.5}$)

The EPA criteria for both the 24-hour average and annual average $PM_{2.5}$ concentrations relate to the total concentration in the air and not just the contribution from the UCC.

Modelling results indicate that the Proposed Modification will not cause exceedances of the EPA criterion for either 24-hour average $PM_{2.5}$ (25 µg/m^3) or annual average $PM_{2.5}$ (8 µg/m^3) at any sensitive receptor.

Particulate Matter (as TSP)

The EPA's criterion for annual average TSP relates to the total concentration in the air and not just the contribution from the UCC.

Modelling results indicate that the Proposed Modification will not cause exceedances of the EPA criterion for annual average TSP (90 µg/m^3) at any sensitive receptor.

Deposited Dust

Modelling results indicate that the EPA's assessment criteria for incremental deposited dust (2 g/m^2/month) and total deposited dust (4 g/m^2/month) will not be exceeded due to the UCC (with the Proposed Modification) at any sensitive receptor.

6.10.5.3 Diesel Exhaust

The EPA criteria for both the maximum 1-hour average and annual average NO_2 relates to the total concentration in the air and not just the contribution from the UCC.

Modelling results indicate that the Proposed Modification will not cause exceedances of the EPA criterion for maximum 1-hour average NO_2 (164 µg/m^3) at any sensitive receptors.

Modelling results also indicate that the Proposed Modification will not cause exceedances of the EPA criterion for annual average NO_2 (31 µg/m^3) at any sensitive receptors.

6.10.6 Monitoring and Management

The existing proactive and reactive air quality emission management measures currently implemented as part of the existing approved AQMP at the UCC will continue to be adopted as part of the Proposed Modification. This will include the continued implementation of operational controls during adverse weather conditions to minimise impacts. These operational controls result in reduced levels of activity during adverse meteorological conditions, identified through a TARP.

The current AQMP will be reviewed and revised where necessary, should the Proposed Modification be approved. The modelling results show that the air quality impacts due to the Proposed Modification would be relatively minor and that impact levels would not exceed relevant EPA assessment criteria at the nearest sensitive receptors. Therefore, the AQIA found that no additional dust emission mitigation is warranted, and the current monitoring regime is considered to be appropriate.

6.11 Greenhouse Gas and Energy

A comprehensive Greenhouse Gas and Energy Assessment (GHGEA) has been prepared for the Proposed Modification and is contained within **Appendix 15**. The scope of the GHGEA included greenhouse gas emission projections, energy use calculations and an assessment of climate change impacts for the Proposed Modification.

6.11.1 Assessment Methodology

The GHGEA framework is based on the methodologies and emission factors contained in the National Greenhouse Accounts (NGA) Factors 2020 (the NGA Factors) (Commonwealth of Australia, 2020). The assessment framework also incorporates the principles of The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (the GHG Protocol) (WRI/WBCSD, 2004).

The GHG Protocol provides an internationally accepted approach to greenhouse gas accounting and provides guidance on setting reporting boundaries, defining emission sources and dealing with issues such as data quality and materiality.

Scope 1 emissions (direct emissions over which the Proponent has a high level of control (e.g. fuel usage) and Scope 2 emissions (emissions from the generation of purchased electricity consumed by the Proposed Modification) were calculated.

Scope 3 emissions (indirect emissions that are a consequence of the activities of the Proposed Modification, including emissions generated upstream and downstream by providers/users of energy, materials and transport) were also calculated.

Consistent with the National Inventory Report, ventilation fugitive emissions were forecast using an implied emissions factor, which was derived from site specific National Greenhouse and Energy Reporting data.

The Proposed Modification has a number of potential emission sources, however, the dominant emission sources often targeted by mitigation measures and of interest to stakeholders can be summarised as:

- fugitive emissions
- diesel use
- electricity use
- materials use
- product transport
- product use.
- These emission sources were considered in the GHGEA.

6.11.2 Results

The Proposed Modification's life of mine (LOM) greenhouse gas emissions are summarised in **Table 6.13**.

Table 6.13 Summary of Greenhouse Gas Emissions

Scope	Source	Source Totals (t CO_2-e)	Scope Totals (t CO_2-e)
Scope 1 (Direct)	Diesel use	29,483	129,308
	Fugitive emissions	99,825	
Scope 2 (Indirect)	Electricity	246,517	246,517
Scope 3 (Indirect)	Product use	61,501,321	64,590,429
	Product transport	3,061,163	
	Associated with energy extraction and distribution	27,807	
	Materials transport	138	
Total greenhouse gas emissions associated with the Proposed Modification			**64,966,254**

Scope 1 emissions are expected to contribute only 0.2% of total emissions from the Proposed Modification due to the relatively low diesel demands of an underground mine and the low fugitive gas content of the UCC coal reserves, characteristic of reserves in the Western Coalfield of NSW. The current UCC operations are considered non-gassy, as they produce relatively low levels of carbon dioxide, and methane levels are also below reliable detection limits (refer to **Appendix 15** for further details). The Proposed Modification is forecast to generate approximately 130,000 t CO_2-e of Scope 1 emissions over its lifetime. The majority of Scope 1 emissions will be generated by the ventilation system releasing coal mine waste gas (fugitive emissions) and diesel consumption. UCMPL has a direct influence over Scope 1 emissions, which will be subject to management and mitigation plans.

The Proposed Modification is forecast to consume approximately 1,516,000 GJ of energy from diesel and grid electricity which will generate approximately 247,000 t CO_2-e of Scope 2 emissions. Scope 2 emissions are produced by electricity generators in NSW. UCMPL is influencing reductions in Scope 2 emissions by driving electricity reduction and mining efficiency initiatives. The forecast energy use intensity of the Proposed Modification is considered to fall below the normal range when compared with other underground coal mining operations across Australia as a result of ongoing energy efficiency initiatives being implemented at UCC through equipment selection, optimised scheduling and reject reduction. Energy efficiency was a key driver for the design of the extended mine plan, as energy usage is a direct driver of cost as well as greenhouse gas emissions.

The Proposed Modification's greenhouse gas inventory is dominated by Scope 3 emissions (representing 99.4% of the total greenhouse gas emissions associated with the Proposed Modification) which are forecast to be approximately 65,000,000 t CO_2-e. Scope 3 emissions are indirect emissions that are associated with the Proposed Modification but occur at sources owned or controlled by other entities. As such, UCMPL has no operational control over Scope 3 emissions. Scope 3 emissions acknowledge that products will continue to generate greenhouse gas emissions as they move through a value chain. The primary sources of Scope 3 emissions for the Proposed Modification are product transport and consumption of coal products. Coal produced by the Proposed Modification will be transported to Newcastle by train, and then shipped internationally to thermal coal consumers.

6.11.3 Impact Assessment Summary

The greenhouse gas emissions generated by the Proposed Modification have the potential to impact the physical environment and the greenhouse gas reduction objectives of both national and international governing bodies.

6.11.3.1 Impacts on the Environment

Greenhouse gas emissions from the Proposed Modification will have a dispersive impact as they are highly mobile and are generated up and down the supply chain. The accumulation of greenhouse gas or carbon in 'carbon sinks' is the primary impact of emissions. Historically, anthropogenic greenhouse gas emissions have accumulated in three major carbon sinks – the ocean (30%), terrestrial plants (30%) and the atmosphere (40%) (Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, 2014).

The accumulation of greenhouse gas in the atmosphere is an important driver of global warming, sea level rise and climate change. Sea level rise and climate change may have many ramifications for the natural and built environment. The accumulation of greenhouse gas in the ocean is also an important driver of ocean acidification (Intergovernmental Panel on Climate Change, 2013).

The Proposed Modification, in isolation, is unlikely to influence global emission trajectories, however, it will contribute emissions. Future emission trajectories will largely be influenced by global scale issues such as technology, population growth and greenhouse gas policy.

6.11.3.2 Impact on Policy Objectives

The Proposed Modification is unlikely to materially increase the national or State effort required to reach Australia's and NSW's 2030 greenhouse gas mitigation targets. Further it is unlikely to limit Australia or NSW achieving their mitigation targets. As part of implementing the Proposed Modification, UCC will seek to mitigate greenhouse gas emissions through ongoing energy efficiency initiatives and optimising productivity.

Glencore has stated that it is committed to transitioning to a low-carbon economy, and announced publicly in 2021 that it would continue to responsibly source the commodities that advance everyday life through a unique business model that enables the production, recycling and marketing of the materials needed to decarbonise energy while simultaneously reducing emissions.

During 2021 Glencore strengthened its commitment to reducing its total emissions footprint (Scope 1, 2 and 3) which underpins its ambition to be a net-zero emissions company by 2050. The revised targets are:

- 15% by 2026 (on 2019 levels)
- 50% by 2035 (on 2019 levels)
- net zero total emissions by 2050 across Glencore's global mining business.

Glencore's focus remains on reducing its total emissions footprint, including Scope 3 emissions, which is critical to achieve the goals of the Paris Agreement. The Proposed Modification and its direct and indirect emissions have been taken into consideration as part of Glencore's broader climate change commitments, and have been included in Glencore's decarbonisation pathway together with the emissions reduction targets outlined above.

6.11.4 Mitigation Measures

UCMPL implements reasonable and feasible management controls to mitigate Scope 1 and 2 greenhouse gas emissions associated with current operations. These are documented in the Air Quality and Greenhouse Gas Management Plan for the Ulan Complex (Glencore, 2021).

UCMPL has incorporated a range of measures into the Proposed Modification with the aim of minimising potential greenhouse gas emissions and improving energy efficiency. Energy efficiency was a key driver for the design of the extended mine plan, as energy usage is a direct driver of cost as well as greenhouse gas emissions. The Proposed Modification design inherently minimises greenhouse gas emissions generated from the mining operations (Scope 1 emissions) through measures including:

- limiting the number of drive headings, minimising the size of the ventilation system and shortening travel distances
- utilising existing mining equipment that has high energy efficiency and optimised motor sizes
- scheduling activities so that equipment operation is optimised and automatically shutting down equipment when not in use
- reducing reject percentage through monitoring of CHPP density set points to extract highest yields.

As a result of ongoing energy efficiency measures across approved operations, energy and greenhouse gas intensities remain lower than predicted in the 2009 Environmental Assessment (Umwelt, 2009) resulting in lower than predicted Scope 1 and Scope 2 emissions for approved operations at the UCC (Glencore, 2021).

6.12 Visual

As the Proposed Modification mainly involves underground mining, there is limited potential for visual impacts. Potential impacts are limited to proposed additional infrastructure:

- three ventilation shafts and associated infrastructure corridors
- five dewatering bores and associated infrastructure corridors
- an alternate access track
- an infrastructure corridor and service borehole to the south-west of Ulan West.

A visual assessment was completed to identify potential visual impacts associated with the Proposed Modification.

6.12.1 Existing Visual Environment

The visual character of the region is diverse, with a range of landforms, vegetative cover patterns and land uses resulting in considerable variations in scenic quality. The UCC is a mixture of undulating valley floor to steeper slopes and rocky escarpments. This is typical of the landforms evident in the eastern uplands of the Great Dividing Range (Umwelt, 2015).

The dominant land uses within and adjacent to the UCC are mining and primary industries. The area to the south and south-west is dominated by rural residential landholdings. The Moolarben Coal Mine is located adjacent to the southern and eastern boundary of the UCC and the Wilpinjong Coal Mine is located approximately 7 km to the south-east. Private quarrying activities for minerals also occur immediately east of and within the UCC. Grazing and cropping activities are also widely spread throughout the surrounding area, particularly in the area to the north where the Talbragar River alluvial flood plains are used for intensive cropping (Umwelt, 2015).

Visual amenity in the Ulan region is also dominated by the presence of large areas of National Parks and conservation areas, which provide connectivity of vegetation across the region (Eco Logical Australia, 2018).

Views of the UCC existing operations are possible to varying degrees from a number of surrounding residential receivers. However, the local topography and vegetation heavily restrict the visibility of the mine. Therefore, any views of the UCC operations from private residences are either obstructed or long-distance views. Unobstructed views of mining operations are predominantly available from local transport corridors including Ulan Road, Ulan-Wollar Road and Cope Road (Umwelt, 2015).

