EXECUTIVE SUMMARY



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EXECUTIVE SUMMARY

INTRODUCTION

Hansen Environmental Consulting has prepared this Environmental Assessment Report (EAR) on behalf of Strategic Minerals Corporation Pty Ltd for the Big Vein South Gold Project (the project).

The project involves the construction and operation of an open cut gold mine on a greenfield site in North Queensland. The project requires a site-specific Environmental Authority (EA). This EAR has been prepared in support of the EA application.

The Proponent

The project proponent is Strategic Minerals Corporation Pty Ltd (SMC). SMC has undertaken exploration, project development and mining feasibility assessment in the Woolgar goldfield for over 30 years, including the Big Vein South deposit, and has the financial and technical capability to execute the proposed mining operations.

SMC is wholly owned by QGold Pty Ltd (QGold), a Queensland based company focused on minerals exploration and development. QGold has interests in a number of mineral exploration areas primarily in Queensland and Western Australia and a strong track record of successful exploration and project development through its association with QCoal Group.

QCoal Group has been active in exploration and project development in Queensland since 1989. QCoal Group currently operates six active mines, the majority of which have been developed from greenfield exploration.

Project Justification

The project is located within the North West Minerals Province (NWMP) which is considered one of the world's most significant base and precious metals producers. The NWMP has contributed to significant economic benefits and growth for Queensland over several decades, and the Queensland government recognises the potential economic benefits of further developing the NWMP.

The Queensland government released an Investment Prospectus to encourage further exploration and future development of New Economy Minerals projects in the NWMP (New Economy Minerals, Investment Opportunities in Queensland's Minerals Provinces, State of Queensland, 2020). The Investment Prospectus recognises that investment will drive the evolution of projects and jobs, delivering new economy minerals needed for the future to Queensland and the global market. The Investment Prospectus commits the Queensland government to working in partnership with other levels of government, the resources sector, business, industry and local communities to guide and secure the future of the NWMP. The Investment Prospectus identifies the Big Vein South Gold Project as one of Queensland's major new economy minerals resources.

The project will generate approximately 380 jobs during the operations phase and up to a peak of 980 jobs during the initial construction phase, as well as generating additional indirect employment in the region and Queensland. The Australian Government will receive significant direct and indirect tax revenue from the mine, and the Queensland Government will obtain significant royalties from the mine. The project will also provide welcome economic stimulus for the Richmond Shire and the North Queensland region.

PROJECT APPROVALS

Key Project Approvals

The following key approvals are required for the project:

- Site-specific EA under the *Environmental Protection Act 1994* (Qld) (EP Act); and
- Approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

The proponent holds existing Mining Leases (MLs) over the project site and there are no additional ML applications required for the project.

The proponent holds an existing EA (EPSL00828013) for mining and exploration activities within the project site MLs. The EA is a standard EA under the EP Act that allows low risk mining and exploration activities to be conducted on the mining leases in accordance with the *Eligibility Criteria and Standard Conditions for Mining Lease Activities – Version 2 - ESR 2016/2241* and the *Eligibility Criteria and Standard Conditions for Exploration and Mineral Development Projects – Version 2 – ESR/2016/185*.

The project mining activities do not satisfy the mining lease activity eligibility criteria in the current EA and hence the project will require a new site-specific EA for a resource activity within the project MLs.

The EPBC Act provides a mechanism for national environmental protection and biodiversity conservation. Projects that are considered likely to have a significant impact on Matters of National Environmental Significance prescribed under the EPBC Act require approval from the Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW).

The project was declared a Controlled Action (EPBC 2025/10252) under the EPBC Act on 12 September 2025. The relevant controlling provision for the Controlled Action is *listed threatened species and communities* (Sections 18 and 18A). The project will therefore require a separate assessment by DCCEEW, and approval under the EPBC Act, before it can proceed.

PROJECT DESCRIPTION

Project Setting

The project site is located approximately 100 km north of Richmond and 380 km west of Townsville (Figure 1). The project site is remote, being located approximately 120 km by road from the closest township of Richmond. Richmond is approximately 500 km by road, along the Flinders Highway, from Townsville, which is the closest major coastal centre.

The project site (defined as the area within the existing MLs) covers an area of approximately 2,281 ha (Figure 2). The project site is in the north-eastern corner of the Richmond Shire Council Local Government Area.

The predominant land use in the region is cattle grazing (Figure 3). The project site is located within two large leasehold cattle grazing properties. The proponent has agreements in place with the landholders in relation to access to the land within the project MLs, for mining activities.

The project site is located in the Woolgar River catchment which is at the upstream end of the Flinders River Basin. The Woolgar River flows in a south-westerly direction along the northern and north-western boundaries of the project site (Figure 2). The north-eastern portion of the project site is characterised by a mosaic of sandstone scarps dissected by streams and gullies, while the remainder of the project site is gently undulating and sloping to the west (Figure 2). There are a number of tributary drainage features traversing the project site, originating in the

sandstone scarps to the east and flowing through the site to the Woolgar River. The project site is comprised of remnant woodland vegetation.

Infrastructure within the project site is limited to unsealed local access roads and 2 stock watering dams. There are 3 homesteads within 15 km of the project site (Figure 3). These are located on the properties that include the land within the project site.

There are currently no other existing or approved mining projects in proximity to the project site, within the Woolgar River catchment, or within the Richmond Shire.

Project Activities

Open cut mining will be conducted using excavators and trucks. Gold ore will be processed on site to produce gold doré (solid bars containing gold alloy). The mine will produce up to approximately 1.95 million tonnes per annum (Mtpa) of Run of Mine (ROM) gold ore, yielding up to approximately 100,000 ounces of gold doré per annum. The mine life will be in the order of 11 years.

Open cut mining operations will involve the development of the primary Big Vein South (BVS) Pit, that will be active over the life of the mine, and two smaller satellite pits (the BV1 and BV2 pits) that will be mined in the first two years of operations (Figure 4). Mine waste rock will be stored in three Waste Rock Dumps (WRDs) located in proximity to the pits (Figure 4).

On-site ore processing will include a Carbon-in Leach (CIL) Plant and a Heap Leach Facility (HLF). Spent ore from the HLF will be fed to the CIL Plant over the life of the mine. On-site ore processing will produce gold doré and tailings. The CIL Plant will produce predominantly dewatered tailings that will be stored in a Co-placement Cell within the Central WRD. The CIL Plant will also produce a smaller volume of wet tailings prior to the commissioning of the tailings filter press and during periods when the filter press is not operational. Wet tailings will be stored in a dedicated Tailings Storage Cell (TSC) (Figure 4). Gold doré bars will be transported from the mine site via plane to a refinery.

The majority of the mine infrastructure will be located at the southern end of the project site (Figure 4). Key mine infrastructure will include ore processing facilities, workshop, warehouse, administration buildings, haul roads and access roads, vehicle servicing, refuelling and wash down facilities, fuel storage facilities, diesel and solar power station, water supply and water management infrastructure. Workforce accommodation and a private airstrip will also be located at the southern end of the project site.

Mine Waste Storage Facilities

Geochemical characterisation of waste rock and tailings has been conducted to inform the management and rehabilitation requirements for the mine waste storage facilities, to manage any risk of acid mine drainage.

The Central and Southern WRDs will store waste rock from the BVS pit (Figure 4). The large majority of the waste rock (98%) is non-acid forming (NAF) with significant excess acid neutralising capacity. The tailings has variable geochemistry ranging from NAF with excess neutralising capacity to potentially acid forming (PAF). All PAF waste rock and dewatered tailings will be stored in a dedicated Co-placement Cell within the Central WRD. The Co-placement Cell has been specifically designed to segregate the PAF mine waste materials and to minimise and manage the risk of acid mine drainage. The Southern WRD will only store NAF waste rock.

The waste rock from the BV1 and BV2 Pits will be stored in the Northern WRD (Figure 4). The waste rock from these pits is NAF with significant excess acid neutralising capacity. The Northern WRD therefore does not require any selective handling or waste storage measures for the management of waste rock geochemistry.

The TSC will be a lined containment structure constructed from perimeter embankments (Figure 4). Rehabilitation of the TSC will involve covering the final tailings surface with a 1 m to 3 m thick layer of benign capping material prior to topsoiling and revegetation.

A Mine Waste Materials Management Plan (MWMMP) will be developed for the life of the mine and will include sampling and testing of mine materials as they are produced to confirm geochemistry. The MWMMP will also include procedures for the selective handling and storage of PAF wastes within the Central WRD Co-placement Cell.

Mine Water Management

The mine water management system will be designed to maximise the re-use of mine-affected water for mine water supply. Any excess mine-affected water will be discharged in accordance with controlled release conditions specifically designed to ensure there are no significant impacts on the receiving environment. The CIL Plant will involve a fully contained process with no discharge of process water other than wet tailings. The HLF will also be a fully lined and contained facility with nil discharge of process water or stormwater.

All mine-affected water storages will be sized with sufficient storage capacity to ensure no uncontrolled releases over the life of the mine, taking into account worst case rainfall sequences in long term historical rainfall data. The balance of the total mine water supply is proposed to be sourced via an off-take pump station on the Woolgar River (Figure 4). The proponent proposes to seek an allocation for the off-take under the *Water Plan (Gulf) 2007*.

Sediment affected drainage from disturbed areas on the mine site will be directed to sediment dams to control suspended sediment prior to drainage from site.

Rehabilitation and Mine Closure

This EAR includes a Progressive Rehabilitation and Mine Closure Plan (PRCP) that has been informed by a suite of specialist technical assessments including soils and land capability, mine waste geochemical characterisation, mine waste storage facility design, geotechnical stability assessments and final void water balance modelling.

The majority of the mine site is proposed to be returned to native vegetation with low intensity grazing following mine closure, consistent with the landholders current pre-mining land use. The three open cut pit final voids will not be suitable for grazing and have been classified as Non-Use Management Areas. The PRCP includes a schedule for progressive rehabilitation over the life of the mine as well as rehabilitation and improvement area milestone criteria.

Project Scheduling

The project will have a mine life of approximately 11 years, from the commencement of construction to the completion of mining operations. Project Year 1 is currently anticipated to be 2027, subject to gaining the necessary approvals.

Mine infrastructure construction is scheduled to be completed in the first two years. Initial construction will include the construction workforce camp, Woolgar River pump station, Raw Water Dam and the power station. The HLF will also be constructed in Project Year 1 to enable the processing of ore from the BV1 and BV2 pits prior to the commissioning of the CIL Plant in Year 3.

Open cut mining will commence in Project Year 1. BV1 Pit is scheduled to be mined in Year 1 and BV2 Pit is scheduled to be mined in Year 2. The mining of overburden in the BVS Pit will also occur in Project Years 1 and 2. From Year 3 onwards, all mining will be from the BVS Pit. The CIL Plant and TSC are also scheduled to be commissioned in Year 3. Mining in the BVS pit is scheduled to be completed in Project Year 11.

The final rehabilitation and closure phase will commence in Year 12 after the completion of mining in Year 11. This phase is anticipated to extend for approximately 20 years, allowing time for final rehabilitation work and closure environmental monitoring.

Mine Workforce

The anticipated peak construction phase workforce of approximately 980 persons will occur in Project Year 2. This will include workers involved in construction activities as well as mining activities. The operations workforce will be constant at approximately 380 workers.

Due to the remote location of the project site and the sparse population in the local area, the project workforce will be accommodated in on-site camps and will be employed on a Fly-in Fly-out (FIFO) or Bus-in Bus-out (BIBO) basis. Two 300 bed workforce accommodation camps will be constructed in the south-western corner of the project site (Figure 4). A construction workforce camp will be established at the commencement of the project. It will be utilised by the construction workforce in the first two years of the project and will be used thereafter for accommodation of intermittent workers during equipment shut-downs. An operations workforce camp will also be established during the initial construction phase and will be utilised by the mine operations workforce over the life of the project.

A private airstrip will be constructed in the south-eastern corner of the project site for the transport of mine workers to and from the site, and to transport gold doré from the site (Figure 4). Construction of the airstrip is scheduled to be completed in Project Year 1.

ENVIRONMENTAL IMPACTS

An overview of the key environmental assessments conducted for the project is provided in the following sections.

Groundwater

A specialist groundwater assessment was undertaken, which included:

- Reviewing hydrogeological data including the project geological model, Queensland Groundwater Database registered bores and a groundwater bore census conducted in the area surrounding the project site;
- Groundwater site investigation including the installation of fourteen monitoring bores and 3 vibrating wire peizometers;
- Developing a conceptual groundwater model; and
- Undertaking 3D numerical groundwater modelling to determine the effects of mining on groundwater levels.

The following key hydrogeological units occur within the project area in descending order:

- Localised alluvium in the north-western corner of the project site associated with the Woolgar River and its floodplain. The alluvium contains water during ephemeral river flows in the wet season and dries out quickly following the end of wet season flows.
- A weathered profile comprised of the weathered in-situ rocks of the Eromanga Basin and Proterozoic basement with variable permeability and typically dry.
- Localised, disconnected residual areas of fresh Jurassic sandstone; and
- A fresh Proterozoic basement aquiclude, comprising a dry crystalline rock mass with occasional disconnected cracks in the upper profile that can contain groundwater.

The groundwater assessment considered the impacts of the project on groundwater during the operations and post mining phases. Key conclusions of the groundwater assessment are as follows:

- Maximum drawdown from mining activities will occur at the end of mining operations and is localised in the vicinity of the BVS Pit.
- The predicted drawdown does not extend to the Woolgar River alluvium or the 2 stock water supply bores in the vicinity of the project site and these features will not be impacted by drawdown.
- Groundwater drawdown is not predicted to give rise to impacts on surface drainage features traversing the project site, given that groundwater does not provide baseflow to these features.
- Groundwater levels will recover in the post mining phase in line with the formation of a pit lake in the BVS final void. Modelling indicates the final void will remain a groundwater sink and pit water will not flow to the surrounding groundwater.
- The BV1 and BV2 Pits are above the water table and within the Proterozoic basement aquiclude. These pits will therefore not result in groundwater drawdown or seepage of pit water post mining.
- The project is not expected to have any impact on productive aquifers in the Great Artesian Basin as these are located at least 60 km from the project site.
- Mine infrastructure and mine waste storage facilities have been designed to prevent groundwater contamination and hence there will be no adverse impacts on groundwater quality from these facilities.
- Monitoring did not identify any groundwater dependent stygofauna in the project area and the project is not expected to impact the perched outcrop springs to the east of the project site. These shallow perched springs are not connected to the deeper water table and are beyond the maximum extent of drawdown from the project.

Ongoing monitoring from the established groundwater monitoring program will confirm the groundwater modelling predictions and detect any unexpected impacts.

Surface Water

The surface water assessment conducted for the project included:

- Characterisation of the surface water setting including baseline water quality monitoring, flood modelling and flow modelling;
- Development of the mine water management system including performance simulation modelling;
- Mine water supply assessment including modelling of flow effects from the water supply off-take on the Woolgar River;
- Final void water balance modelling; and
- Surface water impact assessment.

The key findings of the surface water assessment are discussed below.

Surface drainage in the project area is characterised by highly ephemeral flows with high sediment loads. Flows in the Woolgar River have naturally high variability, from year to year, and typically only occur in the wet season from January to March.

Flood modelling indicates that the majority of the project site is above the Woolgar River 0.1% (1 in 1,000) Annual Exceedance Probability (AEP) flood level. All mine infrastructure, mine waste storage facilities and the open cut pits and final voids, are above the Woolgar River 0.1% (1 in 1,000) AEP flood level.

The mine water management system will be designed to maximise the re-use of mine-affected water for mine water supply. Any excess mine-affected water will be discharged in accordance with controlled release conditions specifically designed to ensure there are no significant impacts on the receiving environment. Sediment affected drainage will be directed to sediment dams for the control of suspended sediment prior to drainage from site.

The Woolgar River pump station is expected to have a maximum pumping rate of 1.5 m^3/s. The assessed conservative off-take volume is approximately 2.9 % of the average annual river flow at the project site. Modelling of the operation of the off-take indicates that it will not have a significant effect on the downstream flow regime. Final design will be subject to any conditions associated with the water offtake licence.

The mine layout has been designed so that the project site will be free draining in the post mining phase, with the exception of the final voids. There are two drainage features traversing the footprint of the BVS Pit. A drainage diversion will be constructed to divert the drainage features around the pit (Figure 4). The drainage diversion will be designed with capacity to convey the peak flow from the 0.1% AEP flow event to ensure it is suitable for the post mining phase. Modelling of the final voids also indicates that the final void lake levels will be well below the spill point of the voids and overflows from the final voids are not likely.

The project will be operated in accordance with a suite of surface water management plans and monitoring programs. These will include a Water Management Plan, Erosion and Sediment Control Plan and Receiving Environment Monitoring Program.

Terrestrial Ecology

A specialist terrestrial ecology assessment was undertaken for the project which included multi-season field surveys. The project site is comprised of open Eucalyptus and Corymbia woodland vegetation communities that are Least Concern Regional Ecosystems (REs). Existing clearing on the project site is limited to the local access road corridors and recent exploration activities. There is low weed diversity and abundance within the project area. Potential habitat for a single threatened flora species (*Drummondita calida)* was identified on the sandstone plateaus within the project site.

Overall, the majority of the fauna recorded within the project area are common and widespread. Three listed fauna species were recorded during field surveys:

- Squatter Pigeon (Southern) (listed as Vulnerable under the EPBC Act and *Nature Conservation Act 1992* (Qld) (NC Act));
- Koala (listed as Endangered under the EPBC Act and Vulnerable under the NC Act); and
- Short-beaked Echidna (listed as Special Least Concern under the NC Act).

Development of the project will require clearing of approximately 1,340 ha of vegetation to enable the construction and operation of the mine. This will result in impacts on approximately 40 ha of REs in association with a watercourse that are listed as Matters of State Environmental Significance, in addition to Squatter Pigeon habitat and Koala habitat. Impacts on the Squatter Pigeon and Koala will be assessed as part of the project EPBC Act approval. Biodiversity offsets will be provided for any significant residual impacts.

Aquatic Ecology

A specialist aquatic ecology assessment was undertaken for the project which included aquatic field surveys at the end of the wet season. The field surveys included survey sites across the project area including locations along the Woolgar River, the drainage features traversing the project site and the 2 stock watering dams within the project site.

The surface water system in the project area is characterised by highly ephemeral wet season flows and high bed sediment transport loads in the waterways. In the dry season, the drainage features typically comprise mostly dry creek beds. Remnant pools that can persist in the Woolgar River typically dry out as the dry season progresses.

No threatened aquatic species, habitats, populations or communities listed under the EPBC Act or NC Act were recorded, or considered likely to occur, in the project area. The stock watering dams within the project site are heavily impacted by cattle and have limited aquatic habitat value.

The following potential impacts were assessed:

- Disturbance of the drainage features during the construction of the BVS Pit drainage diversion and mine road crossings, and replacement of the natural reaches of the site drainage features that traverse the footprint of the BVS Pit. The proponent will implement mitigation measures to minimise the potential impacts of the drainage diversion and road crossings in the riparian zones, and consequently no significant impacts on the drainage features and their ecological values are predicted. The drainage diversion and road crossing designs will consider relevant guidelines to minimise impacts and replicate natural drainage conditions, as far as possible. Mitigation measures will include construction during the dry season, limiting the clearing width and implementing clearing protocols, erosion and sediment control and stabilisation works.
- Downstream flow effects on the Woolgar River potentially impacting downstream aquatic ecology. The modelling results for the water supply off-take from the Woolgar River indicate that the off-take rate will be less than 2.9% of the average annual river flow at the project site. Due to the relatively low off-take rate and the high natural variability in annual river flows, the off-take is not expected to have a significant impact on the downstream flow regime or associated aquatic ecology.
- Downstream water quality impacts. Any excess mine-affected water will be discharged in accordance with controlled release conditions specifically designed to ensure there are no significant impacts on the receiving environment, including aquatic ecology. Sediment affected drainage is proposed to be managed in accordance with an Erosion and Sediment Control Plan and directed to sediment dams for control of suspended sediment prior to drainage from site. The project is therefore not expected to have an adverse impact on downstream water quality or aquatic ecology.

Amenity Impacts

There are three sensitive receptors within 15 km of the project site. These are all homesteads on the cattle grazing properties that include the land within the project site. The Mt Norman homestead is approximately 8.4 km south-west of the project site, the Middle Park homestead is approximately 1.1 km north and the Barnes' House is approximately 3 km to the north-east (Figure 3).

Specialist air quality, noise and blast impact assessments were conducted for the project. The assessments considered the background air quality and noise, and included modelling of the worst-case air quality and noise emissions, and blast effects from the project.

The impacts from the project at the sensitive receptors were compared to the relevant air quality, noise and blast criteria. The assessments concluded that predicted air quality, noise and vibration levels from the project at the closest sensitive receptors, including allowance for background levels, are within the relevant criteria. Operational management will include a complaints procedure that will require investigation of any complaints in relation to amenity impacts on the neighbouring homesteads and monitoring to confirm compliance with criteria.

An assessment of the potential visual impacts of the project, including night lighting, was also conducted. It involved detailed review of high resolution aerial photography and topographic maps, and line-of-sight assessments from the homesteads. The assessment concluded that views to the major elements of the project

from the homesteads would be largely screened by intervening topography and/or woodland vegetation. The potential impact of the project on the visual amenity of the receptors is therefore considered to be low.

Cultural Heritage

The proponent has engaged with Traditional Owner representatives in relation to the Aboriginal cultural heritage clearances for exploration works conducted to date, in accordance with the *Aboriginal Cultural Heritage Act 2003* (ACH Act). The proponent is required to manage the potential impacts of the mining activities on Aboriginal cultural heritage in collaboration with the Traditional owners and in accordance with the ACH Act.

A specialist assessment was undertaken to assess the potential impacts of the project on non-Aboriginal cultural heritage. The assessment concluded that there are numerous heritage places on the project site associated with historic gold mining that occurred in the area in the late 1,800s and early 1,900s. The assessment concluded that the heritage places are not state significant and are of only local heritage interest. Development of the project will involve disturbance of 13 of the heritage places within the project site. The proponent is proposing to arrange inspection and recording of the heritage places prior to disturbance.

Socio-Economics

The project site is remote being approximately 1.5 to 2 hours drive from the closest township of Richmond. Richmond is a small town with a population of 578 people (ABS 2022). The project site is within the Richmond Shire Council (RSC) Local Government Area (LGA). The RSC LGA is sparsely populated with a total population of 761 (ABS 2022). The next closest townships to Richmond are Hughenden, which is 240 km by road to the east with a population of 1,113 (ABS 2002), and Julia Creek, which is 270 km by road to the west with a population of 549 (ABS 2020). Overall, the project is located in a region that is sparsely populated.

The project satisfies the definition under the *Strong and Sustainable Resource Communities Act 2017* (SSRC Act) for a *large resource project* as it has a workforce of more than 100 workers. The township of Richmond also meets the definition under the SSRC Act of a *nearby regional community* as it is within 125 km of the project site and has a population of more than 200 people.

In accordance with the requirements of the SSRC Act, the proponent will seek to employ available and suitably qualified local and regional workers, and the workforce recruitment arrangements will not discriminate against local workers. The proponent is also not proposing to employ the operational workforce on a 100% FIFO basis.

Due to the remote location of the project site, and the sparsely populated local and regional area, the majority of the mine workforce is likely to FIFO from Townsville. Townsville is approximately 620 km from the project site by road and is the closest major population centre to the project site. The proponent will also provide buses for the transport of local and regional workers to and from Richmond.

The proponent is committed to maximising the positive social and economic benefits of the project and avoiding potential negative impacts. In order to achieve this, key social impact management measures for the project will include:

- Working closely with the RSC to maximise the economic benefits for the local area, including supporting local and regional businesses, where possible;
- Provision of training and development for the workforce, where required, and provision of employment opportunities for local indigenous people; and
- Providing facilities for on-site workers including fitness facilities, internet and mobile phone services to encourage workers to communicate with partners and families, and to support their health and well-being.

Overall, the project is not considered likely to give rise to any significant or extensive adverse social or economic impacts. The project will provide the following key economic benefits:

- Direct employment of up to approximately 984 persons during the construction phase, and approximately 380 persons during the operations phase;
- Approximately $60M in annual wages;
- Approximately $220M in income tax revenue over the life of the project;
- Creation of substantial indirect employment in Queensland during the construction and operations phases;
- Substantial capital and operating expenditure over the life of the mine; and
- The payment of annual royalties of up to approximately $15M at peak production to the Queensland Government.

The key community stakeholders for the project include the RSC, local landholders and traditional owner representatives. The proponent has maintained regular communication with these stakeholders during the exploration phase to date and will continue communication during the project approval and development phases.

Traffic and Transport

Project generated traffic estimates have been developed for the project construction and operations phases to enable an assessment of the potential road traffic impacts of the project. The State Controlled Roads utilised by project traffic will be limited to the Flinders Highway between Townsville and Richmond. A comparison of the project traffic volumes to base highway traffic volumes indicate that project traffic be well below 5% of highway traffic volumes. In accordance with the *Guide to Traffic Impact Assessment (DTMR, 2018)*, the project therefore does not require a road traffic impact assessment.

