9

AIR QUALITY



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9 AIR QUALITY

9.1 INTRODUCTION

This section provides a summary of the key findings of the air quality assessment and a high level overview of the Greenhouse Gas (GHG) assessment undertaken for the Big Vein South Gold Project (the project) by Katestone Environmental Pty Ltd. The detailed results of the air quality assessment are provided in the *Air Quality Report* (Appendix G) and the *GHG Report* is included in Appendix L of the EAR. Air quality is discussed in Section 9.2 and the *GHG Report* overview is discussed in Section 9.3.

9.2 AIR QUALITY ASSESSMENT

This section discusses air quality, including sensitive receptors relevant to the air quality assessment, regulatory requirements, the methodology used in the air quality assessment and the results of the assessment. It also describes mitigation measures to be adopted.

9.2.1 Project Setting and Sensitive Receptors

The terrain of the project site rises gently from the south-west across the project site, increasing towards the north-eastern extents of the project boundary (Figure 9-1). Elevations in the project site range from 375 to 425 m Australian Height Datum. The Woolgar River runs along the western edge of the project site boundary.

The project site is remote and located within large cattle grazing properties. The region is sparsely populated with only three homesteads located within 10 km of the project site. There are no other sensitive receptors in proximity to the project site.

The location of the sensitive receptors relative the project site is shown in Figure 9-1 and described in Table 9-1.

Table 9-1 Sensitive Receptors

RECEPTOR ID	NAME	EASTING[1]	NORTHING[1]	DISTANCE AND DIRECTION FROM THE PROJECT SITE
R1	Barnes' House	744,624	7,812,087	3 km NE
R2	Middle Park Homestead	739,457	7,810,681	1.1 km N
R3	Mt Norman Homestead	728,026	7,801,787	8.4 km SW

[1]*Coordinates in GDA94/MGA Zone 54*

9.2.2 Air Quality

Particulate matter (PM) (i.e. dust) will be the key air emission generated by mining activities on the project site. Particulate matter can be categorised by size and/or by chemical composition, and the potential for harmful effects depends on such categories. The human respiratory system has a built-in defence mechanism that prevents particles larger than approximately 10 µm (ten one-thousandths of one millimetre) from reaching the more sensitive parts of the respiratory system.

Laboratory and epidemiological studies have shown that elevated levels of very fine particles (aerodynamic diameter less than 2.5 µm or $PM_{2.5}$), mainly generated through combustion processes and vehicle exhaust, have the potential to cause adverse health impacts in susceptible people. Such studies form the basis of the current ambient air quality standards that are used in Australia. For this reason, health impacts are determined primarily by the concentration of

particles with aerodynamic diameters of less than 2.5 µm. Other larger particles can be suspended in the air and can give rise to nuisance and residential amenity effects through soiling of clothes, building surfaces and other surfaces.

The total mass of particles suspended in the air is referred to as total suspended particulates (TSP). This includes particles in the $PM_{2.5}$ and PM_{10} size ranges and larger particles up to approximately 30 to 50 µm in aerodynamic diameter. Particles larger than 30 to 50 µm settle out of the atmosphere quickly and are generally not considered to be a concern for human health. However, these large particles still have the capacity to give rise to nuisance effects and the potential for this is measured by the dust deposition rate.

The use of diesel for power generation would also give rise to emissions of pollutants due to the combustion of diesel fuel. Pollutants from power generation include oxides of nitrogen (NO_x), oxides of sulfur (SO_x), carbon monoxide (CO), and particulates. Trace emissions of these pollutants would also occur due to the combustion of fuels in vehicles on the project site.

There are trace amounts of boron, cobalt, lead, manganese, nickel, arsenic, hexavalent chromium, copper, selenium, zinc and cadmium in the ore, waste rock, tailings and heap leach. Whilst the emissions of the metals due to the project are expected to be small, emissions of metals have been included in this assessment for completeness.

Key pollutants that have been considered in this assessment include PM such as TSP, PM_{10}, $PM_{2.5}$ and dust deposition, as well as NO_x, SO_x, CO and heavy metals.

9.2.3 Regulatory Requirements

Air quality objectives for the project have been obtained from the Queensland Government's *Environmental Protection (Air) Amendment Policy 2024* (EPP Air) that aligns with the National Environmental Protection Council's (NEPC's) Ambient Air Quality National Environment Protection Measure (Air NEPM) and from the Department of Environment, Tourism, Science and Innovation (DETSI) Model Mining Conditions (DETSI, 2024) in the case of dust deposition. The EPP Air provides air quality objectives that are designed to protect environmental values. For metals not covered by the EPP Air, objectives have been taken from the Environmental Protection Agency (EPA) Victoria Publication 1961 and the Texas Commission on Environmental Quality (TCEQ) Effects Screening Levels (ESL).

The air quality objectives and guidelines relevant to the project are reproduced in Table 9-2 and discussed further in the *Air Quality Report* (Appendix G). These objectives and guidelines are applicable to air quality at sensitive locations, such as homesteads.

Table 9-2 Applicable Ambient Air Quality Objectives

PARAMETER	ENVIRONMENTAL VALUE	AVERAGING PERIOD	VALUE (µg/m^3)[A]
TSP	Health and wellbeing	Annual	90
PM_{10}	Health and wellbeing	24-hour	50
		Annual	25
$PM_{2.5}$	Health and wellbeing	24-hour	20
		Annual	7
Dust Deposition Rate	Amenity	1-month	120 mg/m^2/day[b]
Nitrogen dioxide (NO_2)	Health and wellbeing	1-hour	164
		Annual	31

PARAMETER	ENVIRONMENTAL VALUE	AVERAGING PERIOD	VALUE (µg/m³)[A]
Sulfur dioxide (SO_2)	Health and wellbeing	1-hour	214
		24-hour	57
		1-year	21
Carbon monoxide (CO)	Health and wellbeing	8-hr	11,000
HEAVY METALS[C]			
Arsenic	Health and wellbeing	1-year	6 ng/m³
Boron	Health	1-hour	50[e]
		1-year	5 [e]
Cadmium	Health and wellbeing	1-year	5 ng/m³
Chromium (VI)	Human health impacts	1-hour	1.3[d]
		1-year	0.005[d]
Cobalt	Health	1-hour	0.21 [e]
		1-year	0.0017 [e]
Copper	Human health impacts	1-hour	10[d]
Manganese	Health and wellbeing	1-year	0.16
Nickel	Health and wellbeing	1-year	22 ng/m³
Lead (measured as total metal content in TSP)	Health and wellbeing	1-year	0.5
Selenium	Health	1-hour	2 [e]
		1-year	0.2 [e]
Zinc	Human health impacts	1-hour	20[d]
		1-year	2[d]

[a] *EPP Air objective, unless otherwise stated.*

[b] *The dust deposition guideline is not defined in the EPP Air. The DES's Model Mining Conditions (DES, 2024) contains this guideline for dust deposition, which applies to total insoluble solids.*

[c] *Heavy metals are measured as the total metal content in PM_{10}, unless otherwise specified.*

[d] *Victoria EPA air pollution assessment criteria, from Guideline for assessing and minimising air pollution in Victoria.*

[e] *TCEQ Effects Screening Levels – Interim Levels.*

9.2.4 Meteorology

Wind flows are an important consideration in air quality studies as dust emissions are transmitted in wind flow. The *Air Quality Report* (Appendix G) provides a detailed description of the site meteorology.

Locations that are downwind of a source experience higher dust concentrations than sites located upwind. Wind speed is a critical factor as exposed dust sources, such as stockpiles, would have higher dust emissions during stronger winds (greater than 11 m/s) than during lighter winds. This is due to dust particles being more likely to be lifted during stronger winds and carried further off site.

The Air Pollution Model (TAPM) (CSIRO, 2008) was used in conjunction with local observations of meteorological data to represent wind flows in the region. The CALMET model was then used to generate a finer resolution dataset for use in the dispersion modelling.

The annual, seasonal and diurnal frequency of winds were predicted by CALMET for the project site. Winds at the project site are generally light to moderate with an annual wind speed of 2.65 m/s. There is a variation in wind direction throughout the seasons with spring and summer being characterised by predominantly north-easterly winds. During autumn, winds are predominantly from the south-east.

There is a diurnal variation in wind direction at the project site. From midnight to 6am, north-easterly winds dominate. Between 6am and midday, south-easterly winds become more prevalent, and these winds dominate between midday and 6pm. During the late afternoon the south-easterlies reduce, with easterly winds becoming predominant between 6pm and midnight.

9.2.5 Existing Air Quality

The key potential sources of dust in the region include:

- Natural features of the environment such as pollen and grass seeds;
- Smoke from bushfires; and
- Use of unsealed roads.

The background concentrations of dust, NO_2 and SO_2 used in this air quality assessment are shown in Table 9-3. These are based on data recorded by DETSI between 2017 and 2024 at the North Ward monitoring station located in Townsville. This site is located within a residential area where anthropogenic sources of emissions, such as motor vehicles, exist. As a result, there would be higher levels of air pollutants at those sites than would occur in the project area. This monitoring station therefore provides for a more conservative impact assessment at the project site, by assuming higher background concentrations of pollutants. 2019 data was excluded from the selection of representative backgrounds for annual and 24-hour PM_{10} and $PM_{2.5}$, as this was an atypical year where concentrations of particulates were elevated due to bushfire events and regional windblown dust.

Table 9-3 Background Air Quality

AIR POLLUTANT	AVERAGING PERIOD	CONCENTRATION	AIR QUALITY OBJECTIVES	UNITS
TSP	Annual	32.5	90	$\mu g/m^3$
PM_{10}	24-hour	18.7	50	$\mu g/m^3$
	Annual	16.3	25	µg/m3
$PM_{2.5}$	24-hour	6.7	20	$\mu g/m^3$
	Annual	6.2	7	$\mu g/m^3$
Dust Deposition	Annual	40.0	120	$mg/m^2/day$
NO_2	1-hour	14.4	164	$\mu g/m^3$
	Annual	5.5	31	$\mu g/m^3$
SO_2	1-hour	2.9	214	$\mu g/m^3$
	24-hour	2.2	57	$\mu g/m^3$
	Annual	1.5	21	$\mu g/m^3$

9.2.6 Prediction Methodology

The *Air Quality Report* (Appendix G) combines detailed information on the mining activities, local and regional meteorology and existing air quality to estimate the potential effect of project activities on ambient dust levels. Modelled dust levels are compared with the applicable air quality objectives to assess whether any potential adverse impacts on health or amenity may occur. Health and amenity are the most sensitive air quality related environmental values and, therefore, compliance with standards for health and amenity would confirm that no impacts on other less sensitive environmental values would occur.

Modelled Operating Scenarios

Air quality modelling was conducted for Project Years 1, 5 and 11 to ensure that a representative range of potential worst case air quality impact scenarios were considered for the sensitive receptors. These scenarios include the operational years when the mining activities are in closest proximity to each of the three closest receptors and also include the year of maximum total dust emissions from the project (Project Year 5).

Heavy metals emissions and results were presented based on the Project Year 5 dust inventory, deemed as the worst-case scenario in terms of impacts at receptors. Compliance with the heavy metals objectives for Year 5 operations will demonstrate compliance across all project years.

Estimation of Emissions

Dust emission rates for project activities have been calculated using emission factors published in authoritative sources, including the National Pollutant Inventory (NPI) Handbooks (Department of the Environment and Heritage (DEH), 2006; Department of the Environment, Water, Heritage and the Arts (DEWHA), 2008); Department of Sustainability, Environment, Water, Population and Communities (DSEWPC), 2012b) or the USEPA AP-42 Emission Estimation Manuals (United States Environmental Protection Agency, 1998).

The air quality assessment included the key project activities that could contribute to dust generation:

- Excavation and stockpiling of topsoil and subsoil;
- Waste rock and ore excavation, dozing and handling;
- Wheel generated dust due to transport of material across the project site on unsealed haul roads;
- Wind erosion of exposed areas, including pits, Waste Rock Dumps (WRDs) and stockpiles;
- Transport of ore to the processing facilities; and
- Crushing and sag milling of ore in the processing plant.

The dust controls that have been adopted as part of the project design are described in Section 9.2.8. These dust controls were considered in the calculation of dust emission rates for the project.

Emission rates of key exhaust pollutants (NO_2 and SO_2) due to combustion of diesel in the generators have also been estimated using emission factors from the NPI Handbooks (DEH, 2006; DEWHA, 2008; DSEWPC, 2012b).

Emission rates of heavy metals considered in the assessment have been estimated using multi-element testing results from sampling of the different material types associated with the project, presented in the *Geochemistry Report* (Appendix A).

Dispersion Modelling

The modelling assessment has been undertaken using the CALPUFF dispersion model. This model is an advanced non-steady-state air quality modelling system that is approved by DETSI for dispersion modelling. CALPUFF is commonly used throughout Australia for air quality impact assessment studies of mining activities and was chosen

as being the most suitable dispersion model for the air quality assessment. The model was used to estimate dust levels in the vicinity of the project site.

9.2.7 Impact Assessment

The air quality modelling results confirm that Project Year 5 would give rise to the maximum concentrations of the modelled air quality parameters at each of the sensitive receptors over the life of the project. Table 9-4 presents the predicted concentrations of each air quality parameter at the sensitive receptors in Project Year 5. The predicted concentrations of each of the air quality parameters assessed are low and even including the higher than actual background levels (by adoption of the Townsville baseline dataset), results are well within the relevant air quality objective at all sensitive receptors.