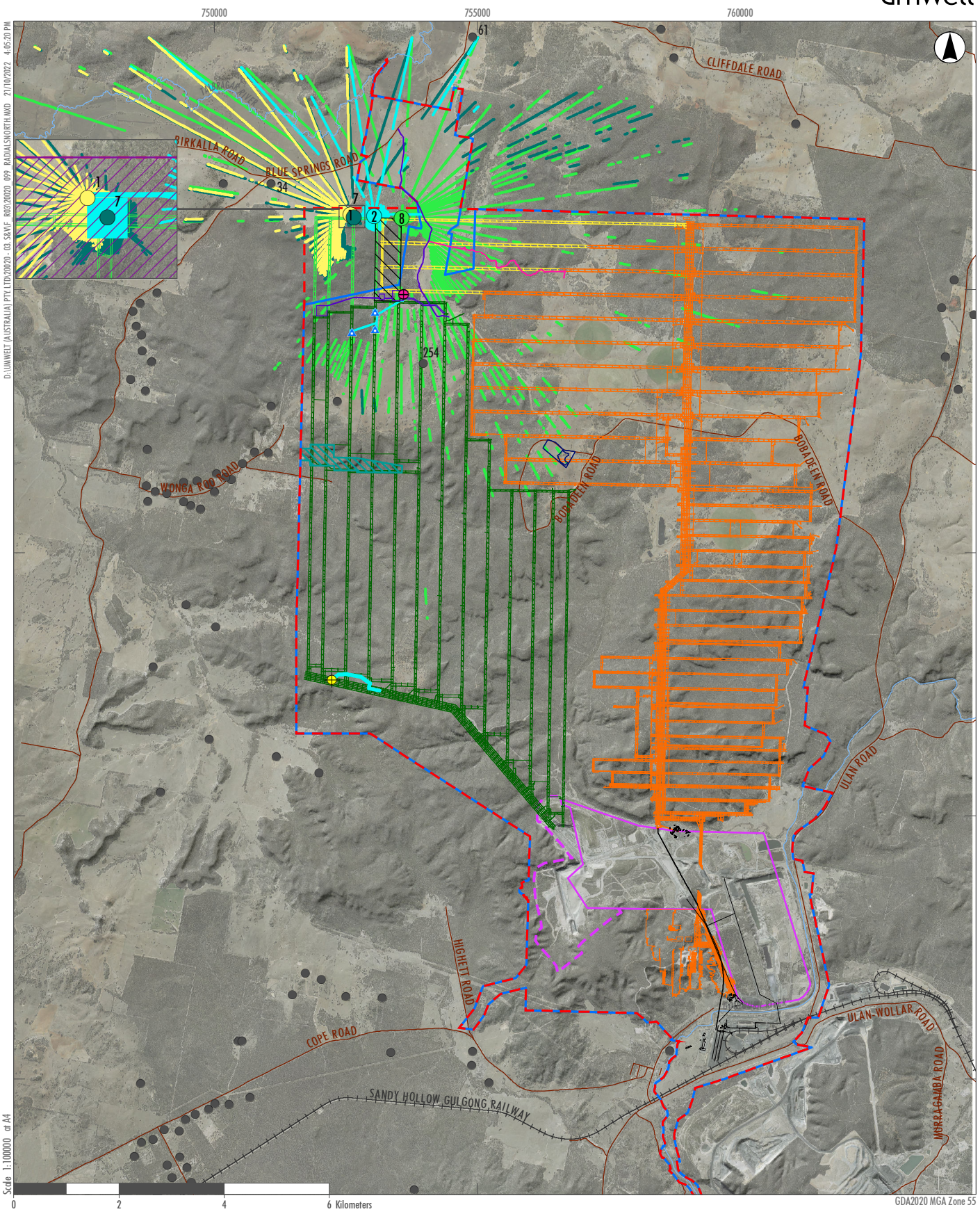
As part of the progressive rehabilitation of its existing mining operations, UCMPL is currently maintaining vegetation planting to screen views. Further screening has occurred through completion of rehabilitation of the Goulburn River diversion, as described in the Goulburn River Diversion Remediation Plan (Glencore, 2016). Extensive vegetation planting has been undertaken on the southern boundary along Ulan Road (Umwelt, 2015).

6.12.2 Potential Visual Impact

As noted above, the Proposed Modification involves underground mining, which has very little surface visibility, other than relatively minor surface infrastructure components which include ventilation shafts, dewatering boreholes, a service borehole and associated services and access tracks (refer to **Figure 1.3**).

An assessment of the existing visual setting and viewshed in and around the Project Area was undertaken to determine the potential visibility of the Proposed Modification. Viewshed analyses were then developed using a detailed three-dimensional topographic model and electronic data files relating to site-specific and other surrounding infrastructure. A series of viewshed analyses were used to estimate, based on the existing topography of the surrounds, where views of the proposed infrastructure may be visible from specific sensitive viewing locations such as private properties.

The viewshed analyses in **Figure 6.11**, **Figure 6.12** and **Figure 6.13** illustrate areas in the surrounding landscape where features of the Proposed Modification may be visible from a height of 1.7 m (i.e. from approximate eye height) based on the operational height of the infrastructure. It should be noted that the analyses are topography-based only and do not include vegetation which may screen a portion of a viewshed. On this basis, the assessment is considered worst case.



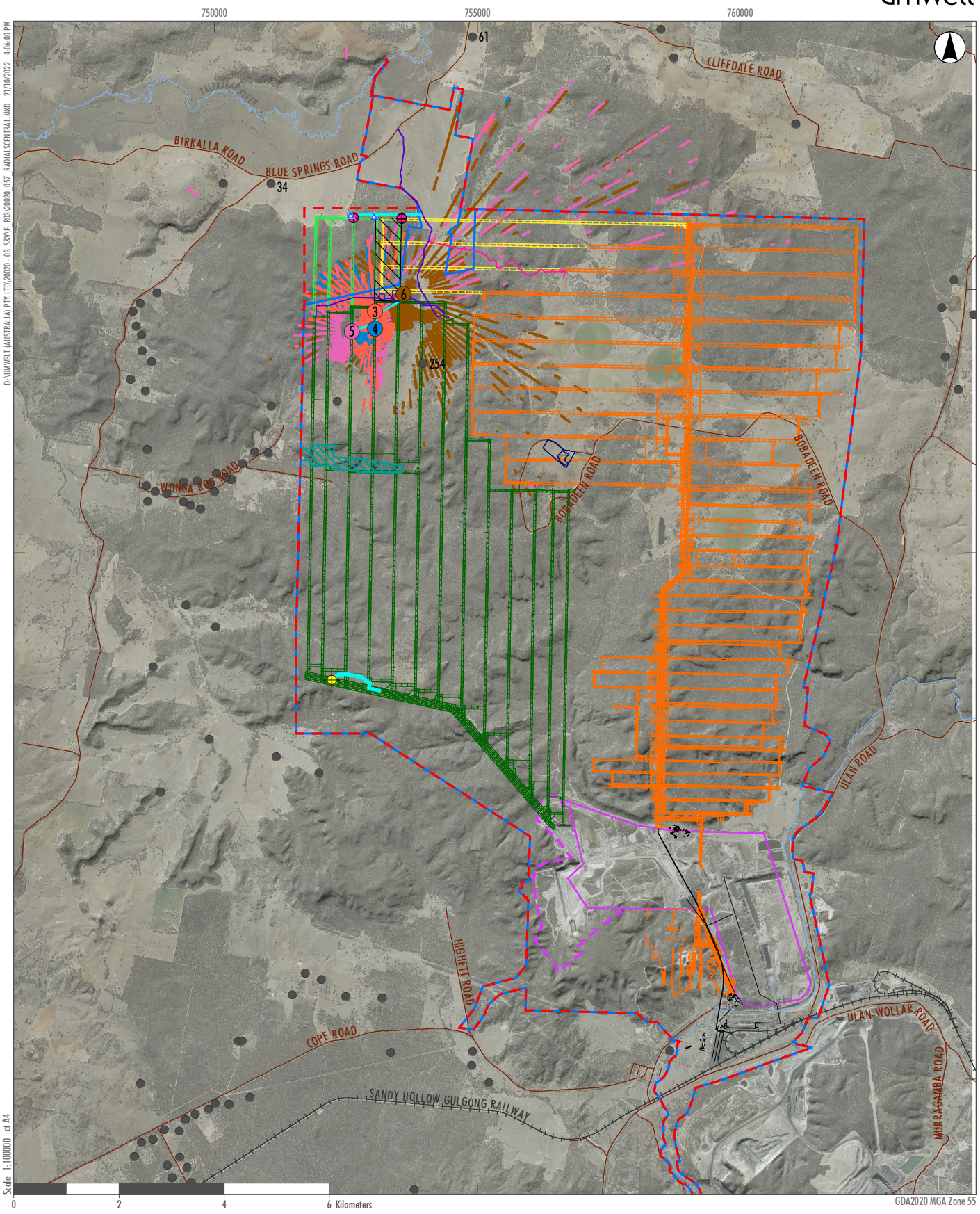
Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Brokenback Conservation Area
- Bobadeen Quarry
- Roads
- Railway
- Major Watercourses
- Private Residence
- Approved Ulan Underground Mine Plan
- Approved Ulan West Mine Plan
- Longwall Option Area
- Previous Ulan Open Cut Area
- Approved Ulan Open Cut Extension
- Approved Infrastructure related to Mod 6
- Proposed Borehole
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Access Track Corridor
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- 1
- 2
- 7
- 8
- Visible
- Visible
- Visible
- Visible

FIGURE 6.11

Viewshed Analysis North

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)



Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Brokenback Conservation Area
- Bobadeen Quarry
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- Major Watercourses
- Private Residence
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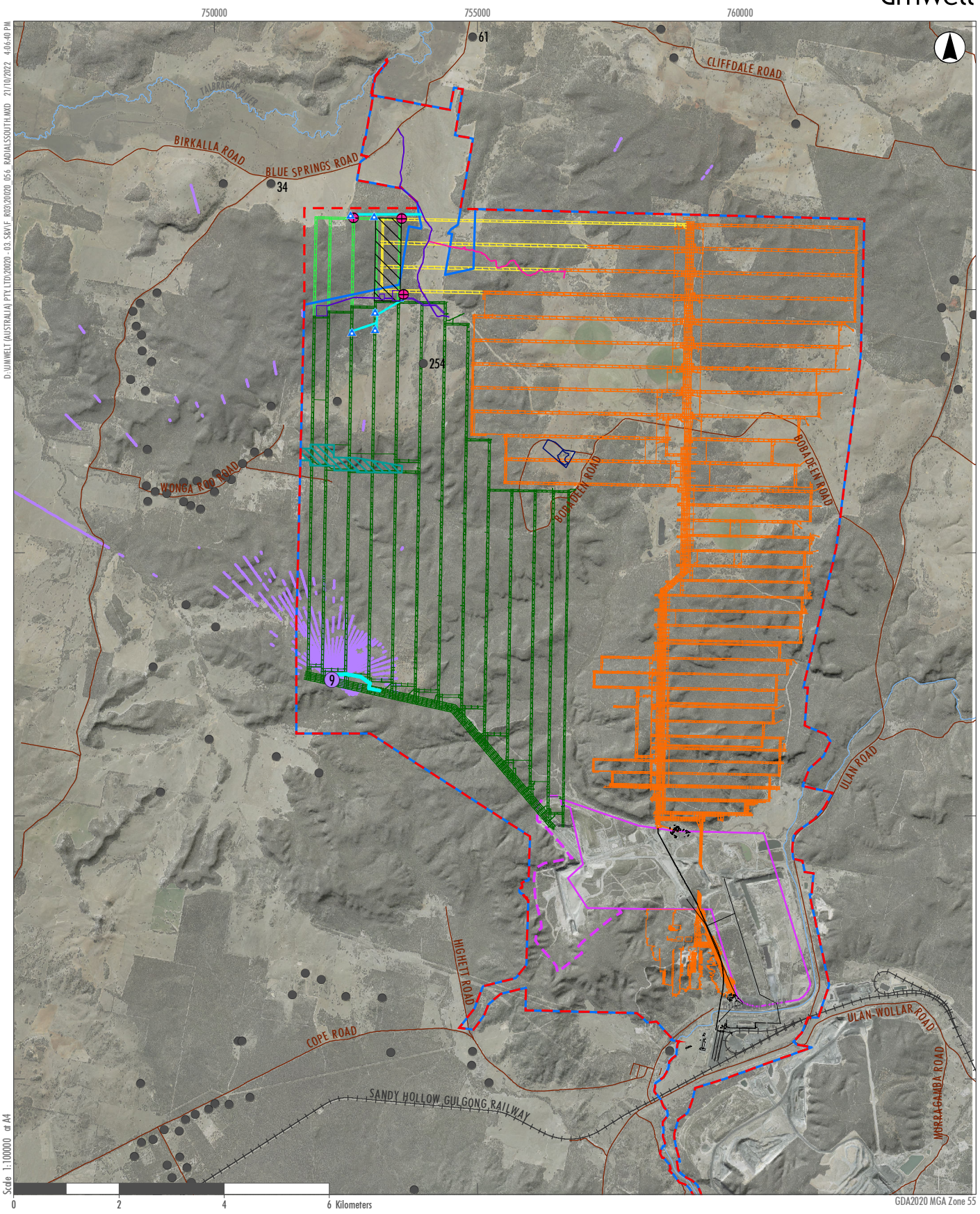
- Previous Ulan Open Cut Area
- Approved Ulan Open Cut Extension
- Approved Infrastructure related to Mod 6
- Proposed Borehole
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Access Track Corridor
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- 3 Visible
- 4 Visible
- 5 Visible
- 6 Visible

FIGURE 6.12

Viewshed Analysis Central

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)



Legend

- Project Approval Boundary
- Proposed Project Approval Boundary
- Brokenback Conservation Area
- Bobadeen Quarry
- Longwall Option Area
- Roads
- Railway
- Major Watercourses
- Private Residence
- Approved Ulan Underground Mine Plan
- Approved Ulan West Mine Plan
- Approved Infrastructure related to Mod 6
- Previous Ulan Open Cut Area
- Approved Ulan Open Cut Extension
- Proposed Borehole
- Proposed Vent Shaft
- Proposed Dewatering Bores
- Proposed Infrastructure
- Proposed Access Track Corridor
- Proposed Ulan Underground Mine Plan Modification
- Proposed Ulan West Underground Mine Plan Modification
- 9
- Visible

FIGURE 6.13

Viewshed Analysis South

Image Source: Glencore (2018) Data source: Glencore (2020); NSW DFSI (2020)

6.12.3 Visual Assessment Results

The visual assessment found that based on topography alone, distant views of the proposed infrastructure would be available to three sensitive viewing locations (residences), being R34, R61 and R254 (refer to **Figure 6.11**, **Figure 6.12** and **Figure 6.13**).

The closest residence with a line of sight to proposed infrastructure is R254, located approximately 1.4 km from the nearest proposed ventilation shaft. R34 is located approximately 1.6 km from the nearest proposed dewatering bore and 1.7 km from the nearest proposed ventilation shaft, while R61 is approximately 4 km from one proposed dewatering bore and two proposed ventilation shafts (refer to **Figure 6.11** and **Figure 6.12**).