Road access to the project site from Richmond is via RSC roads. The proponent will continue to consult with the RSC in relation to any maintenance or upgrades to the roads, required as a result of project traffic. There are a number of unsealed local access roads that provide access to local cattle grazing properties, traversing the project site (Figure 2). The proponent is proposing to realign the sections of unsealed access roads that traverse the project site in consultation with the RSC who is the owner of the roads.

The project involves the construction of a private airstrip at the southern end of the project site to transport workers to and from the site. The airstrip will cater for 40 seater aircraft and current planning indicates approximately 4 return flights to Townsville will be required per week. The airstrip will be constructed and operated in accordance with Civil Aviation and Safety Authority regulations and guidelines.

FIGURES

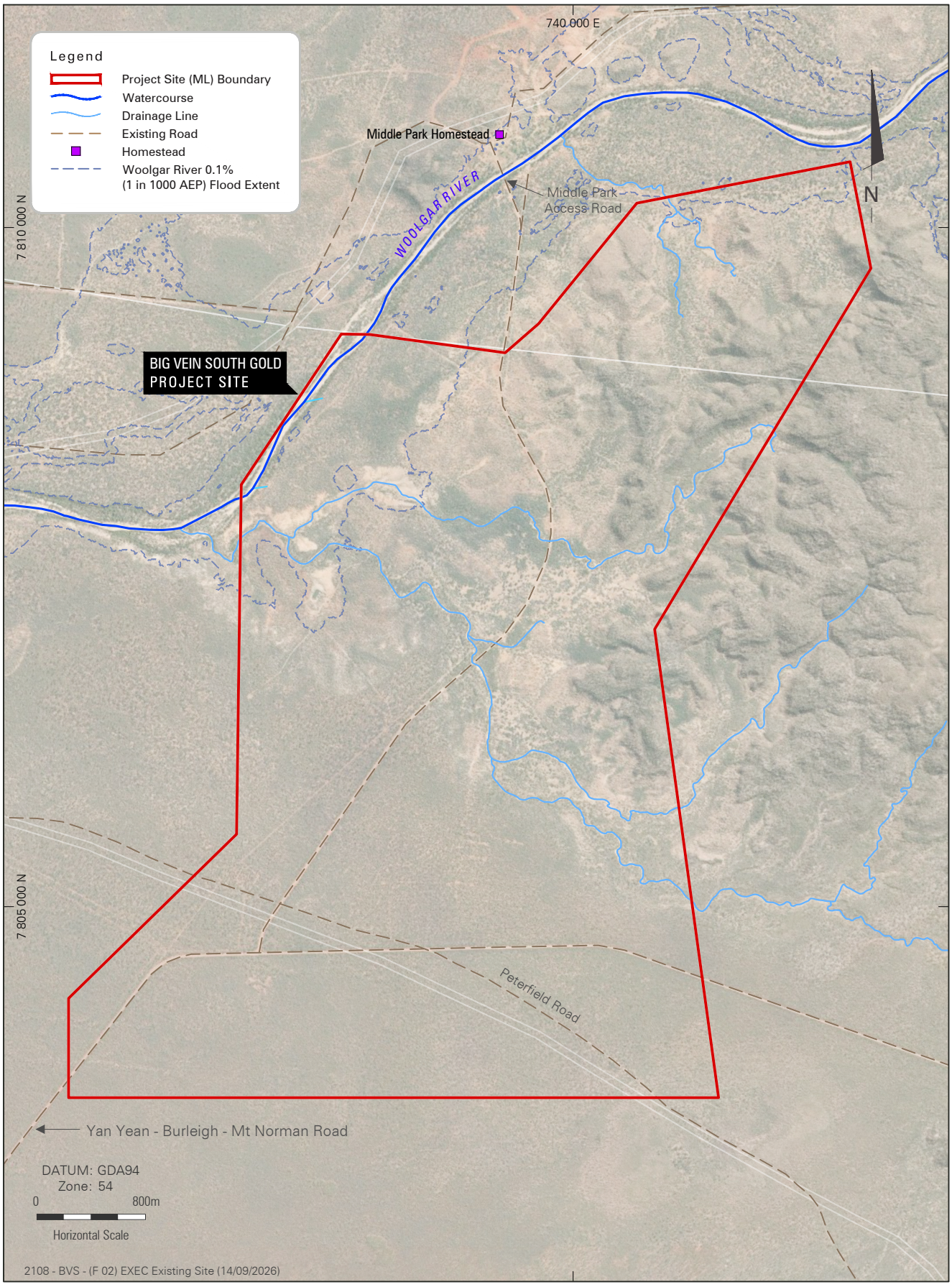


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Location Plan

FIGURE 1

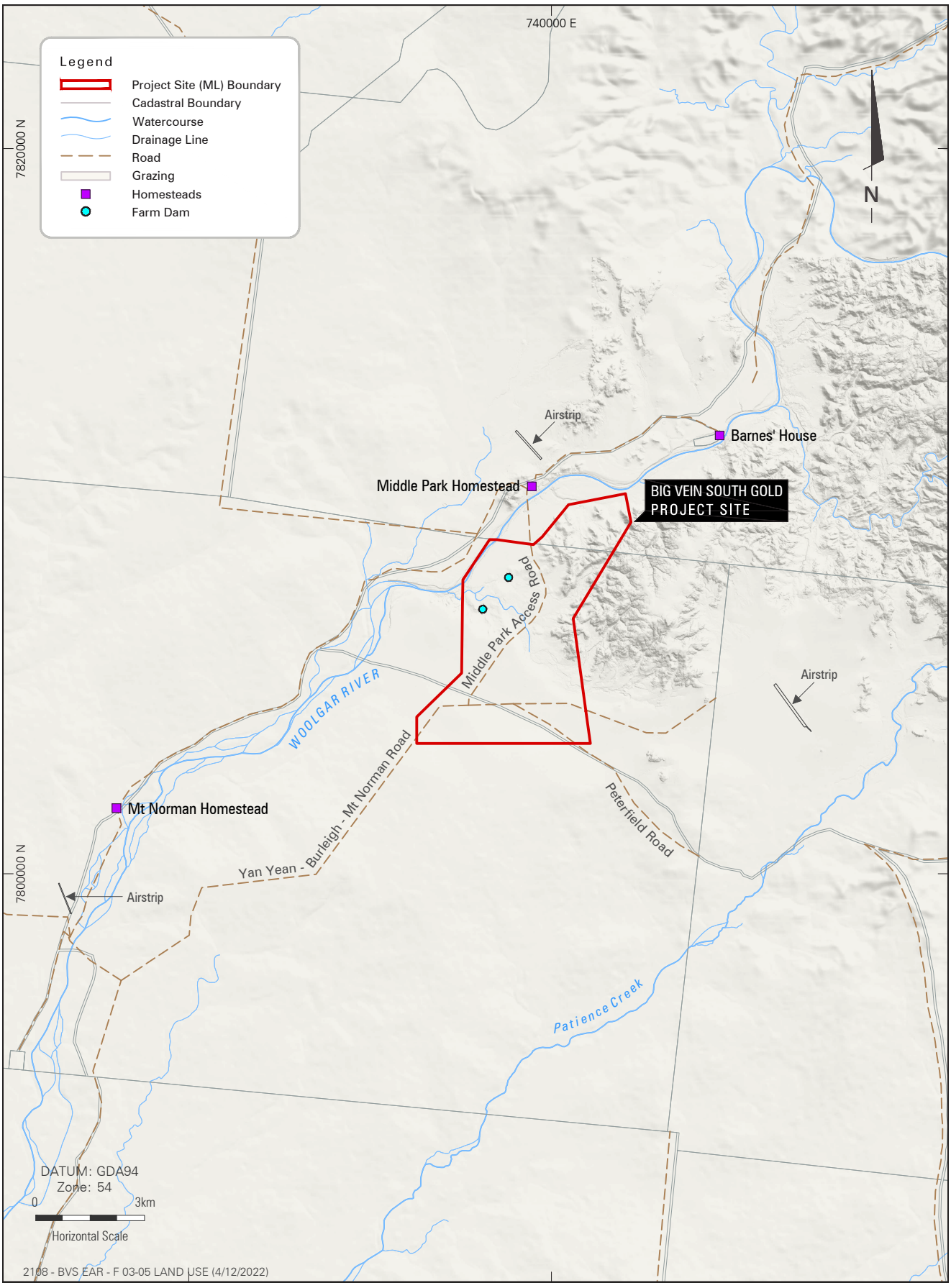


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Existing Site

FIGURE 2

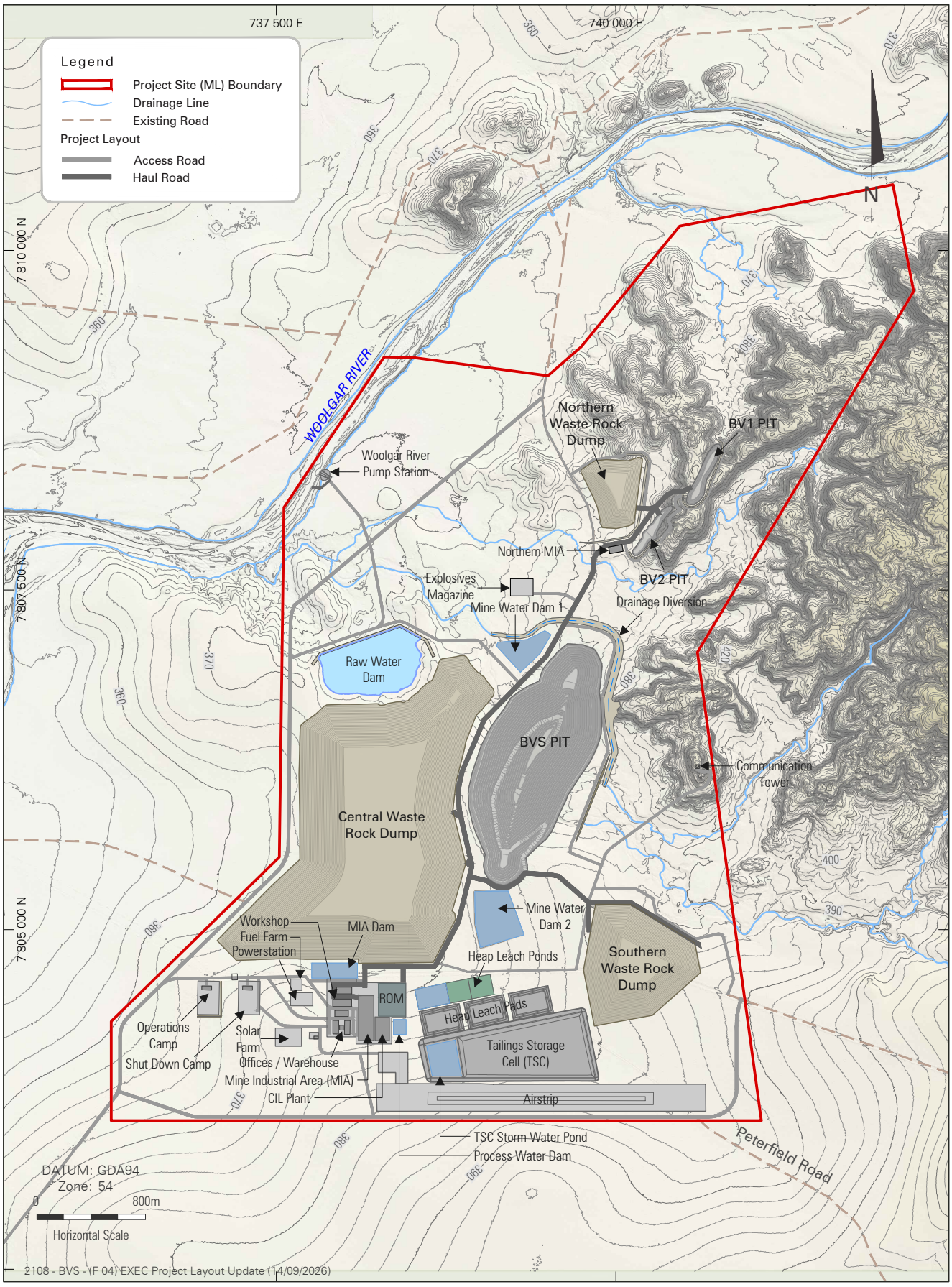


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Land Use

FIGURE 3



BIG VEIN SOUTH GOLD PROJECT

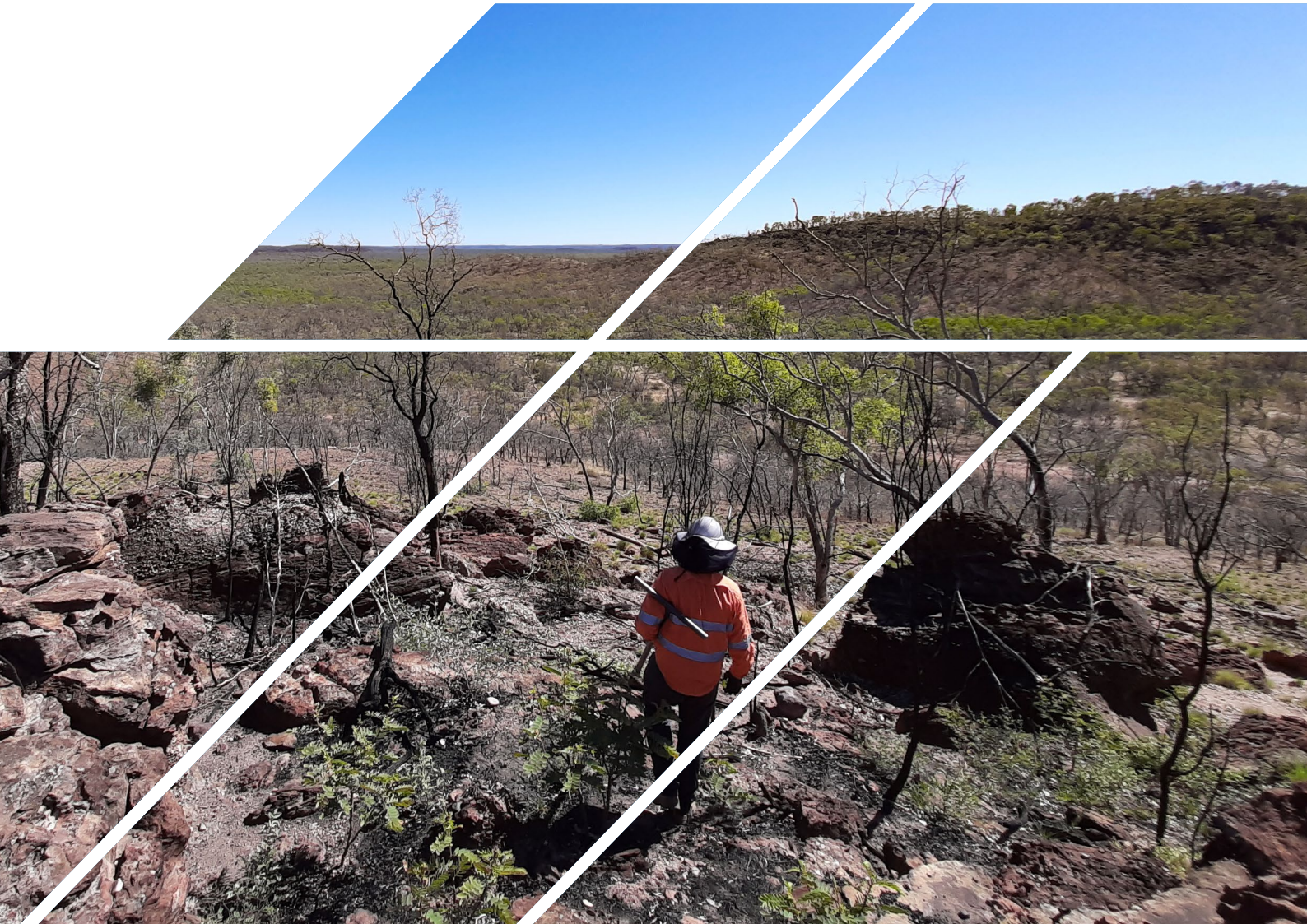
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Project Layout

FIGURE 4

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INTRODUCTION



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1 INTRODUCTION

1.1 INTRODUCTION

This section provides an introduction to the Environmental Assessment Report (EAR). It includes a high level overview of Big Vein South Gold Project (the project), key regulatory approvals, the project proponent, project justification, and an explanation of the structure of the EAR document.

1.2 PROJECT OVERVIEW

The project involves the construction and operation of an open cut gold mine on a greenfield site in North Queensland. The proposed mine site is located approximately 100 km north of Richmond and 380 km west of Townsville (Figure 1-1).

Open cut mining will be conducted using excavators and trucks. Gold ore will be processed on site to produce gold doré (solid bars containing gold alloy). The mine will produce up to approximately 1.95 million tonnes per annum (Mtpa) of Run of Mine (ROM) gold ore, yielding up to approximately 100,000 ounces of gold doré per annum. The mine life will be in the order of 11 years.

Open cut mining operations will involve the development of the primary Big Vein South (BVS) Pit, that will be active over the life of the mine, and two smaller satellite pits (the BV1 and BV2 pits) that will be mined in the first two years of operations (Figure 1-2). Mine waste rock will be stored in three Waste Rock Dumps (WRDs) located in proximity to the pits (Figure 1-2).

On-site ore processing will include a Carbon-in Leach (CIL) Plant and a Heap Leach Facility (HLF). Spent ore from the HLF will be fed to the CIL Plant over the life of the mine. On-site ore processing will produce gold doré and tailings. The CIL Plant will produce predominantly dewatered tailings that will be co-disposed within the Central WRD. The CIL Plant will also produce a smaller volume of wet tailings prior to the commissioning of the tailings filter press and during periods when the filter press is not operational. Wet tailings will be stored in a dedicated Tailings Storage Cell (TSC) (Figure 1-2). Gold doré bars will be transported from the mine site via plane to a refinery.

The majority of the mine infrastructure will be located at the southern end of the project site (Figure 1-2). Key mine infrastructure will include ore processing facilities, workshop, warehouse, administration buildings, haul roads and access roads, vehicle servicing, refuelling and wash down facilities, fuel storage facilities, diesel and solar power station, water supply and water management infrastructure. Workforce accommodation and a private airstrip will also be located at the southern end of the project site.

1.3 KEY REGULATORY APPROVALS

The project site consists of four existing Mining Leases (MLs) which are held by the proponent (ML2729, ML2739, ML90238 and ML100236). The proponent has an existing Environmental Authority (EA) EPSL00828013 for mining and exploration activities within the project site MLs. The EA is a standard EA under the *Environmental Protection Act 1994* (EP Act) that allows low risk mining and exploration activities to be conducted on the mining leases in accordance with the *Eligibility Criteria and Standard Conditions for Mining Lease Activities – Version 2 - ESR 2016/2241* and the *Eligibility Criteria and Standard Conditions for Exploration and Mineral Development Projects – Version 2 – ESR/2016/185*.

The project mining activity does not satisfy the mining lease activity eligibility criteria in the current EA and hence the project will require a new site-specific EA. This EAR has been prepared in support of a site-specific EA application for the project.

The project was declared a Controlled Action (EPBC 2025/10252) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 12 September 2025. It will therefore require separate assessment and approval under the EPBC Act before it can proceed.

1.4 THE PROPONENT

The project proponent is Strategic Minerals Corporation Pty Ltd (SMC). SMC has undertaken exploration, project development and mining feasibility assessment in the Woolgar goldfield for over 30 years, including the Big Vein South deposit, and has the financial and technical capability to execute on the proposed mining operations.

SMC is wholly owned by QGold Pty Ltd (QGold), a Queensland based company focused on minerals exploration and development. QGold has interests in a number of mineral exploration areas primarily in Queensland and Western Australia and a strong track record of successful exploration and project development through its association with QCoal Group.

QCoal Group has been active in exploration and project development in Queensland since 1989. QCoal Group currently operates six active mines, the majority of which have been developed from greenfield exploration.

1.5 PROJECT JUSTIFICATION

The proponent's justification for the project is:

- It is consistent with a number of significant state and local government planning initiatives for the region. These include:
  - New Economy Minerals development in Queensland's Northern Minerals Province.
    - The project is located within the North West Minerals Province (NWMP) which is considered one of the world's most significant base and precious metals producers. The NWMP has contributed to significant economic benefits and growth for Queensland over several decades, and the Queensland government recognises the potential economic benefits of further developing the NWMP.
    - The Queensland Governments' recent New Economy Minerals Investment Prospectus identifies the Big Vein South Gold Project as one of Queensland's major new economy minerals resources (referred to in the prospectus as "Woolgar – Big Vein").
  - Mount Isa to Townsville Economic Development Zone (MITEZ) development initiatives of the participating local governments.
  - Queensland Resources Industry Development Plan.
- It involves a responsible mine plan that incorporates appropriate constraints and control measures to limit any potential adverse environmental and social impacts to an acceptable level;
- It maximises the responsible utilisation of the gold resource; and
- It will result in significant economic benefits for the local area and Queensland.

The key economic benefits of the project include:

- Direct employment of up to approximately 984 persons during the construction phase, and approximately 380 persons during the operations phase;
- Creation of substantial indirect employment in Queensland during the construction and operations phases;
- Approximately $220M in income tax revenue over the life of the project; and
- The payment of annual royalties of up to approximately $15M at peak production to the Queensland Government.

1.6 EAR DOCUMENT

1.6.1 Purpose of EAR Document

Hansen Environmental Consulting has prepared this EAR on behalf of the proponent to support an application for an EA for the Big Vein South Gold Project. This EAR provides an assessment of the environmental impacts of the mining activities proposed within the project site. The EAR document:

- Provides decision-makers, stakeholders and the public with information on the project;
- Discusses the justification for, and alternatives to, the project;
- Describes and assesses potential environmental and social impacts of the project; and
- Provides management, monitoring and control measures to be implemented to mitigate all adverse impacts of the project.

1.6.2 Structure

The EAR document consists of a main volume and appendices. The main volume addresses all areas of the environmental impact assessment and summarises the detailed specialist technical reports. The appendices provide the full specialist technical reports.

The EAR table of contents is as follows:

Table 1-1 Main Volume Sections

SECTION NO.	MAIN VOLUME SECTIONS
	Executive Summary
1	Introduction
2	Regulatory Framework
3	Project Description
4	Scoping of Environmental Assessment
5	Groundwater
6	Surface Water
7	Terrestrial Ecology
8	Aquatic Ecology
9	Air Quality

SECTION NO.	MAIN VOLUME SECTIONS
10	Noise and Vibration
11	Visual Amenity
12	Socio-Economics
13	Traffic and Transport
14	Cultural Heritage
15	Non-Mining Waste Management
16	References
17	Glossary
18	Abbreviations
19	EAR Study Team

Table 1-2 Technical Appendices

APPENDIX NO.	TECHNICAL APPENDIX REPORT
A	Geochemistry Report
B	Soils Report
C	Groundwater Report
D	Surface Water Report
E	Terrestrial Ecology Report
F	Aquatic Ecology Report
G	Air Quality Report
H	Noise and Vibration Report
I	Non-Indigenous Heritage Report
J	Progressive Rehabilitation and Closure Plan
K	Groundwater Dependent Ecosystems Report
L	Greenhouse Gas Assessment Report

1.6.3 How to Read the EAR

If you are interested in all aspects of the project, then it is suggested that you read the entire EAR document.

However, if you are only interested in specific issues, it is suggested that you familiarise yourself with the project by reading the project description in Section 3 – Project Description. This section describes the proposed mining operations including site and surrounds, mining methods and mine infrastructure.

After familiarising yourself with the project, refer to the Table of Contents in order to identify your sections of interest. For more detailed technical assessments, refer to the specialist technical reports in the Appendices.

For example, if you are interested in air quality impacts, you could adopt the following course of reading:

- First, familiarise yourself with the project by reading Section 3 – Project Description.

- Second, refer to the Table of Contents and note the location of the air quality section which is located in Section 9 – Air Quality.
- Finally, refer to Appendix G - *Air Quality Report* for detailed technical information on air quality impacts.