The predicted contours for each air quality parameter are presented in the *Air Quality Report* (Appendix G).

9.2.8 Dust Impact Mitigation Measures

The following key measures to control and manage dust emissions and minimise the potential impact of the project are proposed:

- Use of fabric filters when drilling;
- Partially enclosed crushing operations;
- Progressively rehabilitating disturbed areas as soon as they are available; and
- Watering haul roads and active pit areas to minimise dust emissions.

The modelling described in preceding sections has included these dust controls and shown that they would be effective in controlling dust emissions and avoiding adverse impacts.

Table 9-4 Predicted Air Quality Parameter Concentrations at Sensitive Receptors

RECEPTOR ID		R1	R2	R3	AIR QUALITY OBJECTIVE
RECEPTOR		BARNES' HOUSE	MIDDLE PARK HOMESTEAD	MT NORMAN HOMESTEAD	
PM_{10}					
Maximum 24-hour Average (µg/m³)	Project in Isolation	3.9	19.6	15.0	***50 µg/m³***
	Project + Background	25.0	40.7	36.1	
Annual Average (µg/m³)	Project in Isolation	0.1	0.5	1.2	***25 µg/m³***
	Project + Background	20.3	20.7	21.4	
$PM_{2.5}$					
Maximum 24-hour Average (µg/m³)	Project in Isolation	0.8	3.0	2.3	***20 µg/m³***
	Project + Background	8.3	10.5	9.8	
Annual Average (µg/m³)	Project in Isolation	0.01	0.1	0.2	***7 µg/m³***
	Project + Background	7.1	7.2	7.3	
TSP					
Annual Average (µg/m³)	Project in Isolation	0.1	0.7	1.4	***90 µg/m³***

RECEPTOR ID		R1	R2	R3	AIR QUALITY OBJECTIVE
RECEPTOR		BARNES' HOUSE	MIDDLE PARK HOMESTEAD	MT NORMAN HOMESTEAD	
	Project + Background	40.6	41.2	41.9	
DUST DEPOSITION					
Maximum Monthly Average (mg/m2/day)	Project in Isolation	0.3	1.7	2.3	***120 mg/m²/day***
	Project + Background	40.3	41.7	42.3	
NO_2					
Maximum 1-Hour Average (µg/m³)	Project in Isolation	19.0	21.9	30.2	***164 µg/m³***
	Project + Background	33.4	36.3	44.6	
Annual Average (µg/m³)	Project in Isolation	0.02	0.03	0.1	***31 µg/m³***
	Project + Background	5.32	5.33	5.40	
SO_2					
Maximum 1-Hour Average (µg/m³)	Project in Isolation	0.02	0.02	0.03	***214 µg/m³***
	Project + Background	2.92	2.92	2.93	
Annual Average (µg/m³)	Project in Isolation	0.00002	0.00003	0.0001	***21 µg/m³***
	Project + Background	1.50	1.50	1.50	
ARSENIC					
Annual Average (ng/m³)	Project in Isolation	0.002	0.02	0.04	***6 ng/m³***
BORON					
Annual Average (µg/m³)	Project in Isolation	0.0000006	0.000006	0.00001	***5 µg/m³***
CADMIUM					
Annual Average (ng/m³)	Project in Isolation	0.0003	0.003	0.006	***5 ng/m³***
CHROMIUM					
Maximum 1-Hour Average (µg/m³)	Project in Isolation	0.002	0.005	0.002	***1.3 µg/m³***
Annual Average (µg/m³)	Project in Isolation	0.000002	0.00001	0.00003	***0.005 µg/m³***
COBALT					
Maximum 1-Hour Average (µg/m³)	Project in Isolation	0.001	0.003	0.001	***0.21 µg/m³***
Annual Average (µg/m³)	Project in Isolation	0.0000008	0.000008	0.00002	***0.0017 µg/m³***
COPPER					
Maximum 1-Hour Average (µg/m³)	Project in Isolation	0.003	0.007	0.003	***10 µg/m³***
MANGANESE					
Annual Average (µg/m³)	Project in Isolation	0.00004	0.0004	0.0008	***0.16 µg/m³***

RECEPTOR ID		R1	R2	R3	AIR QUALITY OBJECTIVE
RECEPTOR		BARNES' HOUSE	MIDDLE PARK HOMESTEAD	MT NORMAN HOMESTEAD	
NICKEL					
Annual Average (ng/m3)	Project in Isolation	0.002	0.01	0.03	***22 ng/m3***
LEAD					
Annual Average (µg/m^3)	Project in Isolation	0.00002	0.0001	0.0003	***0.5 µg/m^3***
SELENIUM					
Maximum 1-Hour Average (µg/m^3)	Project in Isolation	0.00002	0.00004	0.00002	***2 µg/m^3***
Annual Average (µg/m^3)	Project in Isolation	0.00000001	0.0000001	0.0000003	***0.2 µg/m^3***
ZINC					
Maximum 1-Hour Average (µg/m^3)	Project in Isolation	0.02	0.04	0.02	***20 µg/m^3***
Annual Average (µg/m^3)	Project in Isolation	0.00001	0.0001	0.0003	***2 µg/m^3***

9.3 GREENHOUSE GAS

A GHG assessment for the project has been conducted in accordance with the requirements of the DETSI *Greenhouse Gas Emissions Guideline* (ESR/2024/6819) (GHG Guideline). The assessment report (Appendix L) includes the following key components:

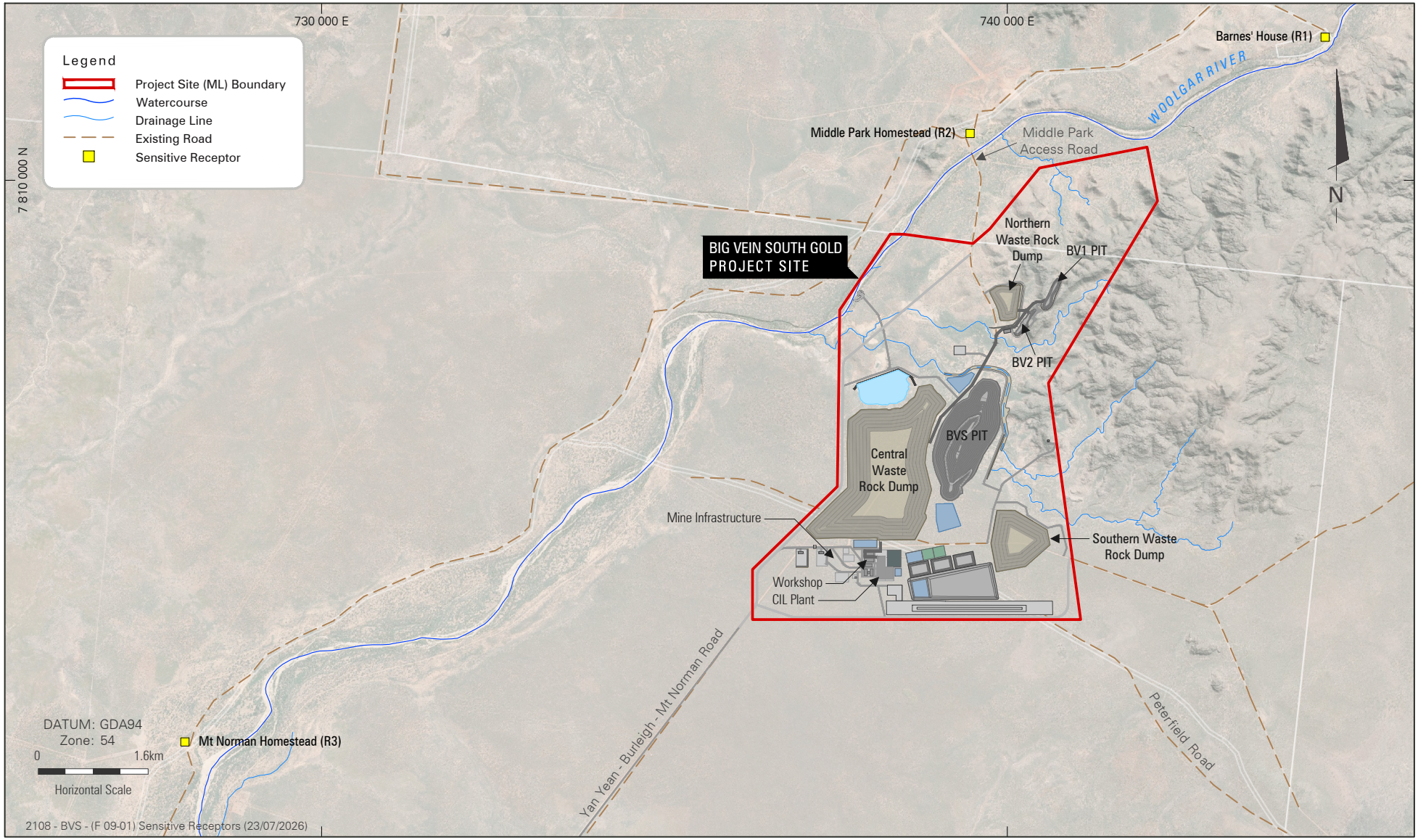
- Methods for estimating project GHG emissions
- GHG emissions inventories for scope 1, 2 and 3 emissions
- GHG abatement plan
- Risk assessment

The key conclusions of the GHG assessment are as follows:

- There are no scope 2 GHG emissions associated with the project as all electricity is proposed to be generated on-site power by a combination of diesel generators and a 2.5 MW solar array
- The estimated project scope 1 GHG emissions are greater than 25,000 t CO_2-e and the project is therefore categorised as a medium to high emitter under the GHG Guideline, and requires an inventory of scope 3 emissions (Table 4 of the *GHG Report* [Appendidx L]) and a GHG abatement plan (Section 5 of the *GHG Report* [Appendix L])
- A key GHG abatement measure for the project is the inclusion of solar power in the on-site power generation
- As the estimated scope 1 GHG emissions are greater than the 25,000 t CO_2-e threshold, GHG emissions and energy use/production will need to be reported annually under the National Greenhouse and Energy Reporting (NGER) scheme

- The project maximum annual scope 1 GHG emissions, applicable to the Safeguard Mechanism, are estimated to be 88,256 t CO_2-e and hence the project does not trigger the Safeguard Mechanism threshold of 100,000 t CO_2-e. The project will therefore not subject to the requirements of the Safeguard Mechanism.

FIGURES



BIG VEIN SOUTH GOLD PROJECT

Sensitive Receptors

FIGURE 9-1

10

NOISE AND VIBRATION



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Table 10-4 Predicted Project Noise Levels and Noise Criteria at Sensitive Receptors

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Figure 10-1 Sensitive Receptors

10 NOISE AND VIBRATION

10.1 INTRODUCTION

This section provides a summary of the key findings of the noise and vibration assessment undertaken for the Big Vein South Gold Project (the project) by Bridges Acoustics. The detailed assessment is provided in the *Noise Report* (Appendix H).

10.2 PROJECT SETTING AND SENSITIVE RECEPTORS

The terrain of the project site rises gently from the south-west across the project site, increasing towards the north-eastern extents of the project boundary (Figure 10-1). Elevations in the project site range from 375 to 425 m Australian Height Datum (AHD) and the Woolgar River runs along the western edge of the project site boundary.

The project site is remote and located within large cattle grazing properties. The region is sparsely populated with only three homesteads located within 10 km of the project site. There are no other sensitive receptors in proximity to the project site.

The location of the sensitive receptors relative to the project site is shown in Figure 10-1 and described in Table 10-1.

Table 10-1 Sensitive Receptors

RECEPTOR ID	NAME	EASTING[1]	NORTHING[1]	DISTANCE AND DIRECTION FROM THE PROJECT SITE
R1	Barnes' House	744,624	7,812,087	3 km NE
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[1]*Coordinates in GDA94/MGA Zone 54*

10.3 EXISTING NOISE ENVIRONMENT

The sensitive receptors are remote rural homesteads that do not experience background noise associated with main roads or railways. Based on noise measurements previously taken and observations made at other remote locations in central Queensland, sources of background noise would include:

- Insects and frogs, particularly in the wet season when surface water is more consistently available;
- Wind, including the effect of wind in trees and other foliage, which occurs intermittently and varies substantially from time to time; and
- Equipment such as ventilation fans, air conditioners, power generators and other machines associated with each homestead, which operate intermittently as required.

Background noise levels would therefore vary from less than 20 LA90,15min during a quiet period with no significant wind and insect/frog noise, to over 40 LA90,15min. Background noise levels would generally be lower during the dry season due to less insect and frog noise and would typically be lower during the night due to lower average wind speeds. Noise criteria relevant to this assessment are based on a minimum background noise level of 30 LA90,15min during all time periods.

10.4 REGULATORY REQUIREMENTS

The following policy and guidance documents developed or adopted by the Department of Environment, Tourism, Science and Innovation (DETSI), formerly the Department of Environment and Science (DES), are relevant to this assessment:

- *Planning for Noise Control Guideline* (Environmental Protection Agency (EPA), 2004a);
- *Draft Ecoaccess Guideline for the Assessment of Low Frequency Noise* (EPA, 2004b) (Low Frequency Noise Guideline);
- *Noise Measurement Manual* (Department of Environment and Heritage Protection, 2013);
- *Acoustics – Aircraft Noise Intrusion - Building Siting and Construction* (AS2021) (Standards Australia, 2015);
- *The Health Effects of Environmental Noise* (Commonwealth of Australia, 2018);
- *Environmental Protection (Noise) Policy 2019* (Qld) (EPP Noise);
- *Environmental Protection Regulation 2019* (Qld);
- Model mining conditions (ESR/2016/1936) (DETSI 2016, last revised 2024); and
- *Guideline - Noise and Vibration from Blasting* (DES, 2016).