Surface infrastructure would be constructed from non-reflective materials in natural tones to minimise visibility against adjacent vegetation. At heights of 5 m or less, the proposed infrastructure would be shielded by surrounding open forest vegetation, which has a canopy reaching heights of between 10 and 20 m (refer to **Section 6.6**). Therefore, while it is possible infrastructure may be visible, it is not expected to be visually intrusive as it would impact only a small part of the distant viewshed.

6.12.4 Mitigation Measures

It is expected that residential views to the proposed infrastructure during construction and operation would likely be obstructed or screened by vegetation over distances between approximately 1.4 km and 4 km, therefore reducing impacts upon visual amenity.

Current controls used for the management of visual impacts will continue to be implemented by UCMPL should approval be granted. These include:

- use of suitable non-reflective natural tones for infrastructure such as shafts and bores that will be visible to the public
- progressive decommissioning of infrastructure that no longer supports mining operations (or relocation if required)
- progressive rehabilitation of disturbed areas after infrastructure is removed.

6.13 Social

A Social Impact Assessment (SIA) for the Proposed Modification has been prepared by Umwelt addressing the requirements of the Social Impact Assessment Guideline for State Significant Projects (SIA Guideline) (DPIE, 2021). A full copy of the report is available in **Appendix 16** and a summary of key outcomes is provided below.

6.13.1 Methodology

Consistent with the SIA Guideline requirements, the SIA process involves three key phases, being:

- Phase 1 – Scoping, including:
    - preparation of a stakeholder engagement strategy that outlines engagement activities, materials and proposed responsibilities
    - identifying the extent of the Proposed Modification's social locality
    - developing a social baseline of the context in which the Proposed Modification is located
    - engaging with the local community to inform initial prediction and evaluation of likely social impacts.
- Phase 2 – Impact Prediction and Assessment, including:
    - working collaboratively with the Project team so that relevant stakeholders (individuals and groups) are aware of the Proposed Modification and have been provided with an opportunity to provide input
    - predicting and analysing the extent and nature of social impacts and opportunities
    - identifying relevant/appropriate management and enhancement measures
    - preparation of the SIA in accordance with the SIA Guideline.
- Phase 3 – Impact Management, including:
    - outlining how social impacts associated with the Proposed Modification will be managed and monitored
    - ongoing engagement with community and key stakeholders.

Engagement is a key component of a SIA program, commencing early in the scoping phase and affording input from near neighbours and local and regional stakeholders.

The SIA process also included an assessment and prediction of social impacts and the development of relevant strategies to mitigate any negative social impacts and enhance positive impacts associated with the Proposed Modification.

6.13.2 Social Baseline Profiling

A baseline social profile is used to develop an understanding of the existing social environment in which a project is proposed and of potentially affected stakeholders and communities that may be impacted (both positively and negatively).

The area of social influence for the Proposed Modification is defined as:

- the landholdings, property owners and residents situated on, or proximal to, the area of the Proposed Modification, as well as the broader UCC
- the State Suburbs as per the Australian Bureau of Statistics' (ABS) statistical areas of Ulan, Bungaba, Cooks Gap, Gulgong, Mudgee, Rylstone and Kandos
- the host local government area (LGA) of the Mid-Western Regional Council.

The social profile developed for the SIA has utilised a community assets (or capitals) approach in defining the strengths and vulnerabilities of the community across five key areas – natural, human, social, economic and physical. A summary is provided in **Table 6.14**.

Table 6.14 Summary of Strengths and Vulnerabilities

Theme	Strengths	Vulnerabilities
Natural capital	• Mineral rich – coal, gold and silver. • Fertile agricultural land. • Several reserves protecting natural environment. • Developing renewables zone.	• Flood and drought. • Potential land use conflicts. • Stress on water supply from key industries.
Human capital	• Increasing population. • Larger Aboriginal population (6%) compared to state average (3%). • Engineering and related technologies top field of study. • Lower rates of people experiencing barriers to health care.	• Aging population. • Decreasing proportion of working age population. • Low levels of bachelor's degree study and year 12 completion compared with NSW. • Higher levels of asthma, obstructive pulmonary disease, obesity, excessive consumption of alcohol and smoking in the LGA than the NSW average. • Pressure on health services from increasing population.
Social capital	• Higher proportion of volunteering compared with NSW. • Lower rates of mobility i.e. proportion of persons living at a different address five years prior.	• Larger proportions of single parent families and families with no children. • Larger proportions of single person households. • Large proportion of elderly families.
Economic capital	• Diverse and growing economy. • Growing tourism and renewables industry. • Lower costs of living. • Strong economic contribution from mining and agriculture (key employers).	• High unemployment in Gulgong, Mudgee, Rylstone and the LGA. • Decrease in skilled employee base due to aging population. • Potential over dominance of mining industry. • Median personal income below NSW average.

Theme	Strengths	Vulnerabilities
Physical capital	• Redevelopment of Mudgee Hospital. • Higher than state average home ownership in Bungaba, Kandos, Gulgong and Rylstone. • K-12 education infrastructure attractive to young families. • Highways provide good connection throughout NSW.	• No options for tertiary or higher education outside of TAFE. • Lower ratios of GPs and specialists. • Limited public transportation. • Transport infrastructure requires upgrade. • Higher than state average of unoccupied dwellings.

6.13.3 Perceived Social Impacts

Perceived social impacts (both positive and negative) of the Proposed Modification were identified through engagement with key stakeholders including the local community over two rounds of consultation in December 2020 to January 2021 and December 2021 to February 2022.

A summary of the likely and perceived social impacts identified through the SIA is provided in **Figure 6.14**.

6.13.4 Assessment of Social Impacts

The SIA has utilised data from a range of sources to develop a layered picture of the potential social impacts arising from the Proposed Modification. Social impacts associated with the Proposed Modification, have been ranked according to impact characteristics, as defined in the SIA Guideline (DPIE 2021).
To prioritise the identified social impacts, a risk-based framework has been adopted. As part of this approach, both technical ratings and stakeholder perceptions of impacts are assessed.

Stakeholder perception of impact is considered an independent and no less valid component of risk. Stakeholder perceptions often vary between individuals and groups, with no single perception more important than another. However, for the purposes of this assessment, the most common, or what is judged to be the general perception/sentiment of a stakeholder group, has been used as a measure of perceived stakeholder risk or impact.

The SIA provides an overall summary of the social impacts in relation to the Proposed Modification (refer to **Appendix 16**). The SIA has identified that most social risks were assessed as 'low', based on the consideration of both stakeholder perceptions and mitigated technical risk analysis. Two residual impacts were considered 'medium', being:

- loss of social amenity due to noise from construction and installation activities associated with surface infrastructure for residents proximal to the surface infrastructure
- loss of social amenity due to operational noise and vibration associated with surface infrastructure for residents proximal to the surface infrastructure.

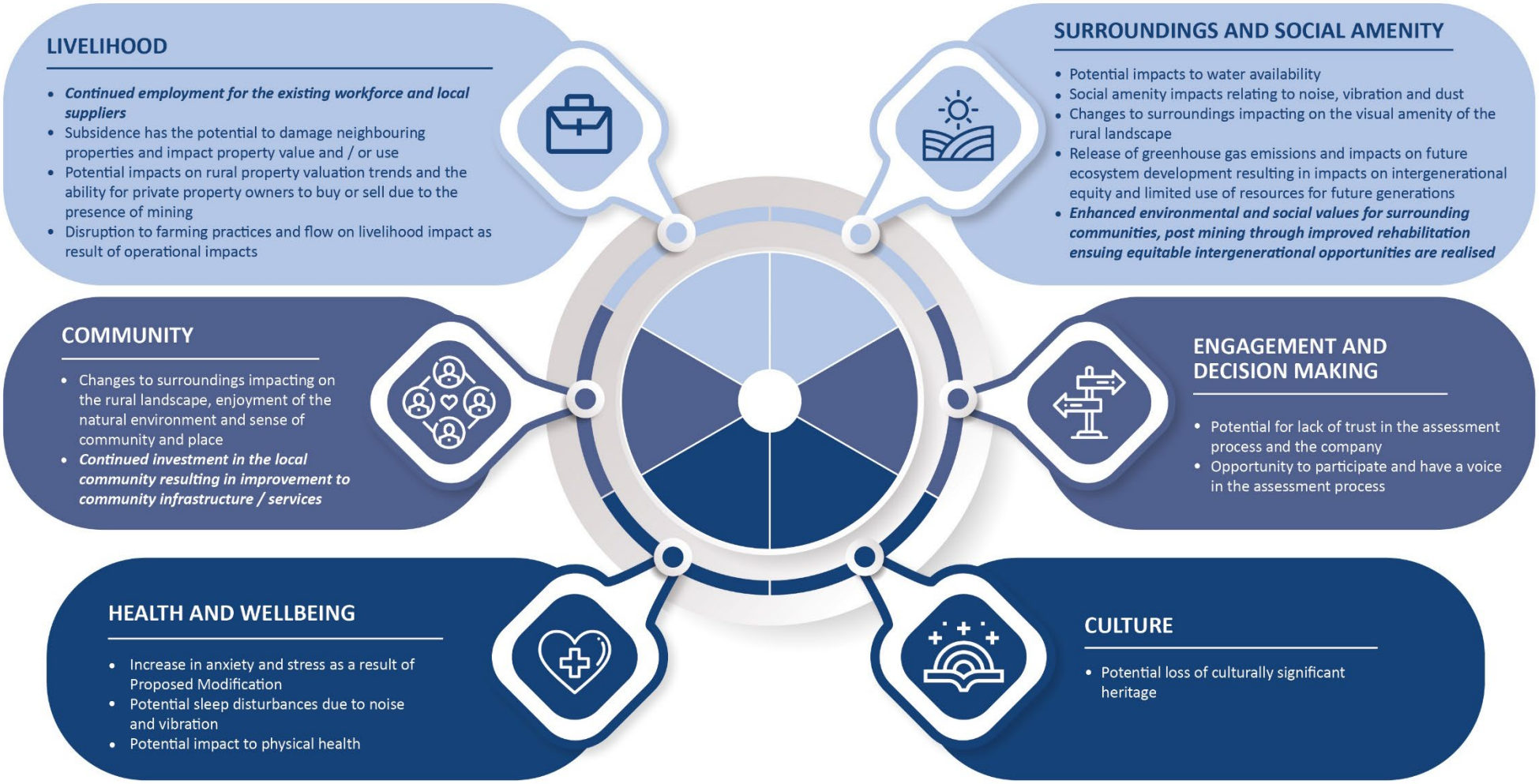


Figure 6.14 Summary of Social Impacts

6.13.5 Management and Mitigation

Table 6.15 outlines the management and enhancement strategies to be continued to address social impacts in relation to the Proposed Modification. It is acknowledged that there are a range of other management and mitigation strategies already implemented by UCMPL and/or proposed throughout this Modification Report that will also assist in minimising social impacts (e.g. the measures to minimise noise). A number of these existing and proposed management strategies that relate to social impacts have been identified in the SIA (refer to **Appendix 16**).

Table 6.15 Mitigation and Enhancement Strategies

Impacts Addressed	Enhancement Strategy
Engagement and decision making	Continue to implement the Stakeholder Engagement Strategy, with key objectives: • focus current engagement activities within the community on issues of key concern to the community (as identified through the SIA consultation program) • align with community identified preferences for engagement and information requirements i.e. as nominated by neighbours and in general from the 2021 GCAA Community Perception Survey • track and monitor community issues and perceptions of the operation over time and evaluate the success of strategies to manage and/or enhance social impacts • ensure near neighbours are kept informed of mining activities • provide access to monitoring data and detail of management strategies to reduce impacts.
Community	UCMPL's existing Community Investment Program provides substantial benefit to the surrounding local communities. Further investment initiatives to be developed in consultation with community and key stakeholders that focus more specifically on the Ulan/Bungaba localities. An evaluation of current investment opportunities has recently been completed by reviewing community-identified suggestions and priorities for investment that have been noted in engagement activities including 2021 GCAA Community Perception Survey.
Impacts to residents in Project Area including potential loss of water access, noise, property damage	Early and ongoing engagement with potentially impacted landholders and communication of eligibility for relevant management/mitigation measures and to discuss any concerns

6.14 Economics

An Economic Impact Assessment (EIA) for the Proposed Modification was prepared by Ernst and Young (EY) following the economic assessment framework set out in the *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (the Guidelines) released by the NSW Government in December 2015 and the accompanying *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (NSW DPE, 2018).

Consistent with these Guidelines, the EIA included a Cost-Benefit Analysis (CBA) and a Local Effects Analysis (LEA). The CBA provides an estimate of the net benefits of the proposed development to NSW. The LEA is based on analysis for the Lithgow-Mudgee local region (as defined by the Australian Bureau of Statistics SA3 region). In addition, the EIA included an assessment of economy-wide impacts of the Proposed Modification to both the local region and to NSW.

A full copy of the EIA is included in **Appendix 17** and a summary of key outcomes provided below.

6.14.1 Cost-Benefit Analysis

The CBA utilised the framework set out by the NSW Guidelines to measure the net economic benefits of the Proposed Modification to the NSW community. Net benefits are measured through the evaluation of:

- direct benefits that accrue to NSW from the direct operation of the proposed mine including net producer surplus attributable to NSW, royalties payable and company tax attributable to NSW
- indirect benefits that are generated for parties that economically interact with the proposed mine including net economic benefits to landowners, NSW employees and NSW suppliers
- indirect costs, that is the social costs, generated by the proposed mine and borne by the NSW community including net environmental, social and transport-related costs, net public infrastructure costs and loss of surplus to other industries.

The Proposed Modification has been assessed to provide a net benefit to NSW, estimated to be $292.6 million in net present value (NPV) terms. The estimated net benefit is comprised of $144.9 million and $147.7 million in direct and indirect benefits respectively. Incremental indirect costs to NSW are estimated to be negligible.