FIGURES

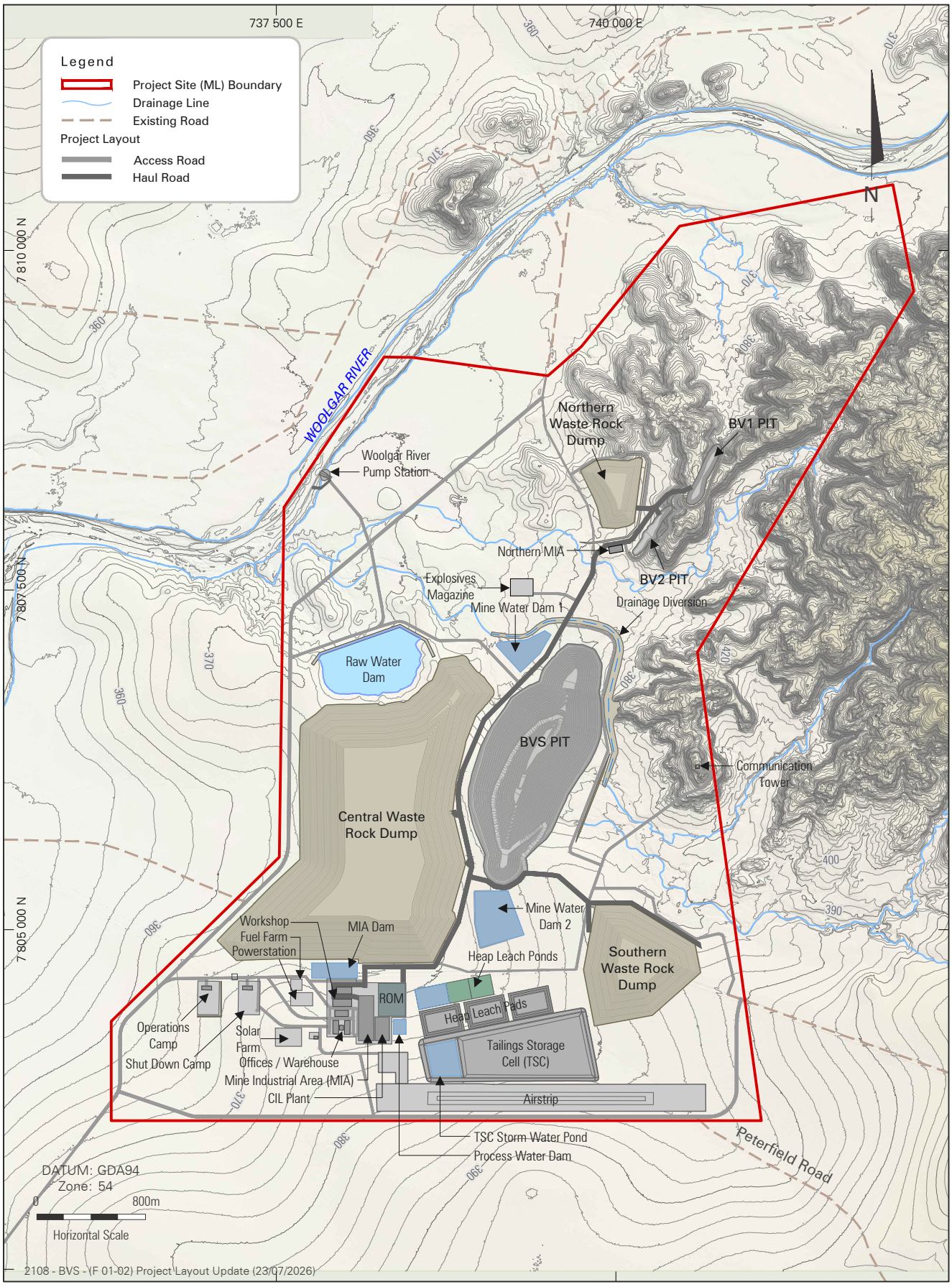


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Location Plan

FIGURE 1-1



BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Project Layout

FIGURE 1-2

2

REGULATORY FRAMEWORK



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2 REGULATORY FRAMEWORK

2.1 INTRODUCTION

This section provides an overview of the regulatory framework relevant to the Big Vein South Gold Project (the project). It provides an overview of the existing approvals and the key approvals required for the project.

2.2 EXISTING APPROVALS

The project site consists of four existing Mining Leases (MLs) which are held by the proponent (ML2729, ML2739, ML90238 and ML100236). There are no additional mining leases required for the project.

The proponent holds an existing Environmental Authority (EA) EPSL00828013 for mining and exploration activities within the project site MLs. The EA is a standard EA under the *Environmental Protection Act 1994* (EP Act) that allows low risk mining and exploration activities to be conducted on the mining leases in accordance with the *Eligibility Criteria and Standard Conditions for Mining Lease Activities – Version 2 - ESR 2016/2241* and the *Eligibility Criteria and Standard Conditions for Exploration and Mineral Development Projects – Version 2 – ESR/2016/185*.

The project mining activities do not satisfy the mining lease activity eligibility criteria in the current EA and hence the project will require a new site-specific EA for a resource activity within the project MLs.

2.3 KEY PROJECT APPROVALS

There are two key approvals required for the project:

- A site-specific EA under the EP Act; and
- Approval under the *Environment Protection and Biodiversity Conservation Act 2000* (EPBC Act).

These are discussed in the following sections.

2.3.1 Environmental Authority

An EA is an approval issued by the Department of the Environment, Tourism, Science and Innovation (DETSI) under the EP Act. The EA imposes environmental management conditions on mining activities undertaken on a ML. The EA conditions set the environmental performance requirements that the proponent must comply with. Failure to comply with the EA conditions is a breach of the EP Act and there are various compliance enforcement actions available to DETSI under the EP Act.

As noted in Section 2.2, a site-specific EA for a resource activity is required for the project.

The following sections outline the site-specific EA approval process, the Environmentally Relevant Activities (ERAs) that are required to be approved by the EA, and the Progressive Rehabilitation and Closure Plan (PRCP) that is required to be submitted with the EA application.

Environmental Authority Approval Process

The approval process for a site-specific EA application for resource activities includes the following steps:

- Application stage;
- Information stage;
- Notification stage; and
- Decision stage.

SMC submitted a site-specific EA application for the project (Reference No. A-EA-NEW-100363198) on 6 January 2023. DETSI issued an Information Request Notice for the project on 20 June 2025 including a list of additional information requirements for the application and indicating that an Environmental Impact Statement (EIS) process was not required for the project.

As the EA application relates to a mining lease it will also require public notification. The notification stage will occur after the information stage. During the notification stage, a person can make a submission on the EA application within the submission period.

Once the information and notification stages have been completed, the decision stage will commence. A decision about the EA application is required to be made within 30 business days from the commencement of the decision stage, unless extended by DETSI and/or in agreement with the proponent. At the end of the decision stage an EA will be issued.

Table 2-1 Environmentally Relevant Activities

The *Environmental Protection Regulation 2019* (EP Regulation) defines ERAs as activities with the potential to impact negatively on the environment. The project EA will provide approval to carry out the relevant ERAs on the project MLs. Under Schedule 3 of the EP Regulation, the project is classified as resource activity 16 – Mining Gold Ore. The following prescribed ERAs under Schedule 2 of the EP Regulation are also proposed to be undertaken as part of this resource activity and are referred to as ancillary activities:

- ERA 8(2) – Chemical Storage for storing 50 t or more of chemicals of dangerous goods class 6, division 6.1 under subsection (1)(b);
- ERA 8(3) – Chemical Storage for storing more than 500 m3 of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods under class 3 under subsection (1)(c);
- ERA 8(4) – Chemical Storage for storing 200 t or more of chemicals that are solids or gases, other than chemicals mentioned in items 1 to 3, under subsection (1)(d);
- ERA 14(2a) – Electricity Generation for generating 10 MW electrical to 150 MW electrical;
- ERA 15 – Fuel Burning using fuel burning equipment that is capable of burning at least 500 kg of fuel in an hour;
- ERA 31(2b) – Mineral Processing for processing, in a year, more than 100,000 t of mineral products, other than coke;
- ERA 33 – Crushing, Milling, Grinding or Screening for crushing, grinding, milling or screening more than 5,000 t of material in a year;
- and

- ERA 63(1)(b)(i) – Sewage Treatment for operating a sewage treatment works, other than no-release works, with a total daily peak design capacity of more than 100 but not more than 1,500 EP if treated effluent is discharged from the works to an infiltration trench of through an irrigation scheme.

The site-specific EA for the project will include approval for these ancillary activities.

Progressive Rehabilitation and Closure Plan

Site-specific EA applications for new mining activities are required to include a PRCP. A PRCP is prepared for the purpose of maximising the progressive rehabilitation of the land and specifying the condition to which the land must be rehabilitated prior to surrender of the mining tenement. The *Guideline – Progressive rehabilitation and Closure Plans (PRC Plans)* (DETSI, 2026) specifies the content requirements for a PRCP. PRCPs are subject to public notification and assessed by DETSI, concurrently with the EA application. Appendix J of this EAR includes the project PRCP.

2.3.2 EPBC Act Approval

The EPBC Act prescribes the Commonwealth government's role in environmental assessment, biodiversity conservation and the management of protected Matters of National Environmental Significance (MNES). The Department of Climate Change, Energy, Environment and Water (DCCEEW) is the administering authority for the EPBC Act.

The EPBC Act provides a mechanism for national environmental protection and biodiversity conservation. Biodiversity conservation is promoted by providing protection for MNES, including:

- Listed threatened species, communities and migratory species;
- Protected areas (e.g. world heritage properties, wetlands of international importance (Ramsar wetlands)); and
- Commonwealth Indigenous heritage.

The project was referred to DCCEEW under the EPBC Act for a Controlled Action decision. The project was declared a Controlled Action (EPBC 2025/10252) under the EPBC Act on 12 September 2025. The relevant controlling provision for the Controlled Action is *listed threatened species and communities* (Sections 18 and 18A). The project will therefore require a separate assessment and approval under the EPBC Act before it can proceed. The referral decision notice confirms that DCCEEW's assessment will be via Preliminary Documentation.

2.4 SECONDARY APPROVALS

The project will require a range of secondary approvals, in addition to the key approvals described in Section 2.3. The regulatory requirements relevant to each of the EAR technical assessments, and the associated secondary approvals required for the project, are discussed within the technical assessments presented in the various EAR specialist reports and the EAR main volume sections (e.g. legislation and secondary approvals related to groundwater are discussed in Section 6 – Groundwater).

3

PROJECT DESCRIPTION



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3 PROJECT DESCRIPTION

3.1 INTRODUCTION

This section describes the Big Vein South Gold Project (the project), including the setting and activities. Key project alternatives and the project justification are also discussed in this section.

3.2 PROJECT OVERVIEW

The project involves the construction and operation of an open cut gold mine on a greenfield site in North Queensland. The proposed mine site is located approximately 100 km north of Richmond and 380 km west of Townsville (Figure 3-1).

Open cut mining will be conducted using excavators and trucks. Gold ore will be processed on site to produce gold doré (solid bars containing gold alloy). The mine will produce up to approximately 1.95 million tonnes per annum (Mtpa) of Run of Mine (ROM) gold ore, yielding up to approximately 100,000 ounces of gold doré per annum. The mine life will be in the order of 11 years.

Open cut mining operations will involve the development of the primary Big Vein South (BVS) Pit, that will be active over the life of the mine, and two smaller satellite pits (the BV1 and BV2 pits) that will be mined in the first two years of operations (Figure 3-2). Mine waste rock will be stored in three Waste Rock Dumps (WRDs) located in proximity to the pits (Figure 3-2).

On-site ore processing will include a Heap Leach Facility (HLF) that will operate predominantly in the initial project years prior to the commissioning of a Carbon in Leach (CIL) Plant in Year 3 (Figure 3-2). Spent heap leach ore will be reprocessed through the CIL Plant. The CIL Plant will produce gold doré and tailings. Tailings will be dewatered at the CIL Plant following commissioning of a tailings filter press. Dewatered tailings will be strategically placed to form a Co-placement Cell (CPC) within the Central WRD. The CIL Plant will produce wet tailings in Project Year 3, prior to the commissioning of the filter press, and over the remaining mine life in periods when the filter press is not operational. Wet tailings will be pumped to a dedicated Tailings Storage Cell (TSC) (Figure 3-2). Gold doré bars will be transported from the mine site via plane to a refinery.

The majority of the mine infrastructure will be located at the southern end of the project site (Figure 3-2). Key mine infrastructure will include ore processing facilities, workshop, warehouse, administration buildings, haul roads and access roads, vehicle servicing, refuelling and wash down facilities, fuel storage facilities, diesel and solar power station, water supply and water management infrastructure. Workforce accommodation and a private airstrip will also be located at the southern end of the project site.

3.3 PROJECT SETTING

3.3.1 Location

The project site is the combination of four existing mining leases and covers a total area of approximately 2,281 ha (Figure 3-2). The project is located approximately 100 km north of Richmond and 380 km west of Townsville (direct) (Figure 3-1).

The project site is remote, being located approximately 120 km by road from the closest township of Richmond (Figure 3-3). Richmond is approximately 500 km by road, along the Flinders Highway, from Townsville. Richmond

is approximately a 5.5 hour drive from Townsville and the project site is approximately 2 hours drive from Richmond (Figure 3-1).

The project site is located immediately to the east of the rural locality of "Woolgar" (Figure 3-3). Woolgar contained a small historical gold mining settlement and numerous small scale gold prospecting areas in the late 1800s and early 1900s. There is no notable settlement remaining at Woolgar today.

The project site is in the north-eastern corner of the of the Richmond Shire Local Government Area (Figure 3-3).

3.3.2 Land Tenure and Ownership

The project site is located within two parcels of crown land that are leased by separate landholders, as shown in Figure 3-4 and described in Table 3-1. The proponent has agreements in place with the landholders in relation to access to the land within the project mining leases, for mining activities.

Table 3-1 Land Ownership within the Project Site

REF NO.	DESCRIPTION	PROPERTY NAME	REGISTERED OWNER	REGISTERED LESSEE
1	Lot 2 on WLR12	Mt Norman	Crown Land	Burnett Holdings (NQ) Pty Ltd
2	Lot 2414 on SP289336	Middle Park	Crown Land	Woolgar Valley Aboriginal Corporation

A gazetted road reserve, referred to as "Peterfield Road", passes through the Mt Norman property at the southern end of the project site (Figure 3-4). The proponent has a consent and compensation agreement with the Richmond Shire Council that allows the proponent to close the road reserve within the project mining leases and establish alternate road access for the local landholders.

The Peterfield road reserve is also a stock route (Stock Route ID: 139RICH). The stock route is classified as "minor and unused". The proponent will consult with the Department of Resources, Richmond Shire Council and local landholders in relation to the management and potential realignment of the stock route, prior to the commencement of the project.

The land within the project site is not subject to any Native Title claims or determinations

3.3.3 Land Use

The current land uses within the project site and surrounding area are cattle grazing and mineral exploration. The two land parcels within the project site are part of large-scale cattle grazing properties. The proponent has been conducting exploration activities within the project site in accordance with relevant resource tenure and environmental authorities over the last 30 years.

There are no Strategic Cropping Areas, Priority Agricultural Areas, Priority Living Areas or Strategic Environmental Areas, as defined by the *Regional Planning Interests Act 2014* (Qld), within the project site. The land within the project site is not subject to any Property or Project Plans approved under the *Soil Conservation Act 1986* (Qld).

Built infrastructure within the project site and surrounding area is limited to stock fencing, unsealed access roads and stock watering dams (Figure 3-5). The local roads that traverse the project site provide access to the local grazing properties. The proponent is proposing to realign the sections of unsealed access roads that traverse the project site in consultation with the Richmond Shire Council who is the owner of the roads (Figure 3-2).

There are three homesteads within 15 km of the project site (Figure 3-5). Middle Park Homestead is located approximately 1.1 km to the north and Mt Norman Homestead is located approximately 8.4 km to the south-west. These homesteads are both permanently occupied. Barnes' House, on the Middle Park property, is located

approximately 3 km north-east. Barnes' House is occupied occasionally on weekends. There are three privately-owned airstrips, associated with the grazing properties, in the vicinity of the project site (Figure 3-5).

There are scattered remnants of historic gold mine workings from the late 1800s and early 1900s in the northern section of the project site. The heritage assessment conducted for the project is discussed in Section 14 – Cultural Heritage.

3.3.4 Natural Features

The project site is situated on the south-western edge of the Gregory Range (Figure 3-3) at elevations of between approximately 360 m and 450 m Australian Height Datum (AHD) (Figure 3-10). The north-eastern portion of the project site is characterised by a mosaic of sandstone scarps dissected by streams and gullies, while the remainder of the project site is gently undulating and sloping to the west (Figure 3-6).

The project site is located adjacent to the Woolgar River at the upstream end of the Flinders River Basin (Figure 3-6). The Woolgar River is a sub-catchment of the Stawell River which joins the Flinders River approximately 100 km downstream of the project site. The Flinders River flows north through the Gulf Country and discharges into the Gulf of Carpentaria.

The Woolgar River is ephemeral and flows in a south-westerly direction along the northern and north-western boundaries of the project site. The majority of the project site is above the 0.1% (1 in 1,000) Annual Exceedance Probability (AEP) Woolgar River flood level (Figure 3-6). There are a number of ephemeral tributary drainage features traversing the project site, originating from the sandstone scarps to the east and flowing through the site to the Woolgar River (Figure 3-6).

The local vegetation is characterised as open woodland dominated by Eucalyptus and Corymbias, with a variable native shrub layer. Limited clearing has occurred on the site and is predominantly associated with the local access roads (Figure 3-6).

3.3.5 Climate

The climate of the region is dominated by intense rainfall events throughout the summer months of each year. More than 90% of rainfall typically falls between November and April. Consequently, the region exhibits distinct wet and dry seasons.

The nearest BoM weather station with long-term rainfall monitoring data is the Gilberton Station (BoM weather station number 030019), located approximately 84.6 km from the project site, with data available from November 1917 to February 2022. Mean annual rainfall for the weather station is 688.9 mm. Mean monthly rainfall ranges from 4.0 mm in August to 199.4 mm in January. Total average rainfall recorded during the wet season (November to April) is 641.8 mm. Total average rainfall recorded during the dry season (May to October) is 66 mm.

The SILO data drill for the project site indicates that mean annual lake evaporation is 1,930 mm resulting in a net average annual evaporation of approximately 1,338 mm.

Temperature data has been collected from the Bureau of Meteorology (BoM) weather station at Richmond Airport (BoM station number 030161) from March 1998 to February 2022. The highest daily maximum temperature recorded at the Richmond Airport weather station over this period is 45.1°C, recorded in December 2019. The lowest daily minimum temperature is -1.0°C, recorded during June 2005. During winter months, the mean recorded daily minimum temperatures range from 9.1 °C to 10.2 °C and the mean recorded daily maximum temperatures range from 26.7°C to 29.2 °C. During summer months, the mean recorded daily minimum temperatures range from 22.9°C to 23.7 °C and the mean recorded daily maximum temperatures range from 36.3 °C to 38.5°C.

3.3.6 Mining Tenements

Table 3-2 lists the Mining Leases (MLs) and Mineral Exploration Permits (EPMs) within the project site, all of which are held by the proponent. Table 3-3 lists the adjoining tenements.

There are no petroleum authorities under the Petroleum and Gas (Production and Safety) Act 2004 (Qld), petroleum tenures under the Petroleum Act 1923 (Qld), geothermal tenures under the Geothermal Energy Act 2010 (Qld) or greenhouse gas tenures under the Greenhouse Gas Storage Act 2009 (Qld) overlying, or adjacent to, the project site.

Table 3-2 Project Site Tenements

TENEMENT	TENEMENT HOLDER	FIGURE REFERENCE
MINING LEASE (ML)		
ML2729	Strategic Minerals Corporation Pty Ltd	Figure 3-7
ML2739	Strategic Minerals Corporation Pty Ltd	
ML90238	Strategic Minerals Corporation Pty Ltd	
ML100236	Strategic Minerals Corporation Pty Ltd	
EXPLORATION PERMIT – MINERALS OTHER THAN COAL (EPM)		
EPM9599	Strategic Minerals Corporation Pty Ltd	Figure 3-8
EPM13942	Strategic Minerals Corporation Pty Ltd	
EPM14060	Strategic Minerals Corporation Pty Ltd	
EPM14209	Strategic Minerals Corporation Pty Ltd	

Table 3-3 Adjoining Tenements

TENEMENT	TENEMENT HOLDER	FIGURE REFERENCE
EXPLORATION PERMIT – MINERALS OTHER THAN COAL (EPM)		
EPM18781	Energy Minerals Pty Ltd	Figure 3-8
EPM26263	Strategic Minerals Corporation Pty Ltd	

The proponent also holds ML90044, located approximately 9.5 km to the north-east of the project site. The existing Sandy Creek Dam is located within ML90044.

3.3.7 Geology

The project site and its surrounds have a long history of geological exploration. Exploration activities commenced in the 1950s and have continued at intervals until the present day. On this basis, the geology of the project site and its surrounds is well understood.

The project site is located at the northern margin of the Eromanga Basin, a sedimentary basin that was deposited in the Mesozoic era. Locally, the Eromanga Basin overlies a Proterozoic basement. The Proterozoic basement is part of the North Australian Craton, one of Australia's major mineral provinces.

The Eromanga Basin and Proterozoic basement have been extensively modified by weathering and erosion. The weathered profile extends to depths of up to 40 m below ground level in the project site.

The surface geology in the project site and its surrounds is shown in Figure 3-9.

The project site stratigraphy includes the following (in descending order):

- Localised alluvium in the north-western corner of the project site associated with the Woolgar River and its floodplain.
- The weathered in-situ rocks of the Eromanga Basin and Proterozoic basement (herein called the 'weathered profile').
- Fresh (i.e. unweathered) Jurassic strata of the Eromanga Basin.
- Fresh Proterozoic basement rocks, including the target gold ore.

The Woolgar River alluvium is a sand and gravel deposit that forms the Woolgar River floodplain along the north-western boundary of the project site. The floodplain alluvium is confined within a narrow valley. The floodplain alluvium thickness typically ranges from a few centimetres at the edge of the floodplain up to approximately 10 m on the riverbanks.

The weathered profile comprises poorly consolidated, fine-grained, clay-bound sands and silts. The weathered profile is present across the entire project site. The weathered profile is typically located at the ground surface, except where it is overlain by the alluvium. The weathered profile is up to approximately 40 m thick in the lower lying areas and is typically thinner in the elevated parts of the project site (approximately 0.5 m thick). The weathered profile is between 4 m and 25 m thick in the open cut mining areas.

Bore logs show that the fresh Jurassic strata forms a single, undifferentiated sedimentary rock formation, comprising mainly sandstone, with minor conglomerate, siltstone and claystone. Where present within the project site, the fresh Jurassic strata underlies the weathered profile (Figure 3-9) and ranges in thickness up to approximately 70 m. The fresh Jurassic sediments are between 0 m and 30 m thick in the open cut mining areas.

Exploration data from the project site shows that the Proterozoic basement comprises folded metamorphic rocks (e.g. amphibolite), granite and intrusive (dolerite and rhyolite) dykes. The Proterozoic basement typically underlies the weathered profile and the fresh Jurassic sediments (where present). Within the open cut mining areas, the top of the Proterozoic basement is located at depths of between 10 m and 40 m below the ground surface. The Proterozoic basement is estimated to be several kilometres thick in the open cut mining areas.

The gold ore has been deposited in a deformation (or shear) zone within the Proterozoic basement. The shear zone is orientated along a south-southwest to north-northeast axis and extends across the project site. Exploration data from the project site shows that the shear zone has been completely mineralised.

3.4 MINING OPERATIONS

Open cut mining operations will involve the mining of waste rock and gold ore from three open cut pits. The majority of the gold ore will be mined from the BVS Pit, which will be active over the life of the mine. The BV1 and BV2 pits are small satellite pits that will produce gold ore during the first 2 years of the project (Figure 3-2). During this time, the overburden from the BVS Pit will also be stripped (Figure 3-11).

Open cut mining will be conducted using excavators and trucks. Waste rock will be transported from the pits in haul trucks and stored in three Waste Rock Dumps (WRDs) located in proximity to the pits (Figure 3-2). Waste rock from the BV1 and BV2 pits will be stored in the Northern WRD. Waste rock mined from the BVS Pit will be stored in the Central and Southern WRDs.

Mined gold ore will be transported from the pits by haul truck to the Run-of-Mine (ROM) area at the southern end of the project site (Figure 3-2) and either stockpiled prior to processing, or fed directly to a crusher at the CIL Plant or the heap leach pads.

The mine will have a peak production rate of 1.95 million tonnes per annum (Mtpa) of ROM gold ore. The mine life will be in the order of 11 years.

The open cut mining operations will involve the following activities:

- Clearing of any vegetation;
- Stripping and stockpiling of topsoil;
- Drilling and blasting of waste rock and ore;
- Mining of waste rock and ore using excavators and trucks;
- Haulage of ore by truck to the ore stockpile areas for processing;
- Haulage of waste rock by truck to the Waste Rock Dumps (WRDs); and
- Progressive rehabilitation of WRDs.

The progression of mining over the mine life is illustrated in Figures 3-11 to 3-14.

3.5 ONGOING EXPLORATION ACTIVITIES

Ongoing exploration on the mining leases will be undertaken over the life of the mine. This may include exploration drilling, as well as seismic surveys. These activities will be similar to the exploration activities that have been undertaken on the mining leases to date.

3.6 MINE INFRASTRUCTURE

The majority of the mine infrastructure will be located at the southern end of the project site (Figure 3-2). Key mine infrastructure in this area will include:

- Ore processing facilities (CIL Plant and HLF):
- ROM ore stockpile area and temporary ore stockpile areas;
- Tailings Storage Cell;
- Diesel and Solar Power Station;
- Workshop and vehicle servicing facilities;
- Warehouse, laydown and storage areas;
- Administration building;
- Water supply and mine water management infrastructure.
- Workforce accommodation camps; and
- Private airstrip.

During the operation of the BV1 and BV2 pits the Northern Mine Industrial Area (MIA) will be operational (Figure 3-2). The Northern MIA will include a mine vehicle parking area, crib hut and vehicle refuelling and servicing facilities.

The key mine infrastructure components are discussed in the following sections.