10.5 NOISE CRITERIA AND OBJECTIVES

10.5.1 Mine Noise and Sleep Disturbance

The DETSI Model mining conditions (ESR/2016/1936) noise criteria have been used for this assessment and are shown in Table 10-2. LAeq[1] criteria are used to control average mine noise levels in each of the day, evening and night-time periods. The *Noise Report* (Appendix H) compares the model mining conditions criteria with the acoustic quality objectives of the EPP Noise and the criteria recommended in The Health Effects of Environmental Noise. The adopted model mining conditions criteria are the most stringent of the three and hence compliance with the these criteria will ensure compliance with the other two sets of criteria. An adjustment value of 5 dBA has been applied to the LAeq criteria in all time periods on the basis that the night-time adjustment value of zero recommended in the model mining conditions is more stringent than equivalent noise policies in other Australian states and territories.

Sleep disturbance potentially occurs when short, sharp sounds that intrude above the ambient level can be heard within a bedroom or sleeping quarters during the night. The LA1[2] criteria shown in Table 10-2 are the sleep disturbance criteria for the project.

Table 10-2 Adopted Noise Criteria for Sensitive Receptors (dBA[3])

CRITERIA/OBJECTIVES	TIME PERIOD	LAeq	LA1
Model Mining Conditions	Day (7 am to 6 pm), evening (6 pm to 10 pm) and night (10 pm to 7 am)	35	40

[1] The A-weighted equivalent continuous, or logarithmic average, noise level over a defined time period (usually 15 minutes or one hour) either measured or predicted at a specific location.
[2] Noise level exceeded for 1% of the measurement period.
[3] A-weighted decibels

10.5.2 Low Frequency Noise

The Low Frequency Noise Guideline provides a low frequency criterion of 50 decibel (linear) (dBL) inside a residence for the frequency range 10 hertz (Hz) to 200 Hz to minimise the potential for impacts on sensitive receptors. This criterion applies inside a dwelling with the windows and doors closed and would be approximately equivalent to a criterion of 60 dBL outside a dwelling.

10.5.3 Blasting – Ground Vibration and Overpressure

Blasting criteria are sourced from the *Guideline - Noise and Vibration from Blasting* (DES, 2016) which contains the following criteria:

- Ground vibration limits of 5 mm/s Peak Particle Velocity (PPV) for 9 out of 10 consecutive blasts, with an absolute limit of 10 mm/s PPV; and
- Noise limit (overpressure) of 115 dBL peak for 9 out of any 10 consecutive blasts, with an absolute limit of 120 dBL peak for all blasts.

The blasting guideline recommends blasting criteria apply, for mining projects, during the hours 7 am to 6 pm, 7 days per week.

These criteria, although intended to minimise disturbance to residents, would also prevent any damage to residential or industrial structures.

10.5.4 Aircraft Noise

Aircraft noise criteria have been determined based on *Acoustics – Aircraft Noise Intrusion, Building Siting and Construction (AS2021)* (Standards Australia, 2015) for the worst-case scenario for the project of two night-time flights and one day-time flight in a 24-hour period. An average maximum noise level of less than 90 dBA has been adopted as the aircraft noise criteria.

10.6 PREDICTION METHODOLOGY

Environmental noise levels expected to be produced by the project have been calculated using RTA Technology Pty Ltd Environmental Noise Model software (ENM software). ENM software is a general-purpose noise modelling package that combines terrain and noise source information with other input parameters such as weather conditions to predict noise levels at specific receptor locations or as contours over a specified receptor area.

10.6.1 Prevailing Weather Conditions

Weather conditions relevant to the project site were derived from CALMET 2020 data, supplemented by stability class and representative annual average temperature and relative humidity data supplied by the project air quality consultant (Section 9 – Air Quality). This data was analysed to identify prevailing noise enhancing winds and temperature inversion conditions. The parameters shown in Table 10-3 were considered in the noise and vibration assessment.

10.6.2 Operational Noise Sources

Noise levels that would be produced by equipment operating as part of the project have been determined from noise measurements taken at other operating mines. The sound power levels for each noise source, together with the source locations, are provided in the *Noise Report* (Appendix H). Noise levels from the project have been

calculated with all noise sources operating normally. Several project design features have been adopted for the purpose of ensuring compliance with noise criteria. The project noise model takes account of these design features.

Noise modelling was conducted for Project Years 1, 5 and 11 to ensure that a representative range of potential worst case noise impact scenarios were considered for the sensitive receptors. These scenarios include the operational years when the mining activities are in closest proximity to each of the three closest receptors and also include the year of maximum material movements from the project (Project Year 5).

Table 10-3 Modelled Weather Conditions

TIME PERIOD	SCENARIO	WEATHER PARAMETER				
		TEMP. (°C)	RELATIVE HUMIDITY (%)	WIND SPEED (m/s)	WIND DIRECTION	TEMP. GRADIENT (°C/100 m)
Day	Calm	30	40	0	-	-2
	Prevailing Wind	30	40	2	ESE	-2
Evening	Neutral	25	50	0	-	-
	Prevailing Wind	25	50	2.5	NE	-
		25	50	3	ESE	-
	Inversion + Prevailing Wind	25	50	2	NE	3
Night	Inversion	15	60	1	NE	4
	Inversion + Prevailing Wind	15	60	2	NE	3
	Prevailing Wind	15	60	2.5	NE	0
		15	60	2.5	ESE	0

10.7 IMPACT ASSESSMENT

10.7.1 Project Noise

Table 10-4 provides a summary of predicted noise levels from the project mining operations at sensitive receptors. As shown in Table 10-4, predicted noise levels meet the relevant criteria at all sensitive receptors in all time periods.

Table 10-4 Predicted Project Noise Levels and Noise Criteria at Sensitive Receptors

RECEPTOR ID	PROJECT YEAR	PREDICTED NOISE LEVEL (LAeq,15min)			
		NEUTRAL	PREVAILING		
		DAY	DAY	EVENING	NIGHT
R1	1	15	15	19	26
	5	12	12	14	25
	11	8	8	10	20
R2	1	28	32	34	35

RECEPTOR ID	PROJECT YEAR	PREDICTED NOISE LEVEL (LAeq,15min)			
		NEUTRAL	PREVAILING		
		DAY	DAY	EVENING	NIGHT
	5	24	25	30	31
	11	18	21	26	26
R3	1	8	17	20	20
	5	9	19	23	23
	11	7	15	17	17
	Noise Criteria	**35**	**35**	**35**	**35**

Noise contour figures for Project Years 1, 5 and 11 for day (neutral), day (prevailing), evening (prevailing) and night (prevailing) are provided in the *Noise Report* (Appendix H).

10.7.2 Cumulative Mine Noise

The area around the project site is currently occupied by large rural properties typical of north Queensland. No other industrial developments exist or are proposed in the vicinity of the project. Therefore, no cumulative noise impacts will occur at any sensitive receptors.

10.7.3 Sleep Disturbance

Project related noise sources that have the potential to disturb sleep include vehicle reverse alarms, generators, material handling, and heavy vehicle movements.

The noise model for the project was used to calculate the maximum noise levels at the sensitive receptors. The model predicted that LA1,15min noise levels will exceed LAeq,15min levels by less than 0.2 dBA at all sensitive receptors. In reality, differences between LAeq,15min and LA1,15min levels would typically be higher than this due to variations in wind or other atmospheric conditions, as well as variations in equipment operating locations during a typical 15-minute period. However, experience at other mine sites in Queensland indicates that LA1,15min levels are rarely more than 5 dBA above LAeq,15min levels.

Considering that the recommended LA1,15min criteria are 5 dBA above the LAeq,15min criteria (refer to Table 10-2) it is assumed that, where predicted LAeq,15min noise levels meet the relevant criteria, LA1,15min noise levels would also meet the relevant criteria. Project noise levels are therefore expected to comply with the sleep disturbance criteria.

10.7.4 Low Frequency Noise

The main potential sources of low frequency noise associated with the project would be material processing and other industrial equipment or heavy vehicle engine exhausts, however, all project sources produce some low frequency noise.

The project noise model was used to calculate low frequency noise at all sensitive receptors. The model calculated that, for the worst-case set of weather conditions for each sensitive receptor, the total low frequency noise levels would remain below the adopted external criterion of 60 dBL in all assessed years and at all receptors.

10.7.5 Construction Noise

Construction activities to be undertaken as part of the project include the construction of mine infrastructure in the southern section of the project site, water management structures and internal haul roads. The earthmoving phase for each construction activity has the greatest potential to produce audible noise.

The *Noise Report* (Appendix H) details the equipment fleet expected to be required for earthworks and construction activities. An assessment of sound power levels indicates that noise levels associated with construction activities are unlikely to exceed the predicted operational noise levels presented in Section 10.7.1. In the absence of a Queensland construction noise policy, the acoustic quality objectives of the EPP Noise have been adopted for the construction noise assessment.

In summary, construction activities are predicted to meet relevant noise objectives at all sensitive receptors.

10.7.6 Blasting - Ground Vibration and Overpressure

The predicted blast effects from mining at the sensitive receptors have been calculated, as detailed in the *Noise Report* (Appendix H), and indicate that:

- Predicted ground vibration and blast overpressure levels for blasts in the BVS pit will be within the criteria at all sensitive receptors; and
- Blasts in the northern BV1 and BV2 pits, up to 6,000 kg maximum instantaneous charge, are predicted to comply with the criteria at all sensitive receptors.

10.7.7 Aircraft Noise

Workforce transport to and from the project site would primarily occur by plane upon completion of the airstrip. A regular air service is proposed to and from Townsville.

A theoretical worst-case situation, assuming a twin engine turboprop airliner such as an ATR-72, would result in an average maximum noise level of 33 LAmax during landing and 40 LAmax during take-off at sensitive receptor R1, with lower noise levels at the other sensitive receptors. Maximum noise levels from aircraft servicing the project would therefore be within the maximum noise level criterion of 90 dBA at all sensitive receptors.

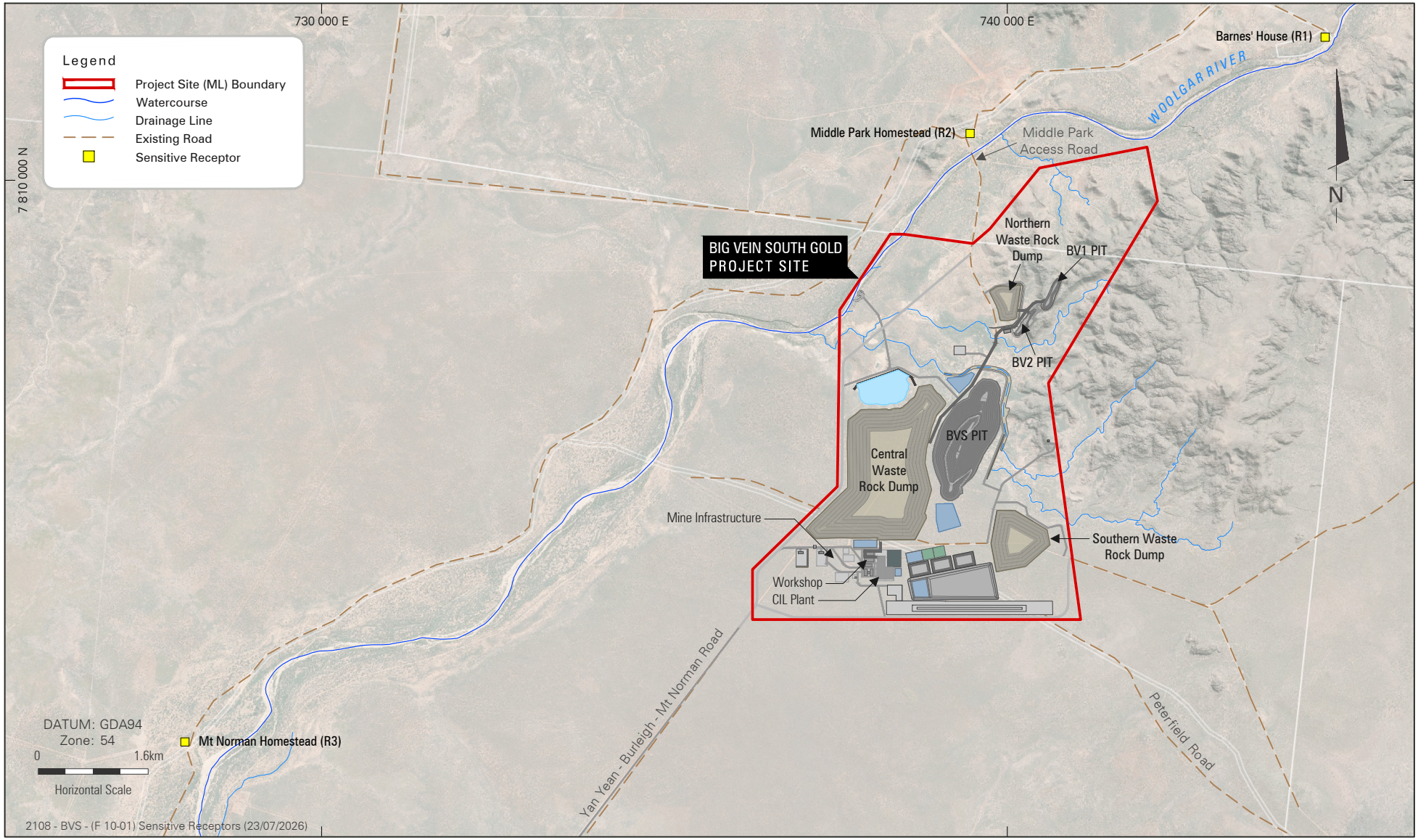
10.8 MITIGATION MEASURES

A complaints handling procedure will be implemented for the project. The procedure will involve the investigation of any community complaints in relation to noise. These investigations would include noise monitoring, if necessary.

