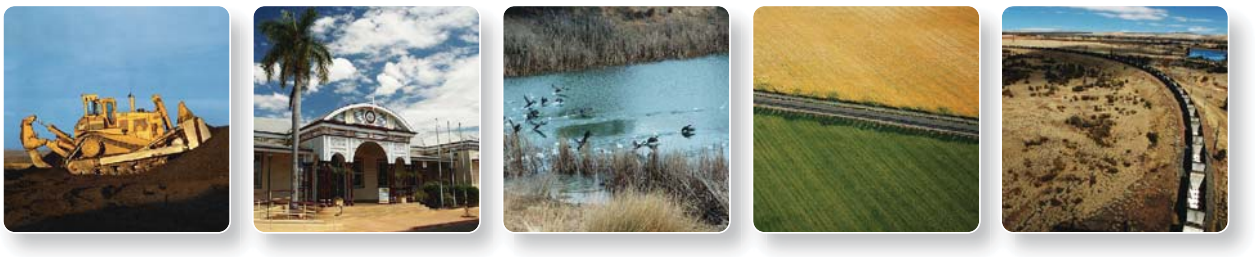

INTEGRA UNDERGROUND MINE

LONGWALL EXTENSION MODIFICATION
Environmental Assessment

for

HV Coking Coal Pty Ltd

December 2017

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

INTEGRA UNDERGROUND MINE
LONGWALL EXTENSION MODIFICATION

ENVIRONMENTAL ASSESSMENT

Prepared by:

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December 2017

For:

HV COKING COAL PTY LTD
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EXECUTIVE SUMMARY

INTRODUCTION

Hansen Bailey has prepared this Environmental Assessment on behalf of HV Coking Coal Pty Ltd (HVCC) in support of a modification to the Project Approval (PA 08_0101) for Integra Underground Mine (Integra Underground). Integra Underground is located in the Upper Hunter Valley of New South Wales. HVCC is a wholly owned subsidiary of Glencore Coal Pty Limited.

The modification application will be made under Section 75W of the *Environmental Planning and Assessment Act 1979*. HVCC is seeking approval to continue longwall mining of the Middle Liddell Seam further to the north of the currently approved longwall panels (the Modification). The Modification also involves the construction and operation of ancillary surface infrastructure required to support the proposed mining activities.

MODIFICATION DESCRIPTION

The Modification includes the following components:

- Adjustments to the approved mine plan for the Middle Liddell Seam including:
  - Realignment and extension of the main headings further to the north-west;
  - Increases to the dimensions of the approved LWs 15-17; and
  - Mining of up to three additional longwall panels.
- Construction and use of additional surface infrastructure to support the proposed future operations at Integra Underground, including:
  - Goaf Dewatering Site consisting of additional dewatering boreholes and associated infrastructure;
  - Surface auxiliary fans and associated infrastructure;
  - Additional electricity transmission lines and distribution lines;
  - Additional gas drainage boreholes to facilitate the safety of underground operations;
  - Increased usage of the currently approved gas flares; and
  - Relocation and upgrade of the existing store facility; and
  - An additional access road off Middle Falbrook Road.
- Use of the C4 Dam (at Rix's Creek North Mine) to store raw water from Glennies Creek.

Integra Underground is located adjacent to the Mount Owen Complex, which is also owned and operated by subsidiaries of Glencore Coal Pty Limited. The Modification does not involve any alterations to the Development Consents for the Mount Owen Complex. However, the proposed mining activities and infrastructure development will be undertaken within the development consent boundaries for the Mount Owen Complex.

IMPACTS, MANAGEMENT AND MITIGATION

The Modification is located within the existing mining operations of Mount Owen Complex. A small portion of Ravensworth State Forest lies within the north eastern boundary of the Modification. All land subject to the Modification is owned by subsidiaries of Glencore Coal Pty Limited or the New South Wales Government (managed by the Forestry Corporation of New South Wales). Existing surface infrastructure associated with the mining operations of the Mount Owen Complex are included within the proposed Modification Project Boundary including the Mount Owen Rail Spur.

Subsidence

A Subsidence Impact Assessment has been completed by SCT Operations Pty Ltd to predict the subsidence effects that may result from the proposed longwall mining and to assess the impacts of these subsidence effects on the overlying natural and built features and recommended measures to mitigate and manage the identified impacts. A conservative Subsidence Assessment Area for the Modification was defined by a horizontal setback equivalent to the overburden depth (top of coal seam to the natural surface), with the setback being applied to the outermost edge of the goaf.

Subsidence impacts resulting from the extraction of the proposed longwall panels are expected to remain within the levels predicted in previous Environmental Assessments for Integra Underground.

There is limited public infrastructure within the Subsidence Assessment Area. The majority of the built features within the Subsidence Assessment Area are components of mine infrastructure owned by other subsidiaries of Glencore Coal Pty Limited. The existing mine infrastructure, including the Mount Owen Rail Spur, has been subject to subsidence as a result of current and previous mining operations at Integra Underground. The safety and operability of the mining infrastructure was maintained via the implementation of the Subsidence Monitoring Program and asset specific management plans. Subsidence impacts to mine related infrastructure will continue to be managed through revisions of these plans, which will include specific measures to address the potential impacts of the Modification.

Small patches of remnant vegetation are present within the Modified Project Boundary, including parts of the Ravensworth State Forest, Southern Remnant Offset Area, Bettys Creek Habitat Management Area, and some remnant vegetation to the south-east of the Mount Owen North Pit. Parts of the Ravensworth State Forest and the Southern Remnant Offset Area are predicted to experience vertical subsidence of up to 0.3 m with low levels of tilt and strain. Consultation with the Forestry Corporation of NSW will continue to be undertaken. The existing Biodiversity Management Plan will be revised to incorporate relevant management and mitigation measures to address the predicted subsidence resulting from the Modification.

Bettys Creek Diversion is currently being mined beneath by the approved Longwalls 13 and 14 and is expected to experience 1.9 m of vertical subsidence along the diversion channel. The Modification is not expected to increase the maximum subsidence along the diversion channel. The consequences of the subsidence effects are expected to remain consistent with the predictions of previous Environmental Assessments for Integra Underground. Management and mitigation impacts will be detailed in the Extraction Plan, which will be developed in consultation with the relevant regulators and Mt Owen Pty Limited. The Extraction Plan will include a Water Management Plan to address potential impacts to stream morphology.

Geotechnical

SCT Operations Pty Ltd conducted a Geotechnical Assessment to assess the potential impacts of subsidence on the highwall of the Mount Owen Complex North Pit and recommended measures to mitigate and manage the identified impacts. Longwall mining directly below the highwall of the North Pit has the potential to induce rockfalls along the sections of the highwall that will be directly mined beneath. Mining directly beneath the highwall also has the potential to induce tensile cracking, which can lead to slope instability if there is water ingress into the cracks. The potential impacts to the highwalls will be managed through the development of an Extraction Plan in consultation with Mt Owen Pty Limited.

Groundwater

A Groundwater Impact Assessment has been completed by Australasian Groundwater and Environmental Consultants Pty Ltd. The assessment includes a 3D numerical groundwater model developed for the Modification based on an existing regional model developed for the Mount Owen Continued Operations Project. The regional model was used to simulate the likely impacts of the Modification on groundwater resources over an 18 year mining period (i.e. the remaining approved duration of mining). Adjacent mining impacts were included within the model based on currently approved and foreseeable mine plans.

Groundwater inflow into the mine workings is predicted to range from 30 ML/year in Year 1 to 257 ML/year (0.7 ML/day) in Year 5 of the simulated mine period.

The model predicts no measurable change to drawdown within the Quaternary alluvium as a result of the Modification alone. Drawdown within the Quaternary alluvium resulting from the Modification and approved mining at Integra Underground is predicted to be less than 1 m within the Glennies Creek alluvium and Main Creek alluvium.

The change in groundwater flux to alluvial systems, as a result of the Modification and approved mining operations, is predicted to peak at 36 ML/year in Glennies Creek alluvium and 4 ML/year in the Main Creek alluvium. This change in flux to the alluvium is also predicted to result in a change in the baseflow to Glennies Creek of 21 ML/year and to Main Creek of less than 1 ML/year. Glennies Creek has an average flow of 66,335 ML/year. Therefore the predicted change in groundwater baseflow of 21 ML/year is minor compared to the background stream flows. Main Creek is an ephemeral system with no recorded permanent baseflow.

One private groundwater bore, which draws water from the Glennies Creek alluvium, is located in the vicinity of the Modification. However, no detectable decline in groundwater levels is predicted to occur as a result of the Modification.

Water quality within the Quaternary alluvial aquifers and the hardrock aquifer is highly variable. Water quality data indicates Bettys Creek and Main Creek alluvium have salinity levels ranging from fresh (less than 500 mg/L) to saline (more than 7,000 mg/L). Salinity with the hardrock aquifer is also highly variable, ranging from fresh to highly saline (more than 15,000 mg/L). Groundwater from the Quaternary alluvium and the underlying hardrock groundwater systems is not suitable for potable or irrigation uses.

The predicted impacts to groundwater systems will continue to be managed in accordance with existing management measures implemented at Integra Underground. The current Water Management Plan will be updated to include additional measures specific to the potential impacts of the Modification, such as:

- Expansion of the existing groundwater monitoring network (in consultation with relevant regulators) to monitor predicted impacts of the Modification;
- Expansion of the water quality monitoring suite to include key analytes for determining changes to water quality throughout the life of the mine; and
- Validation of the model predictions every five year.

Surface Water

A Surface Water Impact Assessment has been completed by Hansen Bailey to determine the impacts of the Modification on the Integra Underground Water Management System and the wider Greater Ravensworth Area Water Sharing Scheme. The assessment also identified potential impacts to catchments and streams resulting from the Modification and recommended measures to mitigate and manage the identified impacts.

The Integra Underground Water Management System involves:

- Containment and reuse of:
    - Underground mine water (i.e. water captured in the underground workings);
    - Rainfall runoff from areas disturbed by open cut mining, including parts of the adjacent Rix's Creek North Mine;
    - Seepage from the Rix's Creek North Mine and surrounding catchment; and
    - Rainfall runoff from surface infrastructure areas.
- Use of an external raw water supply (sourced from Glennies Creek) to meet operational water demands; and
- Diversion of clean water around disturbed areas.

Mine water is reused for operational purposes wherever practicable. Surplus mine water within the Water Management System is transferred to either the Greater Ravensworth Area Water Sharing Scheme (via Mount Owen Complex) or Rix's Creek North Mine.

The water balance for Integra Underground indicates that the mine will generally operate at water surplus. The water balance confirmed there is sufficient capacity within the Greater Ravensworth Area Water Sharing Scheme to accommodate the additional mine water accumulated by the Modification.

The water balance determined that the raw water requirements at Integra Underground will not increase as a result of the Modification. The use of the C4 Dam (at Rix's Creek North Mine) to store raw water from Glennies Creek will further optimise water usage at Integra Underground.

The Modification will not result in any additional reduction to the Bettys Creek catchment, as the parts of the Bettys Creek catchment that are predicted to be affected by the Modification are already within the catchment of the approved Mount Owen Complex Water Management System.

The Modification is predicted to result in containment of approximately 0.1 ha of the Glennies Creek catchment, which represents a minor decrease (<0.001%) in the Glennies Creek catchment. This will result in a proportionate decrease in catchment yield. There are no third party water users located along Glennies Creek downstream of Integra Underground.

Therefore, the minor decrease in catchment yield will not impact upon any downstream water users.

Erosion and sediment controls will be implemented (as per existing controls at Integra Underground) to minimise sedimentation of water resources. Indirect impacts resulting from subsidence may result in short term, localised bank instability, water pooling and erosive processes within Bettys Creek. The predicted subsidence effects to Bettys Creek Diversion will also result in bed lowering. However, the Bettys Creek Diversion is required to be rehabilitated by Mt Owen Pty Limited in accordance with the development consent for the Mount Owen Continued Operations Project.

Potential impacts to surface water will continue to be managed in accordance the Water Management Plan. The Water Management Plan will be updated to include management measures specific to the Modification.

Noise

An Acoustic Impact Assessment was completed by Bridges Acoustics to predict the construction and operational noise levels that would be generated by the Modification at the nearest sensitive receptor. Pursuant to Condition 1 under Schedule 3 of PA 08_0101 (as modified), the nearest sensitive receptor is subject to acquisition upon request from the owner.