3.6.1 Ore Processing Facilities

Carbon-in-Leach Plant

The CIL Plant will include a crushing circuit, sag mill, carbon-in-leach circuit, elution circuit and gold room (Figure 3-16). The CIL Plant will have a design feed capacity of approximately 1.95 Mtpa to match the peak mine ROM ore production and will produce up to approximately 100,000 ounces of gold doré (solid bars containing gold alloy) per annum.

Gold ore from the ore stockpiles will be fed to the CIL Plant via the crusher at the ROM. The CIL Plant will produce gold doré and tailings. Gold doré bars will be transported from the site via plane to a refinery.

The CIL Plant elution circuit and gold room will be commissioned in Project Year 1 to enable the processing of pregnant heap leach solution. The remainder of the CIL plant is scheduled to be commissioned by Project Year 3. A tailings dewatering system (filter press) is scheduled to be commissioned by Project Year 4.

Dewatered tailings will be hauled by truck from the CIL Plant and placed in the CPC within the waste rock in the Central WRD. Wet tailings will be produced in Project Year 3, prior to the commissioning of the tailings filter press, and over the remaining life of the mine in periods where the filter press is not operational. Wet tailings will be stored in a dedicated Tailings Storage Cell (TSC) (Figure 3-2).

The reagents used in the CIL Plant will include Quicklime, silica, sodium cyanide, sodium carbonate, sodium borate, flocculant, caustic soda, hydrochloric acid, hydrogen peroxide and copper sulphate. Copper sulphate will be delivered to the site in 1 tonne bulka bags which will be stored in a bunded and covered reagent shed. All other reagents will be delivered to site in isotainers and stored in a dedicated chemical storage area at the plant. The reagents will be consumed in the process and will not be released to the environment.

The CIL Plant will include a tailings filter cake washing circuit and cyanide destruction circuit that will reduce weak acid dissociable (WAD) cyanide levels in the tailings to below 50 mg/L, to ensure that stored tailings does not pose a threat to the environment. This is consistent with the Cyanide Management Handbook (Department of Resources, Energy and Tourism, 2008) and the International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold (International Cyanide Management Institute, 2021).

Heap Leach Facility

On-site ore processing will include a HLF that will operate predominantly in the initial project years prior to the commissioning of the CIL Plant in Year 3. The HLF will include a mobile crusher, three heap leach pads and three heap leach ponds (Figure 3-2). The heap leach process involves the irrigation of a cyanide leaching solution onto ore heaps that are fed through the mobile crusher and placed on the heap leach pads by a stacker. The irrigated leaching solution seeps through the ore heap "leaching" gold from the ore. The leaching solution is referred to as "barren" prior to irrigation and "pregnant" after leaching gold from the ore heaps.

Both the heap leach pads and heap leach ponds will incorporate an engineered liner system designed to contain the leaching solution, collect any leakage and prevent contamination of the underlying natural materials or groundwater. Conceptually, the liner system will comprise:

- A low permeability synthetic geomembrane designed to prevent leakage of leach fluids and HLF stormwater through the floor and sides of the HLF.
- A leak collection layer, including underdrains and leakage collection sumps, to intercept and recover any leakage through the geomembrane.
- Appropriately prepared and compacted subgrade materials providing a stable low-permeability foundation for the liner system.

The detailed configuration and specification of the liner system will be determined through detailed engineering design, based on the site-specific geotechnical and hydrogeological conditions. The detailed design will have regard to the relevant Queensland regulated structures requirements and relevant good-practice guidance, including and, where applicable, the International Cyanide Management Code. Geomembrane materials, installation, construction quality assurance and integrity testing will be specified in accordance with relevant standards. The detailed design and liner system specifications will be prepared and certified by an appropriately qualified Registered Professional Engineer of Queensland (RPEQ).

The barren leaching solution will be stored in the Barren Pond prior to irrigation (Figure 3-17). The pregnant leaching solution will drain via synthetic lined open collection drains on the heap leach pads, via gravity to the Pregnant Pond. The pregnant solution will be pumped from the Pregnant Pond to the gold elution circuit within the processing plant for metal extraction. After metal extraction in the gold room, the leaching solution will be returned to the Barren Pond and reused in the heap leaching process (Figure 3-17).

The HLF will be operated so that the heap leach process solutions are contained within a closed system with no external discharge. The Pregnant Pond will have a storage capacity of approximately 75 ML and the Barren Pond will have a storage capacity of approximately 25 ML. These ponds have been sized (modelled) to contain the maximum volumes of pregnant and barren leaching solutions generated from the heap leach process and also have additional freeboard capacity to ensure total containment. In addition to the Pregnant and Barren ponds, the HLF will also have a dedicated Storm Water Pond with a modelled storage capacity of 140 ML. The Storm Water Pond has been sized with sufficient capacity to contain the runoff from the modelled worst rainfall sequence (Section 6 – Surface Water). Emergency spillways will be installed in the Pregnant and Barren ponds so that the Pregnant Pond would overflow into the Barren Pond, and the Barren Pond would overflow into the Storm Water Pond, in any unexpected overflow scenario. Water collected in the HLF Storm Water Pond will be re-used as make-up water in the heap leach process or pumped to the Tailings Storage Cell (TSC) Storm Water Pond for storage and use as CIL Plant water supply.

The HLF management and monitoring measures have been designed to minimise the risk of leakage, ensure early detection of any leaks, trigger rectification and avoid any potential adverse environmental impacts. These measures include:

- Pre-commissioning integrity testing of the HLF geomembrane liner to ensure that the liner is undamaged by construction and placement of cover materials. Integrity testing will be determined by the design engineer as part of the construction quality assurance process and may include seam testing and an electrical leak-detection survey.
- Operational leak detection monitoring in the HLF liner leak collection sumps, including routine measurement of:
  - Any liquid levels and volumes collected in each sump
  - Sampling of sump liquids for pH, electrical conductivity and key indicators of leaching solution, including cyanide species
- Routine engineering inspections of the HLF, including exposed liner areas, embankment toes, drains, pipelines, sumps, pads and ponds.
- Monitoring of the leaching process water balance to identify any unexpected loss of leaching solution. This will include monitoring pond levels and changes in stored inventory, leaching solution application and recovery volumes, rainfall and evaporation.
- Groundwater monitoring upgradient and downgradient of the HLF to identify any unexpected changes in groundwater levels or quality due to the HLF operations. Groundwater quality monitoring will include cyanide testing.

Any monitoring results indicating leakage from the HLF will be investigated and corrective actions undertaken. Corrective actions may include ceasing leaching solution application to the affected area of the HLF, recovering collected leakage liquid and/or locating and repairing the liner defect.

Spent heap leach ore will be reprocessed through the CIL Plant over the life of the mine. At mine closure, the heap leach pads and ponds will be decommissioned and the HLF site will be decontaminated prior to rehabilitation.

3.6.2 Water Supply and Water Management Infrastructure

Water Management Infrastructure

The mine water management system includes the collection and containment of mine affected water for use as mine water supply and the direction of sediment affected water through sediment dams to control suspended sediment prior to drainage from site. Mine affected water, including drainage from WRDs and temporary ore stockpiles, will also be released in accordance with Environmental Authority (EA) controlled release conditions. The mine water management system and water management infrastructure are described in Section 6 – Surface Water. The key water management system infrastructure (Figure 3-2) includes the following:

- Mine Water Dams – for storage of mine affected water including water pumped from the active mine pits and drainage from the Central WRD;
- HLF Storm Water Pond – for collection of storm water from the HLF;
- TSC Storm Water Pond – for collection and containment of tailings supernatant water and storm water from the TSC, and transfers from the HLF Storm Water Pond;
- MIA Dam – for collection of storm water from the ROM and MIA areas;
- Process Water Pond – for buffer storage for the CIL Plant water supply;
- Network of collection drains and catch dams – for the collection and containment of WRD and temporary ore stockpile area drainage;
- Controlled release infrastructure designed and operated in accordance with the EA release conditions;
- Collection drains and sediment dams – for the collection and treatment of sediment affected stormwater from disturbed areas;
- Network of clean water diversion drains – for the diversion of runoff from undisturbed areas away from areas disturbed by mining activities;
- BVS Pit drainage diversion – a constructed embankment and diversion channel to divert drainage features around the BVS Pit; and
- Raw Water Dam.

Flood modelling conducted as part of the surface water assessment (Section 6 – Surface Water) indicates that the majority of the project site is above the Woolgar River 0.1% (1 in 1,000) AEP flood level and all mine infrastructure is above the 0.1% (1 in 1,000) AEP flood. The three open cut pits are also well above the Woolgar River 0.1% (1 in 1,000) AEP flood level. Hence, there are no flood protection levees required for the project.

Water Supply

Raw water supply for the mine will be obtained from on offtake on the Woolgar River. The offtake will include a pump station on the bank of the river to extract water from river flows during the wet season (Figure 3-2). Water will be pumped to a dedicated 1,200 ML Raw Water Dam located north of the Central WRD. The offtake rate and

Raw Water Dam capacity have been modelled and designed to provide an offtake capacity sufficient to ensure a reliable raw water supply for the project, without materially impacting flow in the Woolgar River.

The proponent is proposing to obtain a water entitlement either by securing a transfer from existing allocation holders or from the Flinders River Catchment Strategic Reserve under the Water Plan (Gulf) 2007.

The raw water supply is discussed in detail in the *Surface Water Report* (Appendix D).

3.6.3 Power Station

There is no existing power supply available in the vicinity of the project site. Hence a power station is proposed to be constructed on the project site to power the mine. The power station will include diesel generators with an average generation load of 8.75 MW, supplemented with a 2.5 MW solar farm. The solar farm does not currently include any battery storage. The power station will be located adjacent to the MIA (Figure 3-2) and well above the 1 in 1,000 year flood level of the Woolgar River. Minor drains will be installed to direct runoff away from the solar farm area. The ground surface in the solar farm area will be stabilised with grass and/or gravel to prevent erosion. Runoff from the solar farm area will be managed in accordance with the project Erosion and Sediment Control Plan (ESCP).

3.6.4 Accommodation Camps

Workforce recruitment is discussed in Section 12 – Socio-economics. Due to the remote location of the project site and the limited available labour force in the region, the project workforce will be accommodated in on-site camps and will be employed on a Fly-in Fly-out (FIFO) or Bus-in Bus-out (BIBO) basis.

Two 300 bed workforce accommodation camps will be constructed in the south-western corner of the project site. A construction workforce camp will be established at the commencement of the project (Figure 3-2). It will be utilised by the construction workforce in the first two years of the project and will be used thereafter for accommodation of intermittent workers during equipment shut downs. An operations workforce camp will also be established during the initial construction phase and will be utilised by the mine operations workforce over the life of the project.

The accommodation camps will be located in proximity to the airstrip to facilitate the efficient movement of workers to and from the site. The accommodation camps will include:

- Prefabricated accommodation rooms;
- Worker recreation facilities;
- Kitchens and mess halls;
- Administration facilities;
- First aid facilities; and
- Water and sewage treatment facilities.

3.6.5 Private Airstrip

A private airstrip will be constructed in the south-eastern corner of the project site for the transport of mine workers to and from the site, and to transport gold doré from the site (Figure 3-2). Construction of the airstrip is scheduled to be completed in Project Year 1.

The airstrip will be designed to cater for Turboprop ATR 72 aircraft, or similar. Current planning estimates approximately 4 flights per week will be required during operations, from Townsville.

The airstrip will be designed, constructed and operated in accordance with the Civil Aviation Safety Authority regulations and guidelines.

Prior to the commissioning of the on-site airstrip, workers will travel to and from site via plane to Richmond Airport and bus from Richmond.

3.7 MINE WASTE STORAGE FACILITIES

The conceptual designs of the WRDs and TSC are described in the Progressive Rehabilitation and Closure Plan (PRCP) (Appendix J). Water management and drainage associated with the WRDs and TSC is discussed in Section 6 – Surface Water. The geochemistry of waste rock and tailings is discussed in *Geochemistry Report* (Appendix A). An overview of the WRDs and TSC is provided in the following sections.

3.7.1 Waste Rock Dumps

Central and Southern Waste Rock Dumps

The Central and Southern WRDs will store waste rock mined from the Big Vein South (BVS) Pit. The Central WRD will have a capacity of approximately 100 Mm^3 with an ultimate footprint of approximately 260 ha and a maximum height of approximately 60 m. The Southern WRD will have a capacity of approximately 15 Mm^3 with an ultimate footprint of approximately 55 ha and a maximum height of approximately 50 m. The WRDs will be constructed with maximum final landform slopes of 5H:1V (Figure 3-15).

Geochemical characterisation of waste rock and tailings was conducted as part of the project environmental assessment (*Geochemistry Report* (Appendix A)). The characterisation concluded that the large majority of waste rock from the BVS Pit (approximately 98%) will be non-acid forming (NAF) with significant excess acid neutralising capacity. The bulk waste rock stored in the Central and Southern WRDs will therefore have a high factor of safety with respect to potential for acid generation.

Approximately 2% of the waste rock and the dewatered tailings produced in the CIL Plant may have some potential for acid generation if stored in isolation. These materials will be stored in a central co-placement cell within the Central WRD that will be surrounded by NAF waste rock. The co-placement cell waste materials will make up approximately 15% of the total waste stored in the Central WRD. The conceptual design of the Central WRD, including the co-placement cell, is described in the *Central WRD Conceptual Design Report* (PRCP Appendix E).

Runoff and any seepage from the waste materials in the Central WRD co-placement cell will be contained, collected and transferred to the mine water management system for containment or re-use.

There will be no tailings and only NAF waste rock stored in the Southern WRD. Due to the benign geochemistry of the waste rock, no specific handling or storage measures are required for waste rock in the Southern WRD.

A new Mine Waste Material Management Plan (MWMMP) will be developed for the project in accordance with the EA conditions. The MWMMP will include management measures for identifying, handling, storing and monitoring any potentially acid-forming mine waste materials and operating procedures for the Central WRD co-placement cell. The MWMMP monitoring program will include testing and analysis to confirm the geochemistry of the waste rock and tailings as they are produced in order to identify potentially acid forming waste rock that requires selective handling and storage within the Central WRD co-placement cell.

Geochemical testing indicates the NAF WRDs are unlikely to generate contaminated drainage (*Geochemistry Report* [Appendix A]). Nevertheless, runoff from the WRDs will be collected in toe drains and directed to catch dams for storage, reuse, or controlled release, as a precautionary measure.

Rehabilitation of the WRDs will involve topsoiling of the final slopes and dump crest areas, and subsequent revegetation by seeding.

Northern Waste Rock Dump

The Northern WRD will store waste rock mined from BV1 Pit and BV2 Pit. It will have a capacity of approximately 2 Mm^3 with an ultimate footprint of approximately 18 ha and a maximum height of approximately 20 m (Figure 3-15).

The geochemical test results indicate that all of the waste rock from the BV1 and BV2 Pits will be NAF with significant excess acid neutralising capacity. The bulk waste rock stored in the Northern WRD will therefore have a high factor of safety with respect to potential for acid generation. Due to the benign geochemistry of the waste rock, no specific handling or storage measures are required for waste rock from the BV1 and BV2 pits in the Northern WRD. Nonetheless, the MWMMP will include progressive monitoring of the waste rock during mining in order to confirm the benign nature of these materials and identify any unexpected geochemistry.

Drainage from the Northern WRD will have the same characteristics as drainage from the NAF waste rock stored in the Southern and Central WRDs, and will be managed using the same drainage design and water management strategies.

The landform, drainage and rehabilitation of the Northern WRD will be similar to the Central and Southern WRDs.

3.7.2 Tailings Storage Cell

The TSC will be a lined containment cell with nil external catchment, constructed from perimeter embankments (Figure 3-2). It will store approximately 3.15 Mm^3 of tailings (settled solids) produced in the CIL Plant over the life of the mine. The TSC will be used to store all tailings generated in Project Year 3 after the CIL Plant has been commissioned and prior to the commissioning of the tailings dewatering system. From Project Year 4 to Year 11 the TSC will also store up to 20% of the annual tailings produced in periods when the tailings dewatering system is not operating.

The TSC will have an ultimate footprint of approximately 45 ha and a maximum embankment height of approximately 16 m. The TSC will also include a 550 ML Storm Water Pond, separated from the tailings storage area by an internal embankment (Figure 3-2). Preliminary assessment indicates the TSC will have a high consequence category (in accordance with the *Manual for assessing consequence categories and hydraulic performance of structures (DETSI 2025)*) and would therefore be a regulated structure (Section 6 – Surface Water).

Geochemical characterisation of the tailings was conducted as part of the project environmental assessment (*Geochemistry Report* (Appendix A)). The tailings geochemistry is variable, and ranges from non-acid forming material with excess acid neutralising capacity to material that may have some potential for acid generation. The geochemical testing results to date show that water from the stored wet tailings will be pH neutral to slightly alkaline, with low salinity and low concentrations of metals and metalloids. Monitoring of the tailings stored in the TSC will be conducted in accordance with the MWMMP to confirm the tailings geochemistry and water quality.

Tailings will be pumped to the TSC in a slurry pipeline. Tailings will be discharged from multiple spigot locations around the perimeter embankment in order to optimise emplacement of the tailings and filling of the storage area. A pontoon mounted pump will operate in the decant pond that will form at the low point of the deposited tailings surface. The decant pond will collect tailings supernatant and storm water from the tailings storage area. The decant pond will be dewatered to the TSC Storm Water Pond. This will maintain a low level in the decant pond to maximise consolidation of settled tailings and tailings water recovery. The internal TSC embankment will have a spillway that will allow any excess stormwater in the tailings storage area during extended rainfall periods to overflow to the Storm Water Pond.

The TSC Storm Water Pond will receive tailings supernatant water and storm water from the tailings storage area, as well as storm water transferred from the HLF Storm Water Pond. The TSC Storm Water Pond has been sized with sufficient capacity to contain all inputs during the modelled worst case rainfall sequence (Section 6 – Surface Water). The TSC Storm Water Pond will operate as a nil discharge dam and will be the priority source of CIL Plant water supply.

The lining of the TSC tailings storage area and Storm Water Pond will be designed to minimise the risk of seepage of tailings water to groundwater. The configuration and specification of the liner system will be determined through detailed engineering design, based on the characteristics of the tailings and tailings water, site-specific geotechnical and hydrogeological conditions, and the assessed consequences of seepage. Conceptually, the liner system will comprise:

- A low permeability liner designed to minimise seepage of tailings water through the floor and sides of the TSC and Storm Water Pond.
- Seepage management measures, which may include leak detection, secondary containment and/or seepage collection and interception systems, as determined during detailed design. Any collected TSC seepage water will be monitored and returned to the TSC Storm Water Pond.Appropriately prepared and compacted subgrade materials to provide a stable foundation for the liner system.

The monitoring of TSC seepage collection systems and groundwater bores is included in the surface and groundwater monitoring programs described in Sections 5 and 6.

The TSC will be rehabilitated and decommissioned at mine closure. This will involve covering the stored dried tailings solids with a 1 m to 3 m thick layer of benign capping material, including subsoil and a 30 m wide zone of rock around the perimeter of the plateau, and shaping the capped surface to promote runoff and minimise infiltration. The final surface will be topsoiled and revegetated with grass species. These measures will ensure containment of the tailings solids and any tailings moisture in the long-term following mine closure.

3.8 REHABILITATION AND MINE CLOSURE

A PRCP has been prepared for the project and is included in Appendix J. Areas of progressive rehabilitation and improvement measures over the life of the mine are shown in Figures 3-11 to 3-14. The conceptual final landform for the project site is shown in Figure 3-15. The PRCP includes geotechnical assessments that confirm that the mine waste storage facilities have been designed with appropriate levels of geotechnical stability. A soils assessment has also been conducted to confirm the soil types present on the project site and the availability of topsoil suitable for use in rehabilitation (*Soil Report* (Appendix B)).

The PRCP includes areas of proposed native vegetation with low intensity grazing post mining land use in mine infrastructure areas, WRDs, water management infrastructure areas, hardstands etc, which is generally consistent with the current pre-mining land use. Rehabilitation of these areas will include:

- Decommissioning and removal of mine infrastructure;
- Contamination assessment and decontamination, where necessary;
- Surface reprofiling, where necessary, to match the adjacent natural surface areas;
- WRD maximum slopes of 5H:1V;
- Topsoiling and soil amelioration;
- Ripping and seeding with native and endemic species.

The final landform will also contain an engineered drainage diversion PMLU for the BVS pit diversion drain and an engineered waste storage facility PMLU for the TSC. These areas will be designed by suitably qualified engineers in accordance with relevant engineering and rehabilitation standards.

Non Use Management Areas (NUMAs) will be limited to the three final open cut pit voids. The PRCP contains assessments and improvement measures to ensure the stability of the NUMAs.

3.9 ACCESS

Road access to the project site from Richmond will be via the existing Richmond-Woolgar Road and Yan Yean – Burleigh – Mt Norman Road (Figure 3-3). Any maintenance or upgrades to the existing roads, necessary for the project, will be determined by the proponent in consultation with the Richmond Shire Council.

Project traffic impacts are discussed in detail in Section 13 – Traffic and Transport.

3.10 CONSTRUCTION AND DEVELOPMENT

3.10.1 Project Development Schedule

The project will have a mine life of approximately 11 years, from the commencement of construction to the completion of mining operations. Mine infrastructure construction is scheduled to be completed in the first two years. Initial construction will include the construction workforce camp, Woolgar River pump station, Raw Water Dam and the power station. The HLF and gold room will also be constructed in Project Year 1 to enable the processing of ore from the BV1 and BV2 pits prior to the commissioning of the CIL Plant in Year 3.

Open cut mining will commence in Project Year 1. BV1 Pit is scheduled to be mined in Year 1 and BV2 Pit is scheduled to be mined in Year 2. The mining of overburden in the BVS Pit will also occur in Project Years 1 and 2. From Year 3 onwards, all mining will be from the BVS Pit. Mining in the BVS pit is scheduled to be completed in Project Year 11.

The final rehabilitation and closure phase will commence in Year 12 after the completion of mining in Year 11. This phase is anticipated to extend for approximately 20 years, allowing time for final rehabilitation work and closure environmental monitoring.

It is important to note that this is an indicative schedule, subject to change based on detailed planning and mining conditions. The timing of the commencement of construction is also subject to the receipt of environmental approvals and other necessary approvals. Project Year 1 is currently anticipated to be 2027, subject to gaining the necessary approvals.

3.10.2 Operating Hours

Construction and operations will be undertaken 24 hours per day, 7 days per week.

3.11 WORKFORCE

The project workforce is described in detail in Section 12 - Socio-Economics and summarised below.

3.11.1 Construction Phase Workforce

The Construction Phase for the project extends from Project Year 1 to Project Year 2 and will involve:

- Construction of infrastructure and buildings;
- Construction of water management infrastructure and the Woolgar River offtake;
- Mining of the BV1 and BV2 Pits and construction of the Northern WRD;
- Waste rock overburden removal in the BVS Pit and commencement of the Central WRD;
- Processing of BV1 and BV2 Pit ore at the HLF; and
- Operation of site facilities.

The workforce for the construction phase will require workers involved in construction of the mine infrastructure as well as workers for the mining activities. The construction workforce will rise and fall over the construction phase to match the construction work schedule. The anticipated peak construction phase workforce of 984 persons will occur in Project Year 2. This comprises 590 workers involved in construction activities and 394 persons involved in mining activities.

A typical roster for the construction workforce will be two weeks on and one week off.

3.11.2 Operations Phase Workforce

The operations phase will commence after the completion of mine infrastructure construction, in Project Year 3. The operations phase will involve open cut mining in the BVS Pit, construction of the Central and Southern WRDs and processing of ore in the CIL Plant. The operations phase will continue for 9 years until Project Year 11. The operations workforce will be constant at approximately 380 workers.

A typical roster arrangement for the operations workforce will be one week on and one week off. A variety of shift arrangements will be utilised based on the nature of the role.

3.12 PROJECT ALTERNATIVES AND JUSTIFICATION

3.12.1 Project Alternatives

The key aspects of the project where alternatives were considered during project planning include:

- Alternative mining methods;
- Alternative project layout;
- Alternative tailings storage strategies;
- Alternative power supply options; and
- Alternative workforce strategy.

Alternative Mining Methods

The project involves mining the ore bodies by open cut mining. The relatively shallow ore bodies could not be extracted by underground mining methods with an acceptable level of resource recovery or economic viability.

Alternative Project Layout

Alternative project layouts were considered during the project planning phase. However, the opportunities for alternative layouts are constrained by the location of the ore bodies, the topography and the suitable area available for the construction of infrastructure within the mining leases. The location of the open cut pits is determined by the ore bodies. The southern portion of the project site is the only suitable and sufficient area

available for the construction of the mine infrastructure. This area is above the Woolgar River 0.1% (1 in 1,000) AEP flood level and avoids drainage lines and the steeper topography in the north-east portion of the project site.

The proposed project layout has been developed taking into account these constraints.

Alternative Tailings Storage Strategies

The alternative of a conventional tailings dam for LOM storage of wet tailings was considered.

This option was not progressed for the purposes of the EAR as it is not feasible due to the size of the tailings dam that would be required for LOM tailings storage and the significant increase in raw water supply that would be required if tailings was not dewatered at the CIL Plant.