These estimates are based on central case assumptions in relation to the Proposed Modification and replacement and sustaining capital expenditure of $88.93 million in NPV terms and a realised coal price ranging between $172.6 and $93.9 per tonne for thermal coal in real 2021 Australian Dollar terms.

6.14.2 Local Effects Analysis

The LEA considers the costs and benefits of the Proposed Modification on residents of the Lithgow-Mudgee region of NSW. The analysis shows an estimated net benefit of $45.2 million to the Lithgow-Mudgee region in NPV terms. This is driven largely by:

- benefits to local workers of $15.4 million in NPV terms, as most of the employees at the UCC live around the Lithgow-Mudgee region
- benefits to local suppliers of $29.8 million in NPV terms.

6.14.3 Economy-Wide Modelling

To corroborate these findings, the economy-wide impacts of the Proposed Modification were assessed using the EY General Equilibrium Model (EYGEM); a large scale, dynamic, multi-region, multi-sector model of the global economy, with an explicit representation of the Lithgow-Mudgee region and the NSW economy.

Using this assessment technique, the Proposed Modification is projected to provide significant positive economy-wide impacts to both the local region of Lithgow-Mudgee and to NSW. In the Lithgow-Mudgee region, the Proposed Modification is projected to increase gross regional product (GRP) by $1,240 million in NPV terms. For NSW, the projected increase in gross state product (GSP) is $1,295 million in NPV terms.

Gross regional income (GRI) is projected to increase by $1,022 million in NPV terms. The projected increase in GRI is significant to the relatively small region of Lithgow-Mudgee. Gross state income (GSI) is projected to increase by $1,341 million.

7.0 Matters of National Environmental Significance

As discussed in **Section 4.1.1**, the Proposed Modification has been determined by DCCEEW to be a controlled action (EPBC 2022/09292) requiring assessment and approval under the EPBC Act due to controlling provisions related to listed threatened species and communities, and impacts to a water resource, as detailed below:

- listed threatened species and ecological communities (section 18 and section 18A)
    - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered
    - large-eared pied bat (*Chalinolobus dwyeri*) – Vulnerable.
- a water resource, in relation to coal seam gas development and large coal mining development (section 24D and section 24E).

In addition, the DCCEEW Protected Matters Search Tool (PMST) identifies the potential presence of additional listed threatened species or communities within 5 km of the Proposed Modification area which the controlled action decision indicates may be impacted and require assessment.

The Proposed Modification will be assessed under the Bilateral Agreement between the Commonwealth of Australia and NSW, made under section 45 of the EPBC Act.

Detailed assessments have been undertaken as part of this Modification Report to assess the Proposed Modification's potential impacts on these MNES. The following section provides a summary of the key MNES assessment findings in relation to DCCEEW's assessment requirements (refer to **Appendix 3**). The following summary should be read in conjunction with:

- the Groundwater Impact Assessment (refer to **Appendix 8**) and **Section 6.4** of this Modification Report
- the Surface Water Assessment and Water Balance (refer to **Appendix 9** and **Appendix 10**) and **Section 6.5** of this Modification Report
- the Biodiversity Development Assessment Report (refer to **Appendix 11**) and **Section 6.6** of this Modification Report.

7.1 DCCEEW Assessment Requirements

A checklist of the general DCCEEW assessment requirements and where they have been addressed in the Modification Report is provided in **Table 7.1**. Requirements specific to the key issues of biodiversity and water resources are contained in **Table 7.2** and **Table 7.3** respectively.

Table 7.1 DCCEEW Assessment Requirements – General

No.	Requirement	Relevant Section
Introduction		
Relevant Regulations		
6.	The Modification Report must address the matters outlined in Schedule 4 of the EPBC Regulations and the matters outlined below in relation to the controlling provisions.	**Appendix 5** (Table A5.3)
Project Description		
7.	The title of the action, background of the action and current status.	**Section 1.0**
8.	The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on Matters of National Environmental Significance (MNES).	**Section 3.0**
9.	How the action relates to any other actions that have been, or are being taken in the region affected by the action.	**Section 4.1.1**
10.	How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	**Section 3.0** and **Section 6.6.1** specific to biodiversity
Impacts		
11.	The Modification Report must include an assessment of the relevant impacts[1] of the action on the matters protected by the controlling provisions, including:	
i.	a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long-term relevant impacts	BDAR (**Appendix 11**) Appendix H, Section 6.0, GIA (**Appendix 8**) Section 8 and SWIA (**Appendix 9**) Section 4
ii.	a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible	BDAR (**Appendix 11**) Appendix H, Section 8.0, GIA (**Appendix 8**) Section 9 and SWIA (**Appendix 9**) Section 4.9
iii.	analysis of the significance of the relevant impacts	BDAR (**Appendix 11**) Appendix H, Section 8.0, GIA (**Appendix 8**) Section 8 and SWIA (**Appendix** 9) Section 4
iv.	any technical data and other information used or needed to make a detailed assessment of the relevant impacts.	BDAR (**Appendix 11**) Appendix H, Section 8.0, GIA (**Appendix 8**) Section 5, Section 6 and Appendix A and SWIA (**Appendix 9**) Section 3 and Appendices
Avoidance, mitigation and offsetting		
12.	For each of the relevant matters protected that are likely to be significantly impacted by the action, the Modification Report must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including:	

[1] Relevant impacts are those impacts likely to significantly impact on any matter protected under the EPBC Act.

No.	Requirement	Relevant Section
i.	a description, and an assessment of the expected or predicted effectiveness of the mitigation measures	**Section 6.0**, **Section 7.2.1.3** and **Section 7.2.1.4**
ii.	any statutory policy basis for the mitigation measures	**Section 6.0**
iii.	the cost of the mitigation measures	This is included in the capital and operating costs for the Proposed Modification, which are included in the outcomes of the economic assessment in **Appendix 17**
iv.	an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing	**Section 2.2** and **Section 6.3.5** (Subsidence), **Section 6.4.4** (Groundwater), **Section 6.5.5** (Surface Water) and **Section 6.6.5** (Biodiversity). Also refer to UCMPL website: https://www.glencore.com.au/operations-and-projects/coal/current-operations/ulan-coal/management-plans
v.	the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	Detailed in individual management plans (refer to website as above)
13.	Where a significant residual adverse impact to a relevant protected matter is considered likely, the Modification Report must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.	The offset strategy proposed under the NSW BAM is described in **Section 6.6.7** and BDAR (**Appendix 11**) Section
14.	For each of the relevant matters likely to be impacted by the action the Modification Report must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any:	
i.	conservation advice or recovery plan for the species or community	BDAR (**Appendix 11**) Appendix H (Appendix 1)
ii.	relevant threat abatement plan for a process that threatens the species or community	BDAR (**Appendix 11**) Appendix H (Appendix 1)
iii.	wildlife conservation plan for the species	BDAR (**Appendix 11**) Appendix H (Appendix 1)
iv.	any strategic assessment.	N/A
Other approvals and conditions		
20.	Information in relation to any other approvals or conditions required must include the information prescribed in Schedule 4 Clause 5 (a) (b) (c) and (d) of the EPBC Regulations.	**Section 2.2**, **Section 4.0** and **Appendix 5**

Table 7.2 DCCEEW Assessment Requirements – Biodiversity

No.	Requirement	Relevant Section
3.	The Applicant must undertake an assessment of all protected matters that may be impacted by the development under the controlling provisions identified in paragraph 1. The DCCEEW considers that there is likely to be a significant impact on the following:	
i.	*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* –Critically Endangered	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.2, Appendix 1)
ii.	Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.3, Appendix 1)
4.	DEECCW also considers that the proposed action may result in significant impacts to the following species:	
i.	Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.4, Appendix 1)
ii.	Swift Parrot (*Lathamus discolor*) – Critically Endangered	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.5, Appendix 1)
iii.	Superb Parrot (*Polytelis swainsonii*) – Vulnerable	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.7, Appendix 1)
iv.	Spot-tailed Quoll (*Dasyurus maculatus maculatus*) – Endangered	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.8, Appendix 1)
v.	Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.9, Appendix 1)
vi.	Brush-tailed Rock-wallaby (*Petrogale penicillata*) – Vulnerable	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.10, Appendix 1)
vii.	Koala (QLD, NSW, ACT) (*Phascolarctos cinereus*) – Endangered	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.11, Appendix 1)
viii.	Greater Glider (*Petauroides volans*) – Endangered.	BDAR (**Appendix 11**) Appendix H (Section 8.0, Table 8.1 and Table 8.12, Appendix 1)
	These species require further assessment, surveys and analysis to determine whether they are likely to be significantly impacted. Note that this may not be a complete list and it is the responsibility of the Applicant to ensure any protected matters under this controlling provision are assessed for the Commonwealth decision-makers consideration.	BDAR (**Appendix 11**) Section 2.0 and Appendix H (Section 4.0, Section 8.5, and Section 8.12 to Section 8.16)

No.	Requirement	Relevant Section
5.	The Applicant must consider each of the protected matters under the triggered controlling provisions that may be impacted by the action. Note that this may not be a complete list and it is the responsibility of the Applicant to undertake an analysis of the significance of the relevant impacts and ensure that all protected matters that are likely to be significantly impacted are assessed for the Commonwealth Minister's consideration.	BDAR (**Appendix 11**) Section 2.0 and Appendix H (Section 4.0, Section 8.5, and Section 8.12 to Section 8.16)
16.	For each of the EPBC Act listed species predicted to occur in the project site, and each of the EPBC Act listed ecological communities likely to be significantly impacted, the EIS [Modification Report] must provide:	
	Survey results, including details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Commonwealth guidelines and policy statements and/or the relevant NSW offsetting method.	BDAR (**Appendix 11**) Section 2.0 and Appendix H (Section 4.0 and Section 8.0)
	A description and quantification of habitat in the study area (including suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advices, conservation advices, recovery plans, and threat abatement plans.	BDAR (**Appendix 11**) Appendix H (Section 8.0)
	Maps displaying the above information (specific to each EPBC protected matter) overlaid with the proposed action. It is acceptable, where possible, to use the mapping and assessment of Plant Community Types (PCTs) and the species surveys prescribed by the BAM as the basis for identifying EPBC Act-listed species and communities. The Modification Report must clearly identify which PCTs are considered to align with habitat for the relevant EPBC Act listed species or community, and provide individual maps for each species or community.	BDAR (**Appendix 11**) Appendix H (Figure 8.1 to Figure 8.14)
	Information on proposed avoidance and mitigation measures to deal with the impacts of the action, and a description of the predicted effectiveness and outcomes that the avoidance and mitigation measures will achieve.	BDAR (**Appendix 11**) Section 4.0 and Appendix H (Section 7.0 and Section 8.0)
	Quantification of the offset liability for each species and community significantly impacted, and information on the proposed offset strategy, including discussion of the conservation benefit for each species and community, how offsets will be secured, and the timing of protection. It is a requirement that offsets directly contribute to the ongoing viability of the specific protected matter impacted by a proposed action i.e. 'like-for-like'.	BDAR (**Appendix 11**) Section 7.0 and Section 8.0 and Appendix H (Section 7.1.1 and Section 8.0)
	Like-for-like includes protection of native vegetation that is the same ecological community or habitat being impacted (preferably in the same region where the impact occurs), or funding to provide a direct benefit to the matter being impacted e.g. threat abatement, breeding and propagation programs or other relevant conservation measures.	BDAR (**Appendix 11**) Section 7.0 and Section 8.0 and Appendix H (Section 7.1.1)

Table 7.3 DCCEEW Assessment Requirements – Groundwater and Surface Water

No.	Requirement	Relevant Section
3.	The Applicant must undertake an assessment of all protected matters that may be impacted by the development under the controlling provisions identified in paragraph 1. The DCCEEW considers that there is likely to be a significant impact on the following:	
iii.	Groundwater and surface water resources within the project area and surrounding area	**Section 6.4**, **Section 6.5**, **Section 7.2.2** and GIA (**Appendix 8**) and SWIA (**Appendix 9**)
18.	The Modification Report must include a detailed water assessment. The water assessment must be undertaken accordance with the IESC Information Guidelines (https://iesc.environment.gov.au/information-guidelines) and provide the information outlined in these guidelines.	GIA (**Appendix 8)** Section B2.2 and SWIA (**Appendix 9**) Section 5.0
19.	To adequately assess the impact of the proposed action on water resources, the Modification Report requires:	
i.	site specific information based on scientific evidence or modelled data	GIA (**Appendix 8**) Section 5.0 and SWIA (**Appendix 9**) Section 3.0
ii.	a cumulative impact assessment for surface and groundwater resources	GIA (**Appendix 8**) Section 7.3 and Section 8.6 and SWIA (**Appendix 9**) Section 4.9
iii.	Information regarding the potential for significant impacts to surface water resources to support or independently assess the impact of the proposed action that include: a) the information on the potential impacts to water resources b) impact assessment data from mining to date c) predictions of ground water impacts from the proposed action.	SWIA (**Appendix 9**) Section 4.1 to Section 4.10
iv.	Key Matters requiring further assessments in the Modification Report:	
a)	documentation on the predicted nature and extent of subsidence related impacts for locations in and around the project area	**Section 6.3**, **Section 6.4**, **Section 6.5** and **Appendix 7**, **Appendix 8** and **Appendix 9**
b)	geophysical information regarding faults and other features identified in the project area with a view to how these may enhance impacts, including incorporation into the groundwater model	GIA (**Appendix 8**) Section 4.0 and Section 5.8, and EPBC Addendum Section 5
c)	simulations of mining related impacts on The Drip should be reconsidered, as current predictions may not be accurate due to the conceptualised isolation of the feature from other Triassic formations	**Section 7.2.2** and GIA (**Appendix 8**) Section 5.6.1.1 and EPBC Addendum Section 4
d)	a comparison of fracturing height estimates using the Ditton-Merrick method and Tammetta method	GIA (**Appendix 8**) EPBC Addendum Section 3
e)	inclusion of accurate climate projections in the modelling	SWIA (**Appendix 9**) Section 4.10 and Appendix C GIA (**Appendix 8**) EPBC Addendum Section 2

No.	Requirement	Relevant Section
f)	a reconsideration of boundary conditions and a reassessment of potential impacts from groundwater drawdown following that reconsideration (if required)	GIA (**Appendix 8**) Section 6.0, Section 9.0, Appendix A, and EPBC Addendum Section 6
g)	documents outlining the conceptual layout of surface infrastructure	**Section 3.0**
h)	clarification on the intended storage and treatment of mine-affected water within the proposed action area	**Section 6.5.2**
i)	a detailed assessment of potential impacts to flow regimes and water quality within the wider catchment from the Proposed Modification	SWIA (**Appendix 9**) Section 4.2, Section 4.5 and Section 4.10
k)	stygofauna assessment within the alluvium and colluvium of Mona Creek and Talbragar River.	The GIA contains a detailed assessment of drawdown impacts. The majority of the groundwater drawdown impacts arise from the already-approved mining operations. The additional drawdown associated with the Proposed Modification does not extend under any saturated alluvium, however, the predicted drawdown contours extend under and into areas of the colluvium associated with Mona Creek (AGE, 2022). The extent of predicted additional drawdown does not extend north into the Talbragar alluvium and no changes to the impact on the Goulburn River alluvium are predicted from the Proposed Modification. Modelled drawdown does not identify any areas of significant drawdown which would result in isolation or loss of stygofauna communities. Given the nature of predicted impacts, it is considered that sampling of stygofauna is not warranted.