The sound power levels of equipment required for each construction task were identified and the noise level was calculated based on the distance of the sensitive receptor from the construction activities. Operational noise levels were predicted using a similar methodology, except using the sound power levels generated by the operation of the infrastructure. The predicted noise levels at the sensitive receptor represent the worst case noise levels that would occur under noise enhancing (prevailing) weather conditions.

Construction noise levels at the receptor are predicted to remain within the 'noise affected' level of 40 $L_{Aeq,15min}$ (as recommended by the *Interim Construction Noise Guideline*) during the construction phase. Similarly, operational noise levels are not expected to result in any exceedance of the operational noise criteria at the sensitive receptor.

The existing Noise Management Plan will be updated to include the activities proposed by the Modification. If alternative temporary construction noise limits are sought, HVCC will develop a Construction Work Noise Protocol in accordance with the conditions of PA 08_0101 (as modified).

Air Quality and Greenhouse Gas

An Air Quality and Greenhouse Gas Assessment was completed by Jacobs. An environmental risk assessment was undertaken for all potential air quality hazards associated with the construction phase of the Modification. The environmental risk was determined using qualitative criteria for the likelihood and consequences of adverse impacts. Air quality impacts during the operational phase of the Modification were assessed by

preparing an emissions inventory and comparing the predicted emissions to those of nearby mining operations.

Air quality hazards during the construction phase may include dust resulting from earthworks, grading of unsealed surfaces, drilling of boreholes and wheel generated dust. The risk assessment determined that with appropriate dust controls, the risk of air quality impacts would be 'low'.

The main air quality hazards during the operational phase are associated with the handling and stockpiling of coal. The Modification will not change the approved maximum coal production rate and will therefore result in similar emissions to the approved operations at Integra Underground. The operational emissions generated by Integra Underground are likely to be minor compared to background emissions.

An inventory of greenhouse gas emitting activities was developed for both the construction and operational phases of the Modification. The emissions inventory included Scopes 1, 2 and 3 as defined by the *Greenhouse Gas Protocol.* The Carbon Gauge tool was used to estimate the greenhouse gas emissions associated with key construction activities. Operational greenhouse gas emissions, including fugitive emissions, were projected utilising existing data reported in accordance with the *National Greenhouse and Energy Reporting Act 2007* and the project coal production for the period of the Modification.

During the construction phase, vegetation clearing (resulting in loss of the carbon sink) was determined to be the greatest contributor (56%). During the operational phase, fugitive emissions from the extraction of coal accounts for approximately 86% of the total projected operational greenhouse gas emissions.

The existing Air Quality and Greenhouse Gas Management Plan will be updated to include the activities proposed by the Modification. Integra Underground currently transfers methane gas to the Glennies Creek Power Station for beneficial use in electricity generation. Surplus gas that cannot be converted to electricity is managed through flaring. Reuse of methane gas for electricity generation and flaring will continue to be implemented for the Modification.

Ecology

An Ecological Impact Assessment has been completed by Cumberland Ecology to identify the potential impacts to flora, fauna and ecological communities (including threatened species and communities) that may arise as a result of the Modification. The assessment included a desktop review of existing data and a field survey.

The Assessment Boundary consists predominantly of disturbed land (due to mining and agricultural land uses). The Assessment Boundary also includes areas that are approved to be disturbed by the Mount Owen Continued Operations Project. The Modification will result in direct disturbance of up to approximately 5.40 ha of native woodland vegetation. Approximately 3.45 ha of this woodland vegetation is approved to be disturbed by the Mount

Owen Continued Operations Project. Therefore, the Modification is predicted to result in disturbance of up to an additional 1.95 ha.

The Central Hunter Ironbark – Spotted Gum - Grey Box Forest vegetation community (listed as a threatened ecological community) is located within the Assessment Boundary. The Modification will avoid direct impacts to listed ecological communities. Vegetation within the Assessment Boundary has been identified as potential habitat for threatened species. However, no areas of significance (i.e. roosting sites) were identified within the field survey.

Terrestrial groundwater dependent ecosystems occur within and immediately adjacent to the Assessment Boundary. The Modification is not expected to result in significant disturbance of groundwater dependent ecological communities. The Modification is not expected to result in any measurable drawdown of the alluvial aquifer in the vicinity of groundwater dependent ecosystems. Therefore, impacts to groundwater dependent ecosystems are predicted to be minor.

The Biodiversity Management Plan will be updated for the Modification and will include:

- Additional subsidence monitoring within Ravensworth State Forest and Southern Remnant Offset area to monitor impacts from subsidence; and
- Avoidance of disturbance to listed ecological communities.

Aboriginal and Historic Heritage

An Aboriginal and Historic Heritage Impact Assessment was completed by OzArk Environmental and Heritage Management to identify the Aboriginal and historic archaeological values and sites within the Assessment Boundary. The assessment was completed utilising existing studies, reports and databases and verified by a field survey. The Aboriginal Sites Decision Support Tool (OEH, 2014) was used to predict the likelihood of Aboriginal sites being present prior to European settlement.

Five Aboriginal heritage sites were identified within the Assessment Boundary. One site (MOCO OS-6) is located within the proposed 66 kV powerline easement. Direct impacts to this site resulting from surface disturbance will be avoided where practicable. If direct impacts cannot be avoided, surface collection of the artefacts will be undertaken in accordance with the Aboriginal Heritage Management Plan. There are no sites of historical heritage significance located within the Assessment Boundary.

The Aboriginal Heritage Management Plan and will be updated to address the potential impacts to the identified sites. The protocols in the Aboriginal Heritage Management Plan and Historic Heritage Management Plan will be implemented in the event of an unanticipated discovery of a potential historical archaeological material, site or item.

Traffic

A Traffic Impact Assessment was completed by WSP to review the condition of the existing road network in the vicinity of Integra Underground and assess the impacts of the potential traffic volumes generated by the Modification. The assessment included traffic surveys of the key roads and intersections, traffic modelling of the existing performance of key intersections and a review of crash data provided by NSW Roads and Maritime Services to assess safety of the existing road network.

Impacts on the road network during the construction period of the Modification are expected to be negligible. A peak of 68 daily vehicle movements (14 vehicles/hour during peak hours) is predicted to be generated by the Modification during the construction phase. The additional construction traffic will be temporary in nature and will not impact upon the performance of the road network.

Additional traffic will not be generated during the operational phase of the Modification as the Modification does not seek to increase the currently approved workforce of 280 personnel.

To ensure the safe operation of all services during the construction phase, the following measures are proposed:

- Minimise the use of level crossings on Hebden Road and Glennies Creek Road during periods of known rail movements;
- Information regarding the safe use of level crossings will be provided to construction personnel; and
- Where possible, construction traffic is to scheduled outside the hours of school pick up and drop off time on Hebden Road where school bus services are provided.

Economics

An Economic Impact Assessment was completed by Cadence Economics to assess the net benefits (both direct and indirect) of the Modification on the regional and NSW economies. The assessment was undertaken in accordance with the NSW Government's economic assessment guidelines and included a Cost Benefit Analysis, Local Effects Analysis and Computable General Equilibrium model.

The Cost Benefit Analysis estimated that the Modification will generate a total net benefit to NSW of $205.5 million (present value). The total net benefit is comprised of $80.9 million (present value) in direct benefits and $124.6 million (present value) in indirect benefits. The direct benefits include royalties, company tax attributable to NSW, council rates and other taxes. The indirect benefits include economics benefits to workers and suppliers.

The Local Effects Analysis estimated the total net benefit to the region at $78.7 million (present value). The net benefit to the regional is comprised primarily of indirect benefits, which include economic benefits to local workers and suppliers.

The Computable General Equilibrium model estimated the gross income and employment that would be generated by the Modification, at both the regional and NSW levels. At the regional level, the Modification is predicted to increase Gross Regional Income by $834 million to $876 million (present value), depending on the labour supply response. The employment generated by the Modification is predicted to average 195 full time equivalent workers (assuming high labour response) and 109 workers (assuming medium labour response).

At the NSW level, the Modification is predicted to increase Gross State Income by $1,201 million to $1,268 million (present value), depending on the labour supply response. The employment generated by the Modification is predicted to average 272 workers (assuming high labour response) and 150 workers (assuming medium labour response).

JUSTIFICATION

HVCC acquired Integra Underground in December 2015. Given that Integra Underground and Mount Owen Complex are now both owned by subsidiaries of Glencore Coal Pty Limited, HVCC's acquisition of Integra Underground has given rise to the opportunity to recover the coal resources beneath the surface mining operations at Mount Owen Complex. Given the ability to extend underground mining beneath Mount Owen Complex, HVCC has undertaken extensive mine planning to optimise the recovery of coal from the Middle Liddell seam. The Modification will enable the extraction of up to an additional 9.9 Mt of run of mine coal from the Middle Liddell coal seam, whilst not impacting upon the approved coal recovery at Mount Owen Complex. The Modification is predicted to generate net benefits to NSW valued at $205.5 million (present value). The expected net benefits (direct and indirect) include royalties, payroll tax, council rates, and economic benefits to workers and suppliers.

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1 INTRODUCTION

This section provides a background to the Modification, introduces the proponent, and explains the purpose and structure of this Environmental Assessment.

1.1 BACKGROUND

HV Coking Coal Pty Limited (HVCC) operates the Integra Underground Mine (Integra Underground) in the Upper Hunter Region of New South Wales (NSW). Integra Underground is located at Glennies Creek, approximately 12 km north-west of Singleton (see **Figure 1**). HVCC is a wholly owned subsidiary of Glencore Coal Pty Limited (Glencore). HVCC operates under a Project Approval (PA 08_0101) granted under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). PA 08_0101 was granted on 26 November 2010 and has been modified on seven occasions. PA 08_0101 (as modified) enables mining operations (in three coal seams) to be undertaken until 31 December 2035.

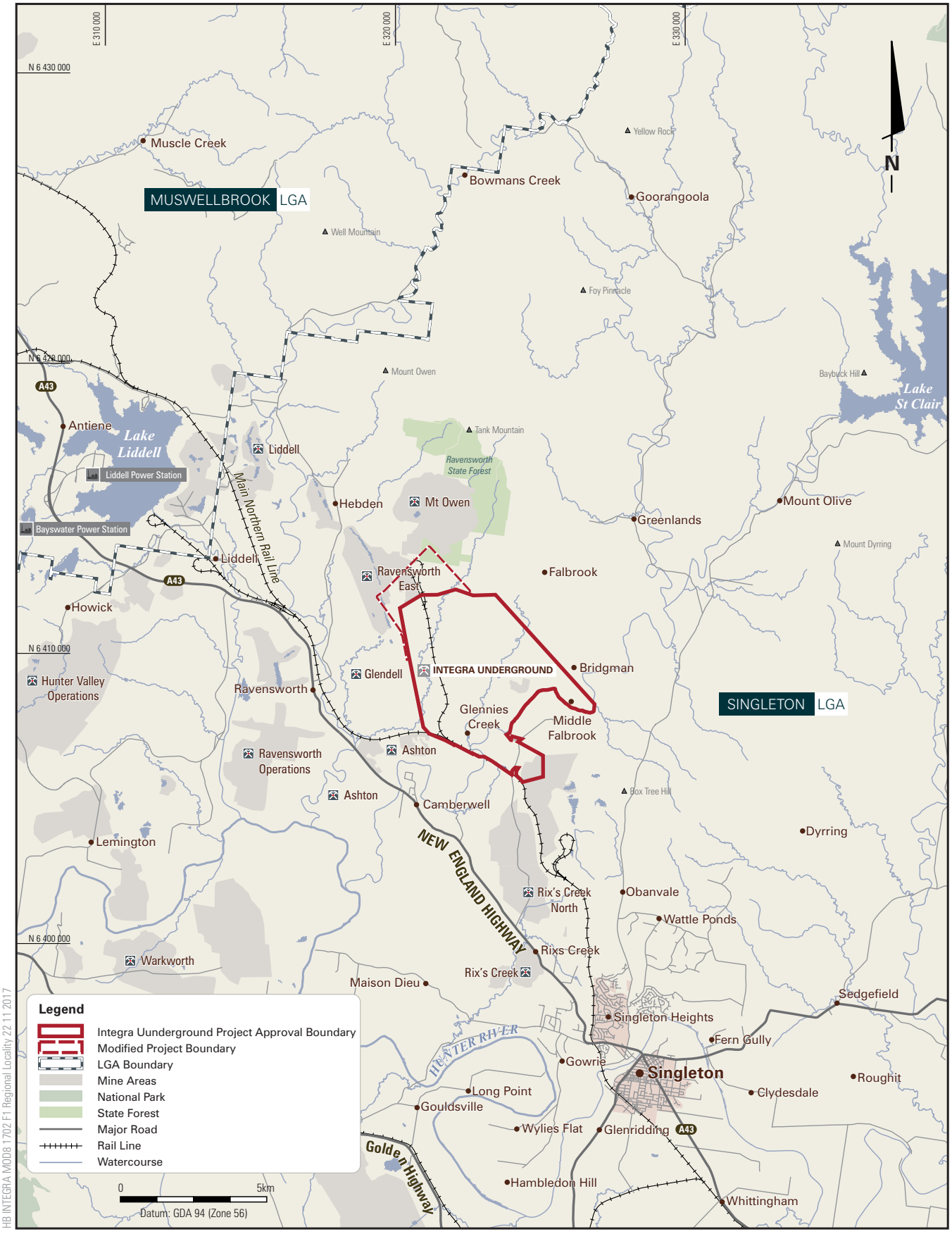
HVCC is seeking to modify PA 08_0101 under Section 75W of the EP&A Act to enable further longwall mining of the Middle Liddell Seam and the construction and operation of ancillary surface infrastructure (the Modification). **Section 1.2** provides an overview of the Modification with a detailed description provided in **Section 4.**

Integra Underground was formerly a component of the Integra Coal Complex, which included both underground and open cut mining operations. In December 2015, HVCC acquired the underground mining component of the Integra Coal Complex. The open cut mine and surface facilities were acquired by Bloomfield Collieries Pty Limited (Bloomfield Collieries) and subsequently re-named the Rix's Creek North Mine. Rix's Creek North Mine is located immediately south of Integra Underground.