The current TSC will have a LOM tailings storage capacity (settled tailings) of approximately 3.15 Mm^3. This would increase to approximately 11 Mm^3, or a factor of approximately 3.5 times, for LOM tailings. The installation of the tailings dewatering system (filter press) at the CIL Plant will enable the recovery of approximately 70% of the tailings water that would otherwise be lost from the process water circuit if a conventional tailings dam was adopted.

Alternative Power Supply Options

The alternative power supply option of connecting to the existing power grid, was considered as part of project planning. This option is not feasible as there is no transmission line in proximity to the project site.

The option of a 100% diesel generator on-site power supply was also considered. This option was discounted as the proposed hybrid diesel-solar power supply results in lower Greenhouse Gas emissions.

3.12.2 Project Justification

The proponent's justification for the project is:

- It is consistent with a number of significant state and local government planning initiatives for the region. These include:
  - *Queensland Resources Industry Development Plan*;
  - *New Economy Minerals development in Queensland's Northern Minerals Province*; and
  - *Mount Isa to Townsville Economic Development Zone* (MITEZ) development initiatives of the participating local governments.
- It involves a responsible mine plan that incorporates appropriate constraints and control measures to limit any potential adverse environmental and social impacts to an acceptable level;
- It maximises the responsible utilisation of the gold resource; and
- It will result in significant economic benefits for the local area and Queensland.

The key economic benefits of the project include:

- Direct employment of up to approximately 984 persons during the construction phase, and approximately 380 persons during the operations phase;
- Creation of substantial indirect employment in Queensland during the construction and operations phases;
- Approximately $220M in income tax revenue over the life of the project; and
- The payment of annual royalties of up to approximately $15M at peak production to the Queensland Government.

3.12.3 Consequences of Not Proceeding with the Project

The consequences of the project not proceeding are:

- The opportunity to mine the gold resource would be lost;
- The royalty charges and other government levies associated with the project would be lost;
- The contribution of the project to the state economy would not eventuate;
- The employment opportunities provided by the project would not eventuate;
- The project's environmental impacts specified in this EAR would not eventuate;
- The significant socio-economic benefits associated with the development of the project would be forgone; and
- The projects contribution to the economic development of the Northern Minerals Province and investment in the Queensland Government's New Economy Minerals initiative, would be lost.