To ensure compliance at sensitive receptor R2, the following mitigation measures are required (these have already been accounted for in the noise assessment):

- Fit effective engine exhaust silencers to all haul trucks, drills and water carts;
- Operate tracked dozers at moderate engine speed in first gear in reverse on Waste Rock Dumps (WRDs) during the night period or use wheeled dozers to avoid generating significant track noise at night; and
- Dump plan for the Northern WRD will consider dumping on higher areas in the day and on lower shielded areas in the evening and night, where the configuration of the WRD allows. This strategy will provide a noise barrier for evening and night operation of the Northern WRD and will maintain the barrier as the WRD increases in height.

FIGURES



BIG VEIN SOUTH GOLD PROJECT

Sensitive Receptors

FIGURE 10-1

11

VISUAL AMENITY



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11 VISUAL AMENITY

11.1 INTRODUCTION

A visual impact assessment was undertaken by Hansen Environmental Consulting to determine the impact of the Big Vein South Gold Project (the project) on the surrounding area. This section describes the methodology for the visual impact assessment, the project visual setting, the visual effects and potential impacts of the project, and proposed mitigation measures.

The project involves the construction and operation of a greenfield open cut gold mine. Significant project elements that have the potential to impact the visual amenity of the surrounding area, include:

- Three (3) Waste Rock Dumps (WRDs);
- Heap Leach Facility (HLF) and Tailings Storage Cell (TSC);
- Three (3) open cut pits;
- Mine infrastructure located at the southern end of the project site, including:
  - Carbon-in-Leach (CIL) plant;
  - Run-of-Mine (ROM) ore stockpiles;
  - Mine industrial area;
  - Workshop, warehouse and administration buildings;
  - Workforce accommodation camps; and
  - Airstrip.

11.2 METHODOLOGY

The visual assessment involved undertaking photographic and map analyses to identify visual receptors and characterise the existing visual setting, the sensitivity of visual receptors and the visibility and visual effect of the project.

Visual impacts are determined by assessing the visual sensitivity of receptors and the visual effect of the project on each receptor. Visual sensitivity is a measure of how critically the various components of a project are viewed by people utilising different land uses in the vicinity. It considers the importance of visual amenity to the receptor, with residential receptors considered to have a higher visual sensitivity than receptors such as industrial facilities.

Visual effect is a measure of the level of visual contrast between the project elements and the existing visual environment, and is determined by a balanced consideration of the following:

- Screening by intervening topography and vegetation;
- The level of contrast and integration between the visible project elements and the landscape within which they are viewed;
- The distance between the visual receptor and the project elements; and
- The proportion of the view occupied by the project elements.

Lines of sight were developed to assist in determining the visibility and visual effect of the project at the visual receptors. A line of sight is a representative sight line drawn from a visual receptor to the project elements.

Lines of sight are drawn from viewing eye level and are used to evaluate the extent to which project elements will be visible at a receptor location. Topographic maps, aerial photography and photographs from the receptors to the project site, were used to identify the terrain and vegetation across the site, and to determine the level of screening of project elements by intervening topography and/or vegetation from each visual receptor.

The visual impact on each visual receptor was then assessed through the consideration of the visual sensitivity of the receptor and the visual effect of the project elements as viewed from the receptor, using the visual assessment matrix (Table 11-1).

Table 11-1 Visual Assessment Matrix

	HIGH EFFECT	MODERATE EFFECT	LOW EFFECT	VERY LOW EFFECT
HIGH SENSITIVITY	High Impact	High Impact	Moderate Impact	Low Impact
MODERATE SENSITIVITY	High Impact	Moderate Impact	Low Impact	Low Impact
LOW SENSITIVITY	Moderate Impact	Low Impact	Low Impact	Low Impact

11.3 VISUAL ASSESSMENT

11.3.1 Visual Setting

The local landscape in the project area is dominated by remnant woodland vegetation including Eucalyptus and Corymbia tree species, the Woolgar River and its floodplain, and the sandstone scarps at the south-western edge of the Gregory Range that extend to the north-eastern portion of the project site (Figure 11-1). The project site is located within large scale cattle grazing properties and there are three grazing property homesteads within 15 km of the project site.

The topography within the project site ranges from approximately 360 m to 450 m Australian Height Datum (AHD). The eastern edge of the project site is characterised by a mosaic of sandstone scarps dissected by streams and gullies. The northern and western portions of the project site are flatter, sloping gradually towards the Woolgar River. A number of streams cross the project site, flowing in a north-westerly direction towards the Woolgar River.

Existing infrastructure within the project site is limited to unsealed local access roads and two stock watering dams. There are remnants of historical gold prospecting infrastructure in the northern portion of the project site (Section 14 – Cultural Heritage).

11.3.2 Visual Receptors

Given the remote location of the project site within large scale cattle grazing properties, the project has a limited number of visual receptors. The visual receptors in proximity to the project site are limited to the homesteads on the grazing properties located within 15 km of the project site and the unsealed local access roads.

The homesteads each have high sensitivity to visual impacts due to their residential use and the potential for adverse visual impacts to affect residential amenity. The unsealed access roads are considered to have low sensitivity as they provide access to the local grazing properties and homesteads and have very low traffic volumes.

The visual receptors are discussed in the following sections.

Middle Park Homestead

Middle Park Homestead is located approximately 1.1 km from the north-western boundary of the project site (Figure 11-1). Middle Park Homestead comprises a residential building, with outlook to the surrounding area. Several small structures are also present on the property (i.e. storage sheds and shade structures for livestock). It is understood that Middle Park Homestead is permanently occupied.

Barnes' House

The Barnes' House is located approximately 3 km from the northern boundary of the project site (Figure 11-1). The Barnes' House comprises a residential building, with outlook to the surrounding landscape and the Woolgar River to the south. Some sheds are also present on the property. It is understood that the Barnes' House is not permanently occupied and is used occasionally mostly on weekends.

Mt Norman Homestead

The Mt Norman Homestead is located approximately 8.5 km from the south-western corner of the project site (Figure 11-1). The Mt Norman Homestead comprises a small residential building with outlook to the surrounding area and some sheds for livestock. The Mt Norman Homestead is permanently occupied by its owners.

Unsealed Local Access Roads

The unsealed local access roads currently traversing the project site are proposed to be realigned around the perimeter of the mine site, prior to the commencement of the project (Figure 11-1). The Yan Yean – Burleigh – Mt Norman Road will also become the main road access for the project.

11.3.3 Visual Effect

Project Elements

The elements of the project with the greatest potential to give rise to visual effects are the WRDs and the larger components of mine infrastructure, including the CIL Plant.

The WRDs will be constructed progressively over the life of the mine and will increase in height over time. The WRDs will have terraced slopes during operations and will be progressively revegetation over the life of the project. The WRDs will appear as large earthen dumps that will contrast in colour and landform to the surrounding landscape prior to revegetation. The Central WRD is the largest. It will be located in the south-western portion of the project site and will be developed progressively over the life of the mine. The Central WRD will have a maximum height of approximately 60 m and a footprint area of approximately 260 ha. The Southern WRD will be located in the south-eastern corner of the project site. It will be developed in the later years of the mine life. The Southern WRD will have a maximum height of approximately 50 m and a footprint area of approximately 55 ha. The Northern WRD is the smallest WRD. It will be located in the northern portion of the project and will be fully developed at the end of Project Year 2. The Northern WRD will have a maximum height of approximately 20 m and a footprint area of approximately 18 ha.

The CIL Plant and the workshop will be the tallest elements of mine infrastructure at the southern end of the project site. The CIL Plant will be up to approximately 20 m in height and the workshop will be up to approximately 10 m high. Other mine infrastructure components are expected to be generally less than approximately 5 m in height. The CIL Plant will consist of an elevated crusher and steel framed and iron clad plant buildings. The workshop will be an iron clad steel frame building. These buildings will visually contrast with the surrounding bushland.

Middle Park Homestead

The closest significant project elements to the Middle Park Homestead will be the Northern and Central WRDs, that will be located approximately 2.5 km and 4.5 km to the south, respectively. Views from the homestead towards these WRDs are shown in Figures 11-2 and 11-3. The landscape between the homestead and the project elements comprises the Woolgar River valley and open woodland on relatively flat terrain. The lines of sight indicate that views to the Northern WRD would be screened by intervening topography and vegetation, and views to the Central WRD would likely be screened by foreground vegetation.

The visual effect of the project on the Middle Park Homestead is considered to be very low given the screening of views to key project elements due to intervening topography and/or woodland vegetation.

Barnes' House

The closest significant project elements to the Barnes' House will be the Northern and Central WRDs, that will be located approximately 6 km and 8.75 km to the south-west, respectively. Views from the house towards these WRDs are shown in Figures 11-4 and 11-5. The landscape between the house and the project elements comprises the Woolgar River valley, woodland vegetation and significant topography associated with sandstone scarps in the north-eastern portion of the project site. The lines of sight indicate that views to the Northern and Central WRDs would be screened by intervening topography and woodland vegetation.

The visual effect of the project on the Barnes' House is considered to be very low given the screening of views to key project elements due to intervening topography and woodland vegetation.

Mt Norman Homestead

The closest significant project elements to the Mt Norman Homestead will be the mine infrastructure at the southern end of the project site and the Central and Southern WRDs. The mine industrial area and CIL Plant will be located approximately 9.75 km to the north-east of the homestead. The Central and Southern WRDs will be located approximately 10.5 km and 12.5 km to the north-east, respectively. Views from the homestead towards the mine infrastructure and WRDs are shown in Figures 11-6 and 11-7.

The landscape between the homestead and the project element comprises the Woolgar River valley and relatively flat terrain with open woodland vegetation. The lines of sight indicate that views to the mine infrastructure and WRDs are likely to be screened by intervening woodland vegetation.

The visual effect of the project on the Mt Norman Homestead is considered to be very low given the long range viewing distances and the screening of views to key project elements due to intervening woodland vegetation.

Unsealed Local Access Roads

Project elements will be visible to road users from sections of the local access roads around the perimeter of the project site. The visibility and visual effect of the project elements will vary along the access roads depending on the level of screening from roadside woodland vegetation, intervening topography, travel speed and the direction of travel relative to the visible elements. Overall, the visual effect of the project elements on road users is expected to be moderate.

11.3.4 Visual Impact

The visual impact on the visual receptors has been assessed using the visual assessment matrix presented in Table 11-1. The results of the assessment are presented in Table 11-2.

Homesteads

Views of the mining operations from each of the homesteads are likely to be screened by intervening topography and vegetation. Consequently, the key project elements are not likely to be visible from the homesteads and hence the project will not have a significant visual effect or visual impact on the homesteads.

Unsealed Local Access Roads

Elements of the project will be visible to road users on the local access roads around the perimeter of the project site. The roads are considered to have low sensitivity due to the remoteness of the project area and the low local traffic volumes. The visual effect on the road users will vary depending on a range of factors and overall is considered to be moderate. Overall, the visual impact of the project on the local road users is considered to be low.

Lighting

Night lighting at the mine is not likely to be visible from the homesteads due to screening provided by intervening topography and/or woodland vegetation. Lighting at the mine infrastructure area at the southern end of the project site will also be screened from the homesteads to the north (Middle Park Homestead and Barnes' House) by the Central WRD. Lighting is likely to be noticeable as a faint glow above the mine infrastructure area and any night-time work areas in the pits and WRDs. Night lighting is not likely to adversely impact on the homesteads due to the long range viewing distances (Mt Norman Homestead) and the screening of direct line of sight by the intervening topography and/or woodland vegetation, and the Central WRD. Night lighting is not likely to have a significant impact on the road users on the unsealed local access roads due to the very low volumes of traffic on these roads at night.