Although Integra Underground and Rix's Creek North Mine are no longer managed as a joint operation, there remain a number of interactions between the operations (refer to **Section 3**). These interactions are managed in accordance with a commercial agreement between HVCC and Bloomfield Collieries.

The Mount Owen Complex (MOC) is comprised of the Mount Owen, Glendell and Ravensworth East Mines, all of which are open cut mining operations. The surface mining operations associated with MOC are located directly above and to the north of Integra Underground (see **Figure 1**). Accordingly, this document addresses the various interactions between the Modification and the approved operations at MOC.

The Mount Owen and Ravensworth East Mines are managed by Mt Owen Pty Limited (Mt Owen) in accordance with Development Consent (SSD-5850), which was granted in respect of the Mount Owen Continued Operations Project (MOCO). SSD-5850 enables open cut mining operations to be undertaken until 31 December 2031.



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INTEGRA UNDERGROUND MINE

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Regional Locality

FIGURE 1

Glendell Mine is managed by Glendell Tenements Pty Limited (Glendell) in accordance with Development Consent DA 80/952 (as modified). DA 80/952 permits mining operations to be undertaken until 30 June 2024.

HVCC, Mt Owen and Glendell are all subsidiaries of Glencore. The common ownership of Integra Underground and MOC has given rise to the opportunity for HVCC to recover the coal reserves beneath the surface operations at MOC. The Modification will facilitate the extraction of up to an additional 9.9 Mt of Run of Mine (ROM) coal. The Modification will not involve any alterations to the approved activities under SSD-5850 or DA 80/952.

1.2 OVERVIEW OF MODIFICATION

The Modification includes the following components:

- Adjustments to the approved mine plan for the Middle Liddell coal seam including:
  - Realignment and extension of the main headings further to the north-west;
  - Increases to the lengths and widths of the currently approved longwall panels (LWs 15-17); and
  - Mining of up to three additional longwall panels within the Future Underground Extraction Area.
- Construction and use of ancillary surface infrastructure to support the proposed future operations at Integra Underground, including:
  - Goaf Dewatering Site consisting of additional dewatering boreholes and associated infrastructure;
  - Surface auxiliary fans and associated infrastructure;
  - Additional electricity transmission lines and distribution lines;
  - Additional gas drainage boreholes to facilitate the safety of underground operations;
  - Increased usage of the currently approved gas flares; and
  - Relocation and upgrade of the existing store facility; and
  - An additional access road off Middle Falbrook Road.
- Use of the C4 Dam (at Rix's Creek North Mine) to store raw water from Glennies Creek.

The proposed mining activities and ancillary surface infrastructure associated with the Modification are conceptually illustrated in **Figure 2A** and **Figure 2B** and described further in **Section 4.2** and **Section 4.3** respectively.

The conceptual mine plan illustrated in **Figure 2A** involves the potential widening of LWs 15-17 from the panels depicted in Appendix 3 of PA 08_0101 (Project Layout Plans). Given the conceptual nature of the Project Layout Plan for the Middle Liddell seam, and the fact that the environmental assessment documents identified in Condition 2 under Schedule 2 of PA 08_0101 provide for possible mine plan amendments, a modification of PA 08_0101 is not required for the potential widening of LWs 15-17 within the existing Approved Conceptual Middle Liddell Mining Area (see **Figure 2A**). Further, an Extraction Plan will be prepared to the satisfaction of the Secretary prior to secondary extraction of LWs 15-17. However, given that the proposed extension of LWs 15-17 is part of the Modification, the widening of these longwall panels within the Approved Conceptual Middle Liddell Mining Area has been included as part of the Future Underground Extraction Area for completeness.

The Modification will generate additional royalties (which will accrue to NSW) and increase economic activity within the regional and NSW economies. HVCC will implement appropriate environmental management practices to minimise the potential environmental impacts of the proposed activities. The Modification is not expected to significantly exacerbate the environmental impacts associated with the approved activities at Integra Underground.

1.3 DOCUMENT PURPOSE

This Environmental Assessment (EA) supports the application to modify PA 08_0101 to facilitate the continuation of longwall mining operations in the Middle Liddell Seam and the development of ancillary infrastructure. It provides a description of the Modification and assesses the potential environmental impacts associated with the Modification.

1.4 PROPONENT

The relevant contact details for the proponent are provided below:

HV Coking Coal Pty Ltd

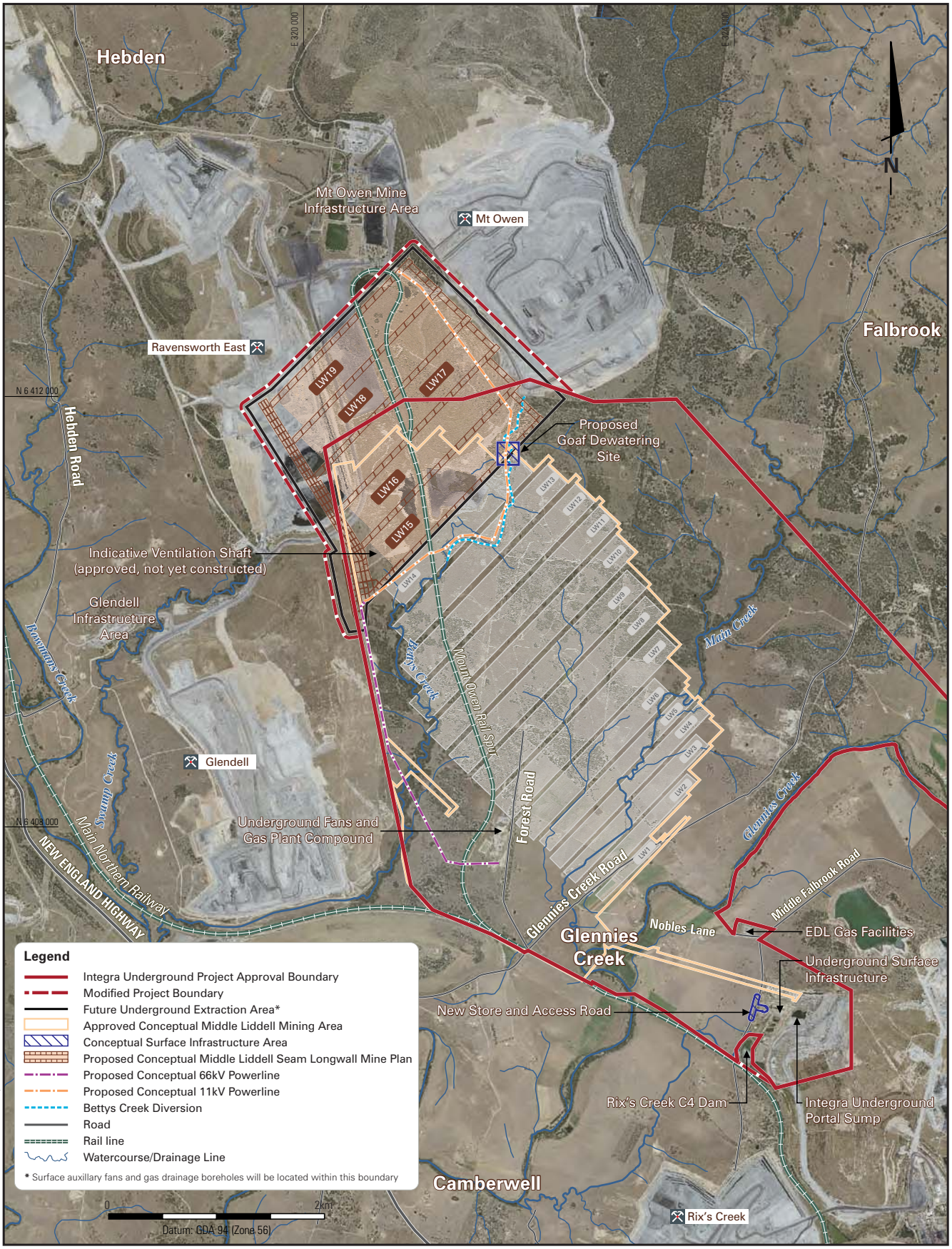
PO Box 534
SINGLETON NSW 2330
Phone: (02) 6577 4200
http://www.glencore.com.au/en/who-we-are/energy-products/integra/

1.5 DOCUMENT STRUCTURE

This EA is structured as follows:

- **Section 2** describes the existing environment in the locality of the Modification;
- **Section 3** describes the approved mining operations at Integra Underground;
- **Section 4** provides a detailed description of the Modification;
- **Section 5** describes the regulatory framework that is applicable to the Modification;

- **Section 6** outlines the stakeholder engagement that has been undertaken for the Modification and the issues raised during this process;
- **Section 7** provides a risk assessment of the potential environmental impacts of the Modification;
- **Section 8** assesses the potential environmental impacts of the Modification and describes the management and mitigation measures that will be implemented to ameliorate these impacts;
- **Section 9** presents a summary of the proposed management and mitigation measures;
- **Section 10** provides a conclusion to the assessment;
- **Section 11** defines the abbreviations and terms used in this EA; and
- **Section 12** lists the sources referenced in this EA.