7.2 Summary of MNES Impacts

7.2.1 Biodiversity

The summary information below should be read in conjunction with **Section 6.6** and **Appendix 11** (BDAR).

7.2.1.1 Key Issues

DCCEEW has indicated that the key biodiversity risks associated with the Proposed Modification from the Commonwealth protected matters perspective include:

- potential impacts from vegetation clearance associated with the placement of surface infrastructure (referred to as the Direct Impact Area)
- potential impacts on threatened species and ecological communities associated with the underground mining component of the project, including subsidence and groundwater drawdown events, which may have implications for species and threatened ecological communities within and surrounding the Proposed Modification area (referred to as the Potential Indirect Impact Area).

Assessments of significance on biodiversity MNES have also considered impacts within the Maximum Parameters Area, which considers a worst-case scenario to allow for flexibility in the footprint of the proposed surface infrastructure (refer to **Section 6.6.1** for further detail on the maximum parameters approach).

DCCEEW indicated in its controlled action decision that they consider that the Proposed Modification is likely to have a significant impact on:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland –Critically Endangered
- Large-eared pied bat (*Chalinolobus dwyeri*) – Vulnerable.

DEECCW also considered that the Proposed Modification may result in significant impacts to the following species:

- Regent honeyeater (*Anthochaera phrygia*) – Critically Endangered
- Swift parrot (*Lathamus discolor*) – Critically Endangered
- Superb parrot (*Polytelis swainsonii*) – Vulnerable
- Spotted-tailed quoll (*Dasyurus maculatus maculatus*) – Endangered
- Corben's long-eared bat (*Nyctophilus corbeni*) – Vulnerable
- Brush-tailed rock-wallaby (*Petrogale penicillata*) – Vulnerable
- Koala (QLD, NSW, ACT) (*Phascolarctos cinereus*) – Endangered
- Greater glider (*Petauroides volans*) – Endangered.

In addition, the following species were also assessed against the Significant Impact Guidelines as they are considered to have the potential to occur or be impacted by the Proposed Modification, based on previous records or suitable habitat:

- Hoary sunray (*Leucochrysum albicans* var. *tricolor*)
- Fairy bells (*Homoranthus darwinoides*)
- *Androcalva (Commersonia) procumbens*
- Painted honeyeater (*Grantiella picta*)
- South-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)
- Pilotbird (*Pycnoptilus floccosus*).

7.2.1.2 Assessment against Significant Impact Guidelines

The following **Table 7.4** provides a summary of the nature and quantum of impacts on the MNES considered in the Assessments of Significance. Section 8.1 to Section 8.14 of Appendix H of the BDAR (refer to **Appendix 11**) provide further details on each entity assessed.

Table 7.4 Summary of Biodiversity Assessments of Significance

Species/CEEC	Presence within Proposed Modification area	Assessment Outcome	Offsetting (in accordance with NSW BAM)
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Direct impact area – 9.5 ha Potential indirect impact area – 352.7 ha Maximum parameters area – 24.1 ha	Impacts on the CEEC would not be significant at the State or National scale, however may have local significance. It is noted that DCCEEW identified in the controlled action decision that it considers that the Proposed Modification is likely to result in a significant impact on the CEEC. The appropriate use of minimisation and management strategies (including offsetting) will be essential, and are proposed, to minimise the short and long-term impacts on the CEEC. UCMPL is committed to these minimisation and management actions and has been operating under a similar approach for previous activities at UCC where the CEEC is present.	218 ecosystem credits (associated with PCTs consistent with the CEEC), following like-for-like offsetting rules. (512 ecosystem credits under the Maximum Parameters approach).
Large-eared pied bat (*Chalinolobus dwyeri*)	Direct impact on native woodland and forest foraging habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 719 ha Potential indirect impact on cliff line habitats – 90 m (of total 128 m) Maximum parameters impact on native woodland and foraging habitat – 24.1 ha	While the Proposed Modification will result in impacts to foraging and potential breeding habitats for the large-eared pied-bat, it is unlikely to result in a significant impact to an important population of the species given the very large foraging range, availability of extensive areas of habitat of similar quality, and the lack of confirmed maternity roosts. It is noted that DCCEEW identified in the controlled action decision that it considers that the Proposed Modification is likely to result in a significant impact on this species. Avoidance, mitigation and management measures, including offsetting, will be in place to reduce any potential impact on the species and its habitats.	58 species credits for the large-eared pied bat. (151 species credits under the Maximum Parameters approach).

Species/CEEC	Presence within Proposed Modification area	Assessment Outcome	Offsetting (in accordance with NSW BAM)
Regent honeyeater (*Anthochaera phrygia*)	Direct impact on native woodland and forest foraging habitat – 3.1 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 29.3 ha Maximum parameters impact on native woodland and foraging habitat – 4.8 ha	Impact is not considered significant at local, state or national scale. Although the Proposed Modification area provides potential foraging habitat for this species, there are no known records, despite repeated targeted monitoring for the species in the UCC for over 10 years. The area proposed to be disturbed is relatively minor (up to 4.8 ha) and the regent honeyeater has not been recorded utilising the potential habitat within the Proposed Modification Area or in the immediate surrounds. The Proposed Modification is unlikely to result in a significant impact on the *population* of the regent honeyeater.	No direct offsetting is required as the Important Areas map for the regent honeyeater does not intersect with the Proposed Modification Area. The removal of habitats providing potential foraging for this species will be offset through 602 ecosystem credits (or up to 1,229 credits for the maximum parameters approach) for PCTs associated with the species.
Swift parrot (*Lathamus discolor*)	Direct impact on native woodland and forest foraging habitat – 3.1 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 29.3 ha Maximum parameters impact on native woodland and foraging habitat – 4.8 ha	Impact is not considered significant at local, state or national scale. The swift parrot has not been recorded within the Proposed Modification area, however, has been recorded at the UCC previously, approximately 100 m east of the Proposed Modification area (BioNet Atlas, sighting date 2005). Despite ongoing targeted monitoring for the species, there have been no records documented since 2007. The Proposed Modification is unlikely to result in a significant impact on a *population* of the swift parrot.	No direct offsetting is required as the Important Areas map for the swift parrot does not intersect with the Proposed Modification Area. The removal of habitats providing potential foraging habitat for this species will be offset through 602 ecosystem credits (or up to 1,229 credits for the maximum parameters approach) for PCTs associated with the species.

Species/CEEC	Presence within Proposed Modification area	Assessment Outcome	Offsetting (in accordance with NSW BAM)
Superb parrot (*Polytelis swainsonii*)	Direct impact on box-gum woodland habitat – 6.5 ha Potential indirect impact on box-gum woodland habitat (likely to be negligible) – 221.2 ha Maximum parameters impact on box-gum woodland habitat – 16.2 ha	Impact is not considered significant at local, state or national scale. The superb parrot has not been recorded within the Proposed Modification area and is considered to have low potential to occur. Despite ongoing targeted monitoring for the species, there have been no records documented since 2007 (Eco Logical 2021c). No *important population* of the species is present. The Proposed Modification will not result in a significant impact on the superb parrot.	Under the NSW BAM, offsetting for the superb parrot falls under species and ecosystem credits. However, the species is not listed in the BAM Calculator as a predicted species associated with the PCTs of the direct impact area. Although no species credit offsetting for this species is required, the removal of habitats providing potential foraging for this species will be offset through 602 ecosystem credits (or up to 1,229 credits for the maximum parameters approach) for PCTs associated with the species.
Spotted-tailed quoll (*Dasyurus maculatus maculatus*)	Direct impact on native woodland and forest habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 721.4 ha Maximum parameters impact on native woodland and forest habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. Although the Proposed Modification area provides potential habitat for this species, the area proposed to be impacted is relatively small considering the home ranges of the species. The spotted-tailed quoll has not been recorded utilising the potential habitat within the Proposed Modification Area or in the immediate surrounds. The Proposed Modification is unlikely to result in a significant impact on the *population* of the spotted-tailed quoll.	Under the BAM, offsetting for the spotted-tailed quoll falls under ecosystem credits. The total direct impacts require offsetting of 602 ecosystem credits (or 1,229 for the maximum parameters approach).

Species/CEEC	Presence within Proposed Modification area	Assessment Outcome	Offsetting (in accordance with NSW BAM)
Corben's long-eared bat (*Nyctophilus corbeni*)	Direct impact on native woodland and forest habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 721.4 ha Maximum parameters impact on native woodland and forest habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. The Corben's long-eared bat was recorded on Anabat at four sites in the Proposed Modification area. While the Proposed Modification will result in impacts to potential foraging and roosting habitat for this species, given the very large foraging range and the availability of extensive areas of similar quality habitat at the UCC and surrounding locality, the removal of up to 37.1 ha is unlikely to constitute a significant impact to the species.	Under the BAM, offsetting for the Corben's long-eared bat falls under ecosystem credits. However, the species is not listed in the BAM Calculator as a predicted species associated with the PCTs of the direct impact area. Although no direct offsetting for this species is required, the removal of potential foraging habitats will be offset through 602 ecosystem credits (or 1,229 for the maximum parameters approach) for PCTs associated with the species.
Brush-tailed rock-wallaby (*Petrogale penicillata*)	Direct impact on native woodland and forest habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 721.4 ha Potential indirect impact on cliff line habitats – 128 m Maximum parameters impact on native woodland and forest habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. The brush-tailed rock-wallaby has not been recorded within the Proposed Modification area, however, it has been recorded at the UCC and potential foraging habitat occurs. Potential cliff line habitat occurs in the wider potential indirect impact area, however, no suitable rocky habitats occur in the direct impact area. The Proposed Modification area is not considered to support an important population of the brush-tailed rock-wallaby. The Proposed Modification is unlikely to result in a significant impact on an *important population* of the brush-tailed rock-wallaby.	Under the BAM, the brush-tailed rock wallaby is a species credit species. As the species was not recorded, an offset credit liability is not required. Although no direct offsetting for this species is required, the removal of habitats providing potential foraging for this species will be offset through 602 ecosystem credits (or 1,229 for the maximum parameters approach).

Species/CEEC	Presence within Proposed Modification area	Assessment Outcome	Offsetting (in accordance with NSW BAM)
Koala (QLD, NSW, ACT) (*Phascolarctos cinereus*)	Direct impact on native woodland and forest habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 721.4 ha Maximum parameters impact on native woodland and forest habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. The koala has not been recorded within the Proposed Modification area, however, potential habitat (supporting secondary feed trees) occurs. Three previous records exist at the UCC, however, the distribution and frequency of these records despite extensive survey and monitoring across the UCC over decades, indicates there is very unlikely to be a resident population or that the foraging habitats are important for the species. Given the low and infrequent records of koala within the locality, and the extensive areas of potential habitat at the UCC and wider locality, the extent of potential habitat disturbance is not considered to be significant. The Proposed Modification is unlikely to result in a significant impact on a population of koala.	Under the BAM, the koala is a species credit species. As the species was not recorded, an offset credit liability is not required. Although no direct offsetting for this species is required, the removal of habitats providing potential foraging for this species will be offset through 602 ecosystem credits (or 1,229 for the maximum parameters approach).
Greater glider (*Petauroides volans*)	Direct impact on native woodland and forest habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 721.4 ha Maximum parameters impact on native woodland and forest habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. The greater glider has not been recorded within the Proposed Modification area, and there is low potential for the species to occur. The Proposed Modification area does not support an important population of the greater glider. The Proposed Modification will not result in a significant impact on an *important population* of the greater glider.	Under the BAM, the greater glider is a species credit species. As the species was not recorded, an offset credit liability is not required. Although no direct offsetting for this species is required, the removal of habitats providing potential foraging for this species will be offset through 602 ecosystem credits (or 1,229 for the maximum parameters approach).