Table 11-2 Visual Impact Assessment

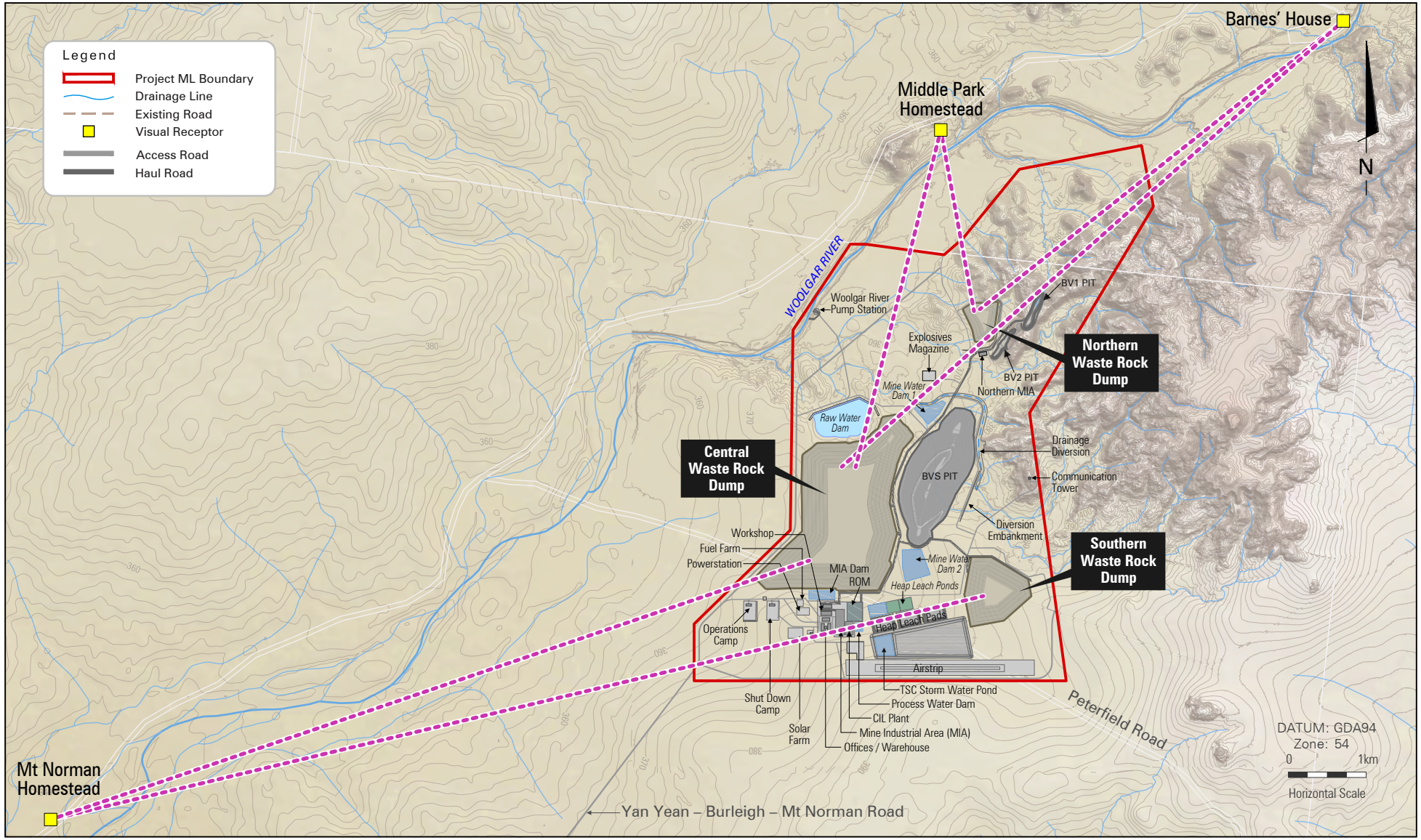
VISUAL RECEPTORS	SENSITIVITY	RELEVANT PROJECT ELEMENTS	VISUAL EFFECT	VISUAL IMPACT
Middle Park Homestead	High	• Central WRD • Northern WRD	Very low	Low
Barnes' House	High	• Central WRD • Northern WRD	Very low	Low
Mt Norman Homestead	High	• Mine Infrastructure • Central WRD • Southern WRD	Very Low	Low
Unsealed Local Access Roads	Low	• Mine Infrastructure • WRDs	Moderate	Low

11.4 MITIGATION AND MANAGEMENT MEASURES

The following mitigation and management measures will be considered to further minimise the visual and lighting effects of the project:

- Progressive rehabilitation and revegetation of available disturbed areas to minimise the visual effect;
- Use of neutral tones in the cladding of mine infrastructure buildings to blend with the surrounding environment; and
- External lighting design that includes:
  - Using the minimum number and intensity of lights required to meet lighting objectives;
  - Utilising amber LED emitters where practical;
  - Switching off all non-essential lighting when not in use. Lights that are not required to be continuously lit will be fitted with motion sensors or timers;
  - Directing lights downwards to illuminate only the specific areas of need, with shields installed to reduce light spill; and
  - Mounting all lights at a height as low as possible while meeting lighting objectives.

FIGURES



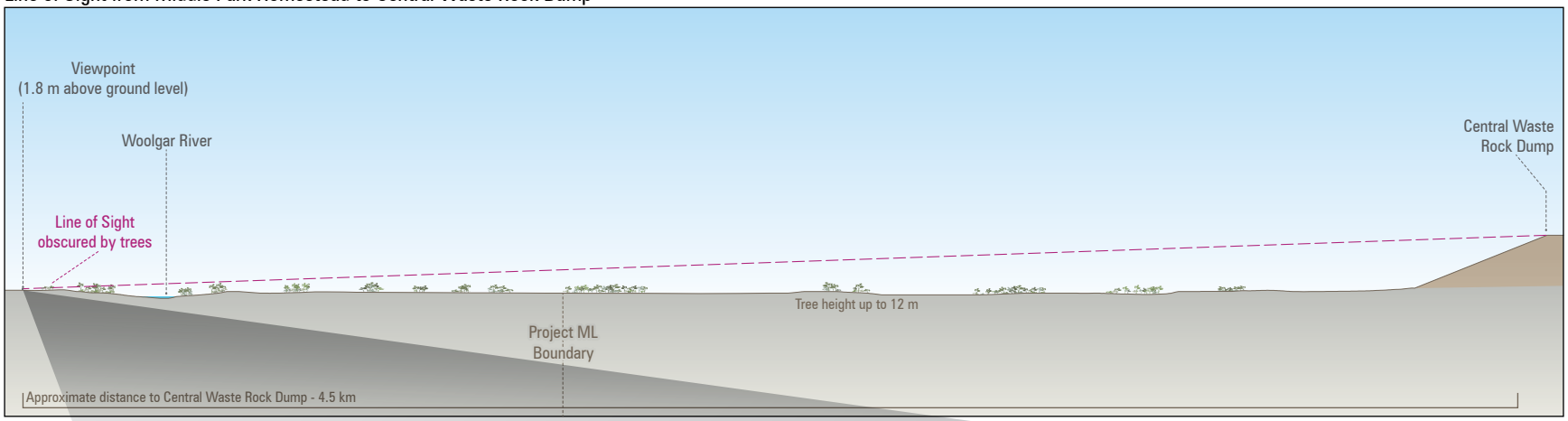
BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Visual Setting

FIGURE 11-1

Line of Sight from Middle Park Homestead to Central Waste Rock Dump





View from Middle Park Homestead to Central Waste Rock Dump

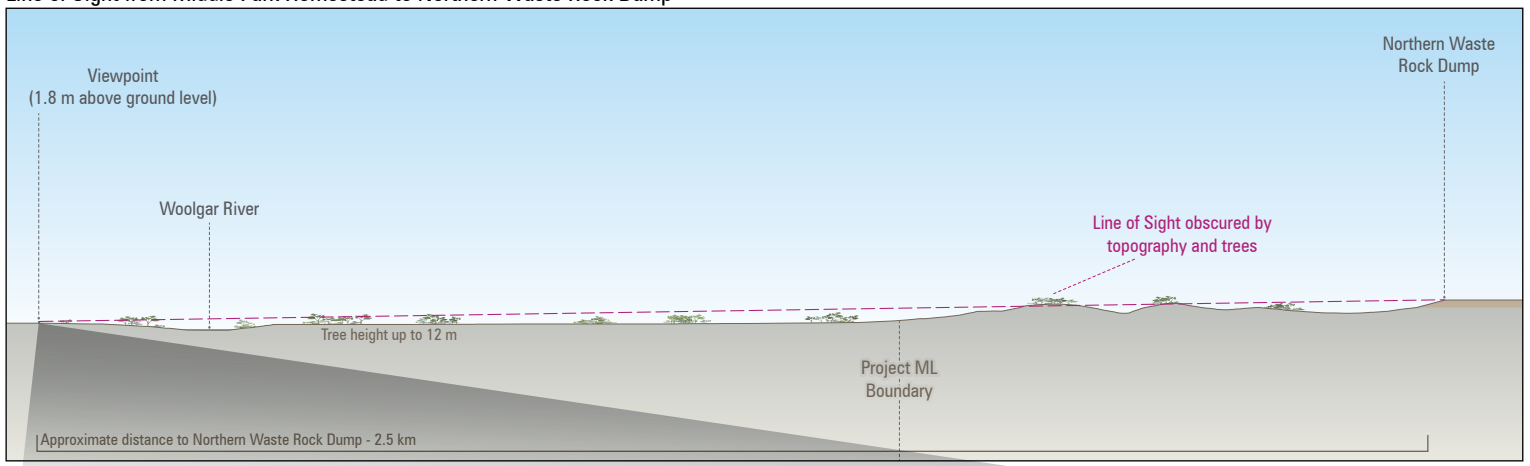
BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

View from Middle Park Homestead to Central Waste Rock Dump

FIGURE 11-2

Line of Sight from Middle Park Homestead to Northern Waste Rock Dump







View from Middle Park Homestead to Northern Waste Rock Dump

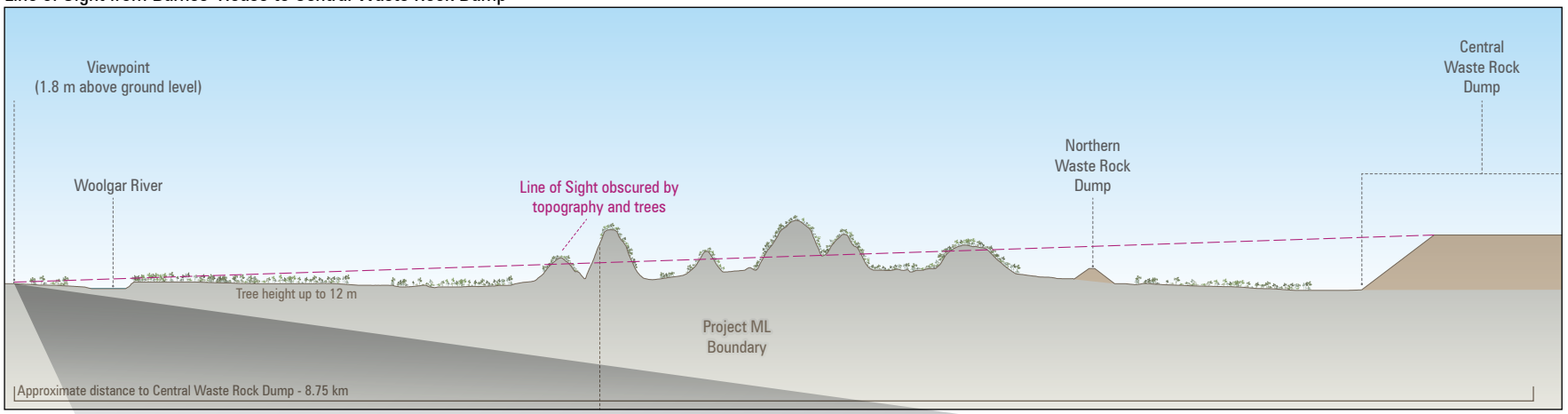
BIG VEIN SOUTH GOLD PROJECT

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View from Middle Park Homestead to Northern Waste Rock Dump

FIGURE 11-3

Line of Sight from Barnes' House to Central Waste Rock Dump



Scales: Horizonal 1:7500 Vertical 1:2000



View from Barnes' House to Central Waste Rock Dump

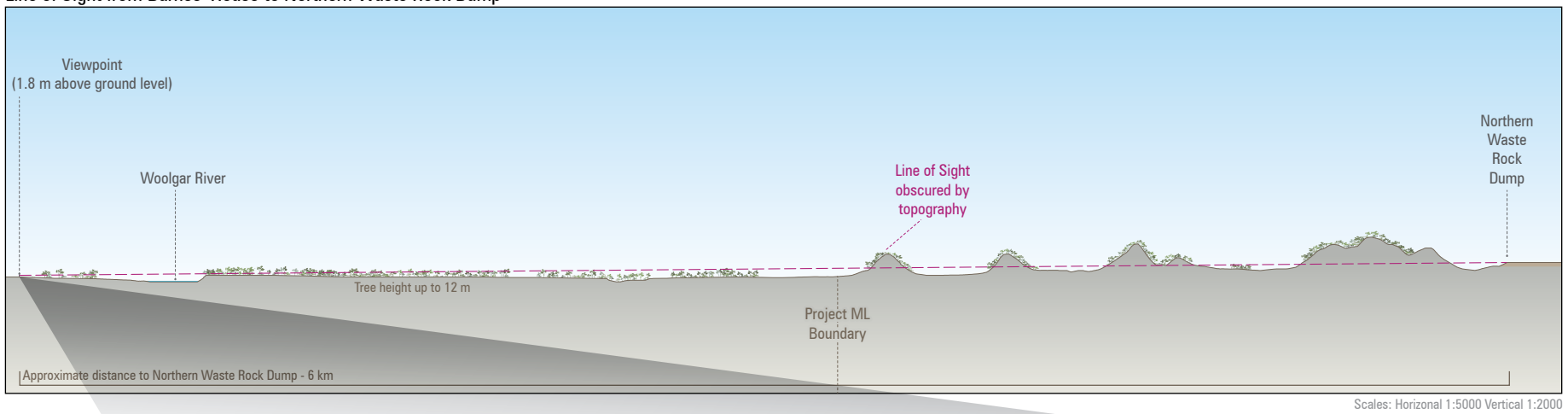
BIG VEIN SOUTH GOLD PROJECT

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View from Barnes' House to Central Waste Rock Dump