HB INTEGRA MOD8 1702 F2a Conceptual Modification Overview (320m) 22 11 2017

INTEGRA UNDERGROUND MINE

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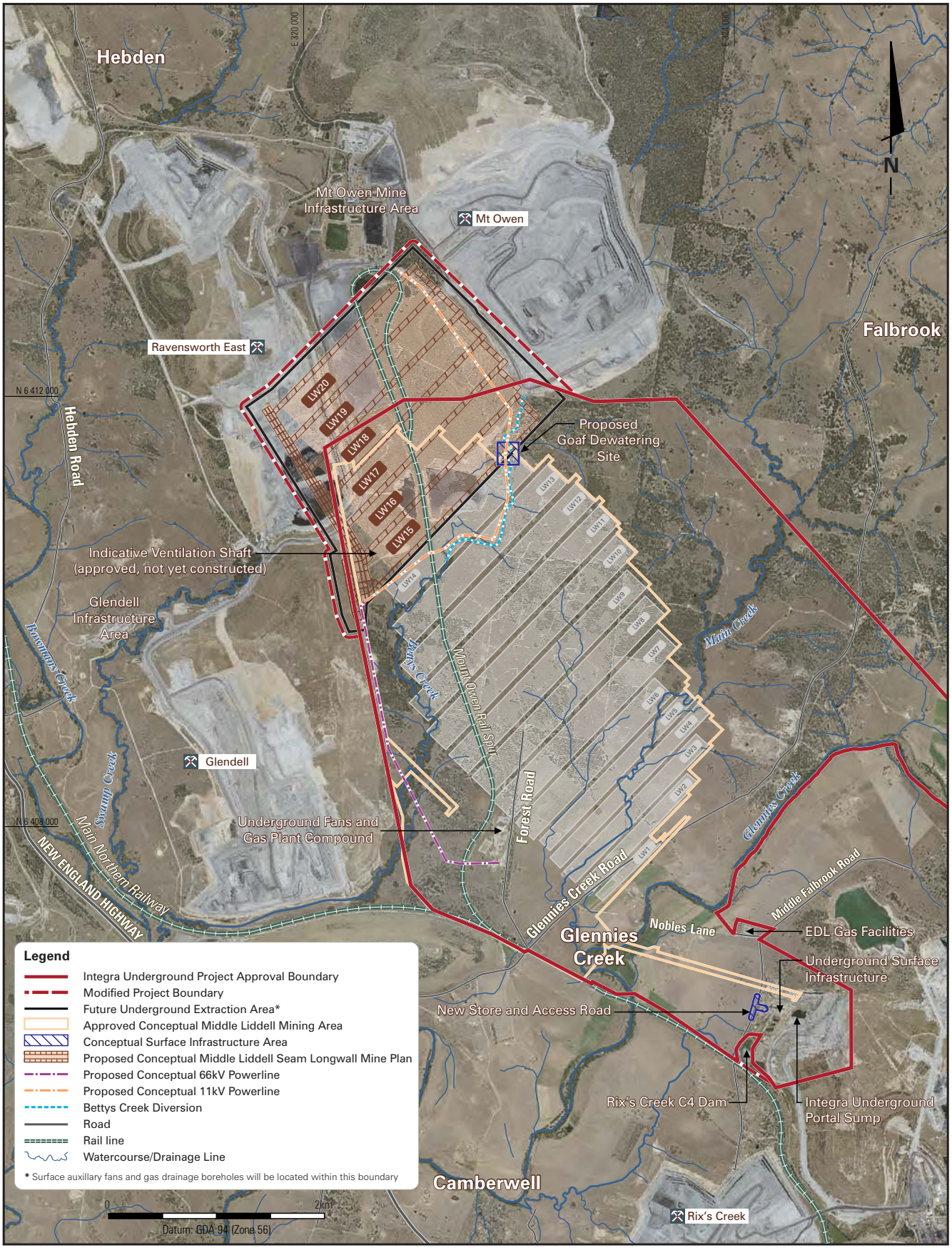
Conceptual Modification Overview (320m)

FIGURE 2A



HB INTEGRA MOD8 1702 F2b Conceptual Modification Overview (246m) 22 11 2017

INTEGRA UNDERGROUND MINE

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Conceptual Modification Overview (246m)

FIGURE 2B

2 EXISTING ENVIRONMENT

This section provides a discussion on the existing natural features, geology, land use and land ownership relevant to the Modification.

2.1 CLIMATE

Integra Underground is located in the Sydney Basin Bioregion, which exhibits a temperate climate. The regional climate is characterised by warm summers and the absence of a dry season. The nearest meteorological station that provides long term climate statistics is the Bureau of Meteorology's (BOM) Singleton STP meteorological station (Site 061397), located approximately 17 km to the south-east of the Modification.

2.1.1 Temperature

Data recorded from the BOM meteorological station indicate that temperatures are highest in January (mean maximum temperature 31.7^{o}C) and lowest in July and August (mean minimum temperature 4.2^{o}C).

2.1.2 Rainfall and Evaporation

Rainfall records from the BOM meteorological station indicate that the average annual rainfall is approximately 677 mm. The highest monthly rainfall occurs in February (mean monthly rainfall of approximately 87 mm) and the lowest monthly rainfall occurs in July (mean monthly rainfall of approximately 25 mm).

2.1.3 Wind Speed and Direction

Wind speeds and directions are measured at the meteorological station at Glendell Mine (part of MOC). **Figure 3** shows that the prevailing winds are from the south-east in summer, north-west in winter, and from both directions in spring and autumn. This pattern of wind is common throughout the Hunter Valley and means that emissions generated by the Modification will be transported to the south-east or north-west for the majority of the time.

2.2 TOPOGRAPHY AND NATURAL FEATURES

Integra Underground is located within the Central Lowlands. The Central Lowlands are flanked by the Liverpool Ranges to the north-west, the Great Dividing Range to the west and the Mount Royal Range and Barrington Tops to the north-east. The Central Lowlands are characterised by undulating to low rolling hills.

Source: Jacobs (2017)

HB INTEGRA MOD8 1702 F3 Annual and Seasonal Windroses 25 09 2017

INTEGRA UNDERGROUND MINE

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Annual and Seasonal Windroses

FIGURE 3

2.3 GEOLOGY

2.3.1 Regional Geology

The coal seams and surrounding strata are assigned to the Foybrook Formation, a stratigraphic unit of the Late Permian Singleton Supergroup (ERM, 2009). The Singleton Supergroup is comprised of the Newcastle Coal Measures, Tomago Coal Measures, Watts Sandstone and the Whittingham Coal Measures. The geology is characterised by Permian lithic sandstone, conglomerate, shale and coal. **Figure 4** shows the indicative geological stratigraphy at Integra Underground.

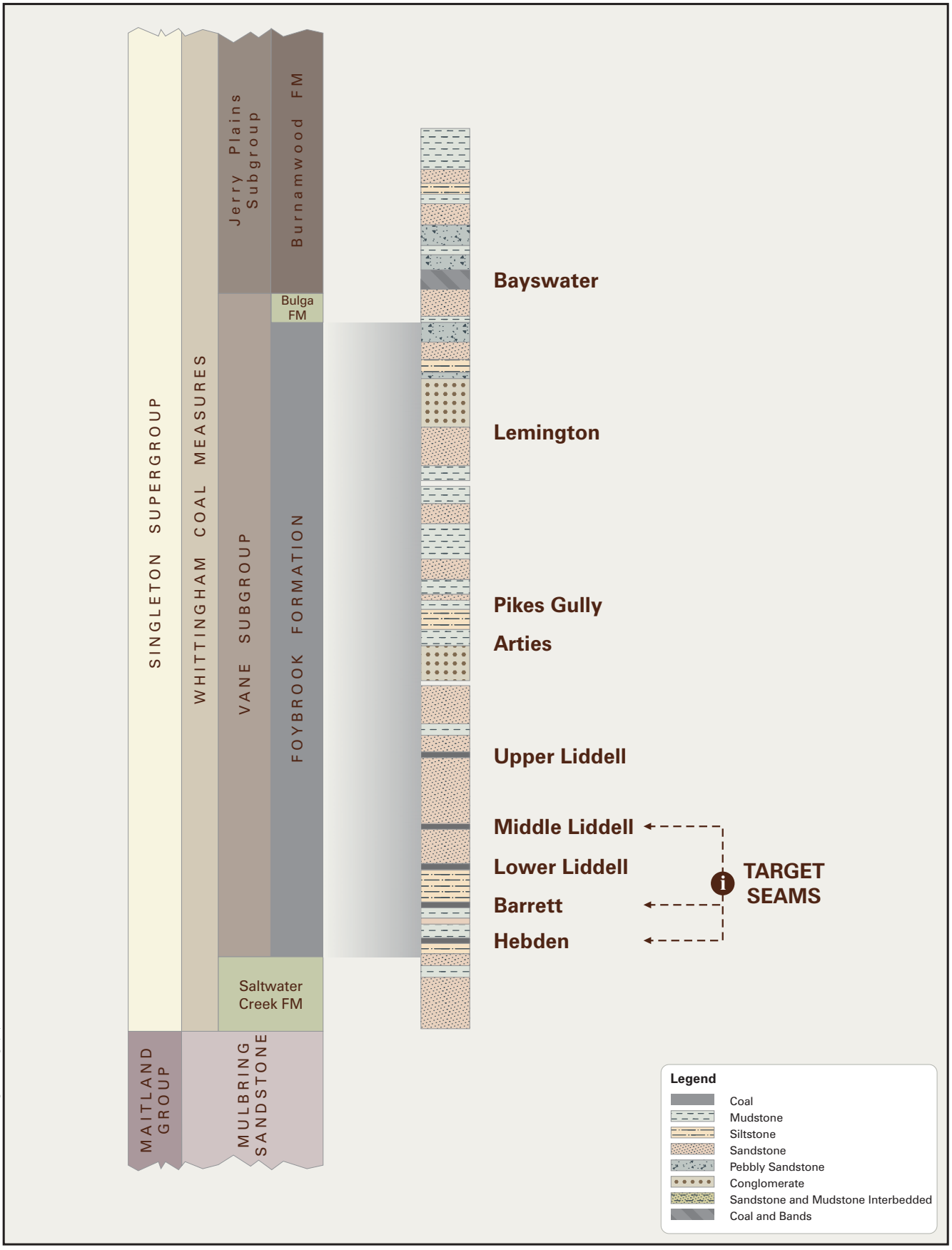
The Foybrook Formation, which forms part of the Whittingham Coal Measures, is generally between 300 to 350 metres (m) thick and contains eight coal seams in the vicinity of Integra Underground. The lower seams of the Foybrook Formation are the Hebden, Barrett, Lower Liddell and Middle Liddell coal seams. The upper seams of the Foybrook Formation are the Upper Liddell, Lemington, Arties and Pikes Gully coal seams. The Foybrook Formation is overlain by the thin Bulga Formation and the Burnamwood Formation. The Burnamwood Formation contains the Bayswater Seam, a seam prevalent throughout the Hunter Valley coalfields.

2.3.2 Local Geology

The Rix's Creek Syncline preserves the coals of the Foybrook Formation within CL 382. This syncline is a north–south trending asymmetric fold that plunges 2 to 3° to the north, with dips ranging between 5° to 10° on the eastern limb and 10° to 25° on the western limb (HVCC, 2017a). The northern extent of the syncline is closed, with steep south-westerly dips (ERM, 2009). Two regional thrust faults are situated in close proximity to Integra Underground. The Hunter Thrust, which forms the eastern margin of the Sydney Basin, lies approximately 3 km to the east of Integra Underground's current operations. The Hebden Thrust, which traverses the eastern boundary of the Modification, has been recognised within mine planning at MOC and further defined as being a deep seated structure, causing a roll structure within the coal seams close to the surface. These thrusts form the eastern limit of the mineable coal resource at Integra Underground (HVCC, 2017a).

2.3.3 Coal Seam Geology

To date, the main target seam for underground mining operations at Integra Underground has been the Middle Liddell Seam. HVCC also has approval to extract coal from the Hebden and Barrett Seams via underground mining methods as detailed in **Section 3**. The target seams are characterised by bituminous, high-volatile, low sulphur and vitrinite-rich coal.



HB INTEGRA MOD8 1702 F4 Geological Stratigraphy 22 11 2017

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Indicative Stratigraphic Column

FIGURE 4

The Middle Liddell seam overlies the Hebden and Barrett seams. Within the Future Underground Extraction Area (see **Figure 2**), the depth of the Middle Liddell seam below the natural ground surface ranges from approximately 450 m to 490 m. Due to surface mining operations that have occurred to date, the ground elevations have been significantly altered from natural levels. The depth of cover below the modified landform ranges from approximately 270 m to 580 m (SCT, 2017) within the Future Underground Extraction Area.

The coal seams dip moderately to steeply in a north-easterly direction before flattening and rising rapidly further to the north-east. Within the Future Underground Extraction Area, the thickness of the Middle Liddell seam ranges from 2.4 to 3.3 m (SCT, 2017) with coal seam thickening toward to the north-west.

2.3.4 Soils

Integra Underground is located within the Bayswater Soils Landscape. The dominant soil units within the Bayswater Soils Landscape are Podzolic and Solodic soils. These soils are susceptible to moderate sheet and gully erosion when occurring on slopes (Umwelt, 2015).

The majority of soils at the site have been significantly disturbed by surface mining operations at the neighbouring MOC. The small pockets of undisturbed land that are present include patches of remnant vegetation (refer to **Section 2.5**), the area inside the Mount Owen Rail Spur and other isolated pockets of undisturbed land.

The soils at the site are generally of poor quality and are characterised by low fertility, poor drainage characteristics and slightly acidic pH of 5.5. Areas where minimal vegetation exists or areas which have been disturbed may result in the dispersion of underlying loams and clays prevalent within the soil landscape.

The Project Approval Boundary under PA 08_0101 (as modified) includes areas of land that are mapped as Biophysical Strategic Agricultural Land (BSAL) under *State Environmental Planning Policy (Mining, Petroleum Production and Extraction Industries) 2007* (Mining SEPP). However, the Modification sought will not result in the extension of mining activities onto that land that is mapped as BSAL. Furthermore, HVCC has obtained a Site Verification Certificate (SVC 8691) which certifies that the land subject to the Modification is not BSAL. The site verification undertaken for the Modification is discussed further in **Section 5.1.3**.