Species/CEEC	Presence within Proposed Modification area	Assessment Outcome	Offsetting (in accordance with NSW BAM)
Hoary sunray (*Leucochrysum albicans* var. *tricolor*)	Direct impact area – 27.4 ha Potential indirect impact on potential habitat (likely to be negligible) – 852.9 ha Maximum parameters impact on potential habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. The species has not been recorded within the Proposed Modification area, however, has been recorded at the UCC previously. It is considered unlikely that the species would occur in the area of disturbance due to the substantial surveys that have been undertaken. Based on the above assessment, the Proposed Modification is unlikely to result in a significant impact on a *population* of the hoary sunray.	Under the NSW BAM, offsetting for the hoary sunray falls under species credits. As the species was not recorded, despite surveys, there are no species credit offsetting requirements.
Fairy bells (*Homoranthus darwinoides*)	Direct impact area – 17.9 ha Potential indirect impact on potential habitat (likely to be negligible) – 492.7 ha Maximum parameters impact on potential habitat – 30.3 ha	Impact is not considered significant at local, state or national scale. The species has not been recorded within the Proposed Modification area, however, it has been recorded previously in the wider the UCC and potential habitat occurs. The Proposed Modification is unlikely to result in a significant impact on an *important population* of *Homoranthus darwinoides*.	Under the NSW BAM, offsetting for *Homoranthus darwinoides* falls under species credits. As the species was not recorded, despite surveys, there are no species credit offsetting requirements.
Androcalva (Commersonia) procumbens	Direct impact area – 16.5 ha Potential indirect impact on potential habitat (likely to be negligible) – 644.1 ha Maximum parameters impact on potential habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. *Androcalva procumbens* has not been recorded within the Proposed Modification area, however, it has been recorded previously in the wider the UCC and potential habitat occurs. The Proposed Modification is unlikely to result in a significant impact on an *important population* of *Androcalva procumbens*.	Under the NSW BAM, offsetting for *Androcalva procumbens* falls under species credits. As the species was not recorded, despite surveys, there are no species credit offsetting requirements.

Species/CEEC	Presence within Proposed Modification area	Assessment Outcome	Offsetting (in accordance with NSW BAM)
Painted honeyeater (*Grantiella picta*)	Direct impact on native woodland and forest habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 721.4 ha Maximum parameters impact on native woodland and forest habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. The painted honeyeater has been recorded within the Proposed Modification area, however, is not considered to support an important population of the painted honeyeater. The Proposed Modification is unlikely to result in a significant impact on an *important population* of painted honeyeater.	Under the NSW BAM, offsetting for the painted honeyeater falls under ecosystem credits. The removal of habitats providing potential foraging for this species will be offset through 602 ecosystem credits (or up to 1,229 credits for the maximum parameters approach) for PCTs associated with the species.
South-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	Direct impact on native woodland and forest habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 721.4 ha Maximum parameters impact on native woodland and forest habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. The south-eastern glossy black-cockatoo has been recorded within the Proposed Modification area, and all woodland/forest condition vegetation is considered potential habitat. The Proposed Modification area does not support an important population of the species. The Proposed Modification will not result in a significant impact on an *important population* of the south-eastern glossy black-cockatoo.	The south-eastern glossy black-cockatoo is not listed under the NSW BC Act, and therefore no direct offsetting is calculated for impacts on the species. Although no direct offsetting for this species is required, the removal of habitats providing potential foraging for this species will be offset through 602 ecosystem credits (or 1,229 for the maximum parameters approach).

Species/CEEC	Presence within Proposed Modification area	Assessment Outcome	Offsetting (in accordance with NSW BAM)
Pilotbird (*Pycnoptilus floccosus*)	Direct impact on native woodland and forest habitat – 24.4 ha Potential indirect impact on native woodland and forest foraging habitat (likely to be negligible) – 721.4 ha Maximum parameters impact on native woodland and forest habitat – 37.1 ha	Impact is not considered significant at local, state or national scale. The pilotbird has been recorded within the Proposed Modification Area, and all woodland/forest condition vegetation is considered potential habitat. The Proposed Modification Area does not support an important population of the species. The Proposed Modification will not result in a significant impact on an *important population* of the pilotbird.	The pilotbird is not listed under the NSW BC Act, and therefore no direct offsetting is calculated for impacts on the species. Although no direct offsetting for this species is required, the removal of habitats providing potential foraging for this species will be offset through 602 ecosystem credits (or 1,229 for the maximum parameters approach).

7.2.1.3 Impact Avoidance Strategies

A range of avoidance, minimisation, mitigation and management measures are proposed to reduce the impacts on biodiversity as a result of the Proposed Modification. A summary of those measures, as they relate to MNES, is provided in **Table 7.5**. Further detail is provided in Section 4.0 of the BDAR (refer to **Appendix 11**).

Table 7.5 Summary of Avoidance Strategies

Avoidance/ Mitigation Measure	Details	Relation to MNES
Site selection and planning	UCMPL has sought to avoid and minimise potential impacts on ecological values throughout the Proposed Modification planning process. This included designing the Proposed Modification to maximise the use of existing mining facilities and consideration of the placement of essential infrastructure to avoid disturbance to native vegetation and habitats, where practicable.	Site planning has aimed to minimise the impacts on known and potential habitat for MNES, in particular the Box-Gum Woodland CEEC.
Disease management and hygiene	While there are no known infestations of disease or pathogens within the UCC, measures will be in place so that vehicles and equipment are clean of mud and vegetation before entering any areas off existing tracks into native vegetation.	Protect known and potential habitats for MNES by reducing the risk of spread of disease or pathogens.
Salvage of biodiversity features	Where practicable, habitat features being disturbed by clearing for surface infrastructure (such as tree hollows, fallen timber and boulders) will be left *in-situ* or relocated to offset or rehabilitation areas where suitable.	Minimise loss of potential habitat features for MNES.
Pre-clearing and tree felling	UCMPL has a pre-clearing and tree felling procedure that outlines the requirements for identification and management of habitat features prior to clearing in approved disturbance areas. This includes micro-siting infrastructure to avoid clearing and disturbance as far as practicable based on final detailed design of surface infrastructure.	The pre-clearing procedure aims to identify threatened flora species and TECs to allow for avoidance where practicable and to minimise impacts on any fauna that may be occupying tree hollows or nests at the time of clearing.
Annual ecological monitoring	UCMPL has a comprehensive annual monitoring program designed to document the pre-mining condition of vegetation and habitats subject to longwall mining, and to document any impacts on biodiversity during and following mining activities. The monitoring program includes cliff line monitoring (to document rockfalls and cracking) flora monitoring, general fauna monitoring and micro-bat monitoring.	The monitoring program is designed to identify and quantify any impacts to biodiversity (including MNES) and, if required, trigger a response to change in management if required.

Avoidance/ Mitigation Measure	Details	Relation to MNES
Revegetation and regeneration methodologies	Areas of surface infrastructure may only require short term disturbance (such as for access to and drilling of boreholes), in which case the disturbed area will be rehabilitated with the goal to stabilise the ground against erosion and to re-establish native plant species representative of the disturbed vegetation.	Minimise the long-term reduction in potential and known habitat for MNES in particular the Box-Gum Woodland CEEC.
Creek and drainage line remediation	The Proposed Modification is not anticipated to result in any significant disturbance to creeks or drainage lines. However, in the event that any such disturbance occurs, remediation will be undertaken so that there is no net loss of stream length and aquatic habitat.	Impacts to MNES that may utilise riparian habitats will be minimised through stream remediation.
Weed and vertebrate pest management	A weed management plan will be in place for the Proposed Modification to manage any weed species that may be inadvertently brought into the UCC throughout the construction and operational phases of the Proposed Modification.	Weed extent in known and potential habitats for MNES within the Proposed Modification area will be managed.
Waste management	Waste generated from the construction or operational phases of the Proposed Modification, in particular in relation to surface infrastructure, will be managed in accordance with the Waste Management Plan. Where waste is identified, it will be removed and disposed of appropriately.	Waste materials will be removed so that there is no adverse impact on known and potential habitat for MNES.
Erosion, sediment and soil management	Erosion and sediment control is critical to the long-term stability of the land surface and downstream water quality. UCC has developed an Erosion and Sediment Control Plan with the main objective being to protect soil resources and maintain local water course quality. The UCC Erosion and Sediment Control Plan outlines the requirements for erosion and sediment control across the UCC and will be implemented for the Proposed Modification.	The implementation of the erosion and sediment control plan will minimise risk of impacts to downstream water quality and habitats that could potentially be utilised by MNES.
Seed collection and propagation	Where local seed collection is required for rehabilitation of surface infrastructure areas, local provenance seed will be targeted for collection (including potential harvesting of native grass species) within Biodiversity Offset Areas and other suitable areas when viable seed is available.	Box-Gum Woodland CEEC and potential habitat for MNES is restored using appropriate local native species that are representative.

Avoidance/ Mitigation Measure	Details	Relation to MNES
Environmental management measures	UCMPL has prepared an Environmental Management Strategy (EMS) which describes the process for planning, communication, documentation, monitoring, evaluation, review and feedback. UCMPL aims to maintain and improve environmental and community performance through regular monitoring, review and audits of the EMS and environmental performance. The EMS includes strategies for such things as water management systems, air quality control measures, waste management, subsidence and Aboriginal and historic heritage management.	The range of strategies implemented under the EMS aim to avoid and minimise impacts on biodiversity, including MNES.
Workforce education and training	The development of education packages and the facilitation of mine site awareness training can help to mitigate anthropogenic impacts on biodiversity. Improved awareness and stewardship of the mine site workforce can potentially benefit all flora and fauna species and vegetation communities.	Through education and awareness, stewardship of biodiversity including MNES, is enhanced.

7.2.1.4 Proposed Biodiversity Offset Strategy

UCMPL is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Proposed Modification.

Glencore has a strong record in preparing and implementing biodiversity offset strategies that address significant biodiversity matters and adequately counterbalance impacts on them. To date, Glencore has prepared and submitted thirteen Biodiversity Stewardship Site applications to the BCT, seeking to conserve and manage upwards of 3,000 ha of land in the Hunter Region. UCMPL, as a subsidiary of Glencore, is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Proposed Modification.

UCMPL is currently considering the merits of all options available under the Biodiversity Offset Scheme (BOS) to satisfy the offsetting requirements for the Proposed Modification. The offset options available under the BC Act and BC Regulation include:

- land based offsets through the establishment of new Stewardship Sites or by retiring credits from existing Stewardship Sites
- purchasing credits from the market, and/or
- paying into the Biodiversity Conservation Fund.

The biodiversity offset strategy will be developed in consultation with the BCS and DPE and will be based on the credits required to be retired to offset the impacts of the Proposed Modification, pending confirmation of final infrastructure footprints. A staged approach to offsetting is proposed, whereby offset credits are retired in line with the progression of surface impacts. This allows the opportunity to reduce the impact footprint as far as practicable once final design work is complete and therefore reduce the offset liability prior to the clearance impacts for the surface infrastructure.

It is important to note that under the NSW BOS, there is an established approach to like-for-like offsetting, such that the biodiversity matters being impacted by the Proposed Modification are offset with similar biodiversity values. This ensures that the offsetting approach contributes to the ongoing viability of the specific matter impacted by the Proposed Modification, whether it is a species, community or PCT listed under the BC Act or the EPBC Act.

7.2.2 Water Resources

The summary information below should be read in conjunction with **Section 6.4** and **Section 6.5** and **Appendix 8** and **Appendix 9** (i.e. the Groundwater Impact Assessment and the Surface Water Impact Assessment).

7.2.2.1 Water Context

The UCC exists within a well-regulated water resource management system that has been designed by the NSW government to provide for the sustainable management of the State's water resources. This includes licensing of allowable water take from both surface water and groundwater with consideration of the environmental flow requirements of watercourses and the needs of other water users; control of water pollution, including mine water discharges; and guidelines that govern the appropriate design of water management systems for mines to provide for appropriate water quality in accordance with pollution control requirements.

At a site level, the UCC Water Management Plan (WMP) provides a framework for the management of water and outlines the interaction between the various policies, plans, programs and procedures in line with State Government requirements. The WMP clarifies requirements for surface water and groundwater management during construction and operational phases.

The UCC is located within the headwaters of both the Goulburn River system and the Talbragar River system (refer to Figure 3.1 of **Appendix 9**). The catchments for these river systems are separated by the Great Dividing Range, with the Goulburn River system draining east into the Hunter River catchment, and the Talbragar River system draining west to the Macquarie River catchment and eventually into the Murray-Darling River System. All the tributaries in the approved mining areas draining to the Goulburn River and Talbragar River are ephemeral by nature.

The additional underground mining area lies within the Mona Creek catchment which is part of the Talbragar River system and is largely occupied by agricultural land.

There are three primary groundwater units across the Project Area:

- Unconsolidated alluvial sediments occurring along the creek lines associated with tributaries of the Talbragar and Goulburn Rivers.
- Shallow regolith and near surface weathered rock profiles which can host unconfined groundwater during extended wet periods when the recharge rate exceeds the rate of downward or lateral flow.
- Triassic, Jurassic and Permian sedimentary bedrock formations which contain the coal seams targeted by mining. The Ulan Seam is identified as the main water bearing zone within the Permian strata as the nature of the coal allows the horizontal movement of water more freely than the other Permian units. The Triassic and Jurassic sandstones overlying the Permian coal measures are more porous and permeable.

7.2.2.2 Key Issues

DCCEEW has indicated that the key risks associated with the Proposed Modification from the Commonwealth perspective include potential impacts to groundwater and surface water resources within the Proposed Modification area and surrounding area, including:

- groundwater drawdown and depressurisation of aquifers
- additional or altered connectivity between surface water and groundwater features
- additional or altered connectivity between aquifers
- impacts related to subsidence events and their associated impact on water resources within the vicinity of the project site
- reduction in water quality
- changes to surface flow volumes, inflows and flow paths
- impacts related to the function of the paleochannel and dependent ecosystems.

Each of these potential impacts is discussed in the following sections.