FIGURES

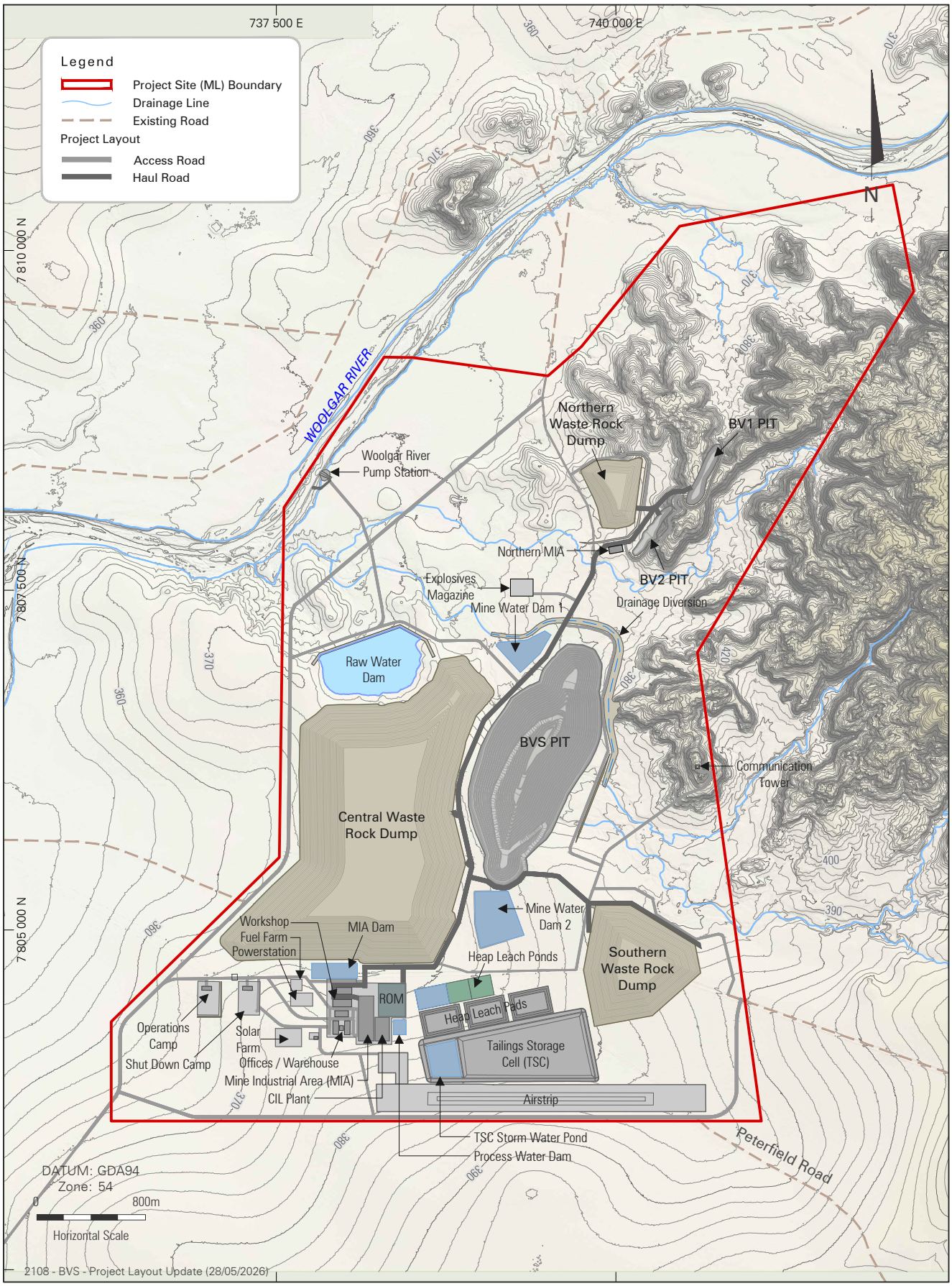


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Location Plan

FIGURE 3-1

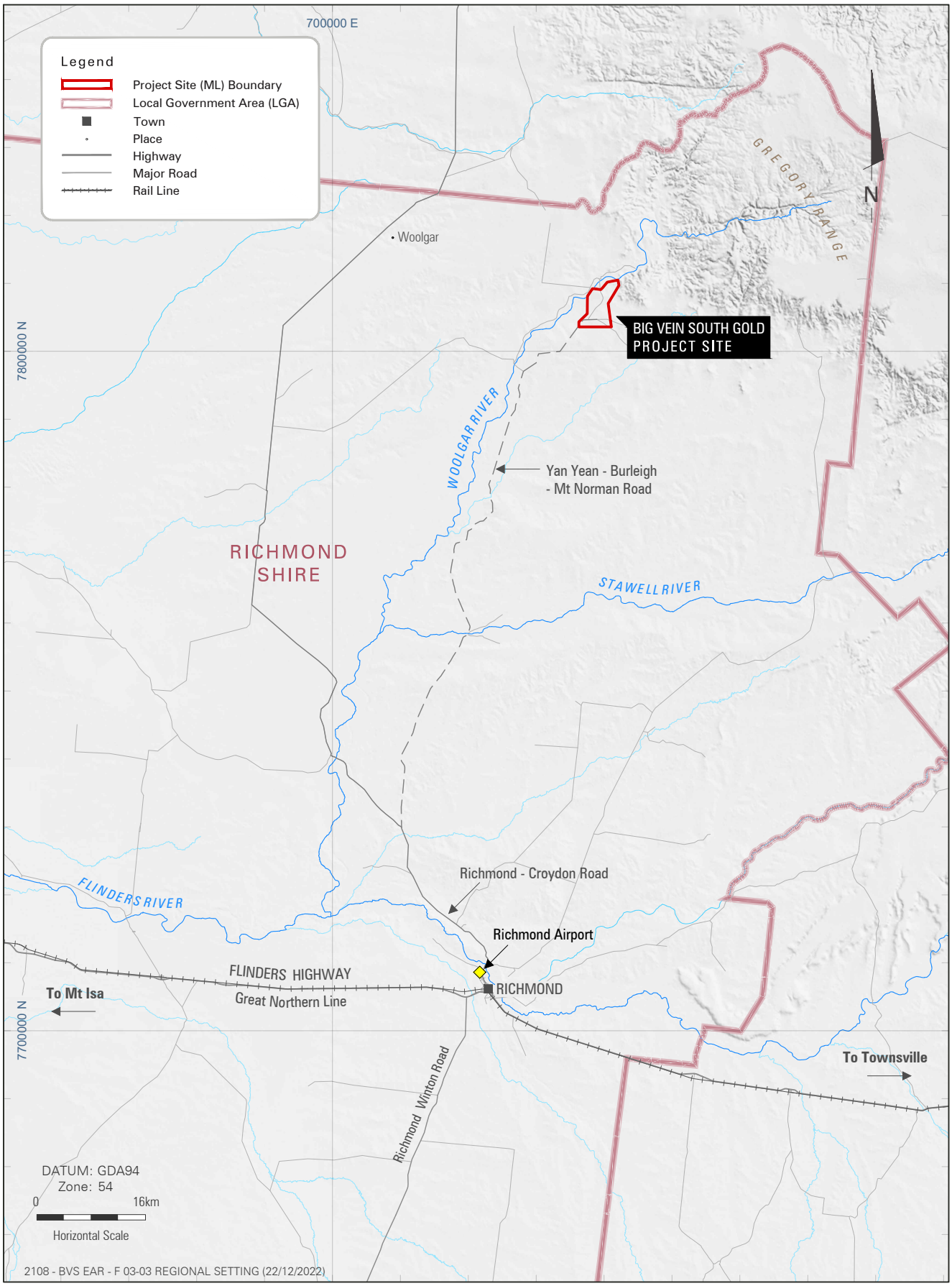


BIG VEIN SOUTH GOLD PROJECT

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Project Layout

FIGURE 3-2

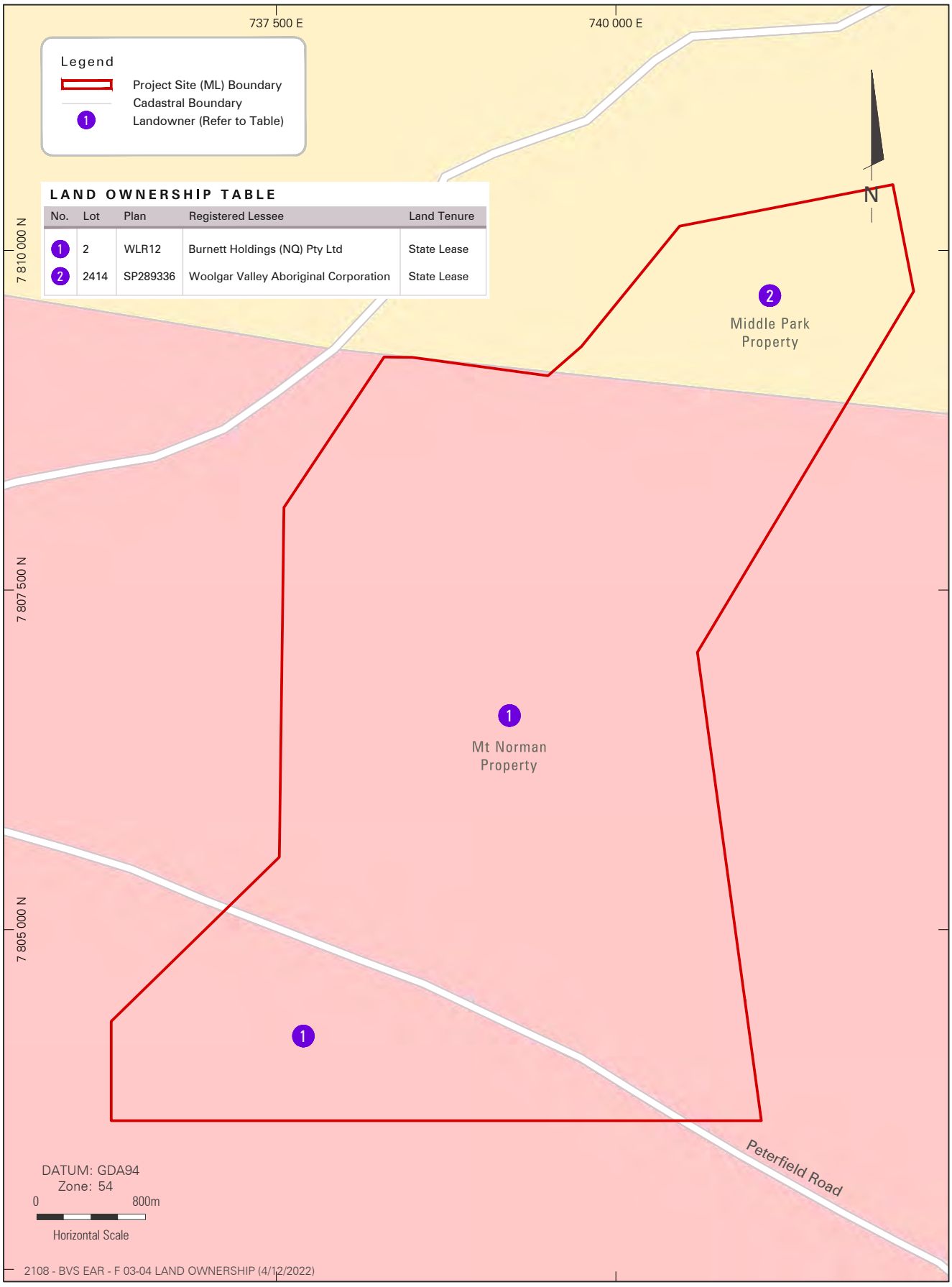


BIG VEIN SOUTH GOLD PROJECT

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Regional Setting

FIGURE 3-3

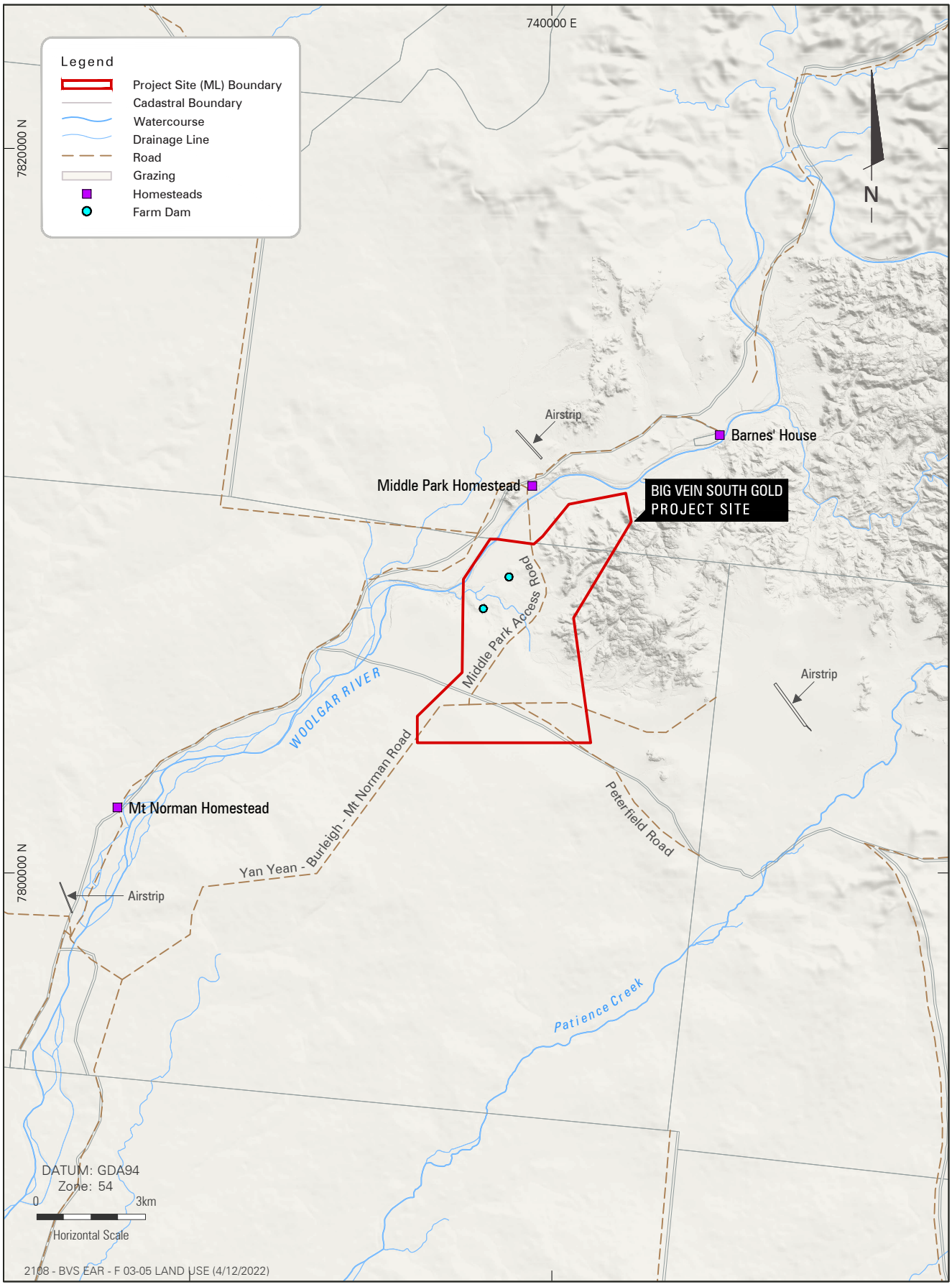


BIG VEIN SOUTH GOLD PROJECT

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Land Ownership

FIGURE 3-4

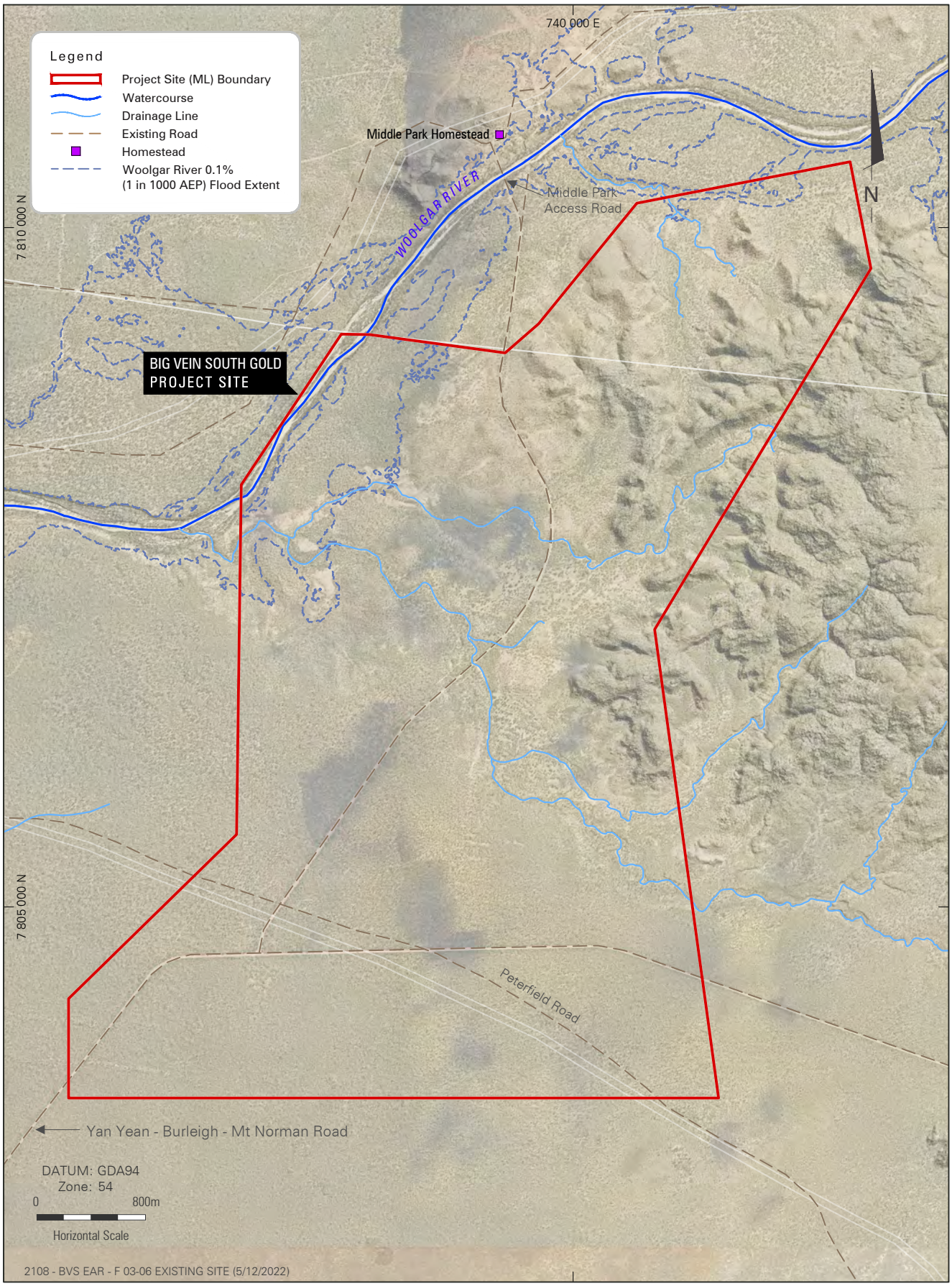


BIG VEIN SOUTH GOLD PROJECT

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Land Use

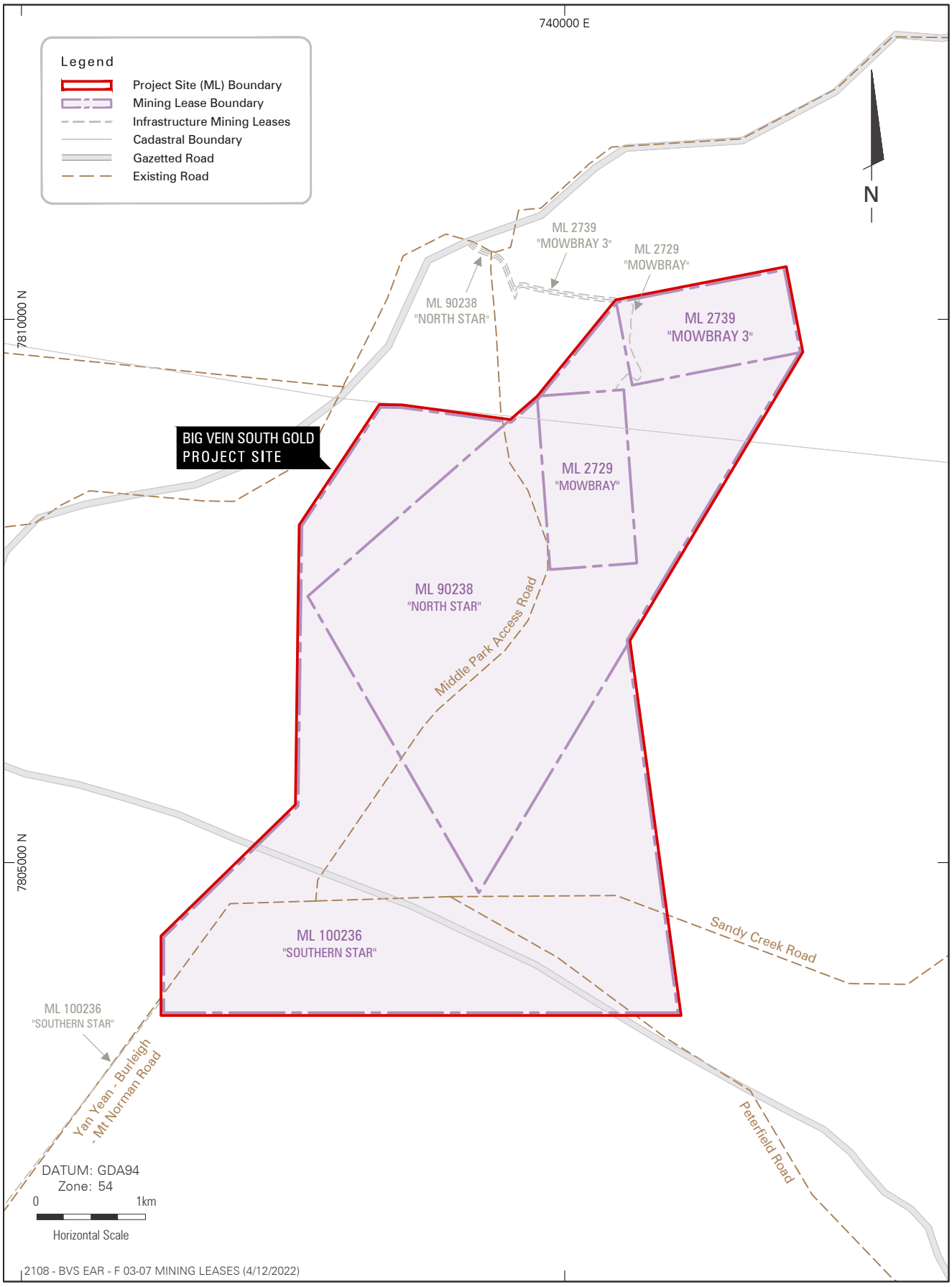
FIGURE 3-5



BIG VEIN SOUTH GOLD PROJECT

Existing Site

FIGURE 3-6

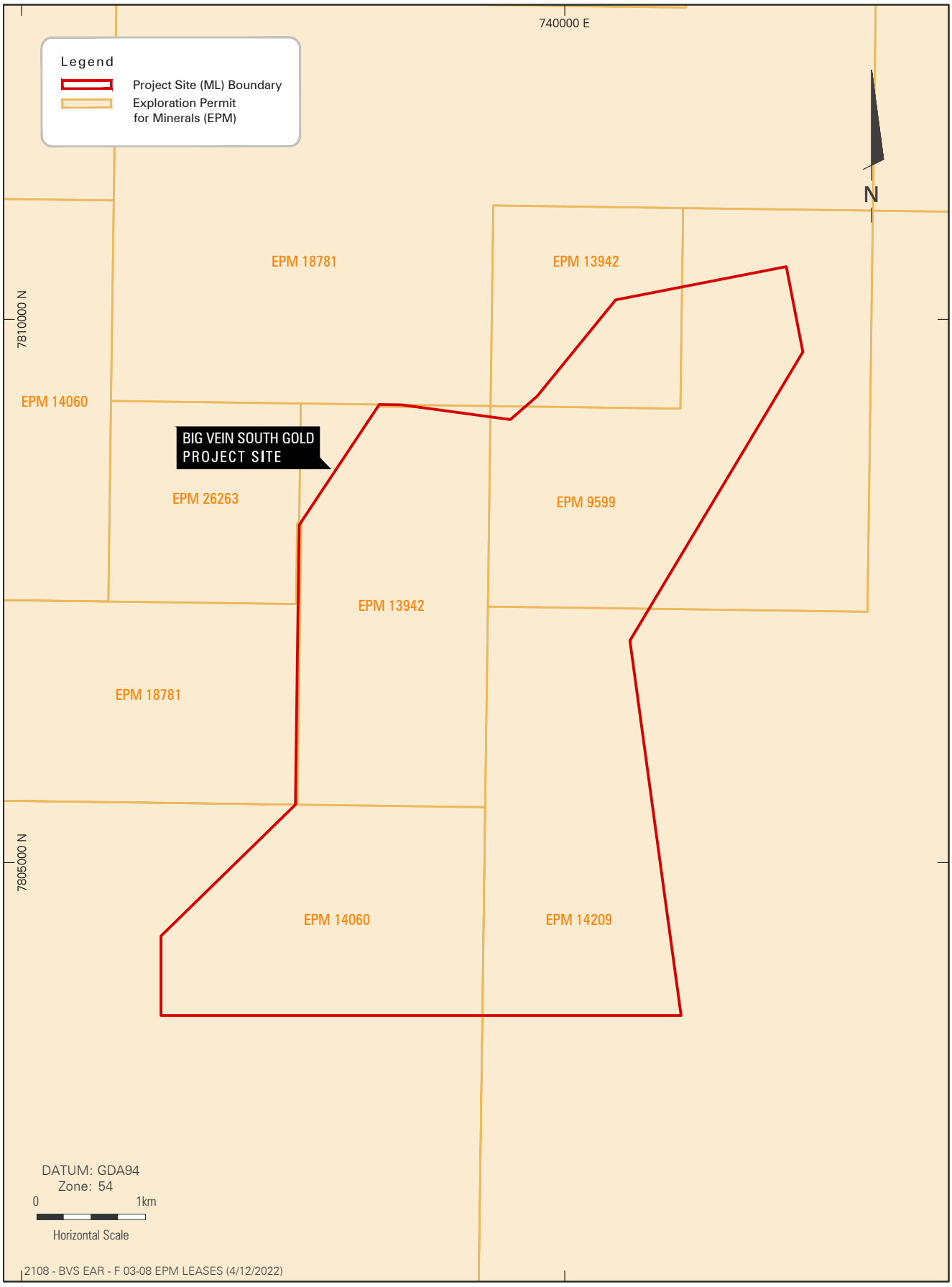


BIG VEIN SOUTH GOLD PROJECT

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Project Site Mining Leases

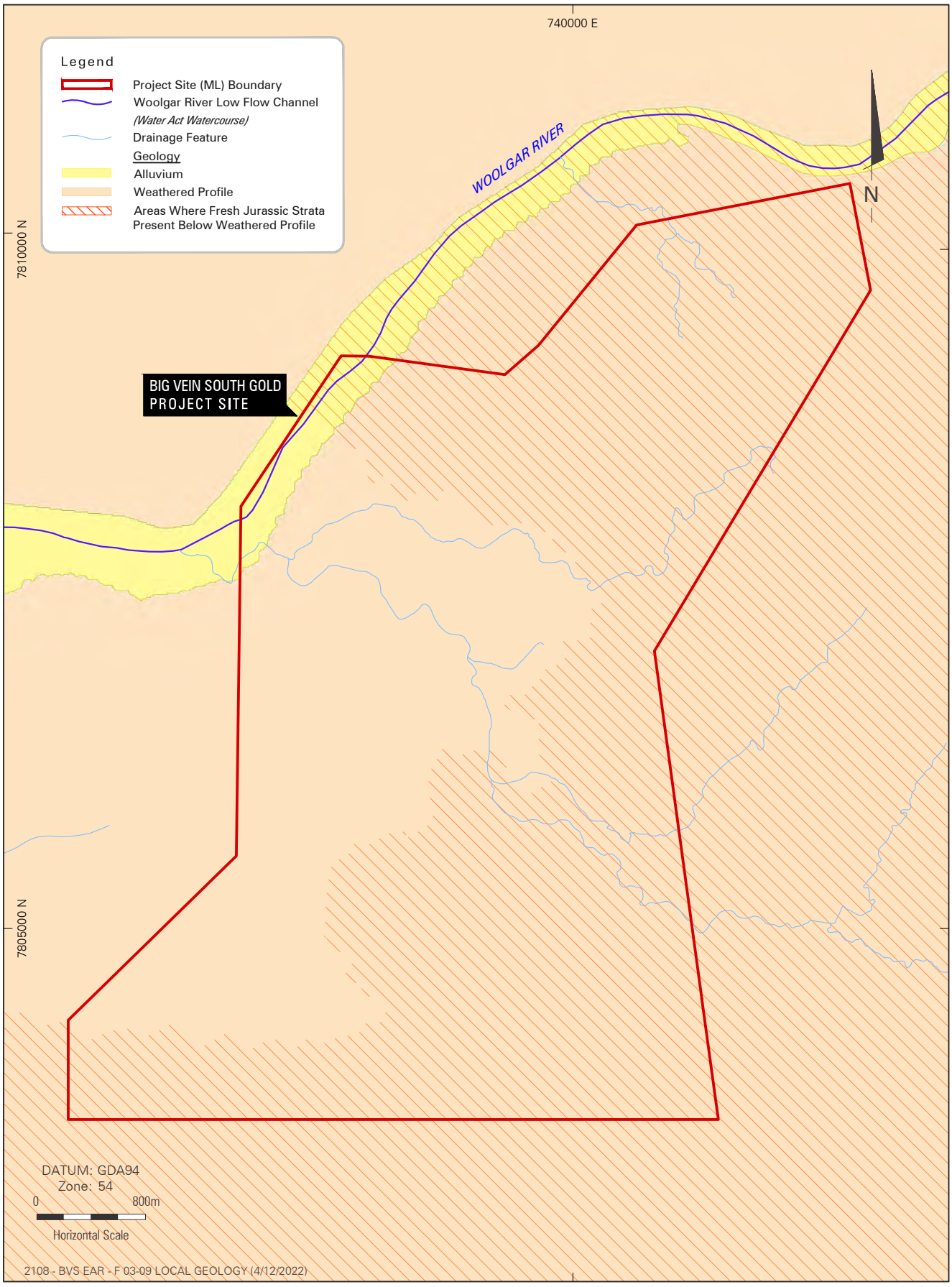
FIGURE 3-7



BIG VEIN SOUTH GOLD PROJECT

Exploration Permits for Minerals other than Coal (EPM)