2.4 WATER CATCHMENT

Integra Underground is located within the Hunter River catchment, the largest coastal catchment within NSW. The Hunter River has a catchment of approximately 21,500 km^2. More specifically, Integra Underground is located within the sub-catchments of Glennies Creek, Main Creek and Bettys Creek. These creeks generally flow in a south-westerly direction towards the main channel of the Hunter River (see **Figure 5**).

2.4.1 Glennies Creek

Glennies Creek traverses through the Project Approval Boundary from the east towards the west and separates the Integra Underground Surface Infrastructure area (to the south) from the approved longwall mining areas to the north of Glennies Creek (see **Figure 5**). Glennies Creek is a sixth order stream which has permanent, regulated flows from Glennies Creek Dam (also known as Lake St Clair). The smaller upstream tributaries of Glennies Creek are ephemeral in nature. Lake St Clair is located approximately 25 km upstream of Integra Underground.

2.4.2 Main Creek

Main Creek is an ephemeral fourth order stream which flows in a generally south-westerly direction towards Glennies Creek (see **Figure 5**). Main Creek and its smaller tributaries overlie the approved longwall mining activities at Integra Underground. Parts of the Main Creek catchment are proposed to be disturbed by the approved surface mining operations at MOC.

2.4.3 Bettys Creek

Bettys Creek is a tributary of Bowmans Creek with a pre-mining catchment area of 1,810 ha (HVCC, 2017b). It is a meandering ephemeral watercourse which is incised between 2 to 3 m into the general floodplain in its natural state. Sections of Bettys Creek have previously been realigned to facilitate open cut mining operations at MOC (see **Figure 5**). Glendell has conducted rehabilitation activities within the Bettys Creek Habitat Management Area (HMA), which was established as an offset area in accordance with DA 80/952 (refer to **Section 2.5**).

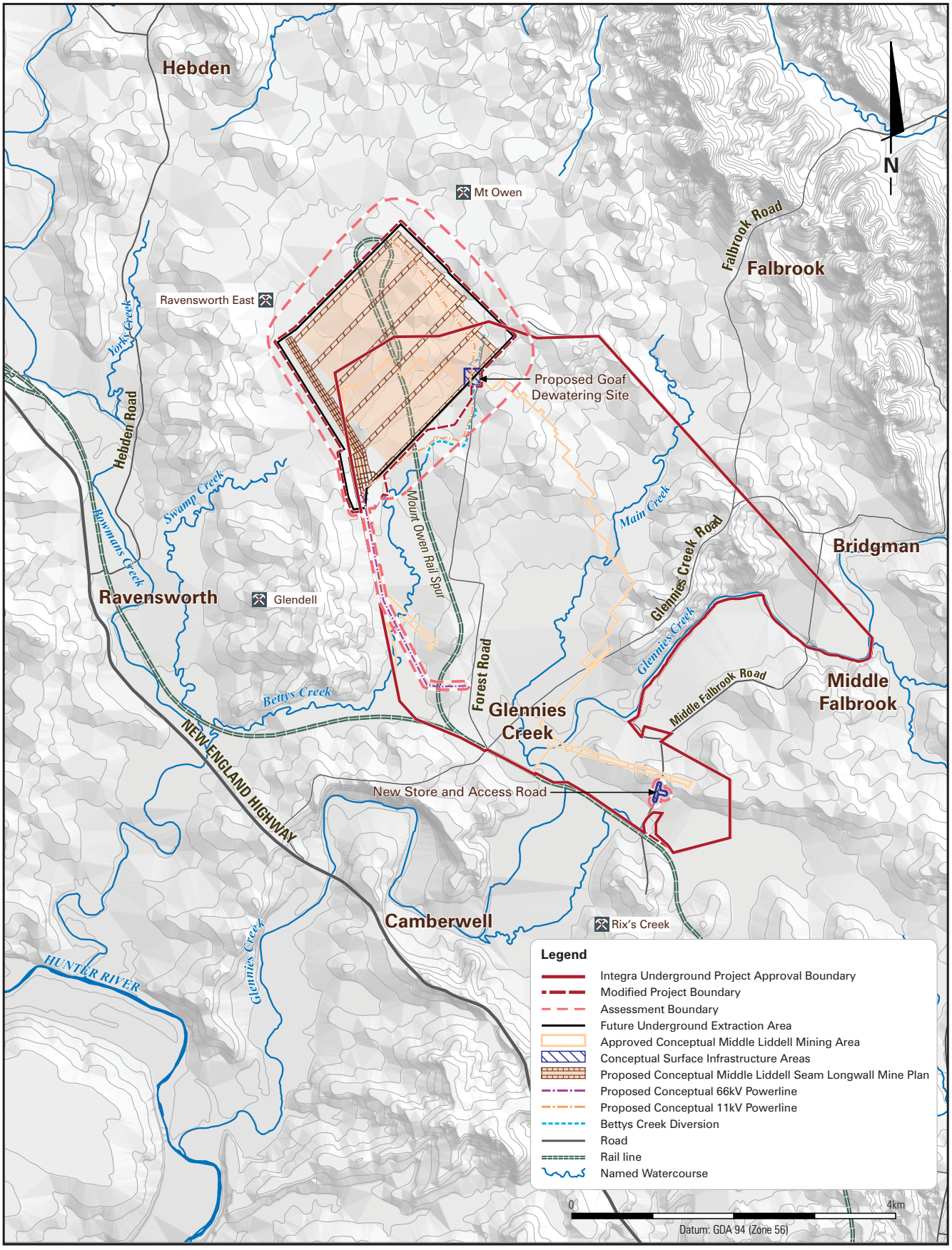
HVCC has approval for the diversion of the downstream reaches of Bettys Creek to remediate potential subsidence impacts associated with the approved Hebden Seam mining operations (yet to be undertaken).

2.5 REMNANT VEGETATION

Historical agricultural practices in the Hunter Valley resulted in the extensive removal of natural vegetation and conversion of much of the land to grassland. Subsequently, the introduction of mining development to the Hunter Valley has resulted in further land clearing and loss of remnant vegetation.

Small areas of remnant vegetation remain in the vicinity of Integra Underground and the Modification.

The remnant vegetation occurs along creek lines and their tributaries, and within a remnant portion of the Ravensworth State Forest and an adjacent patch of woodland known as the Southern Remnant Offset Area (see **Figure 6**). The Southern Remnant Offset Area is an area of approximately 4 ha and consists of the same vegetation community as the neighbouring Ravensworth State Forest. The Southern Remnant Offset Area is a component of the Mount Owen Biodiversity Offset Strategy.



HB INTEGRA MOD8 1702 F5 Watercourses 22 11 2017

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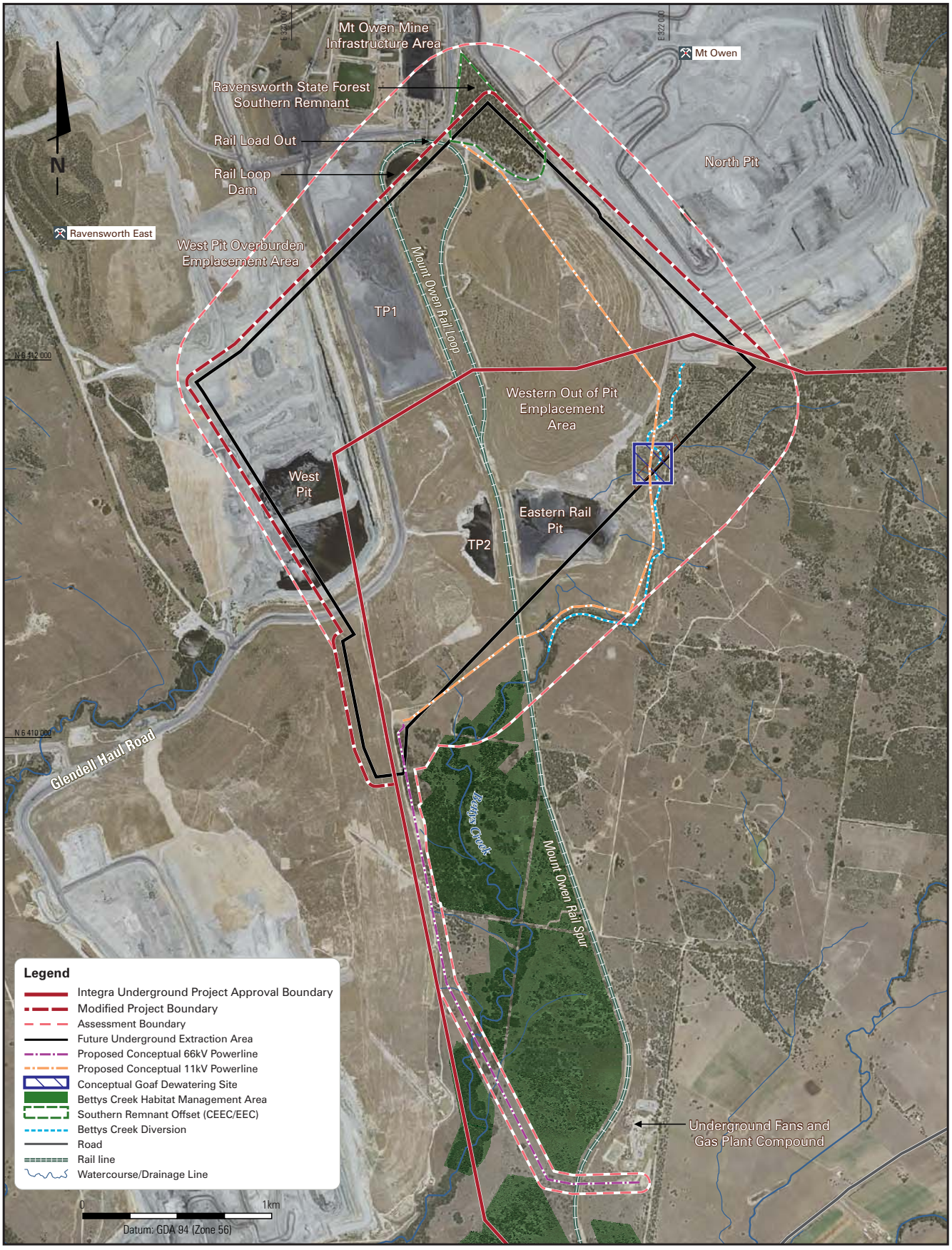
Watercourses

FIGURE 5



HB INTEGRA MOD8 1702 F6 Land Use 23 11 2017

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Land Use

FIGURE 6

These areas of woodland vegetation are currently isolated; however the Mount Owen Biodiversity Offset Strategy includes a habitat corridor regeneration strategy to link these areas with adjacent corridors and proposed conservation areas at Glencore's Liddell Mine (Umwelt, 2017).

The Bettys Creek HMA, an offset area for the Glendell Mine, is also located in the vicinity of Integra Underground (see **Figure 6**). The Bettys Creek HMA occupies an area of approximately 174 ha surrounding the southern natural alignment of Bettys Creek. This area is actively being regenerated with box-gum forest and riparian forest communities.

Areas not modified by mining operations or containing remnant vegetation consist of grassland. These areas have been subject to intensive agricultural practices in the past with moderate to high levels of soil disturbance.

2.6 LAND OWNERSHIP AND USE

Land ownership relevant to Integra Underground and the Modification is shown on **Figure 7**.

Glencore's subsidiaries own the majority of the land that is the subject of the Modification. The Modified Project Boundary also encompasses a small portion of the Ravensworth State Forest. The Ravensworth State Forest is owned by the NSW Government and managed by the Forestry Corporation of NSW.

2.7 BUILT ENVIRONMENT

Integra Underground is located in an area that is dominated by mining and other industrial land uses. **Figure 1** shows the locations of neighbouring mines and other industrial developments in the vicinity of Integra Underground. The MOC mining operations are located to the north and west of Integra Underground. Ashton Coal Mine is located to the south-west and Rix's Creek North Mine is located to the south of Integra Underground (see **Figure 1**).

2.7.1 Mount Owen Complex

MOC is located directly above and adjacent to Integra Underground (see **Figure 8**). The Modification seeks to extend Integra Underground's mining further beneath the existing and approved surface mining operations at MOC.