7.2.2.3 Impact Assessment

Groundwater Drawdown and Depressurisation of Aquifers

The extent of groundwater level drawdown/depressurisation is dependent on the properties of the coal seams, interburden units and other surrounding hydro-stratigraphic units. Groundwater level drawdown within the coal seam is greatest at the working coalface, and gradually reduces with distance from the mine. The UCC and surrounding region has experienced significant disturbance of groundwater levels from historical mining. Subsurface depressurisation from historic and recent mining is evident in the groundwater level records of bores screened in the Permian coal measures at UCC. Moolarben to the south and Wilpinjong Mine to the south-east both also show mine related drawdown in their groundwater level monitoring data.

A numerical model was used to predict the extent of groundwater level drawdown within each of the model layers through comparison of two model setups: a model simulating the approved mining and a model simulating the approved mining plus the changes due to the Proposed Modification.

Model results provided in Section 7.2 of the GIA (**Appendix 8**) show that the additional drawdown contours for the Triassic formations do not extend under any saturated alluvium, however, the predicted drawdown contours do extend under and into areas of the colluvium associated with Mona Creek. This does result in additional drawdown in the Mona Creek valley sediments from the Proposed Modification, but this is contained within the colluvium of Mona Creek. The extent of predicted additional drawdown does not extend north into the Talbragar alluvium. No changes to the impact on the Goulburn River alluvium are predicted from the Proposed Modification.

The model represents the Mona Creek sediments being vertically connected to the mining area through fracturing (noting the estimated fracture height is close to the base of the colluvium in this area). The predicted drawdown is considered conservative because the height of predicted fracturing is not expected to extend to the base of the colluvium. The height of fracturing has been estimated empirically in the GIA using the Ditton-Merrick method, and this process (selecting appropriate input parameters) has been guided by an assessment of groundwater monitoring data observed at UCC. A comparison of the calculated height of connected fracturing using the Ditton-Merrick, Tammetta, and the ACARP study methods are presented in Table 3 of the additional EPBC report provided in **Appendix 8**. Through this process, AGE has been able to 'calibrate' the estimated height of fracturing, based on historical observations at the site, which have occurred in direct response to mining. The GIA concluded that the utility of the sediments associated with Mona Creek will not be significantly impacted by the Proposed Modification.

Drawdown is shown for both the quartzose (the more permeable part of the Triassic and most likely to be the source of water for private bores) and lithic sandstone formations of the Triassic age aquifers. Figure 7.3 and Figure 7.4 of the GIA (**Appendix 8**) show that additional drawdown of the quartzose sandstone is limited in extent (compared with the underlying lithic sandstone) because a large component of the shallower quartzose aquifer is unsaturated prior to any mining. There is no drawdown predicted at the Drip as a result of operations at the UCC, in either the approved or proposed mining scenarios.

The elevation of the coal seam floor in the area covered by the Proposed Modification is higher, or 'up dip' of other mined areas within UCC. Mining in deeper areas has resulted in some depressurisation in the Proposed Modification footprint. This is evidenced by the additional coal seam drawdown maximising at just above 20 m (refer to Figure 7.5 of the GIA (**Appendix 8**)).

In summary, the additional drawdown impact of the proposed mining is within the Proposed Modification footprint, because the areas surrounding UCC have already been impacted by the approved mining.

Connectivity Between Surface Water and Groundwater Features

Groundwater interaction with surface drainage was modelled in the GIA using the river package of the modelling software (MODFLOW) (refer to Section 3.3 and Appendix A of the GIA in **Appendix 8**). Dewatering activities from mining will result in a lowering of the water table in and around the mine. The lowering of the water table will reduce and sometimes reverse gradients in the groundwater regime which will temporarily divert water that might migrate to surface drainages and become baseflow. Predicted baseflows were extracted from the approved mining and the Proposed Modification model simulations to estimate the predicted change in baseflow due to the Proposed Modification. The results from this are summarised below in **Table 7.6**.

Table 7.6 Predicted Baseflow Impacts at the End of Mining (ML/day)

Approved Mining		Proposed Modification	
Goulburn River	Talbragar River	Goulburn River	Talbragar River
0.272	0.078	0.272	0.081

The predicted additional baseflow intercepted in the Talbragar catchment is 0.003 ML/day, which would not be measurable or noticeable in any practical sense.

Connectivity Between Aquifers

The Jurassic and Triassic sandstone and conglomerate units are more porous and permeable than the Permian units, which tend to consist of finer grained lithology. There is a secondary permeability associated with fracturing and jointing of the units. This has the potential to promote vertical connectivity between hydro-stratigraphic units that are generally separated hydraulically. The Ulan Seam is identified as the main water bearing zone within the Permian strata, as the nature of the coal (being fractured and/or with cleating) allows the horizontal movement of water more freely than the other Permian units (Mackie Environmental Research, 2015).

To conceptually illustrate the observed impacts from current mining, the cross-section shown in Figure 5.24 of the GIA (**Appendix 8**) was developed and traverses through the current active mining area, as well as through the area where mining is planned under the Proposed Modification. As indicated on the cross section, subsidence does not instantly vertically connect and drain the overlying strata to the surface. Connected fractures extend into the lower lithic part of the Triassic formation, and in some areas will extend into the quartzose Triassic formation. The lack of any observed reduction in water levels in the Jurassic formations (refer to Section 5.4 of the GIA (**Appendix 8**)) supports the hypothesis that vertical fracturing does not extend to these strata (where present) and that aquitards below the Jurassic aquifers remain intact and are unaffected by longwall mining in the Ulan Seam.

Subsidence-Related Impacts

A detailed Subsidence Assessment has been undertaken for the Proposed Modification (refer to **Section 6.3**). The approach to estimating subsidence effects used in this assessment is based on a review of previous experience over more than 40 longwall panels at the UCC. Measured subsidence at the UCC has generally been within predicted subsidence providing a high level of confidence in the subsidence predictions for the additional underground mining area. Although actual vertical subsidence is expected to be generally less than the upper limit estimates of subsidence movements, these upper limit estimates are considered appropriate to use for assessment purposes. Overall subsidence impacts are expected to be consistent with or less than the predictions for the approved operations, the subsidence performance measures outlined in PA 08_0184, and the monitoring experience since PA 08_0184 was granted. As a result, no impacts on the groundwater resource function are expected.

The subsidence predictions for the Proposed Modification were considered in the flood impact assessment, undertaken using a TUFLOW model. Flood modelling generally found that the modelled impacts to flood depths and velocities would not extend beyond the predicted vertical subsidence affectation area.

Water Quality Impacts

The alluvium, regolith and Triassic overburden are the primary source of recharge waters to the deeper Permian coal measure sequences at the UCC. In the longer term, and on cessation of mining, groundwater will continue to migrate downwards through the subsidence zone to the goaf zone and mined area. This influx of relatively low salinity water will gradually flood and fill the mined workings. As there are no open cut voids associated with the Proposed Modification, there will be no evaporative concentration of salts in groundwaters stored within the underground workings and therefore there is no means by which significant changes to groundwater salinity will occur due to mining.

There is no permanent flow of groundwater into Mona Creek that occurs within the Proposed Modification area and therefore no means by which there will be impacts on surface water quality or shallow groundwater quality. The Proposed Modification is not expected to expose any acid-generating materials and due to the nature of the proposed mining activities there is no means by which the release of heavy metals will occur during mining. Organic chemicals are currently used in the underground mine and will continue to be used in the Proposed Modification, but these are common fuels, oils and greases which are typically biodegradable and not persistent. Therefore, the nature of the Proposed Modification means the potential for a significant impact on water quality is very low.

Surface infrastructure for the Proposed Modification will be designed and constructed to include erosion and sediment controls in accordance with relevant government standards to minimise potential impacts on downstream water qualities by managing water that has the potential to cause environmental harm. Operational and rehabilitation phases of the Proposed Modification will include water quality control measures in accordance with the relevant government standards will be implemented to minimise potential impacts on water quality. These controls are standard practice, are well understood and readily implemented to manage potential impacts.

Surface Flow Volumes, Inflows and Flow Paths

Flow regimes in the river and creek systems which are expected to be impacted by the Proposed Modification were modelled to assess the impact of any potential reduction in baseflows. The estimated baseflow loss was applied to the calibrated models to assess any impacts on baseflows in affected rivers and creeks.

For two of the modelled locations on the Talbragar River (i.e. SW09 and Dunedoo), the model indicates no increase to the estimated frequency of no flow periods and no increase in average annual dry days (defined as flows less than 0.1 ML/day) as a result of the Proposed Modification. For the third modelled location on the Talbragar River (i.e. Elong Elong), the model indicates negligible impact to the estimated frequency of no flow periods and no increase in average annual dry days as a result of the Proposed Modification.

As a result of the predicted subsidence impacts there are no predicted changes to catchment areas in Mona Creek or baseflow to the creek system. As such, the Proposed Modification is not expected to have any impact on streamflow sequences in Mona Creek.

The hydraulic modelling results indicate that the predicted subsidence generally causes:

- pooling on the upstream side of each chain pillar due to the localised flattening of the floodplain
- decreases to the flood depth downstream of each chain pillar due to the localised steepening of the floodplain.

For the 1% AEP event, the modelling indicates localised flood depths of up to 3.4 m within the Mona Creek channel above the proposed longwall extensions under existing conditions. These depths are predicted to increase to 4.3 m in localised areas as a result of the Proposed Modification, primarily within UCMPL owned land and would not impact on current land uses.

Model results for the Proposed Modification show that, immediately downstream of the farm dam on Mona Creek, flood flows are concentrated into the channel due to changes in the level of a spill point into an old channel. This has the effect of removing a breakout path across the grassed floodplain area in all modelled events up to and including the 0.1% AEP event (1 in 1,000 year event). This breakout path is across grassed areas and has been formed due to the construction of a farm dam.

Modelled results on watercourse stability in Mona Creek using the 50% AEP event show increases to velocities and tractive stresses in the channel resulting from subsidence, which could potentially result in an increase to the erosive potential in the channel of Mona Creek. Areas within the channel at risk of potential erosion all occur within landholdings owned by UCMPL. Due to the increased risk of erosion, monitoring of creek stability will continue to be undertaken by UCMPL, with the potential that minor in-channel works may be required to prevent scouring. The need for any such works will be determined through monitoring implemented as part of the Extraction Plan process (refer to **Section 6.5.5** for additional detail on proposed mitigation measures).

Paleochannel and Dependent Ecosystems

A geophysical survey of the sediments within the Mona Creek valley was undertaken in August 2019 using Deep Ground Penetrating radio Radar (DGPR) to visualise the subsurface sediments to a depth of approximately 50 m. The dataset obtained by Ultramag Geophysics identified a number of anomalies that have been interpreted to represent possible paleochannels. The location of the features identified through the DGPR survey are shown on Figure 5.3 of the GIA (**Appendix 8**) including the presence of a thin and shallow alluvial paleochannel within the Mona Creek valley. The alluvial material is characterised by poorly sorted clay, silt and sand sediments. The limited permeability and porosity within the Mona Creek valley sediments results in the sediments forming localised perched groundwater lenses on top of the underlying lower permeability bedrock. The silt and clay bound nature of the Mona Creek valley sediments means these localised perched groundwater lenses are ephemeral and slowly drain into the underlying bedrock, and downgradient (to the north) over time. Any areas of cleaner sands and gravel are not well connected. Poor lateral continuity means that connectivity with persistent pools in the creek will be highly variable. Where unconsolidated sediments are present within the Mona Creek valley, the land area has been previously cleared, and is used for grazing purposes. Therefore, there is not expected to be groundwater dependent vegetation occurring in this area.

Section 8.5 of the GIA (**Appendix 8**) confirmed that no high priority GDEs were identified in NSW Government Water Sharing Plans covering the UCC. Riparian vegetation is present in some areas of UCC, however, these areas will not be impacted by the Proposed Modification, with no significant additional impacts on baseflow noted and the only change in shallow groundwater being in the Mona Creek valley sediments where no riparian vegetation is present. The only creek system potentially impacted by the Proposed Modification is Mona Creek, and riparian vegetation associated with this creek has largely been cleared for agricultural purposes in the areas where longwall panels are proposed for the Proposed Modification.

The riparian vegetation of Mona Creek has been mapped as consistent with the Derived Native Grassland condition state of the White Box – Yellow Box – Blakely's Red Gum Critically Endangered Ecological Community (CEEC) (refer to **Section 6.6.3.1** for further detail). Parts of these grassland areas are highly disturbed and therefore may not meet the EPBC condition thresholds for the CEEC, however, have conservatively been associated with the CEEC as there are parts of the zone that do meet the thresholds. Given the already disturbed nature of this vegetation zone (lacking mid and canopy strata, high density of weed species and low native diversity), any potential minor changes in groundwater are unlikely to result in a reduction in condition of this vegetation.

The Drip is a natural feature that hosts a localised GDE of vegetation growing on a sandstone cliff face, located over 10 km south-east of the Proposed Modification underground mining area and on the opposite side of the UCC. Monitoring data indicates that the aquifer system associated with the Drip is isolated from the broader Triassic layers (AGE, 2019 and AGE, 2021) and the Proposed Modification will not impact The Drip.

7.2.2.4 Assessment against Significant Impact Guidelines

A summary of the potential groundwater and surface water impacts of the Proposed Modification against the Significant Impact Guidelines 1.3: Coal seam gas and large coal mining developments – impacts on water resources (Department of the Environment, 2013) is included in **Table 7.7**.