FIGURE 11-4

Line of Sight from Barnes' House to Northern Waste Rock Dump





View from Barnes' House to Northern Waste Rock Dump

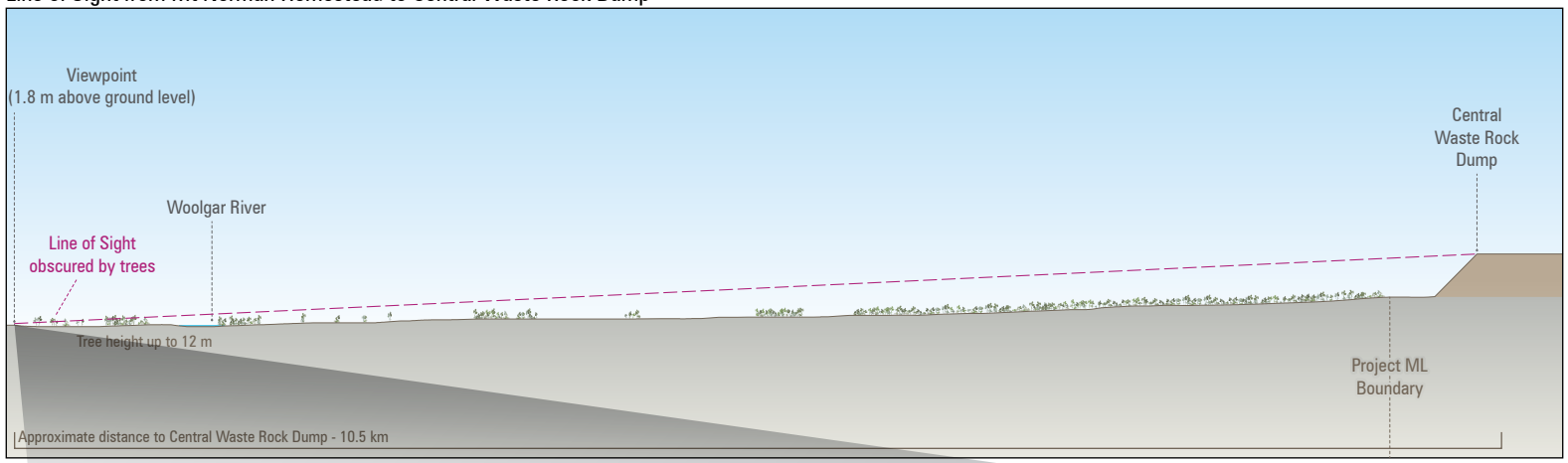
BIG VEIN SOUTH GOLD PROJECT

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View from Barnes' House to Northern Waste Rock Dump

FIGURE 11-5

Line of Sight from Mt Norman Homestead to Central Waste Rock Dump





View from Mt Norman Homestead to Central Waste Rock Dump

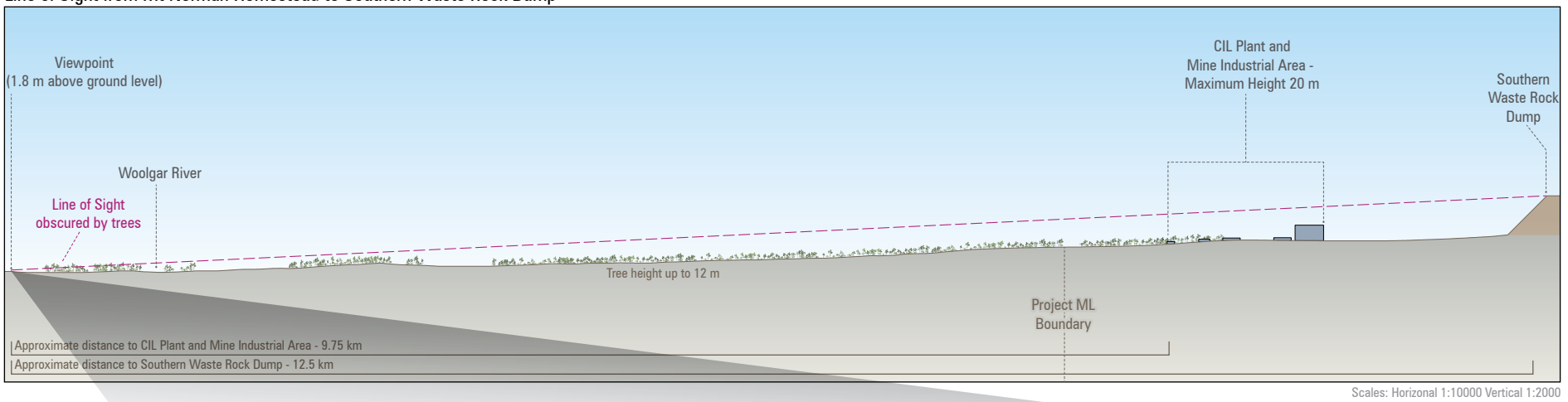
BIG VEIN SOUTH GOLD PROJECT

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View from Mt Norman Homestead to Central Waste Rock Dump

FIGURE 11-6

Line of Sight from Mt Norman Homestead to Southern Waste Rock Dump





View from Mt Norman Homestead to Southern Waste Rock Dump

BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

View from Mt Norman Homestead to Southern Waste Rock Dump

FIGURE 11-7

12

SOCIO-ECONOMICS



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12 SOCIO-ECONOMIC IMPACT ASSESSMENT

12.1 INTRODUCTION

This section provides an overview of the key socio-economic issues relevant to the Big Vein South Gold Project (the project). It includes discussion of project compliance with the relevant regulatory requirements, description of the social setting, details of the project workforce and an overview of the key areas of social impact management for the project.

12.2 REGULATORY REQUIREMENTS

12.2.1 Strong and Sustainable Resource Communities Act

The *Strong and Sustainable Resource Communities Act 2017* (Qld) (SSRC Act) is administered by the Queensland Department of State Development, Infrastructure, Local Government and Planning (DSDILGP). The objective of the SSRC Act is to ensure that residents of communities in the vicinity of large resource projects benefit from the construction and operation of these projects.

The project meets the definition of a "large resource project" under the SSRC Act as it will have a workforce of more than 100 workers. The SSRC Act defines a "nearby regional community" as a community within 125 km of a large resource project with a population of more than 200 people. The township of Richmond (population 578 people) is the only nearby regional community for the project (Figure 12-1).

The SSRC Act has three core elements that are relevant to the project. These elements, and project compliance, are discussed in the following sections.

Workforce Employment Arrangements

The SSRC Act prohibits the employment of 100% of the operational workforce on a Fly-in, Fly-out (FIFO) basis for large resource projects that have a nearby regional community.

The project workforce employment arrangements are discussed in Section 12.5.4. The project will seek to employ available and suitably qualified local and regional workers and will not employ the operational workforce on a 100% FIFO basis.

Recruitment of Local Workers

It is an offence under the SSRC Act for large resource projects to discriminate against local workers in the future recruitment of workers.

The project workforce recruitment arrangements are discussed in Section 12.5.4. The project will provide opportunities for available and suitably qualified local and regional workers to gain employment with the project and will not discriminate against local workers in workforce recruitment.

Social Impact Assessment

The SSRC Act requires a Social Impact Assessment (SIA) to be undertaken in accordance with the *Social Impact Assessment Guideline* (Department of State Development, Manufacturing, Infrastructure and Planning, 2018), (SIA Guideline), for large resource projects conducting an Environmental Impact Statement (EIS). For smaller projects where an application is not subject to an EIS, an SIA under the SIA guideline is not required.

The Department of Environment, Tourism, Science and Innovation (DETSI) has confirmed that the project site-specific environmental authority (EA) application does not require an EIS. Consequently, a SIA under the SIA Guideline is not required. However, for completeness and to achieve the best possible social outcome, each of the key social impact areas identified in the SIA Guideline, were assessed and management strategies identified (Section 12.7).

12.3 PROJECT SETTING

12.3.1 Site Location

The project site is remote, being located approximately 380 km west of Townsville and 100 km north of Richmond in North Queensland (Figure 12-1). The project site is within the North West Queensland Region and in the north-eastern corner of the Richmond Shire Council (RSC) Local Government Area (LGA) (Figure 12-2).

The closest township to the project site is Richmond which is approximately 120 km by road and 2 hours drive. Approximately 90 km of the road from the project site to Richmond is unsealed. Hughenden and Julia Creek are the next closest townships to the project site (Figure 12-2). Hughenden is approximately 110 km drive east of Richmond by road along the Flinders Highway and approximately 150 km south-east of the project site in a direct line. Julia Creek is approximately 150 km west of Richmond by road along the Flinders Highway and approximately 185 km south-west of the project site in a direct line. Townsville is the closest major coastal city and is approximately 500 km drive along the Flinders Highway from Richmond, a 7.5 hour drive from the project site (Figure 12-1).

The project site is located immediately to the east of the rural locality of "Woolgar" (Figure 12-2). 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 located within two large cattle grazing properties referred to as the Middle Park property and the Mt Norman property. Infrastructure on the project site is limited to stock fencing, stock watering dams and unsealed local access roads. There are three grazing property homesteads within 15 km of the project site. There is currently no power, rail or water supply infrastructure in proximity to the project site. There are no other resource projects currently operating in the RSC LGA.

12.3.2 State and Regional Planning Policies

The project site is located in the Richmond Shire Council LGA within the North West Queensland Region. The North West Queensland Region extends from east of Hughenden to the western Queensland border and has a total population of approximately 30,000 people (Figure 12-1). The region has a diverse economy and is renowned for its mining and mineral processing, cattle grazing and outback tourism. The region is 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.

A number of regional strategies and plans have been developed by the State and local governments to support growth within the North-West Queensland Region and the NWMP. The development of the project is consistent with, and complimentary to, the intent of the government plans for the region. The following sections provide an overview of the relevant plans.

North West Regional Plan 2010

The North West Regional Plan 2010-2031 (NW Regional Plan) (Queensland Government, 2010) was prepared by the Minister for Infrastructure and Planning under the *Sustainable Planning Act 2009* and applies to the North West Queensland Region. The NW Regional Plan recognises mining as the largest economic driver for the North West Queensland region now and into the future. The NW Regional Plan sets out strategies and policies aimed at maximising the economic opportunities for mining and mineral processing in the region within acceptable social and environmental standards.

North West Queensland Regional Organisation of Councils

The North West Queensland Regional Organisation of Councils (NWQROC) comprises a number of councils in the region, including the Burke Shire, Carpentaria Shire, Cloncurry Regional, Doomadgee Aboriginal Shire, Flinders Shire, McKinlay Shire, Mount Isa Regional and Richmond Shire Councils. The mission of the NWQROC is to work with councils, communities and people of the North West Queensland Region to facilitate economic diversification and sustainable growth of the region. The NWQROC identifies the North West Queensland Region as one of the world's richest mineral producing areas, that has delivered significant economic benefits (and royalties) to the state for decades. The NWQROC Strategic Plan 2024 -2028 commits to engaging with the State government and resources sector to develop strategies and policies that will enable further development of the region and ensure infrastructure needs are met.

New Economy Minerals

"New economy minerals" is the term used for a range of metals and mineral elements that are essential in the manufacture of the emerging technologies and advanced electronics that are expected to support the economy into the future. Gold is identified as a new economy mineral (Queensland Government, 2020a).

The Queensland government has developed a range of strategies and initiatives to encourage further exploration and facilitate future development of new mining projects focusing on new economy minerals in the NWMP, including:

- *A Strategic Blueprint for Queensland's NWMP: Supporting Strong and Prosperous Regional Communities* (Strategic Blueprint) (Queensland Government, 2017);
- *Research and Development Priorities for Minerals in Queensland* (R&D Roadmap) (Queensland Government, 2020b); and
- *New Economy Minerals: Investment Opportunities in Queensland's Minerals Provinces* (Investment Prospectus) (Queensland Government, 2020a)

One of the aims of the Strategic Blueprint is to create a stronger and more diversified economy, leveraging existing economic and community strengths. In order to achieve this, the need to support further innovation was identified, leading to the development of the R&D Roadmap. The R&D Roadmap is a strategic, industry-led analysis of the research and development priorities for minerals in Queensland, with a focus on new economy minerals projects. The R&D Roadmap identifies research priorities to support both the development of a world-class new economy mineral mining portfolio and knowledge base in Queensland, and a downstream new economy minerals industry.

Complimentary to the R&D Roadmap, the Queensland government has prepared the Investment Prospectus, to encourage further exploration and future development of new mining projects in the NWMP. 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 (referred to in the prospectus as "Woolgar – Big Vein").

Queensland Resources Industry Development Plan

The Queensland Resources Industry Development Plan (QRIDP) (Queensland Government, 2022) sets out a clear 30-year vision for Queensland's resource industry to be "a resilient, responsible and sustainable resource industry that grows as it transforms". Released in 2022, the QRIDP outlines six key focus areas where government and industry need to work together to prepare the resources sector for future opportunities. The QRIDP recognises the importance of supporting new economy mineral projects in Queensland to achieve its vision.