Development Consent (SSD-5850) for the Mount Owen Continued Operations (MOCO) Project was granted on 3 November 2016. SSD-5850 permits the extraction of up to 10 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal from Mount Owen Mine and 4 Mtpa of ROM coal from Ravensworth East Mine. This coal is fed to the Mount Owen Coal Handling and Processing Plant (CHPP) and associated infrastructure for processing with an approved processing capacity of 17 Mtpa of ROM coal. The product coal is then loaded onto trains at the Mount Owen Rail Loop and transported to the Port of Newcastle via the Main Northern Rail Line. The MOCO Project is illustrated in **Figure 8.**

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Land Ownership

FIGURE 7

The following infrastructure associated with MOC is located within the Future Underground Extraction Area (as shown in **Figure 6**)**:**

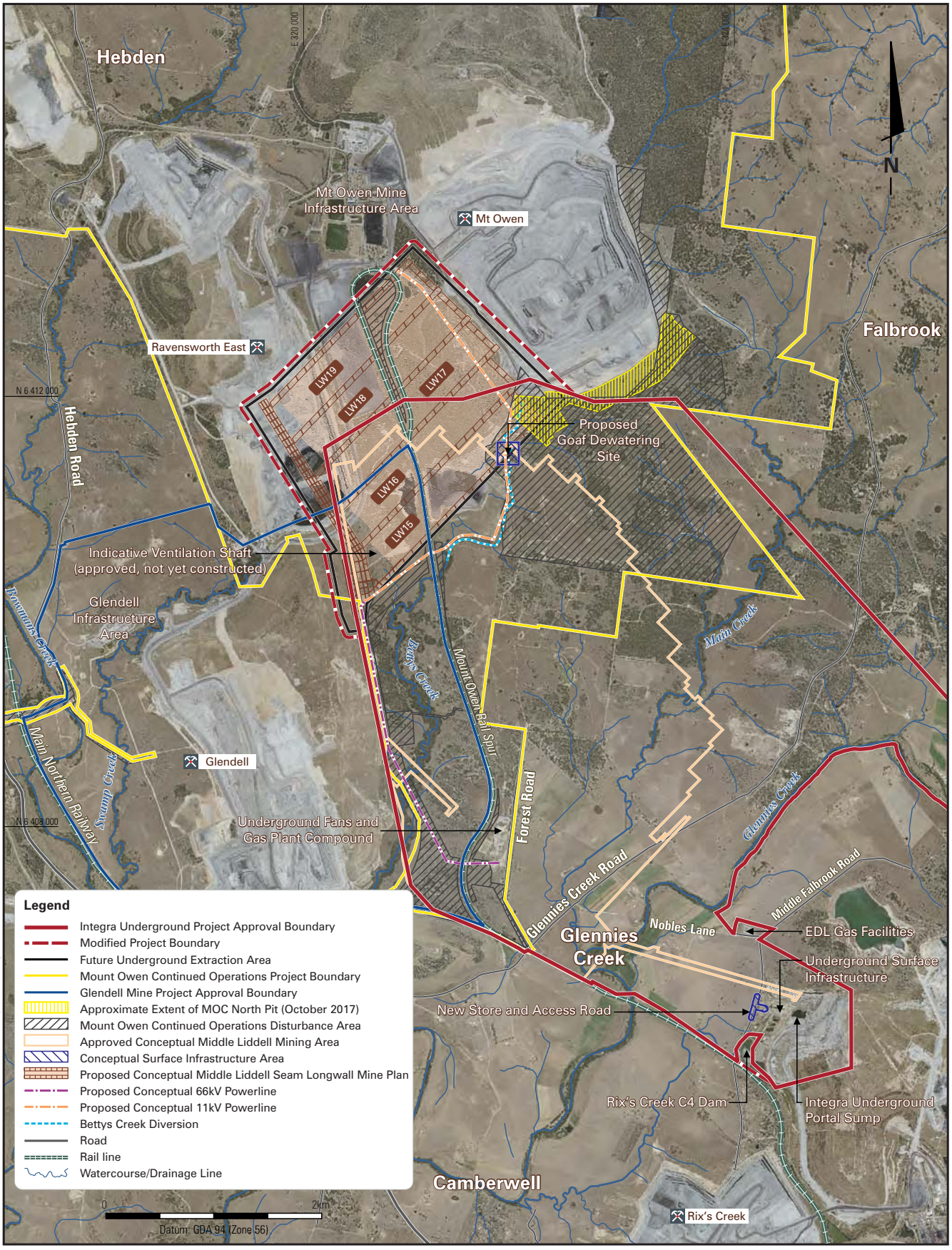
- Mount Owen North Pit;
- Mount Owen Rail Spur and Loop;
- Rail loop dam;
- Eastern Rail Pit (ERP);
- Ravensworth East – West Pit;
- Tailings Pit 1 (TP1);
- Tailings Pit 2 (TP2);
- Western Out of Pit Emplacement Area; and
- Glendell haul road.

As further discussed in **Section 5.3.7**, TP1 is listed as a prescribed dam under the jurisdiction of the NSW Dams Safety Committee.

Development Consent for Glendell Mine (DA 80/952) was granted on 2 May 1983. DA 80/952 permits the extraction of up to 4.5 Mtpa of ROM coal. ROM coal produced by Glendell Mine is processed at the Mount Owen CHPP.

The approved operations associated with the MOCO Project will overlie areas of historical, current and proposed mine workings at Integra Underground. The MOCO Project (as currently approved) will target the coal seams from the Ravensworth seam down to the Hebden Seam, which will reach a mining depth of approximately 300 m (Umwelt, 2015). A minimum overburden depth of approximately 250 m will be maintained between the open cut mining areas at MOC and the proposed underground workings for the Modification (SCT, 2017). The components of the MOCO Project are shown in **Figure 8**.

Mt Owen is currently preparing an application to modify SSD-5850 to facilitate an extension to the North Pit at MOC. Mt Owen currently has approval to continue mining operations in the North Pit further to the south-east of its current position. The proposed modification entails an enlargement of the area that will be mined by the North Pit in the future (see **Figure 8**). The modification will enable the recovery of an additional 36 Mt of ROM coal and will result in approximately 46 ha of surface disturbance.



HB INTEGRA MOD8 1702 F8 Mount Owen Continued Operations Project 22 11 2017

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Mount Owen Continued Operations Project

FIGURE 8

3 APPROVED OPERATIONS

This section briefly describes the activities at Integra Underground as currently approved under PA 08_0101.

3.1 PROJECT APPROVAL

Integra Underground currently operates under PA 08_0101 granted on 26 November 2010. The application for PA 08_0101 was supported by the *Proposed Integra Underground Coal Project Environmental Assessment* (ERM, 2009) (ERM EA).

PA 08_0101 includes the following activities:

- Continuation of previously approved mining operations in the Middle Liddell seam, which includes the development and extraction of 17 longwall panels, and additional first workings;
- Extraction of up to approximately 57 Mt of ROM coal from the Hebden and Barrett coal seams, in addition to the approved coal reserves in the Middle Liddell seam;
- Coal production at a rate of up to 4.5 Mtpa of ROM coal;
- Development and extraction of longwall panels in the Hebden and Barrett coal seams;
- First workings in other areas of the Hebden, Barrett and Middle Liddell coal seams;
- Establishment of gas drainage boreholes and other gas management infrastructure;
- Continued use of the pre-existing surface infrastructure at Integra Underground;
- Diversion of Bettys Creek (approximately 1.4 km in length); and
- Employment of up to approximately 280 full time equivalent personnel.

PA 08_0101 was originally granted concurrently with the Project Approval for the Integra Open Cut Project (PA 08_0102). PA 08_0101 and PA 08_0102 formed a combined Project Approval for the Integra Coal Complex. The combined Project Approval has since been divided into separate approvals for Integra Underground and Rix's Creek North Mine (formerly Integra Open Cut Mine). There remain a number of interactions between Integra Underground and Rix's Creek North Mine, as described in **Table 1**.

Table 1
Interactions between Integra Underground and Rix's Creek North Mine

Aspect	Description
Coal processing	• The CHPP is located at Rix's Creek North Mine • ROM coal extracted from Integra Underground is transported to the CHPP
Reject Management	• Coarse rejects are co-disposed within the overburden emplacement areas at Rix's Creek North Mine • Fine rejects are dewatered and placed in tailings dams located at Rix's Creek North Mine

Aspect	Description
Coal transportation	• The train loader is located at Rix's Creek North Mine • All product coal is transported to Newcastle via rail
Water Management	• Transfer of mine water to the water management system at Rix's Creek North Mine

3.1.1 Modifications to PA 08_0101

PA 08_0101 has been modified on seven occasions since it was originally granted. The approved modifications to PA 08_0101 are summarised in **Table 2**.

Table 2
Summary of Modifications to PA 08_0101

Modification	Description	Date Modified
Modification 1	This modification comprised the following changes: 1. Extension to the area and height of the Northern Open Cut overburden emplacement area; 2. Relocation of the crib huts and associated facilities; 3. Extension of the timeframes for satisfying the following conditions under the combined Project Approval: a. Making the necessary arrangements for long-term security of the Biodiversity Offset Strategy b. To arrange for the transport of coal from the underground mine's surface facilities to the CHPP via conveyor (as opposed to truck haulage).	18 March 2012
Modification 2	This modification involved the removal of the consent condition requiring the transport of coal from the underground mine's surface facilities to the CHPP via conveyor. It enabled the mine to continue truck haulage of coal to the CHPP. It also extended the timeframe for making the necessary arrangements to provide long-term security for the Biodiversity Offset Strategy.	1 February 2013
Modification 3	This was an interim modification to extend the timeframes for the following requirements under the combined Project Approval: a. Making the necessary arrangements for long-term security of the Biodiversity Offset Strategy b. To arrange for the transport of coal from the underground mine's surface facilities to the CHPP via conveyor (as opposed to truck haulage). This interim modification was sought to allow the existing operations to continue whilst a determination was being made for Modification 2.	5 October 2012
Modification 4	Changes to the Biodiversity Offset Strategy to facilitate the potential mining of an identified coal resource in the future.	24 February 2016
Modification 5	Separate the combined Project Approval into discrete approvals for the underground and open cut operations.	23 November 2016
Modification 6	Minor administrative change regarding Project Layout Plans in PA 08_0101 (as modified).	21 December 2016

Modification	Description	Date Modified
Modification 7	Construction and operation of a water pipeline (and ancillary infrastructure) to facilitate the transfer of mine water from Integra Underground to the adjacent MOC.	15 September 2017

Modification 7 had the effect of incorporating Integra Underground into the Greater Ravensworth Area Water Sharing Scheme (GRAWSS). The GRAWSS is a network of water management infrastructure that enables water to be transferred between Glencore's mining operations in the Greater Ravensworth Area, namely Integra Underground, MOC, Liddell Mine and Ravensworth Operations Complex. Mine water from Integra Underground is transferred to MOC where it can be used for operational activities or transferred to other mines within the GRAWSS.