Table 7.7 Assessment Against Significant Impact Guidelines: Impacts on Water Resources

Aspect	Impact
Flow regimes	Based on surface water impact assessment and consideration of the existing grades and flooding regimes in Mona Creek, it is considered that the Proposed Modification will have impacts on flow regimes (including flood flow velocities, depths, and extents), remnant ponding, and associated potential impacts on downstream landholders and watercourse stability in Mona Creek that are consistent with the current approval.
Recharge rates; aquifer pressure or pressure relationships between aquifers; groundwater table levels	There will be no change to recharge rates due to the Proposed Modification. Depressurisation is already occurring in the area due to approved mining and while the extent of this will be expanded slightly, no additional aquifers are predicted to be impacted. Similarly, dewatering is already occurring in the area, and the extent will be expanded slightly but will not impact existing users.
Groundwater/surface water interactions	Minimal additional reductions to baseflow are expected as a result of the Proposed Modification (7.6% for Talbragar system, equating to 0.06% of total baseflow to the Talbragar system). A review of the likely surface water impacts of the Proposed Modification indicates the predicted baseflow impacts will be negligible, and generally consistent with the existing approved mining operations.
River/floodplain connectivity	The Proposed Modification is not expected to have an impact on river/floodplain connectivity as no underground mining is proposed in floodplain areas.
Inter-aquifer connectivity	No impacts are predicted to inter-aquifer connectivity. While fracturing above longwall panels will cause enhanced permeability, connections already exist due to approved mining.
Coastal processes	No impacts on coastal process are predicted as a result of the Proposed Modification, which is located well inland, being over 200 km from the coast.

Aspect	Impact
Impact on water users	The assessment of impacts indicates that there will be negligible impact on surface water users. All water take associated with the Proposed Modification will be licensed in accordance with the NSW WM Act. The WM Act licensing arrangements have been designed to provide for sustainable take from NSW water sources.
State Water Resource Plans	The surface water sources within and adjacent to the Proposed Modification are managed under WSPs governed under the WM Act. The WSPs provide a regional water balance for these water sources and consider cumulative water use. Water take for the UCC will continue to comply with the WSPs and WM Act which are designed to provide for the sustainable use of NSW's water resources.
Water quality	Surface infrastructure for the Proposed Modification will be designed and constructed to include erosion and sediment controls in accordance with relevant government standards to minimise potential impacts on downstream water qualities by managing water that has the potential to cause environmental harm. Operational and rehabilitation phases of the Proposed Modification will include water quality control measures in accordance with the relevant government standards and these will be implemented to minimise potential impacts on water quality. With regard the potential for impacts on groundwater quality, the assessment has concluded that the nature of the Proposed Modification means the potential for a significant impact on groundwater quality is very low.

8.0 Justification and Conclusion

This section provides a conclusion discussing the justification for the Proposed Modification, taking into consideration the environmental, social and economic impacts of the Proposed Modification and the suitability of the site, to assist the consent authority to determine whether or not the Proposed Modification is in the public interest.

8.1 Environmental Impacts

As detailed in **Section 6.0**, the environmental, social and economic impacts of the Proposed Modification have been identified and subject to a detailed environmental assessment based on:

- assessment of the site characteristics (existing environment)
- focused consultation with relevant government agencies
- engagement with local community and other stakeholders
- application of the principles of ecologically sustainable development, including the precautionary principle, inter-generational equity and conservation of biological diversity and ecological integrity
- expert technical assessment.

The key issues identified were subject to comprehensive specialist assessment to identify the potential impacts of the Proposed Modification on the existing environment. These assessments are detailed in **Section 6.0** and the appendices to this document.

The detailed impact assessment undertaken concludes that with the implementation of feasible and reasonable mitigation measures, the Proposed Modification can proceed within acceptable environmental standards. The impacts of the Proposed Modification have been kept to a minimum through:

- obtaining a detailed understanding of the issues and impacts by scientific evaluation and stakeholder engagement
- commitment to proactive and appropriate strategies to avoid, minimise, mitigate, offset or manage a range of potential environmental impacts, building on the experience gained from many years of mining operations at the UCC site (refer to **Section 6.0**).

8.2 Suitability of the Site

The Proposed Modification is located in an area that has a long history of coal mining, with the Project Area itself subject to mining activity since the 1920s. The UCC is a well-established mining operation situated within the Western Coalfields of NSW.

The Proposed Modification will involve the extension of existing longwalls into adjacent exploration leases, and construction of related infrastructure to support these additional underground mining activities. These longwall extensions adjoin and are continuous with the existing approved mining areas providing an efficient mine plan to recover the coal resources in this area. The Proposed Modification will ensure that recovery of the coal resource present at the UCC is maximised and will build upon existing approved activities and utilise existing infrastructure wherever possible. There would be minimal additional impacts on private and public assets or environmental features, consistent with those previously approved under PA 08_0184. The Proposed Modification will not limit the continued use of private landholdings for agricultural or residential purposes. Existing management and monitoring programs are in place to identify and manage the potential impacts on these land uses.

The Proposed Modification would allow for the efficient recovery of a valuable resource by maximising resource utilisation and use of existing infrastructure and workforce, thereby reducing capital costs and minimising environmental impacts compared with recovering this resource by another means.

8.3 Ecologically Sustainable Development

The EP&A Act aims to encourage ecologically sustainable development (ESD) within NSW. As outlined in **Section 4.0**, the Proposed Modification requires approval from the Minister under Section 4.55 of the EP&A Act. As such, the Minister needs to be satisfied that the Proposed Modification is consistent with the principles of ESD. This section provides an assessment of the Proposed Modification in relation to these principles.

To justify the Proposed Modification with regard to the ecologically sustainable development principles, the benefits of the Proposed Modification in an environmental and socio-economic context should outweigh any negative impacts. The principles of ESD encompass the following:

- the precautionary principle
- inter-generational equity
- conservation of biological diversity
- valuation and pricing of resources.

Essentially, ESD requires that current and future generations should live in an environment that is of the same or improved quality than the one that is inherited.

8.3.1 The Precautionary Principle

The EP&A Regulation defines the precautionary principle as:

… if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and

(ii) an assessment of the risk-weighted consequences of various options.

In order to achieve a level of scientific certainty in relation to potential impacts associated with the Proposed Modification, detailed assessment of all key issues and necessary management procedures has been conducted and is comprehensively documented in this Modification Report.

The assessment process has involved a detailed study of the existing environment (refer to **Section 6.0**), and the use of engineering and scientific modelling to assess and determine potential impacts as a result of the Proposed Modification. To this end, there has been careful evaluation to avoid, where possible, irreversible damage to the environment.

The decision-making process for the design, impact assessment and development of management processes has been transparent in the following respects:

- Government authorities, landholders potentially affected by the Proposed Modification, the local community, the Aboriginal community and other stakeholders were consulted during the Modification Report preparation (refer to **Section 5.0**). This enabled comment and discussion regarding potential environmental and social impacts and proposed environmental management procedures.
- The community has been engaged throughout the development and assessment of the Proposed Modification through a range of mechanisms including one-on-one meetings and community newsletters (refer to **Section 5.0**).
- UCMPL has designed and implemented a comprehensive Environmental Management System (EMS), and related environmental management programs, that seek to implement best practice management. The Proposed Modification will incorporate the practices implemented and demonstrated to be effective at the UCC and the existing EMS will be revised to incorporate the additional controls outlined in this Modification Report.
- The Modification Report has been prepared based on the best available scientific information about the Project Area. Where uncertainty in the data used in the assessment has been identified, a conservative 'worst case' analysis has been undertaken and contingency measures have been identified to manage that uncertainty. A long history of monitoring of the existing mining operations has provided a valuable resource of data for use in the impact assessment process providing sound knowledge on which the predict future impacts. A validation program has also been proposed to measure predicted against actual impacts of the Proposed Modification, so that contingency measures, if required, can be implemented in a timely and pro-active manner.
- An auditing and review process will be an integral component of the EMS, providing for verification of the Proposed Modification performance by independent auditors and relevant government agencies. The Proposed Modification will implement an auditing and verification process consistent with that currently undertaken at the current UCC operations.

8.3.2 Intergenerational Equity

The EP&A Regulation defines the intergenerational equity principle as:

… that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, biodiversity and productivity.

The objectives of the Proposed Modification are to:

- conduct mining in an environmentally responsible manner to minimise project-specific and cumulative environmental and social impacts, and make efficient use of the available coal resource
- maintain or reduce impacts of the UCC by incorporating mitigation measures into the project design
- maintain and extend the employment opportunities for UCC employees
- continue to develop the UCC with a long-term focus on:
    - maximising efficiency and coal resource recovery
    - optimising the use of existing infrastructure
    - minimising additional disturbance footprint by maximising use of existing disturbed areas or avoiding sensitive areas, where practicable.
- develop comprehensive mitigation, management and offset strategies that expand on existing commitments to mitigate predicted impacts associated with the Proposed Modification
- co-exist with the local community, including the villages of Ulan and other rural residential areas.

In addition to the Proposed Modification objectives, a range of environmental and social management measures discussed in **Section 6.0** have been developed and evaluated to minimise the impact on the environment and community to the greatest extent reasonably practicable.

The design of the Proposed Modification and commitment to the management of environmental and social issues as outlined in this Modification Report will contribute to the maintenance of the health, diversity and productivity of the environment for future generations whilst providing for the recovery of a valuable, State-owned resource. The Proposed Modification will also make a significant contribution to maintaining services in the community through the direct and flow on effects of employee and operational expenditure and through development contributions in accordance with the EP&A Act.

8.3.3 Conservation and Biological Diversity

The EP&A Regulation identifies:

… that the conservation of biological diversity and ecological integrity should be a fundamental consideration…

In the decision-making process, the conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. All environmental components, ecosystems and habitat values potentially affected by the Proposed Modification are described in the Modification Report (refer to **Section 6.6** and **Appendix 11**). Potential impacts are outlined in these sections, and measures to ameliorate and offset negative impact are outlined in **Appendix 11**.

UCMPL has sought to avoid and minimise potential adverse impacts on the conservation and ecological values throughout the project planning process. This has included designing the conceptual layout of the proposed surface infrastructure to minimise impacts on areas of threatened ecological communities.

A comprehensive biodiversity assessment has been undertaken following the requirements of the NSW BAM and BC Act. The BC Act aims to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BAM process has defined the biodiversity offsets required for the Proposed Modification and the implementation of these offsets will provide for improvements in biodiversity values.

8.3.4 Valuation and Pricing Resources

The EP&A Regulation defines the valuation of pricing resources as:

… that environmental factors should be included in the valuation of assets and services, such as:

(i) polluter pays – that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

UCMPL has intrinsically valued the environmental resources by designing the Proposed Modification to avoid and minimise potential environmental and social impacts as much as practicable. For example, the proposed ventilation requirements have been designed to avoid areas of threatened ecological communities and known Aboriginal cultural heritage sites, where practicable.

Where residual impacts remain, mitigation measures (refer to **Appendix 2**) are proposed to further reduce potential impacts on the environment and offsets will be implemented to address the residual biodiversity impacts.

8.4 Conclusion

As outlined in **Section 8.3**, the Proposed Modification has been assessed against the principles of ESD as required by the EP&A Act. This assessment has concluded that the Proposed Modification is consistent with the principles of ESD.

The Proposed Modification maximises the efficient recovery of an additional approximate 25 Mt of product coal resource and has been designed such that this can be undertaken without significantly increasing the environmental and social impacts of the existing approved UCC operations. The Proposed Modification will result in a minor increase of the total area of subsidence affectation associated with the UCC when compared to the approved operations. The range of predicted subsidence impacts within this additional area of subsidence affectation are consistent with those approved under PA 08_0184, and whilst a range of impacts are predicted, no significant adverse impacts are predicted on the land surface or natural features located within the modified Ulan West and Ulan Underground mining areas. The Proposed Modification is not predicated to result in a significant adverse impact on existing land uses. Impacts on privately owned land or leased land is limited to access roads and tracks, fencing and farm dams. As such, impacts of the Proposed Modification on built features are predicted to be minor and generally consistent with the approved operations and PA 08_0184. The existing suite of approved management measures which have been demonstrated to appropriately address the key potential impact issues at UCC will be applied to the Proposed Modification.

The comprehensive environmental and social impact assessment as described in this Modification Report has found that with the continued implementation of existing management and mitigation measures and the addition of the new measures identified, it is anticipated that the Proposed Modification can proceed within acceptable environmental standards, without significantly increasing the environmental and social impacts of the approved operations.

The SIA has identified that social impacts from the Proposed Modification are primarily consistent with the approved operations. Given UCMPL's approach to avoiding and minimising impacts, the social impacts of the Proposed Modification have been minimised where possible through project design and the proposed management and enhancement approaches.

The Economic Impact Assessment (refer to **Appendix 17**) describes a range of positive benefits from the Proposed Modification that will result at a local, regional and State level. These benefits include:

- continued employment of approximately 930 full time equivalent employees for an additional two years
- the Proposed Modification is estimated to provide a net benefit of $292.6 million to NSW, in NPV terms
- the Proposed Modification is estimated to provide a net benefit of $45.2 million to the Lithgow-Mudgee region, in NPV terms.

On the basis of the findings in this Modification Report, it would be reasonable to consider that with the implementation of the management, mitigation and offset measures proposed by UCMPL, the Proposed Modification will result in a net benefit to the NSW community.

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APPENDIX 1

Schedule of Lands

APPENDIX 2

Updated Mitigation Measures

APPENDIX 3

Controlled Action Determination and *EPBC Act* Assessment Requirements

APPENDIX 4

Approval Path Confirmation

APPENDIX 5

Statutory Compliance Summary

APPENDIX 6

Soils and Land Impact Assessment

APPENDIX 7

Subsidence Assessment

APPENDIX 8

Groundwater Impact Assessment

APPENDIX 9

Surface Water Impact Assessment

APPENDIX 10

Water Balance

APPENDIX 11

Biodiversity Development Assessment Report

APPENDIX 12

Aboriginal Cultural Heritage Assessment Report and Addendums

APPENDIX 13

Noise Impact Assessment

APPENDIX

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Air Quality Impact Assessment

APPENDIX 15

Greenhouse Gas and Energy Assessment

APPENDIX 16

Social Impact Assessment

APPENDIX 17

Economic Impact Assessment

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