Mount Isa to Townsville Economic Development Zone

The Mount Isa to Townsville Economic Development Zone (MITEZ) is a regional organisation representing seven LGAs across the northern parts of Queensland, including the Richmond, Flinders, McKinlay, Charters Towers and Townsville LGAs, and encompassing the towns of Mount Isa, Cloncurry, Julia Creek, Richmond, Hughenden, Charters Towers and Townsville. MITEZ forms a vital corridor connecting the region to the rest of Queensland, helping to provide, process and export resources to Australia and international markets through road, rail, air and sea transport. MITEZ is committed to maintaining its existing investments, and to investigating new opportunities as they arise, to accelerate growth in the region and secure its economic future for decades to come.

The project is located along the MITEZ corridor.

12.4 EXISTING SOCIO-ECONOMIC ENVIRONMENT

A description of the local and regional areas relevant to the project is provided in the following sections, along with an overview of the existing socio-economic environment within these areas.

12.4.1 Local Social Environment

The local area refers to the RSC LGA, with a specific focus on the township of Richmond as a nearby regional community for the project (Figure 12-2).

Richmond Shire Council Local Government Area

The RSC LGA covers an area of approximately 25,580 km^2 and incorporates the township of Richmond. At the time of the 2021 census, the RSC LGA had a total population of 761 persons.

According to the *NWQROC Regional Profile* (AEC Group Ltd, 2018), significant challenges facing the RSC LGA include a reliance on non-resident workforces, a deteriorating labour market, low levels of high school completion and post-school education and limited access to appropriate training.

Richmond Township

Richmond township is located halfway between Townsville and Mt Isa on the Flinders Highway and approximately 120 km by road to the south of the project site (Figure 12-1). Richmond is the administrative centre of the RSC LGA. At the time of the 2021 Census, the population of Richmond township was 578 persons (Australian Bureau of Statistics (ABS), 2022) of which almost 8%[1] identified themselves as Aboriginal and/or Torres Strait Islander.

[1] Approximately 18% of the population did not state their Indigenous status, therefore this number may be higher.

At the time of the 2021 Census (ABS, 2022), the industries providing the majority of employment for Richmond residents were:

- public administration and safety industry - 23%; and
- agriculture, forestry and fishing industry - 20%.

In 2021, 72% of the total labour force was employed full-time, 21% was employed part-time and the unemployment rate was 2.1% (ABS, 2022). There were no persons residing in Richmond who were employed by the mining industry in 2021. Table 12-1 provides a summary of the key population and employment data for Richmond.

The services and facilities available in Richmond include a public library, recreational facilities such as a public swimming pool, tennis courts and golf course, caravan park, limited retail facilities and basic health and education services.

An airport services the Richmond township with flights to Townsville, Mount Isa, Hughenden and Julia Creek. The Great Northern railway linking Townsville to Mount Isa runs through the Richmond township and is serviced by the Richmond railway station (Figure 12-2).

The following emergency services are provided to Richmond:

- Queensland Police Service;
- Queensland Ambulance Service;
- Rural Fire Service; and
- State Emergency Service.

Other Nearby Townships

Other townships in the area include Hughenden, located approximately 240 km by road to the south-east of the project site, within the Flinders Shire LGA, and Julia Creek, located approximately 270 km by road to the south-west of the project site, within the McKinlay Shire LGA (Figure 12-2).

Population and Employment

Table 12-1 provides total and working-age population and key employment data for the townships of Richmond, Hughenden and Julia Creek.

Table 12-1 2021 Population and Employment Data (ABS, 2022)

TOWNSHIP	TOTAL POPULATION	WORKING-AGE POPULATION	UNEMPLOYMENT RATE (%)	EMPLOYED IN THE MINING INDUSTRY (%)
Richmond	578	349	2.1	0
Julia Creek	549	365	1.3	2.7
Hughenden	1,113	643	3.4	0

12.4.2 Regional Social Environment

The regional area includes the local area and the North Queensland Region, with a particular focus on Townsville (Figure 12-1).

North Queensland Region

In 2021, the North Queensland Region had a population of 234,283 persons. This is expected to increase to 324,317 by 2041 (Queensland Treasury, 2022). The major population centres in the North Queensland Region include Townsville, the coastal centres of Ingham and Ayr and the rural centre of Charters Towers.

The North Queensland Region is economically diverse, with a moderate specialisation in the health care and social assistance industry that accounted for 16.7% of employment in 2021 (ABS, 2022). The North Queensland Region provides services and supply chains to mining operations throughout north-west and central Queensland, with approximately 3.2% of employed persons working in the mining sector (ABS, 2022).

Townsville

Townsville is the primary centre of the North Queensland Region and is widely regarded as the capital of North Queensland, providing all the services expected of a moderately-sized city. With a population of approximately 192,820 persons in 2021 (ABS, 2022), the city accounts for more than 80% of the North Queensland Region's population.

In 2021, the unemployment rate in Townsville was reported as 5.1% (ABS, 2022). The city is home to a dedicated Defence Industry Hub, with the defence industry ranked the second highest industry of employment in 2021 at 5.6% (ABS, 2022). Townsville also has a sizeable mining workforce, with the mining industry accounting for 2.8% of Townsville's employment in 2021 (ABS, 2022). Townsville is therefore well-accustomed to transient workforces. Townsville is located on major national and state road and rail networks and has significant capacity for expansion. The city is also the operational base for emergency services in the North Queensland Region and is home to a major domestic airport with international capabilities.

The proponent has identified the North Queensland Region, and in particular Townsville, as the most feasible base from which to source the majority of the project workforce, given its population, labour force and airport facilities.

12.5 PROJECT WORKFORCE REQUIREMENTS

A summary of the anticipated project workforce numbers and occupations is provided in this section, as well as the proposed workforce accommodation, transport and logistics for the project.

12.5.1 Construction Phase Workforce

The project has a two-year initial construction phase that will involve:

- Construction of infrastructure and buildings;
- Mining of the BV1 and BV2 Pits;
- Waste rock removal in the BVS Pit;
- Processing of ore using Heap Leach Pads; 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 anticipated peak construction phase workforce of 984 persons is associated with 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.

12.5.2 Operations Phase Workforce

The project will be fully operational after two years of construction, with Project Year 3 referred to as the beginning of the operations phase. This phase involves open cut mining in the BVS Pit, as well as the processing of ore in an on-site Carbon-In-Leach (CIL) Plant. The operations phase will continue for 9 years until Project Year 11. The anticipated peak operations workforce of 466 persons is associated with Project Year 3. For the remainder of the mine life the operations workforce is estimated to be a total of 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.

12.5.3 Workforce Occupational Requirements

The occupational requirements of the project workforce will vary according to the phase of the project. Table 12-2 details the anticipated number and percentage of workers who will be engaged in the different occupational groupings for the peak year of the construction phase (Project Year 2) and the peak year of the operations phase (Project Year 3).

Table 12-2 Estimated Workforce Occupation Breakdown

OCCUPATION	PEAK CONSTRUCTION PHASE WORKFORCE		PEAK OPERATIONS PHASE WORKFORCE	
	NO. PEOPLE	%	NO. PEOPLE	%
Managers	29	3.0	31	6.7
Professionals	34	3.5	36	7.7
Technical services	16	1.6	16	3.4
Project support and administration	18	1.8	18	3.9
Operations and maintenance	297	30.1	365	78.3
Civil construction	590	60.0	-	-
TOTAL	**984**	**100**	**466**	**100**

12.5.4 Workforce Recruitment

The workforce recruitment strategy will provide opportunities for the employment of suitably qualified workers from the local and regional communities. Based on the local area workforce data discussed in Section 12.4.1, the available labour force in the local area is limited. This is predominantly due to the remote location of the project, and the small population and low rate of unemployment in the nearby regional community of Richmond, and the other regional townships. It is therefore anticipated that the majority of the project workforce will need to be non-local FIFO workers commuting from the North Queensland Region (Townsville). Due to the limited population and labour force in the local area (Richmond, Hughenden and Julia Creek), local workers are likely to be up to 10% of the total workforce.

While the proportion of local labour from the closest regional towns is anticipated to be up to 10% of the project workforce, this figure is not a proposed upper limit. If a larger number of persons from the local area apply for project positions and are found suitable, the actual proportion of the local workforce will be higher.

The proponent will ensure that the project recruitment policy is compliant with the requirements of the SSRC Act discussed in Section 12.2.1, including the prohibition of 100% FIFO workforce arrangements and anti-discrimination provisions for local workers. The recruitment process will include engagement with regional workforce training groups, to ensure employment opportunities for the local workers are maximised.

The NW Regional Plan (Section 12.3.2) identifies that North West Queensland has relatively low Indigenous employment in the resources sector in comparison to the number of resident Indigenous people. It notes that government stakeholders, along with industry and Indigenous communities, are working collaboratively to develop a joint initiative in North West Queensland that aims to increase Indigenous involvement in the resources sector. The proponent will work with the RSC and relevant government stakeholders to identify and develop indigenous employment initiatives, to ensure that recruitment for the project aligns with the NW Regional Plan and that appropriate employment opportunities are available to local Indigenous people.

12.5.5 Workforce Accommodation

Due to the remote location of the project site, the project workforce will be accommodated in on-site camps and will travel to the project site on a FIFO and/or Bus-in Bus-out 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. 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 on-site 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.

The project will have trained paramedics on-site and site security services. The on-site workforce accommodation camps will be self-sufficient and will not be reliant on the Richmond township community services.

12.5.6 Workforce Transport and Logistics

As discussed in Section 12.5.4, the project workforce will be predominantly non-local FIFO workers from the North Queensland Region (Townsville) with up to 10% of workers from Richmond or other regional towns.

During the construction phase, FIFO workers will fly from Townsville to Richmond. Both FIFO and local workers will be transported to site from Richmond airport via buses provided by the proponent. A private airstrip will be constructed within the project site during the construction phase. Once the on-site airstrip is operational, the FIFO workforce will fly directly from Townsville to the project site. Transport of local workers from Richmond would continue by bus.

12.6 COMMUNITY AND STAKEHOLDER ENGAGEMENT

12.6.1 Overview

Community and stakeholder engagement for the project will consist of:

- Communication during project planning and development, to build project awareness, and identify and address stakeholder issues;
- Statutory stakeholder notification and consultation, required for the approvals process; and
- Community and stakeholder engagement throughout the life of the project.

The key stakeholder groups for the project and the approach to consultation are discussed in the following sections.

12.6.2 Key Stakeholders

Key stakeholder groups for the project include:

- Queensland Government;
- Richmond Shire Council;
- The Mount Isa to Townsville Economic Development Zone (MITEZ);
- Landholders within and adjoining the project site; and
- Traditional Owner representatives.

12.6.3 Consultation Approach

Richmond Shire Council

The proponent has consulted with the RSC regularly during the exploration and development phase of the project. This has included regular meetings and project updates with the Mayor and Chief Executive Officer. The RSC is supportive of the project and is interested in the benefits of the project for the Richmond Shire including regional employment and the positive flow-on effects to the local economy, business viability, community and the transport corridor through to Townsville.

The proponent will continue to consult with the RSC during the project approval process through detailed briefings on the project approval process and the environmental impact assessment results. The proponent will continue working closely with the RSC in order to maximise the economic benefits of the project for the area.

MITEZ

MITEZ includes the adjoining Hughenden and Julia Creek Shire Councils and the Townsville City Council. The proponent has previously provided an introductory briefing on the project to MITEZ. The proponent will provide further briefings on the project to MITEZ, as appropriate.

Landholders

As discussed in Section 3.3.2 and shown in Figure 3-4, the project site is located within two parcels of crown land that are leased by separate landholders as follows:

- the Mt Norman property leased by Burnett Holdings (NQ) Pty Ltd; and
- the Middle Park property leased by the Woolgar Valley Aboriginal Corporation.

Both properties are large scale cattle grazing properties. The project site is comprised of existing mining leases and the proponent has existing written agreements with both landholders in relation to access to the land within the mining leases, for mining activities. There are no other adjoining/neighbouring landholders due to the size of the properties. These two properties also contain the three homesteads located within 15 km of the project site. The proponent is in regular communication with the landholders in relation to the ongoing exploration activities within the project site.

The proponent will continue regular communication with the landholders during the project approval process, including briefings on the project approval process and the environmental impact assessment results.

Traditional Owners

The project site is not subject to any Native Title claims or determinations, and Native Title agreements are not required for the project. As stated above, the landholder for the Middle Park property, which is within the northern end of the project site, is the Woolgar Valley Aboriginal Corporation with whom the proponent has existing written agreements to access to the land within the mining leases, for mining activities.

In addition the proponent has engaged with the Traditional Owner representatives in relation to the mining lease and obtaining Aboriginal cultural heritage clearances for exploration activities within the project site in accordance with the *Aboriginal Cultural Heritage Act 2003* (ACH Act). The proponent will continue to engage with the Traditional Owner representatives during the project approval process. Aboriginal cultural heritage clearances are required to be conducted in accordance with the ACH Act.

Complaints Management

A complaints register will be implemented for the project, which will track all complaints received, investigations, responses provided and any corrective actions.