FIGURE 3-8

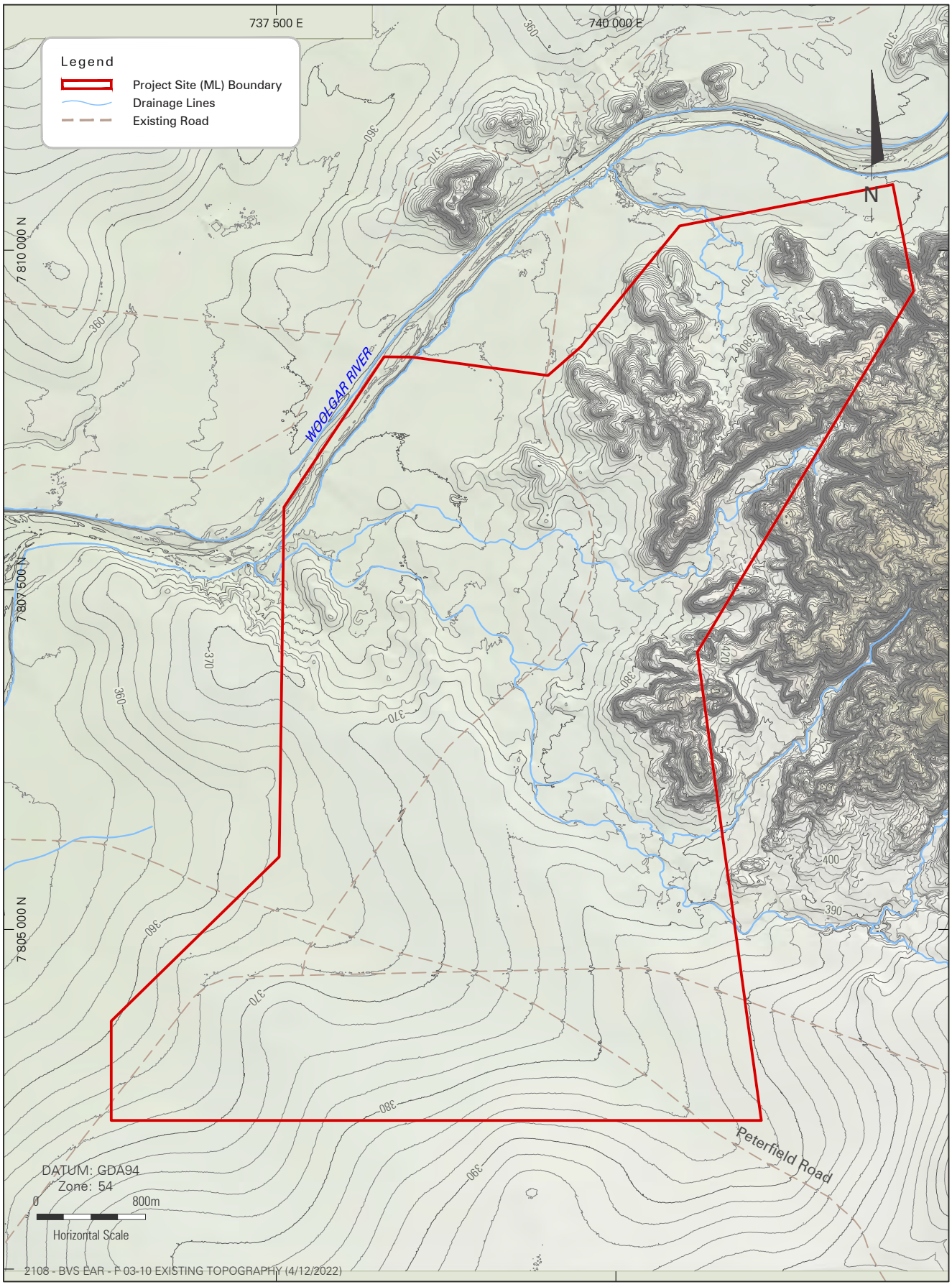


BIG VEIN SOUTH GOLD PROJECT

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Local Geology

FIGURE 3-9

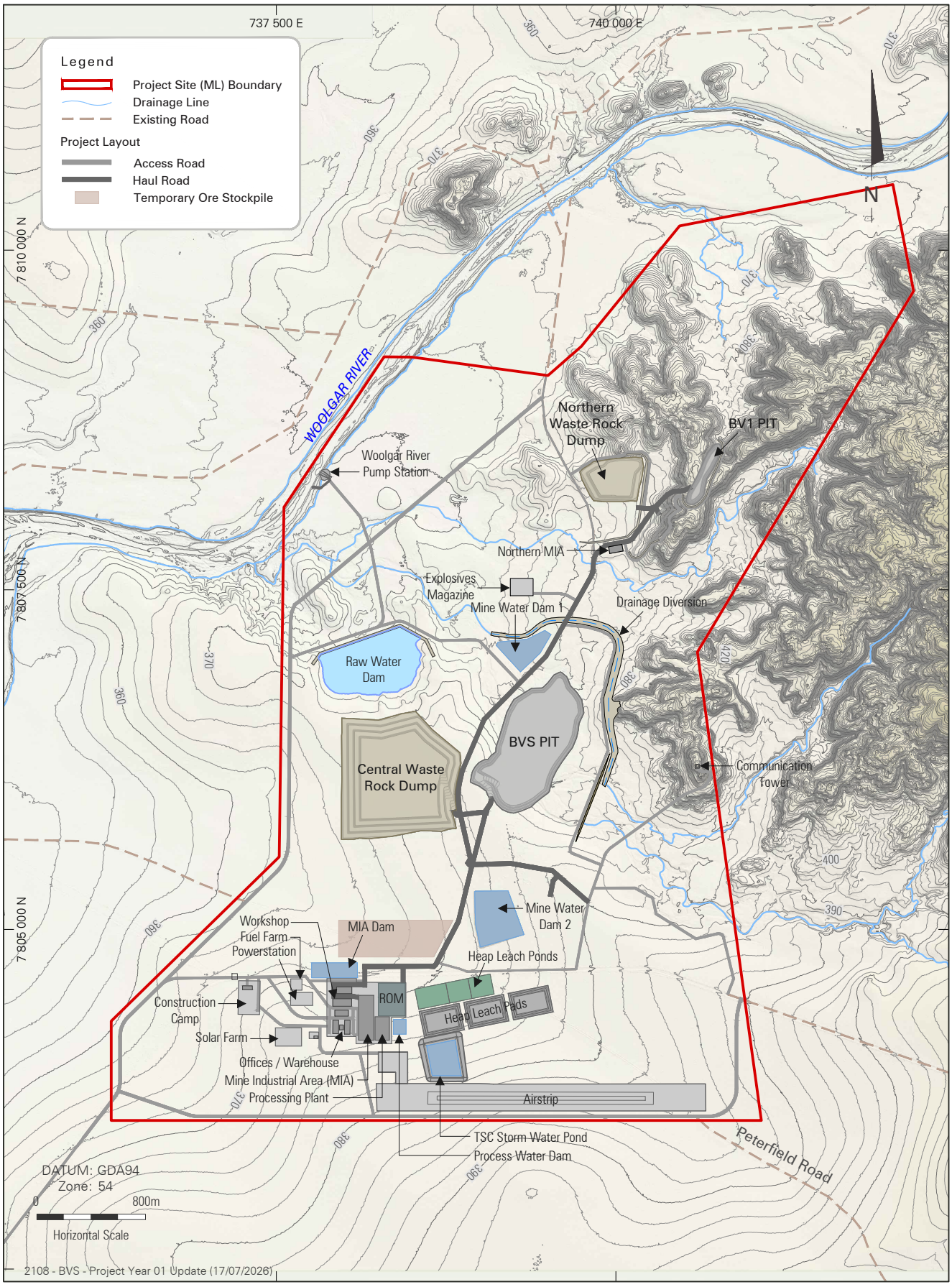


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Existing Topography

FIGURE 3-10

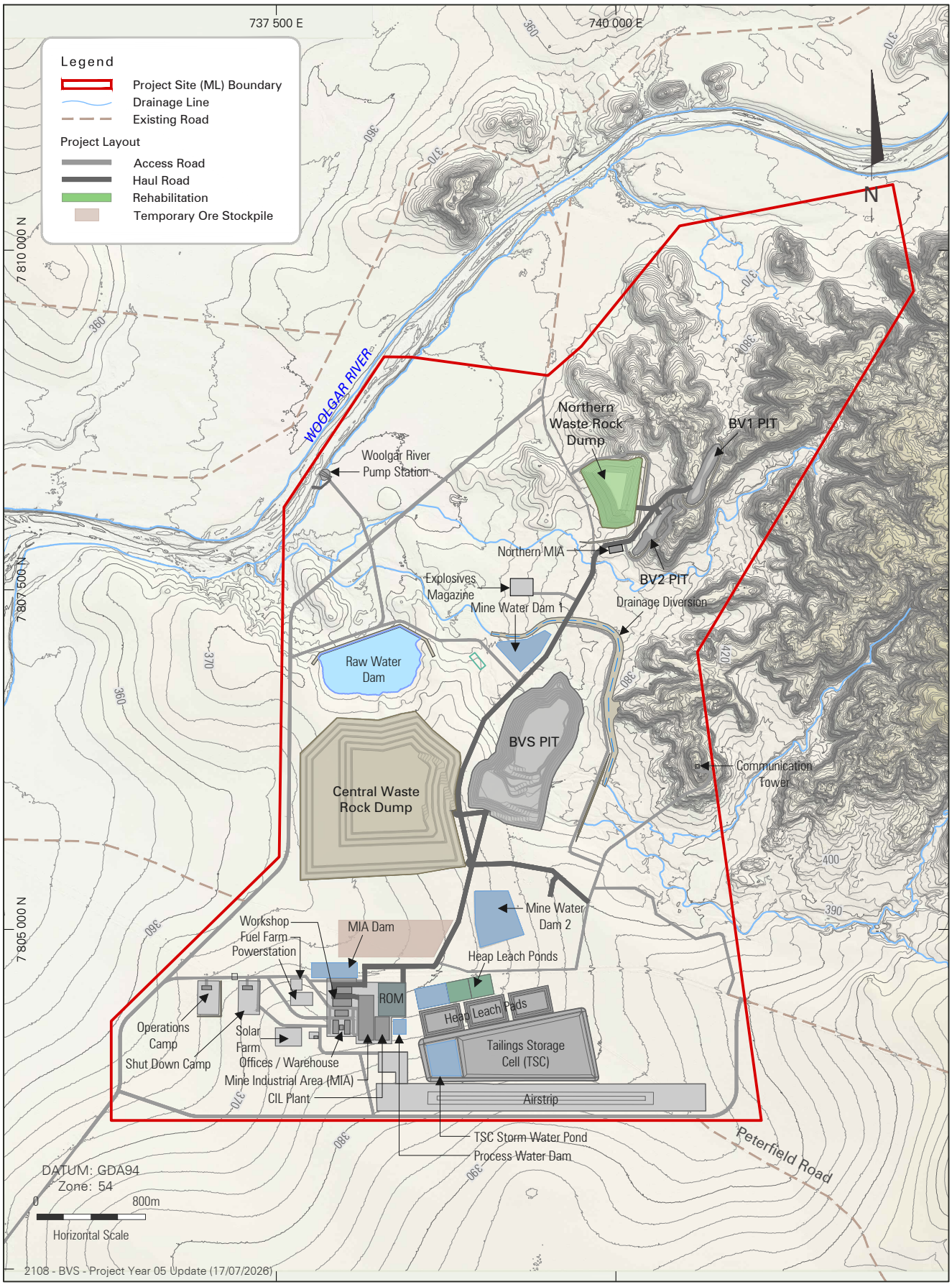


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Project Layout Year 1

FIGURE 3-11

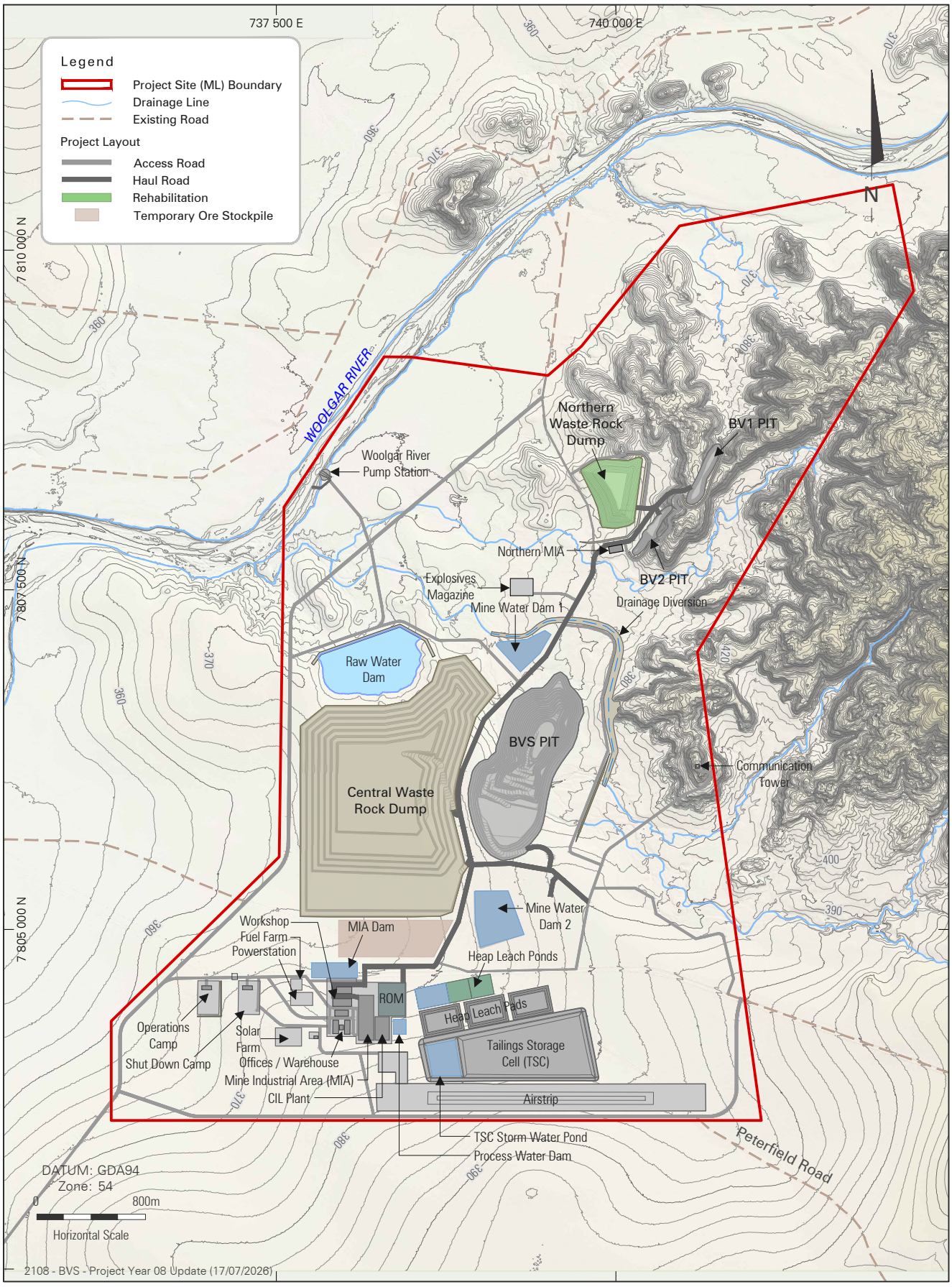


BIG VEIN SOUTH GOLD PROJECT

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Project Layout Year 5

FIGURE 3-12

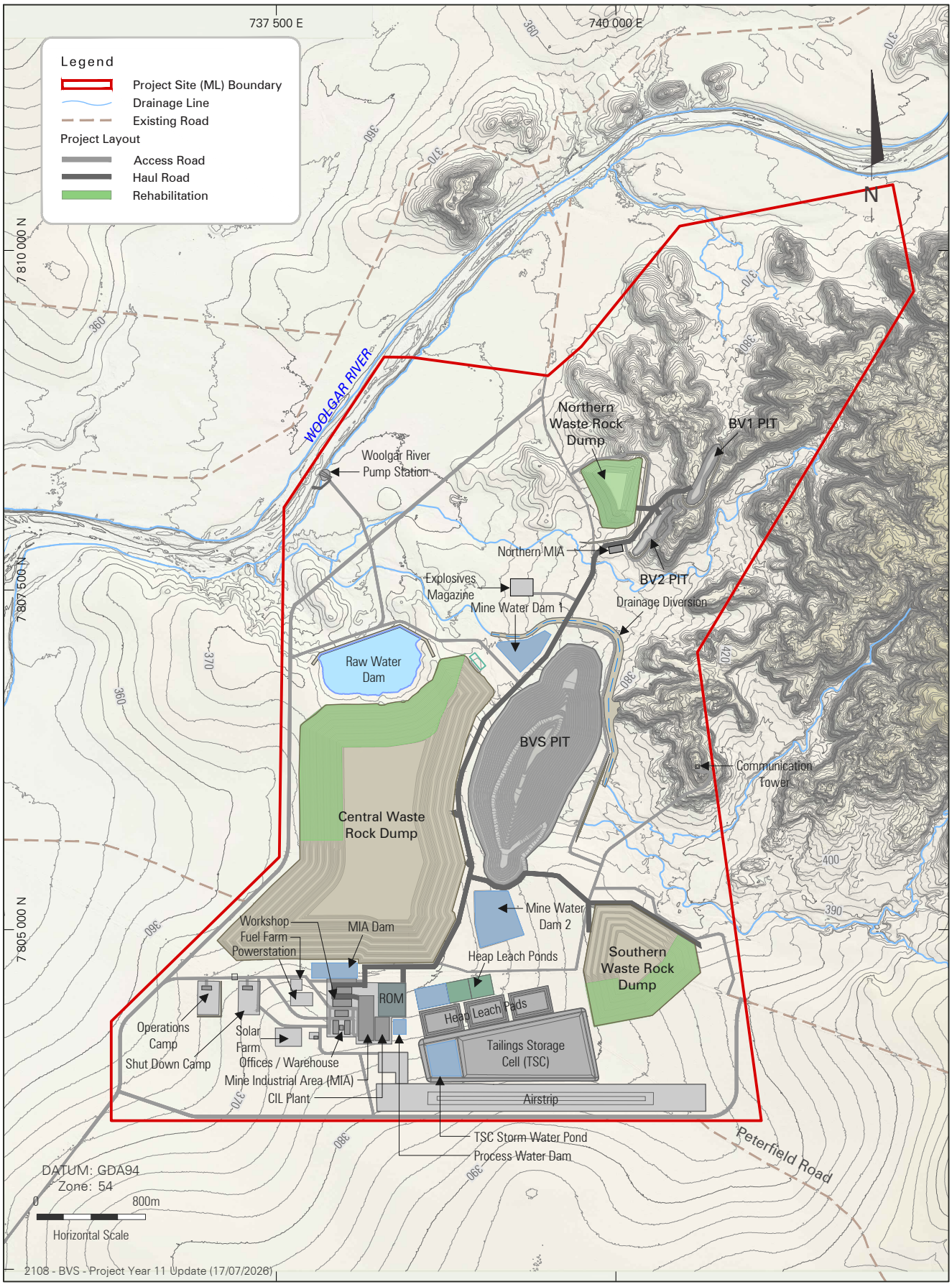


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Project Layout Year 8

FIGURE 3-13

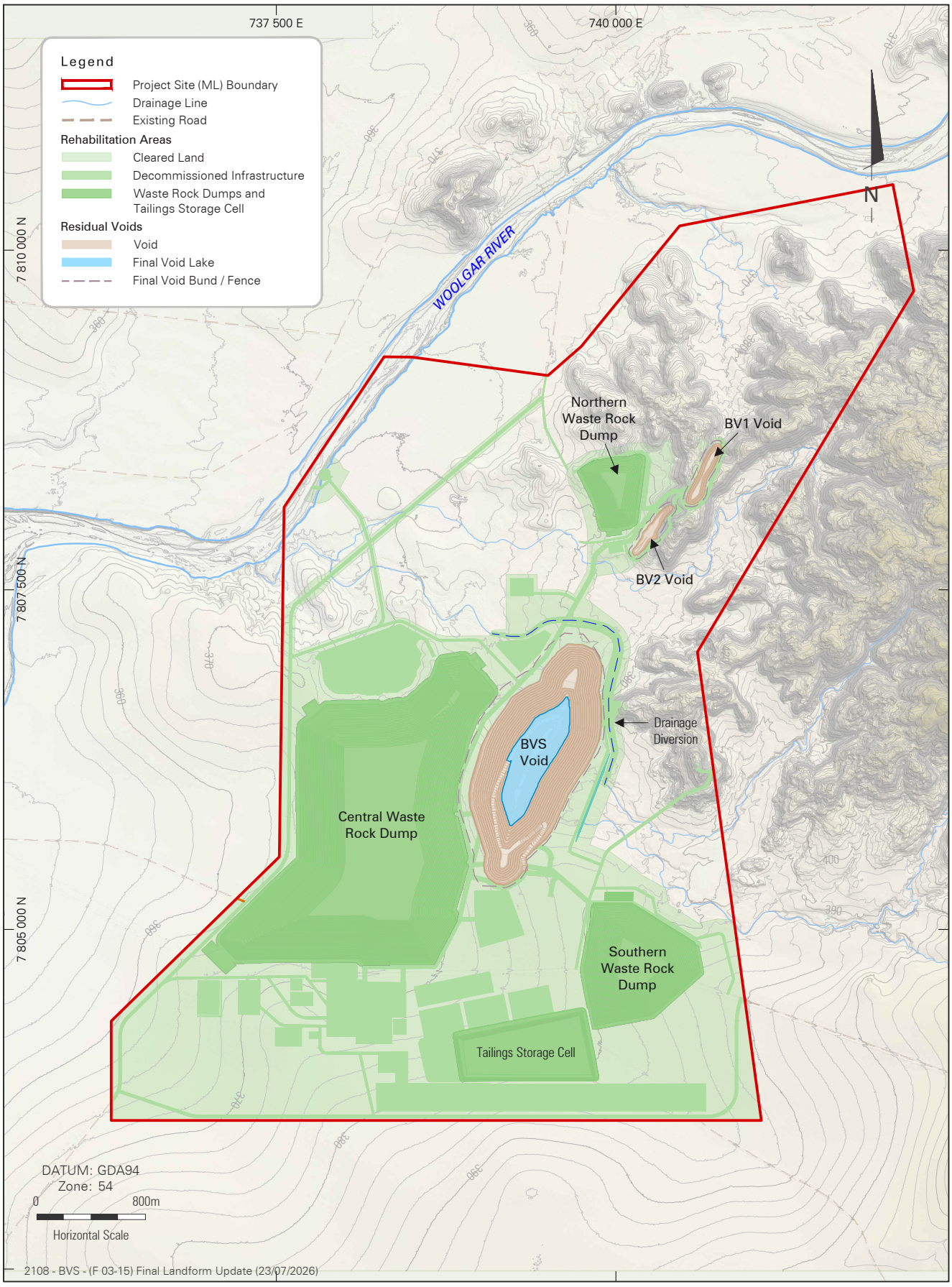


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Project Layout Year 11

FIGURE 3-14

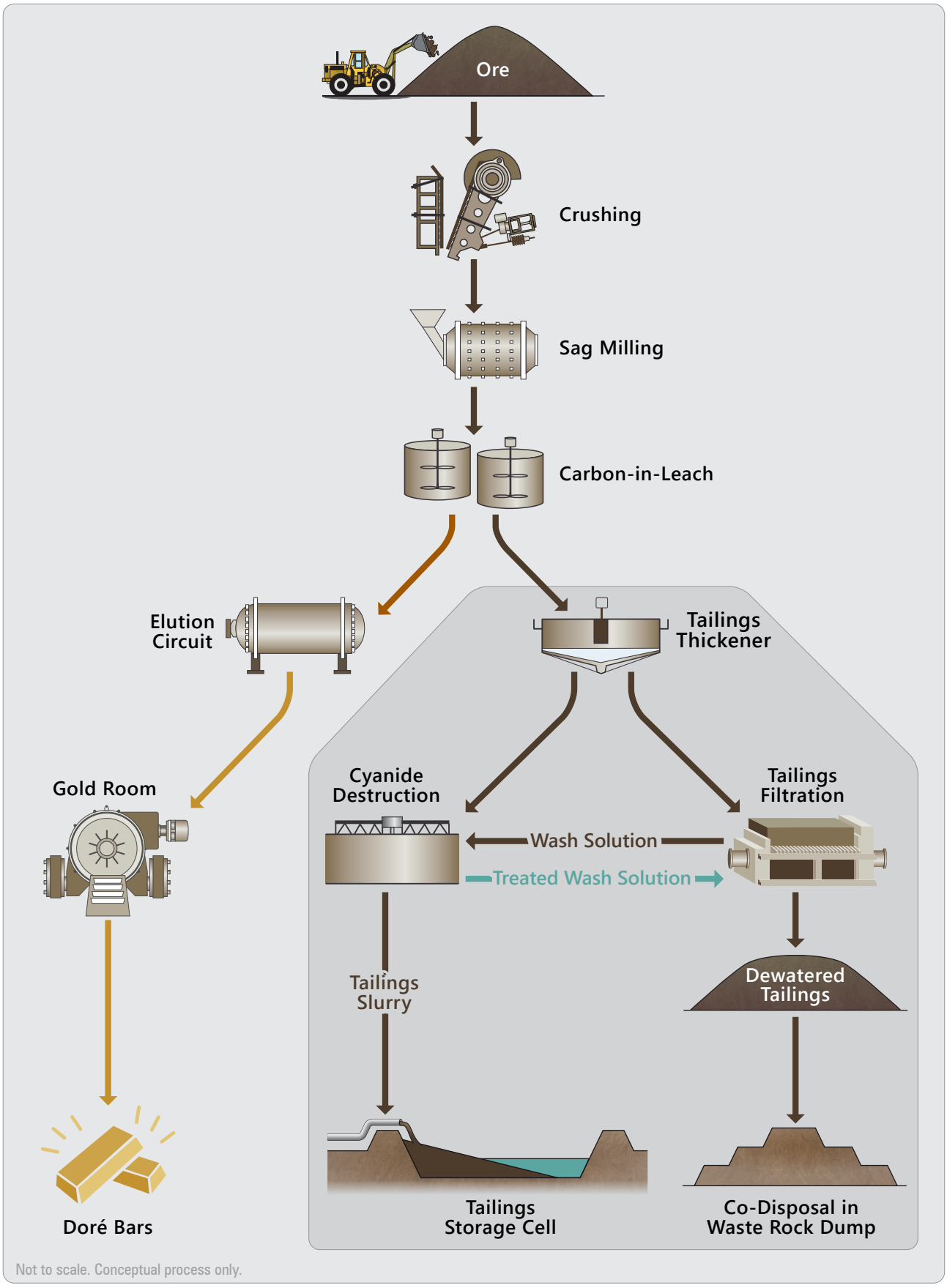


BIG VEIN SOUTH GOLD PROJECT

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Conceptual Final Landform

FIGURE 3-15

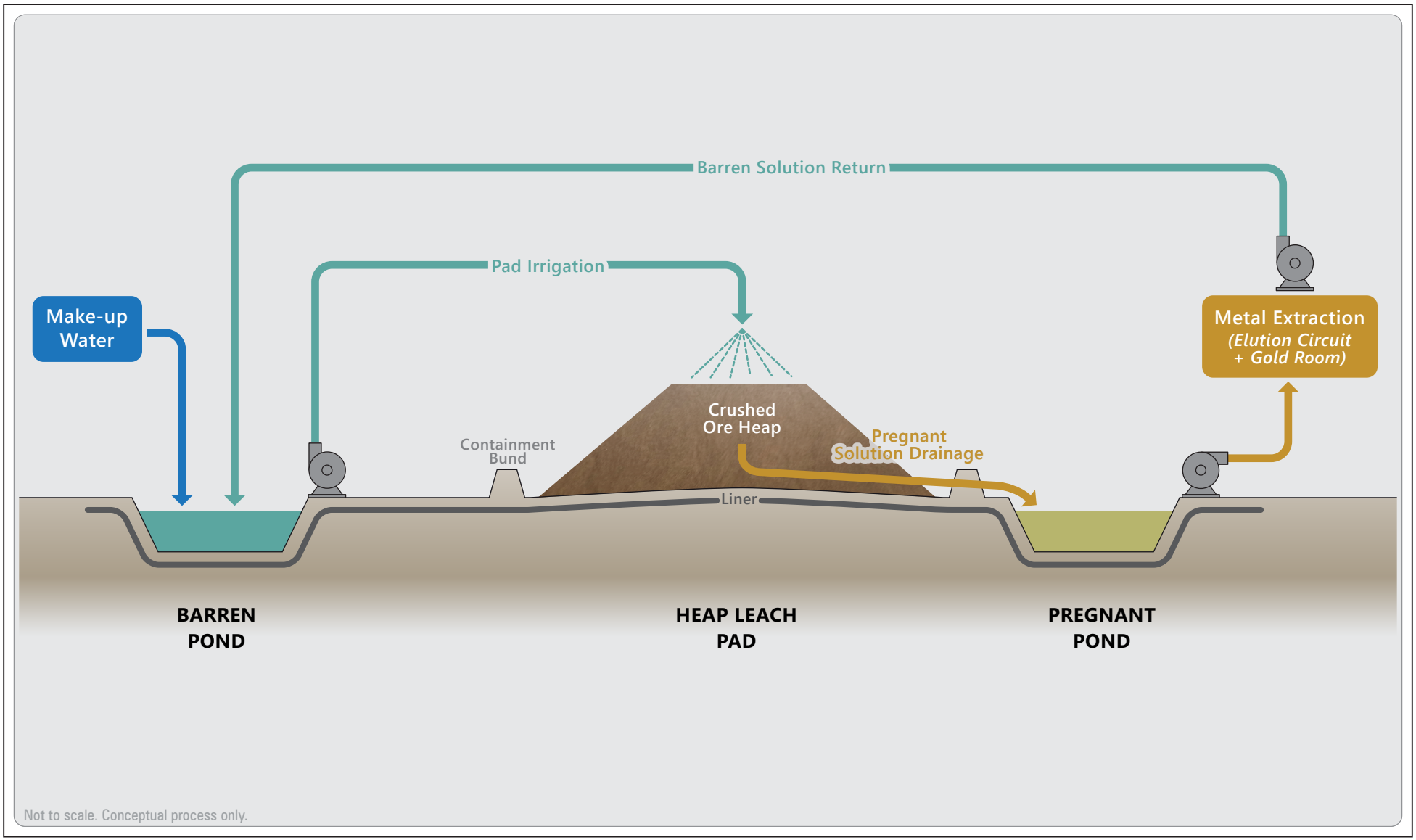


BIG VEIN SOUTH GOLD PROJECT

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Carbon-in-Leach Process

FIGURE 3-16



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BIG VEIN SOUTH GOLD PROJECT

Heap Leach Process

FIGURE 3-17

4

SCOPING OF ENVIRONMENTAL ASSESSMENT



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4 SCOPING OF ENVIRONMENTAL ASSESSMENT REPORT

4.1 INTRODUCTION

This section describes the process that has been followed to determine the scope of the Environmental Assessment Report (EAR) for the Big Vein South Gold Project (the project). The process included an assessment of the potential environmental impacts and risks of the project. The objective of the scoping assessment was to ensure that potential environmental risks were identified and assessed at an appropriate level of detail.

4.2 ENVIRONMENTAL SCOPING ASSESSMENT

A risk-based approach was used to scope the studies included in the EAR. A scoping assessment was undertaken that was informed by comprehensive baseline environmental assessments for the project site and surrounds and considered the potential environmental risks from the project activities and potential environmental impacts from the project.

The results of this assessment were used to inform the scoping of studies for the EAR. For environmental areas with potentially significant impacts, detailed assessments (including specialist studies, field surveys, modelling) were undertaken to ensure all significant environmental risks were thoroughly assessed. In particular, detailed specialist studies have been conducted for groundwater, surface water, terrestrial and aquatic ecology, geochemistry, air quality, Greenhouse Gas (GHG), noise and blasting, soils and land suitability and rehabilitation and mine closure because of the relatively higher risk ratings for these areas. Environmental areas rated as having lower environmental risk (e.g. traffic and non-mining waste) were assessed using desktop techniques, appropriate to the lower level of risk. The results of the assessment are summarised in Table 4-1.

Table 4-1 Environmental Scoping Assessment

POTENTIAL IMPACT AREA	SCOPE OF ENVIRONMENTAL ASSESSMENT
GROUNDWATER	
Open cut mining in the project site will result in depressurisation of the geological units surrounding the mined area. Depressurisation has the potential to lower groundwater levels in the vicinity of the project resulting in: • Impacts on local groundwater supply bores; • Impacts on the Great Artesian Basin, groundwater/surface water interaction and surface water features including the Woolgar River and associated tributaries; • Impacts on Groundwater Dependent Ecosystems (GDEs), springs and stygofauna; and	A specialist groundwater study was conducted to characterise the groundwater regime and assess potential impacts on groundwater. The study scope included: • A review of the existing information related to the hydrogeology of the project site and adjacent areas; • Groundwater field investigation including the installation of monitoring bores, aquifer testing, test pitting in areas of potential alluvium, spring survey, water supply bore census, stygofauna sampling, and baseline water level and quality monitoring; • Identification and characterisation of the groundwater regime including groundwater resources and surface water interaction in the vicinity of the project; • 3D numerical groundwater modelling to provide predictions of the mining effects on groundwater levels in the surrounding aquifers; • Assessment of the project impacts on groundwater bores, groundwater dependent features and surface water features during the operational and post-mining phases;

POTENTIAL IMPACT AREA	SCOPE OF ENVIRONMENTAL ASSESSMENT
• Cumulative impacts on the groundwater regime. The project also has the potential to impact on groundwater quality through the use of hydrocarbons and chemicals, and seepage of mine affected water from mine waste storage facilities, mineral processing facilities and pit water from the final voids.	• Assessment of potential cumulative groundwater impacts; • Qualitative assessment of potential groundwater quality impacts; and • Development of a groundwater monitoring program for the project. The detailed specialist groundwater assessment is provided in the *Groundwater Report* (Appendix C) and a summary is provided in Section 5 - Groundwater. Potential impacts on GDEs are addressed in detail in the *Groundwater Dependent Ecosystems Report* (Appendix K) and a high level summary is provided in Section 7.7 – Terrestrial Ecology.
SURFACE WATER AND MINE WATER MANAGEMENT	
The project site is traversed by the Woolgar River and associated tributary drainage features. The mining activities have the potential to result in physical disturbance of the site drainage features by open cut pits, roads and mine infrastructure. Mining activities could also encroach on the Woolgar River floodplain. Mine water discharges and drainage from disturbed areas also have the potential to impact on downstream surface water quality. The proposed sourcing of raw water for the project from a pump station on the Woolgar River could also result in adverse effects on the downstream flow regime.	A suite of specialist assessments were conducted in order to assess the range of potential surface water impacts from the project and to develop the mine water management strategies and water management system. Flood modelling was undertaken as an integral component of project planning in order to delineate the extent of the 0.1% (1 in 1,000) Annual Exceedance Probability (AEP) flood event and to ensure that mine facilities and final voids were not located within the floodplain. A drainage diversion was also included in the mine design in order to divert drainage features traversing the footprint of the BVS Pit, around the pit and final void. Baseline surface water quality monitoring was conducted in order to assist in the characterisation of baseline water quality and the receiving environment. Mine water management strategies and a mine water management system were developed to ensure that the mine would not result in any adverse impacts on downstream water quality. Goldsim modelling was also conducted to confirm the performance of the mine water management system and raw water supply requirements under the full range of potential climate and mine development scenarios, based on historical daily rainfall data and considering the effects of climate change. The final void pit lakes were also modelled using Goldsim to determine the likelihood of overflows from the final voids. Baseline flow data for the Woolgar River was also developed and the effects of the water supply off-take on river flows was assessed using AWBM modelling. The detailed specialist surface water assessments are provided in the *Surface Water Report* (Appendix D) and a summary is provided in Section 6 – Surface Water.
ECOLOGY	
The project has the potential to give rise to the following impacts: • Loss of biodiversity values due to clearing of vegetation for the development of the project; • Impacts on any groundwater dependent ecosystems that may	***Terrestrial Ecology***: A specialist terrestrial ecology study was conducted. The study scope included: • Multi-season terrestrial ecology field surveys; • Identification of terrestrial flora and fauna species and habitats within the project site;

POTENTIAL IMPACT AREA	SCOPE OF ENVIRONMENTAL ASSESSMENT
be present, including impacts due to clearing of vegetation and impacts due to changes in the hydrogeological regime; and • Loss of biodiversity values due to impacts on the watercourses and aquatic habitats on the project site.	• Identification of significant species including their status under relevant Commonwealth and state legislation; • Assessment of potential impacts on biodiversity values present or likely to be present; and • Development of mitigation and management measures to address any potential significant impacts. The detailed specialist terrestrial ecology assessment is provided in the *Terrestrial Ecology Report* (Appendix E) and a summary is provided in Section 7 – Terrestrial Ecology. ***Aquatic Ecology***: A specialist aquatic ecology study was conducted. The study scope included: • A field survey of the aquatic habitats on the project site; • Identification of aquatic flora and fauna species and habitats within the project site; • Identification of significant species including their status under relevant Commonwealth and state legislation; • Assessment of potential impacts on biodiversity values present or likely to be present; and • Development of mitigation and management measures to address any potential significant impacts. The detailed specialist aquatic ecology assessment is provided in the *Aquatic Ecology Report* (Appendix F) and a summary is provided in Section 8 – Aquatic Ecology. ***Groundwater Dependent Ecosystems***: A GDE assessment was conducted in accordance with the framework set out in the Queensland GDE EIS Information Guideline, with specialist inputs in relation to groundwater and terrestrial and aquatic ecology. The study scope included: • Delineation of the project GDE study area; • Identification of potential terrestrial and aquatic GDEs in the study area based on desktop database searches; • Rationalising potential GDEs from database searches with the site-specific geology, groundwater and ecology data to determine the presence of potential GDEs; • Assessment of potential impacts on confirmed potential GDEs; and • Development of monitoring and management measures to address any potential impacts. The detailed GDE assessment is provided in the *Groundwater Dependent Ecosystems Report* (Appendix K) and a summary is provided in Section 7.7 – Terrestrial Ecology.