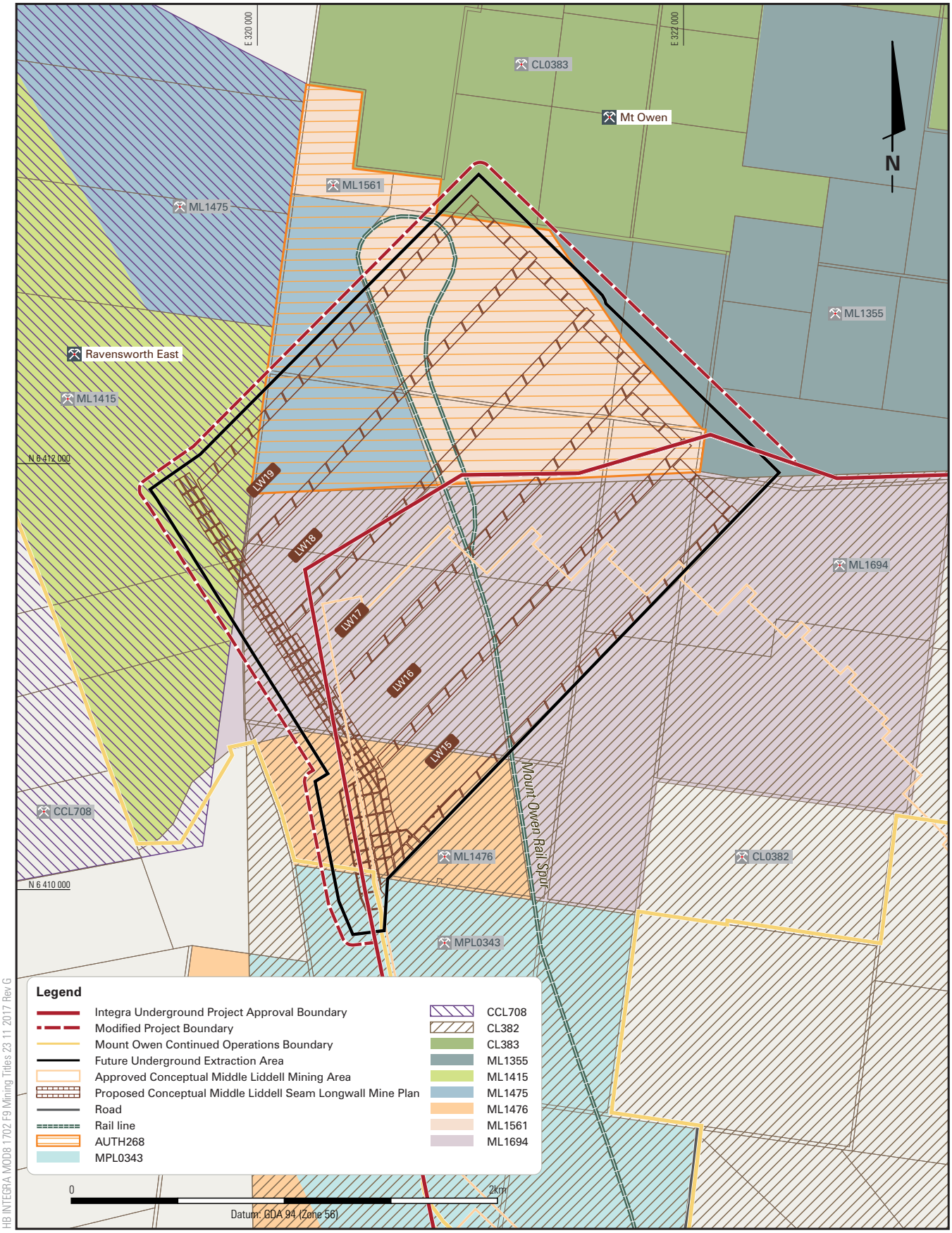
3.2 MINING AUTHORISATIONS AND LICENCES

Table 3 lists the mining authorities (under the *Mining Act 1992*) that are held by Glencore's subsidiaries and apply to the land in the vicinity of the Modification. The areas that are encompassed by these authorisations are shown in **Figure 9**. Mining authorisations can take the form of mining leases (MLs), coal leases (CLs), mining purpose leases (MPLs) and consolidated coal leases (CCLs).

Table 3
Glencore's Current Mining Authorisations

Authorisation	Leaseholder	Expiry Date
CL 382	HVCC	11 November 2033
CL 383	Mt Owen Pty Ltd	12 November 2033
CCL 708	Liddell Tenements Pty Ltd	30 December 2023
ML 1355	Mt Owen Pty Ltd	26 July 2036
ML 1561	Mt Owen Pty Ltd	16 February 2026
ML 1475	Mt Owen Pty Ltd	23 November 2021
ML 1476	Glendell Tenements Pty Ltd	23 November 2021
ML 1415	Mt Owen Pty Ltd	4 July 2020
ML 1694	Mt Owen Pty Ltd	22 October 2034
MPL 343	Glendell Tenements Pty Limited	4 January 2026

HVCC also holds Environmental Protection Licence (EPL) 3390 issued under the *Protection of the Environment Operations Act 1997* (POEO Act).



HB INTEGRA MOD8 1702 F9 Mining Titles 23 11 2017 Rev G

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Mining Titles

FIGURE 9

3.3 MINING OPERATIONS

3.3.1 Coal Mining

PA 08_0101 enables the underground extraction of LWs 1-17 within the Middle Liddell seam (see **Figure 10A**), LWs 1-15 within the Hebden seam and one longwall panel within the Barrett seam (see **Figure 10B**). There are also approved first workings in the Middle Liddell, Hebden and Barrett seams. Underground extraction at this point in time has only occurred from the Middle Liddell seam.

Integra Underground was placed under a period of care and maintenance from April 2014 to February 2017. Prior to April 2014, longwall mining had progressed up to the completion of LW 12 and the development of first workings for LW 13 within the Middle Liddell Seam. Under PA 08_0101, HVCC has approval for mining of LWs 15-17, as shown in **Figure 10A**. Secondary extraction of LW 13 and development of LW 14 has commenced and is being undertaken in accordance with the *Integra Underground Longwalls 13 and 14 Extraction Plan* (HVCC, 2017c). The Modification does not affect the mining of LWs 13-14.

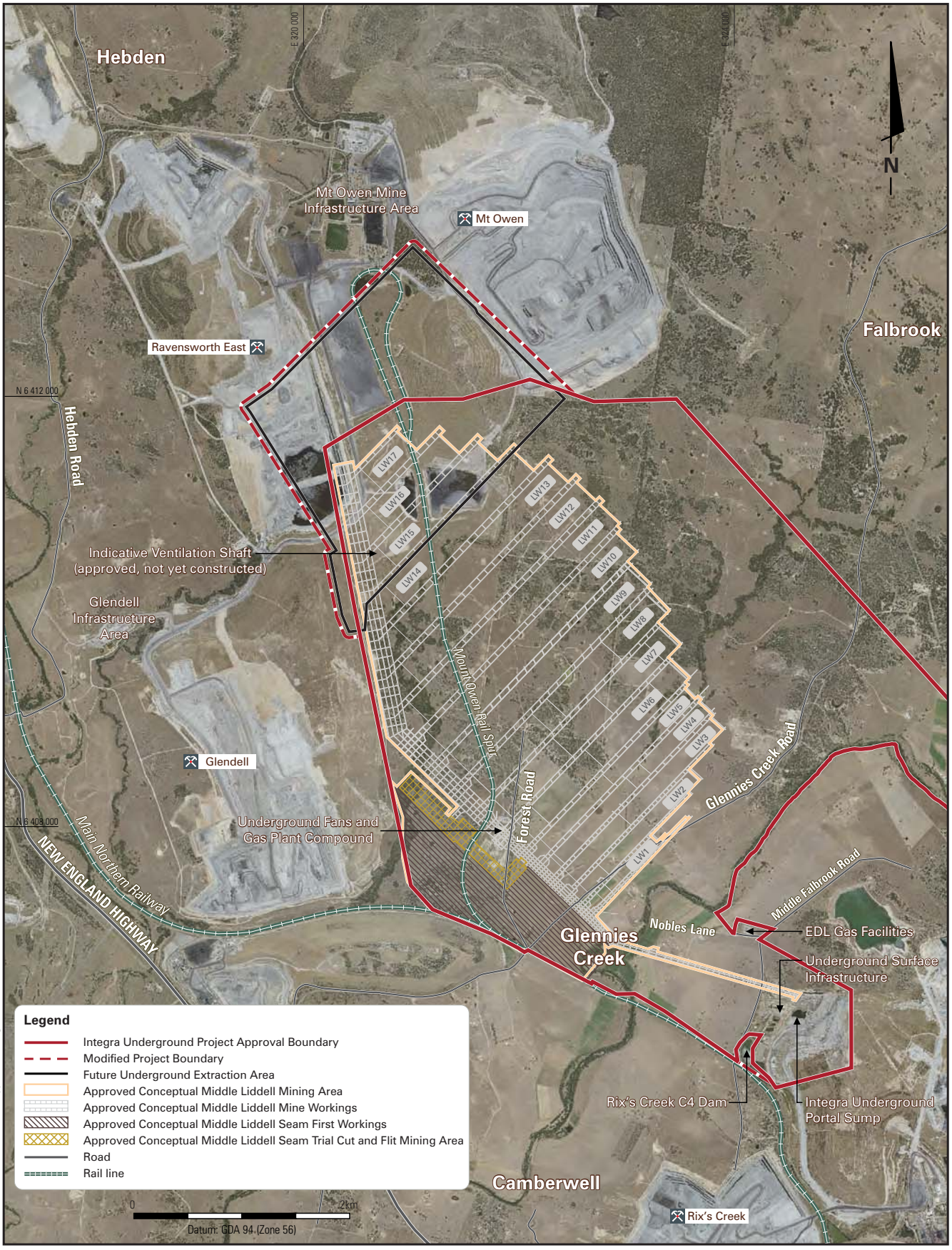
Condition 19 under Schedule 3 of PA 08_0101 (as modified) provides that HVCC may undertake first workings (other than in accordance with an approved Extraction Plan) provided that the first workings are to the satisfaction of the NSW Division of Resources and Geoscience (DRG).

3.3.2 Surface Infrastructure

The approved surface infrastructure at Integra Underground includes:

- Administration buildings, bathhouses and workshops;
- Electricity supply infrastructure (substations, transformers and switch rooms);
- Hardstand / storage areas (wash down areas, carparks);
- Water management infrastructure (sewage effluent ponds, mine water storages, sediment dams);
- Fuel storage tanks;
- ROM stockpile and associated infrastructure;
- Stacker Belt Conveyor;
- Underground portal;
- Ventilation shafts; and
- Gas drainage infrastructure.

The existing surface infrastructure is generally located near the southern extent of the current Project Approval Boundary (see **Figure 2A**).



HB INTEGRA MOD8 HB1702 F10a Approved Mining Activities - Middle Liddell Seam Area 22 11 2017

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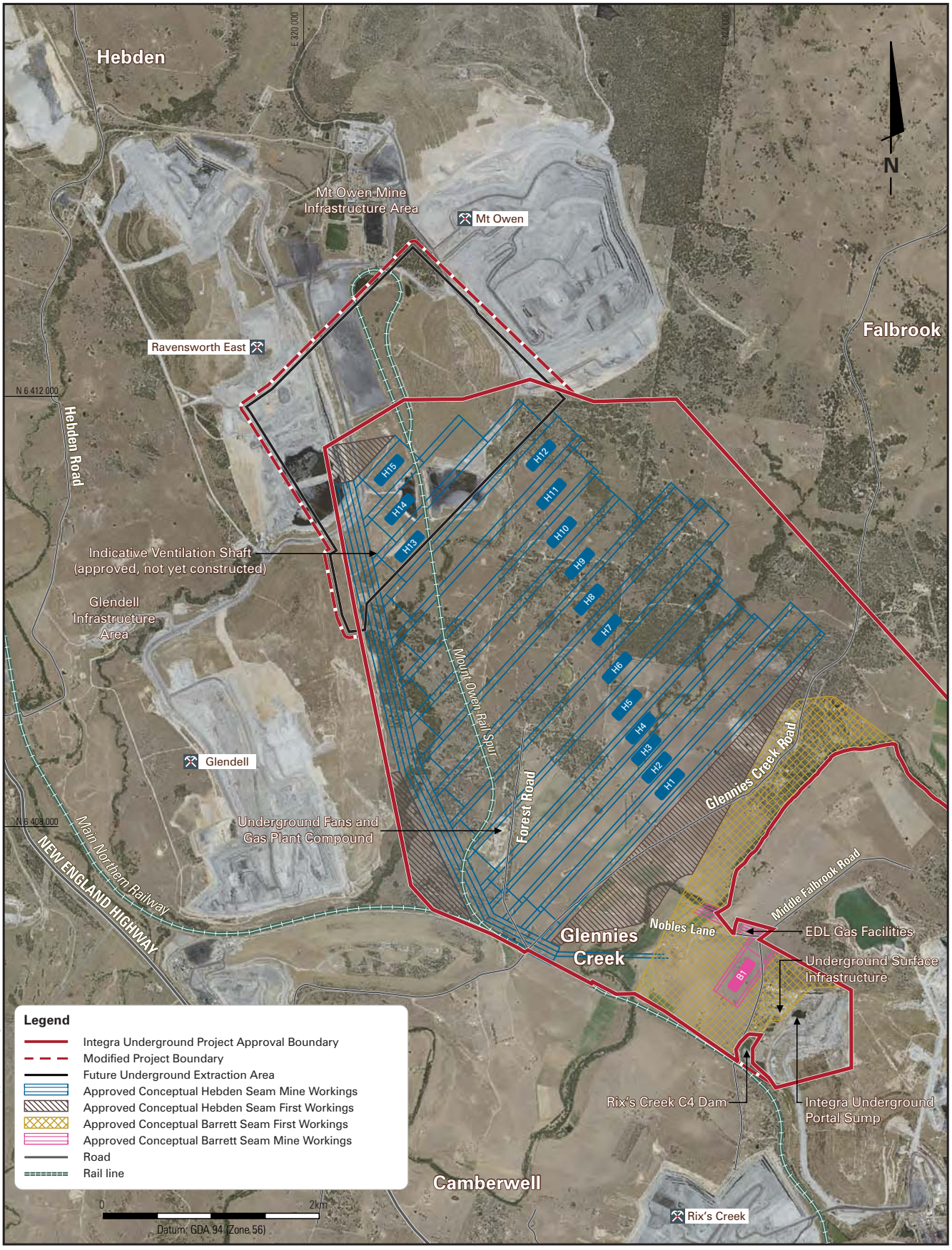
Approved Mining Activities - Middle Liddell Coal Seam

FIGURE 10A



HB INTEGRA MOD8 HB1702 F10b Approved Mining Activities - Hebden and Barrett Seam Areas 22 11 2017

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Approved Mining Activities - Hebden and Barrett Coal Seam

FIGURE 10B

3.3.3 Coal Handling, Processing and Transport

No coal processing or transportation activities are undertaken at Integra Underground. Coal processing and transportation are undertaken at Rix's Creek North Mine, as described in **Table 1**.

At Integra Underground, ROM coal is transported by conveyors from the underground mine to the RL100 coal stockpile. The stockpiled ROM coal is then transported to the CHPP at Rix's Creek North Mine by haul trucks. The CHPP consists of a ROM coal stockpile, ROM hopper, crushers (primary, secondary and tertiary), tailings thickeners, product coal stockpile and associated stacking and reclaim equipment.

Product coal is transported from the product coal stockpile to the Rix's Creek Train Load Out (TLO) facility via an underground conveyor system. The TLO has a rated capacity of 5,000 tonnes per hour. Product coal is transported to the Port of Newcastle via the Mount Owen Rail Spur and Main Northern Rail Line. The CHPP and TLO are operated and managed by Bloomfield Collieries in accordance with PA 08_0102. Processing and transportation of coal extracted from Integra Underground is undertaken in accordance with the commercial agreement between HVCC and Bloomfield Collieries.

3.3.4 Water Management

The Integra Underground water management system has been designed with the objective of segregating clean water from mine water and sediment laden water. Clean water is diverted around disturbed and hardstand areas via drains and bunds.

The principal mine water storages at Integra Underground are the Portal Sump and Process Water Dam. The Portal Sump receives and stores mine water that is dewatered from the underground workings. Modification 7 to PA 08_0101 facilitated the pumping of mine water from the Portal Sump to the mine water management system at MOC. PA 08_0101 (as modified) also allows for mine water to be pumped from the Portal Sump to Rix's Creek North Mine.

The Process Water Dam provides water for underground operational activities. The Process Water Dam captures runoff from the workshop, hardstand, hydrocarbon storage and administration areas. The Process Water Dam overflows to the Portal Sump; however, water can be pumped from the Portal Sump back to the Process Water Dam.

Runoff from disturbed areas (i.e. sediment laden water) is captured and treated in sediment dams. All disturbed areas ultimately drain to the Portal Sump. The Portal Sump has sufficient capacity to contain a 1 in 100 year, 72 hour storm event.

3.3.5 Rejects and Tailings Management

No coarse or fine reject materials are disposed of at Integra Underground. All reject materials generated as a result of coal processing are disposed at Rix's Creek North Mine, as described in **Table 1**. The fine reject materials (tailings) are passed through an underflow thickener and emplaced in approved tailings storage facilities. The coarse reject materials are co-disposed within overburden emplacement areas. The disposal of reject materials (fine and coarse) is managed by Bloomfield Collieries in accordance with the commercial agreement with HVCC.

3.3.6 Waste Management

The waste management program implemented at Integra Underground involves the segregation of general waste and recyclables. Both recycling and disposal of general waste are managed by a licensed waste contractor. Volumes of both waste streams are monitored and reported in the Annual Review.

HVCC operates an onsite sewage treatment system, which consists of a primary aeration tank, secondary maturation pond and sewage treatment plant. Treated effluent is applied to dedicated irrigation areas using sprays.

The existing waste management practices at Integra Underground will continue to be implemented for the Modification.

3.3.7 Personnel Safety

Integra Underground implements a Safety Management System to manage health and safety performance of the operation and meet legislative requirements. Risk assessments are completed for activities undertaken at Integra Underground to identify and control any hazards. All equipment is inspected on a regular basis to identify and rectify any safety hazards. All personnel working at Integra Underground are provided with extensive training regarding safe work practices and are required to complete safety inductions prior to commencing work. The Safety Management System will continue to be implemented for the Modification.

3.3.8 Existing Biodiversity Offsets

There is no requirement under PA 08_0101 for a Biodiversity Offset Strategy. However, the Modification is located adjacent to the biodiversity offset areas established for MOC, namely the Southern Remnant Offset Area and Bettys Creek HMA (refer to **Section 2.5**).

3.4 ENVIRONMENTAL MANAGEMENT SYSTEM

HVCC has developed an Environmental Management System (EMS) to ensure that mining operations are undertaken in an environmentally responsible manner. The EMS is a suite of management plans, monitoring programs and operational procedures. The EMS outlines the environmental management measures that are implemented to ensure compliance with Integra Underground's regulatory approvals, authorisations and licences.

3.4.1 Environmental Management

Environmental management plans describe the relevant regulatory requirements, predicted environmental impacts, mitigation and monitoring measures, reporting requirements and accountabilities. Integra Underground has developed the following management plans and procedures:

- Aboriginal Heritage Management Plan;
- Air Quality and Greenhouse Gas Management Plan;
- Biodiversity Management Plan;
- Extraction Plans;
- Exploration Activities and Minor Surface Infrastructure Management Plan (EAMSIMP);
- Historical Heritage Management Plan;
- Noise Management Plan;
- Pollution Incident Response Management Plan; and
- Water Management Plan.

The aforementioned management plans apply to Integra Underground's operational activities as a whole. The Extraction Plans that are developed to manage subsidence impacts also contain component management plans, including:

- Built Features Management Plan;
- Land Management Plan;
- Public Safety Management Plan;
- Mount Owen Rail and Bettys Creek Bridge Asset Management Plan;
- Mount Owen Rail and Eastern Rail Pit Management Plan;
- Mount Owen TP2 Dam Management Plan;
- Bettys Creek Management Plan; and
- Subsidence Monitoring and Repair Procedure.

3.4.2 Environmental Monitoring

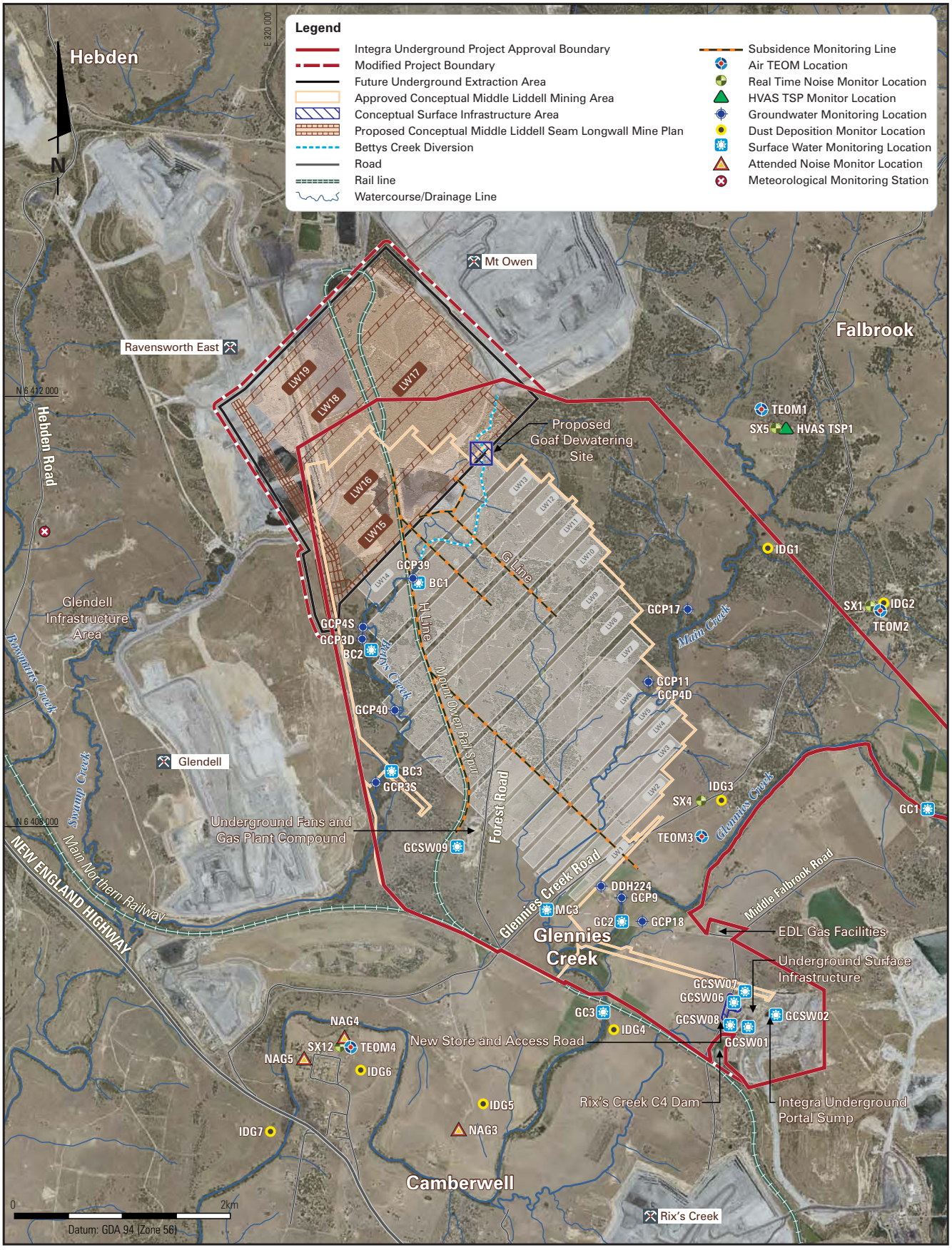
Integra Underground monitors its environmental impacts through an extensive environmental monitoring network. The data collected by the monitoring network is used to inform day-to-day operations and establish compliance with regulatory requirements. Integra Underground has established data sharing arrangements with neighbouring mines to assist in managing cumulative impacts. The existing monitoring network is summarised in **Table 4** and illustrated in **Figure 11**. Environmental monitoring results are reported on a quarterly basis.

Table 4
Integra Underground Mine Monitoring Network

Aspect	Monitor Type	Monitoring Location	Parameters Monitored (indicative)[1]
Meteorology	Meteorology monitoring site	SX13	Temperature, rainfall, wind speed, wind direction, relative humidity, rainfall
Air Quality	Depositional dust gauge	IDG1 – IDG7	Depositional dust (g/m^2/month)
	High volume air sampler (HVAS)	HVAS TSP1	TSP (µg/m^3)
	Tapered element oscillating microbalances (TEOM)	TEOM1 – TEOM4	PM10 (µg/m^3)
Noise	Noise monitoring site (attended)	NAG1, NAG3 – NAG10	$L_{Aeq(15min)}$, $L_{A10(15min)}$, $L_{A90(15min)}$, $L_{A1(1min)}$
	Noise monitoring site (unattended)	SX1, SX4, SX5, SX12	$L_{Aeq(15min)}$, $L_{A10(15min)}$, $L_{A90(15min)}$
Surface Water	Mine water and dam monitoring site	Process Dam GCSW01	Water level (AHD), volume and depth, analytical suites (µg/cm), TPH
		Portal Sump GCSW02	
		Sewage Pond GCSW06	
		Portable Water Supply GCSW07	
		Runoff Pond GCSW08	
		Vent Shaft Dam GCSW09	
	Surface water monitoring site	Glennies Creek GC1, GC2/W4, GC2, GC3	Analytical suites, electrical conductivity (µg/cm) and flow, water level
		Bettys Creek BC1, BC2, BC3	
		Main Creek MC3	
Groundwater	Piezometer, water level logger / dip meter	Bettys and Main Creek Alluvium GCP3S, GCP4S, GCP17, GCP40, GCP39, GCP11	Depth (mbgl), pH, electrical conductivity (µg/cm), AHD, pressure (m head) and analytical suites (µs/cm, pH units and mg/L)
		Glennies and Station Creek Alluvium GCP6	
		Coal Measures GCP3D, GCP4D, GCP18, DDH224	

Aspect	Monitor Type	Monitoring Location	Parameters Monitored (indicative)[1]
Subsidence	Monitoring lines for mine management	H line	Subsidence (mm), Tilt (mm/m), tensile strain (mm/m), compressive strain (mm/m)
		G line	
		P line	
	Survey points for mine management	ERP	
	Survey points for key asset management	Mount Owen Rail Spur	
		Maintenance Road	
		ERP	
		TP2	
		MOCO overburden emplacement	
		Bettys Creek Diversion	

[1] *Monitoring parameters are specific to the monitoring site. Refer to the relevant management plans for the specific monitoring parameters at each location.*



INTEGRA UNDERGROUND MINE

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FIGURE 11