POTENTIAL IMPACT AREA	SCOPE OF ENVIRONMENTAL ASSESSMENT
REHABILITATION AND MINE CLOSURE	
The project will give rise to disturbance due to open cut mining operations in the project site and associated mine infrastructure and mine waste storage facilities. Progressive rehabilitation will be undertaken, where possible, over the mine life and decommissioning and final rehabilitation will be undertaken at mine closure. The site topsoil resources also require assessment for suitability in rehabilitation. A Progressive Rehabilitation and Mine Closure Plan (PRCP) is also required to be submitted with the EA application for the project.	A suite of specialist assessments were conducted in order to inform the conceptual design of the mine waste storage facilities, rehabilitation and mine closure strategies and the development of the PRCP for the project. These included: ● Soils and land capability assessment including field surveys; ● Mine waste geochemical characterisation including testing to confirm the potential for acid mine drainage, and development of mine waste management measures to inform the design of the mine waste storage facilities; ● Conceptual design of the Central WRD including the co-placement of PAF waste rock and dewatered tailings; ● Final void and mine waste storage facility geotechnical stability assessments; ● Final void water balance modelling; and ● Final landform flood modelling.
AIR QUALITY	
The project will result in dust and other air quality contaminant emissions that could result in air quality impacts on sensitive receptors in the area.	A specialist air quality assessment was conducted. The study scope included: ● Review of existing air quality data to determine background air quality; ● Estimation of worst case dust emissions from the project activities; ● Modelling to predict the level of dust impacts in the surrounding area; ● Comparison of predicted dust impacts at sensitive receptors with relevant air quality limits; and ● Development of mitigation and management measures to address any potential significant impacts. The detailed specialist air quality assessment is provided in the *Air Quality Report* (Appendix G) and a summary is provided in Section 9 – Air Quality.
GREENHOUSE GAS	
The project will result in Greenhouse Gas (GHG) emissions that require quantification and management in accordance with the relevant regulatory requirements.	A specialist GHG assessment was conducted in accordance with the DETSI Greenhouse Emissions Guideline. The scope of the assessment included estimation of the GHG emissions from the project, GHG emissions and management practices and a GHG abatement plan. The detailed GHG assessment is provided in the *Greenhouse Gas Assessment Report* (Appendix L) and a high level summary is provided in Section 9.3 – Air Quality.
NOISE AND BLAST IMPACTS	
The project will result in noise emissions and blast effects that could result in impacts on sensitive receptors in the area.	A specialist noise and blasting study was conducted. The study scope included: ● Review of existing data to determine background noise levels at sensitive receptors;

POTENTIAL IMPACT AREA	SCOPE OF ENVIRONMENTAL ASSESSMENT
	• Determination of worst case operating scenarios for noise impacts on sensitive receptors; • Modelling to predict the noise levels in the surrounding area; • Calculation of blast impact levels at sensitive receptors; • Comparison of predicted noise and blast impact levels at sensitive receptors with relevant limits; and • Development of mitigation and management measures to address any potential significant impacts. The detailed specialist noise and blasting assessment is provided in the *Noise and Vibration Report* (Appendix H) and a summary is provided in Section 10 – Noise and Vibration.
VISUAL AMENITY	
The development of the project has the potential to adversely impact the visual amenity of the sensitive visual receptors in the surrounding area.	A visual assessment was conducted for the project, based on review of aerial photography and topographic mapping, inspections of the three closest homesteads to the project site and line-of-sight assessments. The assessment concluded that views to the key project elements from the closest neighbouring homesteads are substantially screened by intervening topography and/or woodland vegetation. Hence the project will not have a significant impact on the visual amenity of the sensitive receptors. The assessment also identified the lighting control measures that will be adopted to minimise night glow from the project at night. Further assessment of visual amenity, including the development of photomontages, is therefore not warranted. The visual impact assessment is presented in Section 11 - Visual Amenity.
TRAFFIC AND TRANSPORT	
The project will generate traffic that will utilise roads in the local and regional area and has the potential to result in significant traffic impacts on local Council and State controlled roads. The project also involves the construction of a private airstrip on the project site for the transport of mine workers.	Estimated project traffic volumes were developed by the proponent's feasibility study engineers and were compared to existing traffic volumes from Department of Transport and Main Roads (DTMR) traffic counts on the Flinders Highway. The project traffic volumes are significantly less than 5% of the base traffic volumes on the highway and therefore do not require a Traffic Impact Assessment, in accordance with the *Guide to Traffic Impact Assessment (DTMR, 2018a)*. The utilisation of Richmond Shire Council roads by project traffic has also been assessed. The details of the proposed air transport utilising the private on-site airstrip were also developed by the proponent's feasibility study engineers. Traffic and transport for the project are discussed in Section 13 – Traffic and Transport.
CULTURAL HERITAGE	
Historical land use on the project site has been limited to cattle grazing and historic gold mining. There are existing comprehensive studies on	A specialist non-Aboriginal cultural heritage assessment was conducted for the project. It included: • Review of existing non-Aboriginal cultural heritage reports and assessments for the area; • Search of non-Aboriginal cultural heritage databases;

POTENTIAL IMPACT AREA	SCOPE OF ENVIRONMENTAL ASSESSMENT
the historic gold mining heritage places in the project area. The proponent is required to manage the impacts of the project on Aboriginal cultural heritage in consultation with the relevant Aboriginal representatives and in accordance with the *Aboriginal Cultural Heritage Act 2003* (ACH Act).	• Detailed review of high-resolution aerial photography of the project site; and • Identification of management and mitigation measures for impacts to non-Aboriginal cultural heritage. Aboriginal cultural heritage is required to be managed in accordance with the ACH Act and an assessment of impacts on Aboriginal cultural heritage is not within the scope of this EAR. The specialist non-Aboriginal cultural heritage assessment is provided in the *Non-Indigenous Heritage Report* (Appendix I) and a summary of the assessment and discussion of the management of Aboriginal cultural heritage is provided in Section 14 – Cultural Heritage.
NON-MINING WASTE MANAGEMENT	
The project will produce non-mining wastes that require management.	The project will establish waste management procedures for non-mining waste. A description of the likely non-mining wastes and waste management procedures are provided in Section 15 – Non-Mining Waste Management.
SOCIO-ECONOMICS	
The project is consistent with the significant state and regional planning initiatives for the region. These include New Economy Minerals development in the North-West Minerals Province and the Mt Isa to Townsville Economic Development Zone (MITEZ) development initiatives of the regional Councils. Due to the relatively small scale and remote location of the project, the sparse population in the local area and region, and the relatively short mine life of 11 years, the project is not expected to give rise to any significant or extensive adverse social or economic impacts. The project will have significant positive economic benefits associated with direct and indirect employment, payment of taxes and royalties and economic stimulus for the region.	A desktop socio-economic assessment has been completed for the project. The scope of the assessment included: • Discussion of compliance with relevant legislative requirements including the Strong and Sustainable Resource Communities Act 2017 (SSRC Act); • Characterisation of the project social setting based on research and review of the 2021 census population and demographic data. • Description of the project workforce requirements for both the construction and operations phases; • Discussion of the proponent's approach to community and stakeholder engagement; • Description of the proposed management for the key social impact areas identified in the *Social Impact Assessment Guideline (DSDMIP, 2018)* including workforce management, housing and accommodation, local business and industry procurement, and health and community well being; and • Description of the economic benefits of the project. The socio-economic impacts of the project are discussed in Section 12 – Socio-Economics.

5

GROUNDWATER



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5 GROUNDWATER

5.1 INTRODUCTION

This section provides a summary of the key findings of the groundwater assessment undertaken for the Big Vein South Gold Project (the project). The groundwater assessment was undertaken by hydrogeologist.com.au and the detailed *Groundwater Report* is provided in Appendix C.

5.2 REGULATORY FRAMEWORK

The *Mineral Resources Act 1989* (Qld) (MR Act) entitles the holder of a mining lease to take or interfere with underground water (i.e. groundwater) as part of approved mining operations. This entitlement is termed the mining lease holder's 'underground water rights'.

Groundwater that is taken or interfered with while exercising the underground water rights is termed 'associated water'. The holder of a mining lease or mineral development licence is entitled to use associated water for any purpose. In order to exercise the underground water rights for the project, the proponent must:

- Obtain an Environmental Authority (EA) under the *Environmental Protection Act 1994* (Qld) (EP Act). In order to obtain an EA, Section 126A(2) of the EP Act requires that the EA application for the project must be supported by specific information on the exercise of underground water rights. The *Groundwater Report* (Appendix C) provides the required supporting groundwater information for the EA application for the project.
- Comply with the notification and reporting requirements under Section 334ZP of the MR Act by notifying the Department of the Environment, Tourism, Science and Innovation (DETSI) of the exercise of its underground water rights. In accordance with the requirements of the MR Act, the proponent will notify the DETSI of its exercise of underground water rights on the project site immediately after it starts exercising the rights. The proponent will report the annual associated water volume taken to the Department of Resources in accordance with the Queensland guideline *Quantifying the volume of associated water taken under a mining lease or mineral development licence* (Department of Natural Resources and Mines, Manufacturing, and Regional Rural Development, 2025).
- Comply with its monitoring and reporting obligations under Chapter 3 of the *Water Act 2000* (Qld) (Water Act). In accordance with the requirements of Chapter 3 of the Water Act, the proponent will prepare an initial Underground Water Impact Report (UWIR). The main purpose of the UWIR is to describe the groundwater take due to mining (and any associated impacts) over a three-year period. The UWIR will also include a process for annual review and reporting. The initial UWIR will be prepared in accordance with Section 376 of the Water Act and the DETSI guideline *Underground water impact reports and final reports* (the UWIR guideline) (DETSI, 2025), where relevant. Consistent with the UWIR guideline, the UWIR will be based on the information presented in the *Groundwater Report* (Appendix D). This information will be updated as necessary as part of the UWIR preparation. The proponent will then consult on the draft UWIR and notify relevant landholders. The draft UWIR will be provided to the DETSI for approval, prior to the proponent exercising its underground water rights.

5.3 SCOPE OF WORK AND METHODOLOGY

The scope of work and methodology for the groundwater assessment included:

- A desktop study to obtain background information on the groundwater regime within the project site and its surrounds. This included a search of relevant groundwater databases and an extensive review of publicly available groundwater reports and information on local and regional geology.
- A groundwater site investigation to develop a detailed understanding of the local groundwater regime. The groundwater site investigation layout is shown in Figure 5-1 and involved:
  - Installing a dedicated groundwater monitoring network of 14 groundwater monitoring bores and three vibrating wire piezometer (VWP) arrays within the project site and the surrounding area to measure groundwater levels, groundwater quality and hydraulic parameters;
  - Installing a datalogger in each monitoring bore and VWP site to record groundwater levels. A total of 49 months of groundwater level data was collected at 6-hour intervals between November 2017 and November 2021.
  - Collecting groundwater quality data from the groundwater monitoring bores over a period of 44 months between April 2018 and November 2021. The groundwater quality data collected includes 154 field measurements of pH and salinity, and laboratory analysis of 109 groundwater quality samples for a range of water quality characteristics including major ions, metals and metalloids.
  - A census of groundwater supply bores in the vicinity of the project site to confirm bore locations, usage and water quality.
  - A survey of groundwater springs in the vicinity of the project site to confirm spring locations and characteristics.
  - A targeted creek and alluvium investigation to ground-truth the extent and depth of bed sediments and alluvium associated with watercourses and drainage features that traverse the project site and its surrounds, and to identify landform features relevant to the local groundwater regime. The creek and alluvium investigation involved:
    - Siting groundwater monitoring bores within areas where Queensland Government geological mapping indicates alluvium is present;
    - Excavating 24 test pits within watercourse and drainage feature channels and/or overbank areas;
    - Undertaking a topographic landform assessment of the project site and its surrounds using high resolution aerial photography and detailed LiDAR data; and
    - Development of accurate mapping of the extent of ground-truthed alluvium.
- Compiling and analysing the information collected from the desktop study and the groundwater site investigation to develop a conceptual model of the groundwater regime;
- Developing a 3D numerical groundwater flow model for the project to simulate the existing groundwater regime and predict the potential effects of the proposed mining activities;
- Assessing the groundwater impacts of the project and developing feasible mitigation and management strategies in the event of potential adverse impacts being identified. Impacts assessed included:
  - The potential impacts of groundwater drawdown on:
    - Groundwater resources, groundwater dependent features and groundwater supply bores;
    - Watercourses and drainage features;

- Potential cumulative drawdown impacts with other resource projects;
- Potential impacts on existing groundwater quality; and

- Developing a groundwater monitoring program for the project.

A detailed description of the groundwater assessment methodology is provided in the *Groundwater Report* (Appendix C). The raw and compiled data collected as part of the desktop study and groundwater site investigation are also presented in the *Groundwater Report* (Appendix C).

5.4 GROUNDWATER REGIME

Sections 5.4.1 to 5.4.7 describe the key aspects of the conceptual groundwater regime, including the hydrogeological setting and groundwater recharge and movement, distribution and depth, discharge, interactions with surface water, quality and use.

5.4.1 Hydrogeological Setting

Geology Setting and Local Hydro-Stratigraphy

A description of the local geology and lithology is provided in Section 3 – Project Description.

The project site is located at the northern margin of the Eromanga Basin, a sedimentary basin that was deposited in the Mesozoic era. Locally, the Eromanga Basin overlies a Proterozoic basement. The Proterozoic basement is part of the North Australian Craton, one of Australia's major mineral provinces. The Proterozoic basement hosts the target gold ore.

The Eromanga Basin and Proterozoic basement have been extensively modified by weathering and erosion. The weathered profile extends across the project site and its surrounds and reaches depths of up to 40 m below ground level in the project site (Figure 5-2 and Figure 5-3).

The local hydro-stratigraphy is illustrated in Figure 5-3 and comprises:

- Localised alluvium associated with the Woolgar River;
- A weathered profile which exhibits variable permeability and is typically dry and unsaturated;
- Localised, disconnected residual areas of fresh Jurassic strata; and
- A fresh Proterozoic basement aquiclude, comprising a dry crystalline and metamorphosed rock mass. Occasional disconnected cracks in the upper profile of this aquiclude that can contain groundwater.

Topography

The local topography transitions from elevated rocky plateaus to the flatter, low-lying terrain of the Woolgar River floodplain (Figure 3-10). Several plateaus and associated ridgelines extend into the eastern portion of the project site. These elevated landforms are formed on thin residual areas of Jurassic strata and are capped by a thin weathered profile (Figure 5-3).

5.4.2 Groundwater Recharge and Movement

Seasonal rainfall and runoff concentrate on the upper surfaces and slopes of the elevated landforms, enhancing infiltration in these areas. A portion of the surface water infiltration moves through the unsaturated weathered profile and Jurassic strata to recharge the underlying regional groundwater table.

Locally, groundwater flows west from the elevated plateau recharge areas towards the surrounding lower-lying areas (Figure 5-3).

Figures 19 to 22 of the *Groundwater Report* (Appendix C) show groundwater elevation and direction of flow in each hydro-stratigraphic unit.

5.4.3 Groundwater Depth and Distribution

Figure 25 of the *Groundwater Report* (Appendix C) shows the spatial variations in the groundwater table depth due to changes in topography. The groundwater table is generally deeper in elevated areas and shallower in the vicinity of the incised river and creeks. In the elevated plateau areas, the groundwater table is typically located in the Proterozoic basement at depths of approximately 50 m, and up to approximately 110 m, below ground level. In the lower-lying areas, the groundwater table is typically located between approximately 10 m and 50 m below ground level and intersects the weathered profile, Jurassic strata and cracks in the upper profile of the Proterozoic basement.

Figures 23 and 24 of the *Groundwater Report* (Appendix C) show the extent and thickness of the saturation in the weathered profile and the Jurassic strata. The Proterozoic basement contains groundwater in disconnected cracks but does not form a continuous, saturated aquifer.

In discrete areas below the Woolgar River channel, where the alluvium is thickest, the base of the alluvium may intersect the groundwater table. In these localised and discontinuous areas, the base of the alluvium is likely to be partially saturated and recharged by the regional groundwater flows. The distribution and thickness of saturated alluvium is shown in Figure 26 of the *Groundwater Report* (Appendix C).

Elsewhere, the base of the alluvium is typically located several metres above the regional groundwater table, and therefore in these areas the alluvium is typically dry and unsaturated. These areas are also shown in Figure 26 of the *Groundwater Report* (Appendix D). In the areas of unsaturated alluvium, the regional groundwater regime does not contribute significantly to recharge of the alluvium.

5.4.4 Groundwater Interactions with Surface Water

Ephemeral surface water flows in the Woolgar River recharge the underlying groundwater regime and result in small seasonal variations in groundwater table depth. The groundwater table immediately below and adjacent to the river channel typically rises by approximately 0.5 m, and up to approximately 2 m in response to ephemeral river flows.

The groundwater table is typically at its highest (i.e., closest to ground level) during flow events in the river. At this time, the groundwater table may intersect the ground surface in the Woolgar River bed.

As surface water flows recede, the depth to groundwater increases rapidly and the shallow alluvium dries quickly. At this time, the groundwater table is typically located between 2 m, and up to 6 m, below the riverbed. The groundwater table does not intersect the riverbed for the remainder of the year.

Groundwater discharge also occurs regionally through a range of processes, including evaporation from the alluvium and transpiration from woodland vegetation, where present.

5.4.5 Perched Groundwater

In the elevated plateau areas, shallow groundwater may also occur in thin permeable layers within the weathered profile. Where this occurs, the shallow groundwater is located (i.e. perched) above the regional groundwater table. Hence, the perched groundwater and regional groundwater table are hydraulically disconnected.

Regionally, discharge of perched groundwater from the weathered formation occurs via outcrop springs of the Flinders River Spring Supergroup.

A spring survey was carried out to identify outcrop springs that could potentially be impacted by the project. The spring survey identified three outcrop springs within 1 km east of the project site (Figure 5-1). No other springs are present within the project site or its surrounds within a 5 km radius.

The Queensland government has documented the hydrogeology of these outcrop springs as part of its Lake Eyre Basin Springs Assessment (LEBSA) Project (Department of Science, Information Technology and Innovation [DSITI], 2015). The LEBSA Project reporting provides a conceptual model of these springs (which is reproduced in Figure 27 of the *Groundwater Report*) and describes the hydrogeology of these springs as follows:

- The outcrop springs occur in elevated areas where Jurassic sandstone outcrops (i.e., before the rocks dip underground). The springs are commonly associated with side gullies and/or foot slopes of the elevated sandstone areas.
- A small percentage of rainwater that falls on the elevated area infiltrates into the ground. The infiltrating groundwater becomes perched when it reaches a less impermeable layer.
- Groundwater drains out of the elevated rocks under gravity or through the intersection of the ground surface with saturated rocks (rather than welling upwards under artesian pressure). Hence, outcrop springs have markedly different characteristics from discharge (artesian) springs that are typically located on low lying plains.
- Groundwater flows from outcrop springs can change dynamically in response to recent rainfall events. Hence, the groundwater has a relatively short residence time in the rock and tends to be neutral to slightly acidic, with low levels of dissolved solids.

On this basis, the three outcrop springs present to the east of the project site are fed by seepage from perched groundwater within the weathered profile in the elevated plateau area. The springs emanate from stratigraphic weaknesses associated with gullies on the slopes of the elevated plateau area.

At the spring locations, the regional groundwater table is located within the underlying rock formations (i.e. in the Jurassic strata and Proterozoic basement) at depths between 30 m to 45 m below ground level. Hence, there is no connection between these springs and the regional groundwater table. This conclusion is consistent with the Queensland government's assessment of the hydrogeology of these springs.

5.4.6 Groundwater Quality

Table 5-1 provides a summary of the groundwater quality data for the local groundwater regime. The number of samples, the applied limit of reporting and number of non-detections are shown, along with the 50th and 80th percentiles of the measured data for each quality characteristic. The 80th percentile describes the typical upper range of baseline groundwater quality, while the 50th percentile describes the average baseline groundwater quality. Several quality characteristics are generally present at concentrations below the limit of detection and statistics could not be calculated for these parameters.

Table 5-1 shows that baseline groundwater quality in the shallow groundwater regime is typically pH neutral and fresh to saline, with low concentrations of metals, metalloids, and other solutes.

5.4.7 Groundwater Use

Groundwater is generally unsuitable for potable or irrigation uses. While groundwater quality is generally suitable for stock watering, yields are generally very low which limits groundwater use in the vicinity of the project site.

There are two water supply bores located within 5 km of the of the project site boundary (Figure 5-1), comprising:

- One registered water supply bore (RN 163296). Database records show that this bore was drilled in 2019 and targets the Jurassic strata. This bore is currently equipped as a stock watering supply bore.
- One unregistered water supply bore locally referred to as the 'Mt Norman Rockspear Bore'. The Mt Norman Rockspear Bore is currently equipped with a solar pump and provides stock watering supply to the landholder. This bore intersects the weathered profile.

Table 5-1 Groundwater Quality Overview

QUALITY CHARACTERISTIC	UNIT	TOTAL NUMBER OF SAMPLES	% SAMPLES BELOW REPORTING LIMIT	NUMBER OF SAMPLES ABOVE REPORTING LIMIT	50TH PERCENTILE[1]	80TH PERCENTILE[1]
pH	pH units	154	0%	154	7.0	7.5
Electrical Conductivity	µS/cm	154	0%	154	983	10,558
Total Dissolved Solids	mg/L	154	0%	154	680	8,529
Sulfate as SO_4	mg/L	66	18%	54	27	144
Aluminium	mg/L	94	46%	51	0.013	0.024
Arsenic	mg/L	94	12%	83	0.007	0.015
Boron	mg/L	94	7%	87	0.085	0.210
Cadmium	mg/L	94	98%	2	Not calculated	Not calculated
Chromium	mg/L	94	95%	5	Not calculated	Not calculated
Cobalt	mg/L	28	54%	13	0.007	0.011
Copper	mg/L	94	93%	7	Not calculated	Not calculated
Iron	mg/L	94	4%	90	0.705	2.328
Lead	mg/L	94	83%	16	0.0004	0.0012
Manganese	mg/L	94	0%	94	1.7	3.4
Mercury	mg/L	37	100%	0	Not calculated	Not calculated
Molybdenum	mg/L	28	25%	21	0.004	0.010
Nickel	mg/L	28	36%	18	0.004	0.009
Selenium	mg/L	28	100%	0	Not calculated	Not calculated
Zinc	mg/L	94	59%	39	0.010	0.025

[1] *Statistics have been calculated for all quality characteristics with at least eight sample test results above the laboratory limit of reporting.*

5.5 ASSESSMENT OF GROUNDWATER EFFECTS

5.5.1 Overview of Project Activities

The project layout is shown in Figure 3-2.

The project will involve the development of three open cut pits, comprising the main BVS Pit and two smaller satellite pits, the BV1 Pit and the BV2 Pit. Waste rock from the BVS Pit will be stored in the Central and Southern Waste Rock Dumps (WRDs). Waste rock from the BV1 Pit and the BV2 Pit will be stored in the Northern WRD. The open cut mining methods are described in Section 3 – Project Description.

Mined ore will be transported to Run-of-Mine (ROM) ore stockpiles, located near the mine processing facilities at the southern end of the project site.

Ore mined from the BV1 Pit and the BV2 Pit will be processed using heap leach pads and gold elution. Ore mined from the BVS Pit will be processed in an on-site Carbon In-Leach (CIL) Plant.

The heap leaching process will generate spent heap leach residues. These residues will be reprocessed in the CIL Plant over the life of the mine. The CIL Plant will generate wet tailings and dewatered tailings. Wet tailings will be pumped to a Tailings Storage Cell (TSC). Dewatered tailings will be stored with waste rock in the Central WRD.

The majority of the mine infrastructure will be located at the southern end of the project site, including the ore processing facilities, workshop, warehouse, administration buildings, haul roads and access roads, vehicle servicing, refuelling and wash down facilities, fuel storage facilities, power station, accommodation camps and airstrip.

5.5.2 Potential Groundwater Effects

BVS Pit

The BVS Pit floor will be located at depths of up to approximately 220 m below ground level (150 mAHD). In the BVS Pit footprint, the groundwater table is located at depths ranging from 5 m to 38 m below ground level (365 mAHD to 332 mAHD). Hence, the base of the BVS Pit will extend below the groundwater table.

Mining below the groundwater table will result in a reduction in groundwater pressure or level in the vicinity of the pit. A reduction in groundwater pressure or level is referred to as 'drawdown'. The affected area is referred to as the 'zone of drawdown'.

As discussed in Section 5.3, a numerical groundwater model was developed to predict the drawdown around the BVS Pit. The extent and magnitude of drawdown around the BVS Pit depends, in part, on the properties of the Proterozoic basement and the other surrounding strata. The magnitude of the drawdown is also influenced by distance from the BVS Pit, with the greatest drawdown occurring adjacent to the pit and gradually reducing with distance from the pit.

The mining schedule and mine plan dictate the occurrence (extent and magnitude) of groundwater drawdown at each stage of the mine development, and this sequencing has been captured in the groundwater modelling.

BV1 Pit and BV2 Pit

The BV1 Pit will extend to a maximum depth of 35 m below ground level (i.e. the pit floor will be located at an elevation of 390 mAHD). The groundwater table is located at a depth of 55 m below ground level (corresponding to an elevation of 370 mAHD) in the BV1 Pit footprint. Hence, the base of the BV1 Pit is located approximately 20 m above the groundwater table and, therefore, the BV1 Pit will not intersect the groundwater table. Mining activities in the BV1 Pit that occur above the groundwater table will not result in groundwater drawdown.

Similarly, the BV2 Pit will have a maximum depth of 10 m below ground level (370 mAHD). This depth is approximately 15 m above the groundwater table (355 mAHD) at this location and, therefore, the BV2 Pit will not intersect the groundwater table or result in drawdown.

In both the BV1 Pit and the BV2 Pit, the base of the open cut pit is located in the Proterozoic basement. The Proterozoic basement is an aquiclude that is essentially a dry crystalline and metamorphosed rock mass with

occasional disconnected cracks that can contain groundwater. It has very low permeability that will effectively prevent seepage of intermittent pit water to the underlying groundwater table. Hence, the BV1 Pit and the BV2 Pit will have negligible effect on groundwater levels.

Mine Infrastructure

The mine infrastructure will not result in drawdown and, therefore, will have negligible effect on groundwater levels.

The key potential sources of groundwater contamination from the mine infrastructure include:

- Seepage from the WRDs;
- Seepage from ore stockpiles;
- Seepage from the TSC;
- Seepage from the heap leach pads; and
- The use of hydrocarbons and chemicals.

Section 5.6.6 describes the expected groundwater quality effects and associated impacts of these potential groundwater contamination sources.

5.5.3 Predicted Groundwater Levels

Groundwater assessments are typically based on the zone of drawdown at the end of mining operations, as this represents the cessation of mine dewatering, and this scenario typically represents the maximum drawdown associated with mining. This approach is appropriate and conservative for assessing the effects of mining on the groundwater regime and ensures that the potential worst-case impacts on groundwater users and sensitive environmental features are assessed.

For the purposes of the groundwater assessment undertaken for the project, the limit of the zone of drawdown is conservatively defined by a predicted 1 m change in the groundwater level. A 1 m change in the groundwater level was adopted in defining the limit of the zone of drawdown as it represents the reasonable limit of precision that can be inferred from groundwater modelling.

Figure 5-4 to 5-6 show the localised drawdown predicted around the BVS Pit.

The Proterozoic basement is predicted to experience up to approximately 65 m of drawdown around the pit margins (Figure 5-4). The zone of drawdown within the Proterozoic basement is predicted to extend up to approximately 1.5 km from the BVS Pit.

Drawdown around the BVS Pit is predicted to extend into the partially saturated Jurassic strata and weathered profile that overlie the Proterozoic basement (Figure 5-5 and Figure 5-6). The maximum predicted drawdown occurs at the pit margins, where up to 3 m of drawdown is predicted in the Jurassic strata, and up to 6 m in the weathered profile. The predicted zone of drawdown in the Jurassic strata extends approximately 760 m east of the BVS Pit, while drawdown in the weathered profile is concentrated in the area within 1.5 km to the north-west of the BVS Pit. Drawdown in these formations is almost entirely localised within the project site.

Within the predicted zone of drawdown, the groundwater table is located within the weathered profile, Jurassic strata, and Proterozoic basement. The predicted drawdown on groundwater levels within these formations will result in a corresponding drawdown on the groundwater table. Figure 31 of the *Groundwater Report* (Appendix D). shows the maximum predicted drawdown on the groundwater table due to the project. The groundwater table is predicted to be lowered by up to 70 m around the BVS Pit. The predicted zone of groundwater table drawdown corresponds to the combined extent of drawdown in the weathered profile, Jurassic strata, and Proterozoic basement formations.