12.7 SOCIAL IMPACT MANAGEMENT

As discussed in Section 12.2.1, an SIA undertaken in accordance with the SIA guideline is not required for this site specific EA application, however, for completeness and to achieve the best possible social outcome, this section provides an overview of proposed management of each of the key social impact areas identified in the SIA Guideline for the project.

12.7.1 Workforce Management

The project is expected to employ a peak workforce of approximately 984 people during the construction phase and a peak of approximately 466 people during the operations phase (Section 12.5). The project recruitment policy will be compliant with the requirements of the SSRC Act in relation to the prohibition of 100% FIFO workforce arrangements and anti-discrimination provisions for local workers.

As discussed in Section 12.5.4, due to the remote location of the project site and the small population and low unemployment rate in the nearby regional community of Richmond, it is anticipated that the majority of the project workforce will need to be non-local workers commuting from the North Queensland Region (Townsville). Due to the limited population and labour force in the local area, local workers are likely to be up to 10% of the total workforce.

Training and development will be provided for the workforce as relevant to their role and as required. For local workers, this will provide an opportunity to improve capability, skills and competency within the local community. The proponent will also work with relevant government stakeholders to provide employment opportunities for local Indigenous people.

The project is not expected to result in labour shortages within the nearby regional community of Richmond since local employment numbers are predicted to be low. Due to its relatively large population, it is anticipated that the majority of the workforce can be sourced from Townsville without any adverse impacts to the Townsville labour force.

Social and recreational activities will be provided on-site for workers, as detailed in Section 12.5.4, including fitness facilities to support the physical health of the project workforce. Internet access and mobile phone services will be available, to encourage workers to communicate with partners and families, and to support their mental health and well-being.

12.7.2 Housing and Accommodation

As discussed in Section 12.5.4, due to the remote location of the project site, the project workforce will be accommodated in on-site camps during their on-site shift roster. On-site camp capacities and facilities are described in Section 12.5.4.

Given the remoteness of the project site from the nearest regional centres, it is unlikely that a significant number of workers will relocate to regional towns (such as Richmond) in order to work for the project. Significant population changes in the local towns resulting from the project workforce are therefore not expected to occur, and the project is not likely to adversely impact on housing in the local or regional area.

12.7.3 Local Business and Industry Procurement

The proponent is committed to supporting local businesses to fulfil the needs of the project, where this is possible. The proponent has actively supported a range of local Richmond businesses over the last 30 years for the purchase of provisions for the exploration and development phase of the project, including:

- Fuel and oil;
- Rural equipment and supplies;
- Food;
- Transportation;
- Electrical items; and
- Tyres.

The proponent has also engaged local contractors to undertake earthmoving activities for exploration activities.

There is a low population and limited local businesses in the RSC LGA and there is potential for local businesses to be overwhelmed by local and project demand for services. The proponent will therefore continue to work closely with the RSC to optimise the use of local services and procurement, to ensure demand is balanced and there are no resulting negative impacts to the local community.

Local businesses are likely to experience a modest increase in revenue from the project through the purchase of goods and provisions, which may lead to an increase in employment within these businesses. There are also opportunities for local businesses to grow in order to service aspects of the project's needs.

Where goods and services cannot be sourced from Richmond or other local towns, the proponent will seek to source these from locations within the MITEZ.

12.7.4 Health and Community Well-being

As discussed in Section 12.5.4, the on-site accommodation camps will provide first-aid and support for project workers. Where medical treatment is required, the on-site airstrip will enable access to the project site by emergency air services. Due to the remote location of the project site and significant distance by road to the nearest regional communities, workers are not expected to utilise services that exist in Richmond and other local towns. The project is therefore not expected to increase demand for local support and emergency services.

Due to the remote location of the project site and the facilities that will be available on-site, the project workforce will have limited exposure to local communities, and the project is therefore not expected to have any adverse impacts on the health and well-being of the Richmond community.

Environmental impacts associated with the project that may affect community health and well-being have been considered in the Environmental Assessment Report, and no significant associated social impacts have been identified. Detailed information relating to these impacts, including proposed management and mitigation measures, is provided in the following sections:

- Groundwater – Section 5;
- Surface Water – Section 6;
- Air Quality – Section 9;
- Noise and Vibration – Section 10;
- Visual Amenity – Section 11;
- Traffic and Transport – Section 13; and
- Progressive Rehabilitation and Mine Closure – Appendix J.

12.8 KEY SOCIO-ECONOMIC BENEFITS

As discussed in Section 12.3, the project involves the development of a new economy mineral mine in the NWMP and is aligned with a number of the significant state and local government planning initiatives for the region. These include:

- QRIDP;
- New economy minerals development in the NWMP; and
- MITEZ development initiatives of the participating local governments.

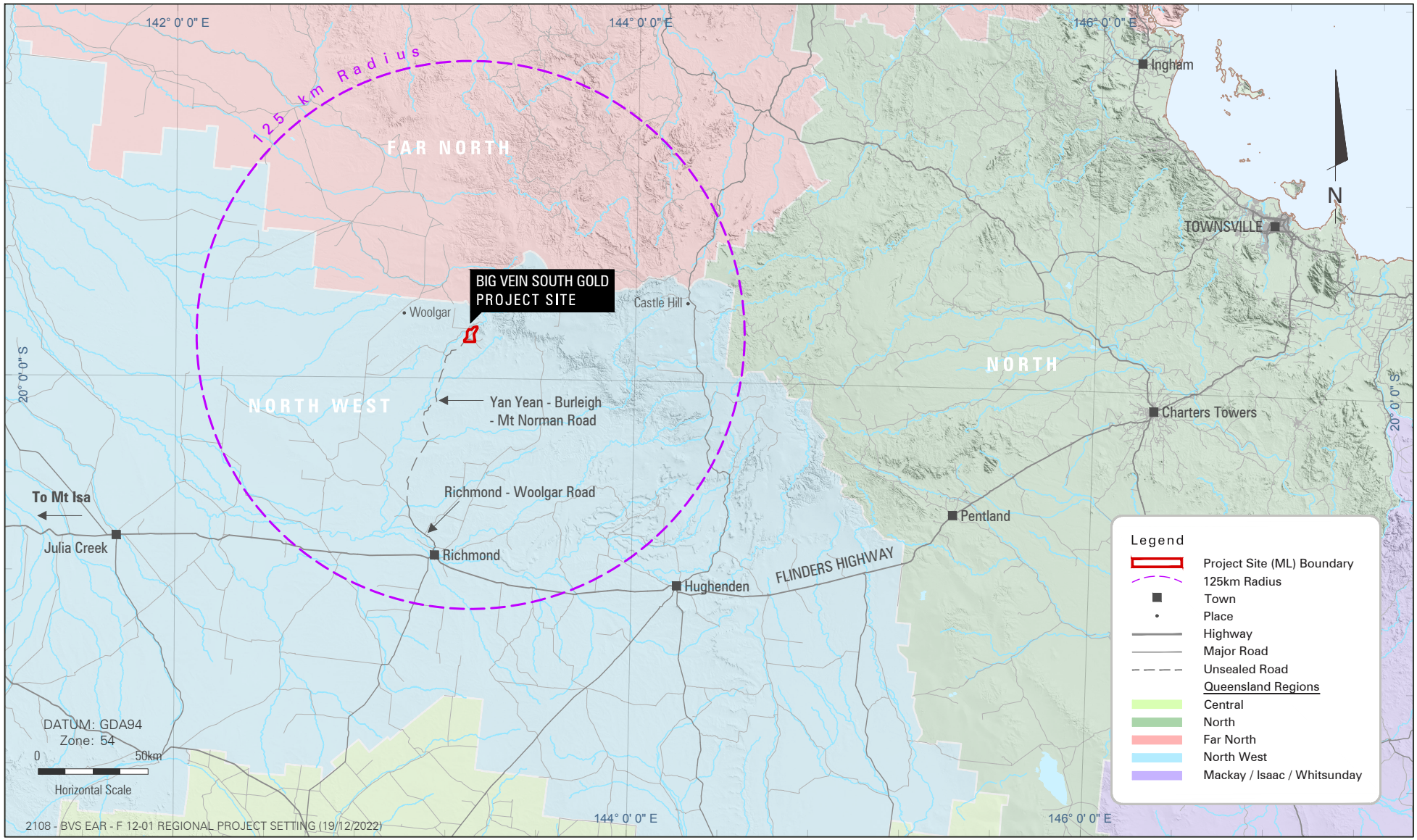
The project will contribute to the continued growth of the North West Queensland region's resources sector and support efforts to build on the strength, prosperity and resilience of the region into the future.

The project will provide job opportunities for the Richmond community and surrounding areas through direct and indirect employment, and will provide employment opportunities and associated economic benefits to Townsville and the North Queensland Region. It will provide positive economic stimulus to the region through the next decade, enabling economic growth of the nearby regional community of Richmond. The project will continue to support local businesses, providing opportunities to enhance local and regional supply chains.

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.
- The payment of annual royalties of up to approximately $15M at peak production to the Queensland Government.

FIGURES

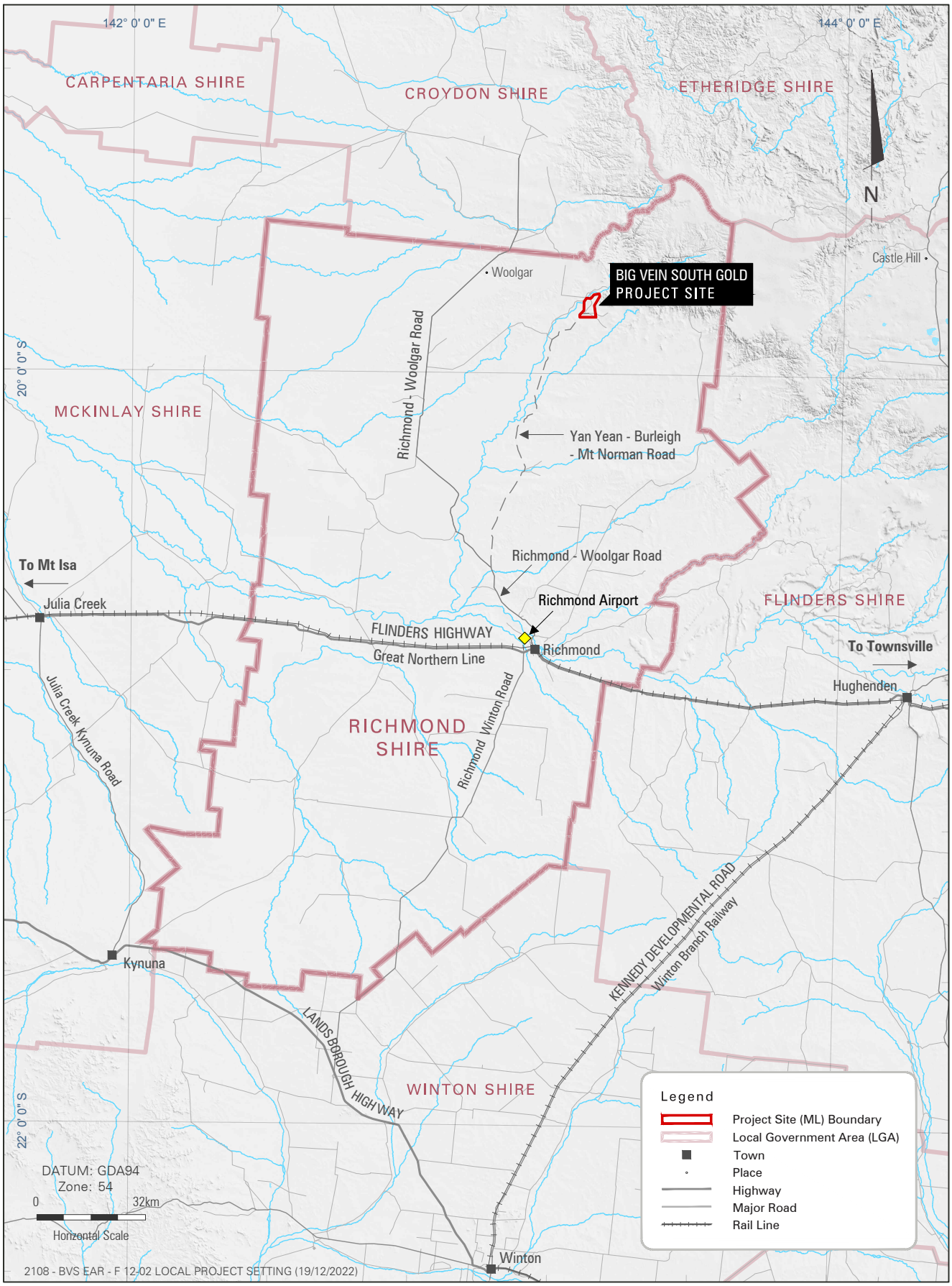


BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Regional Project Setting

FIGURE 12-1



BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Local Project Setting

FIGURE 12-2

13

TRAFFIC AND TRANSPORT



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13 TRAFFIC AND TRANSPORT

13.1 INTRODUCTION

This section provides a description of the road traffic and air transport associated with the Big Vein South Gold Project (the project). It also includes estimated project generated traffic volumes and addresses the management of impacts on public roads.

13.2 ROAD TRAFFIC

13.2.1 Introduction

The project site is located approximately 380 km west of Townsville and 100 km north of Richmond in North Queensland (Figure 13-1). The project site is remote, with the closest township being Richmond, approximately 120 km by road to the south. The project site is in the north-eastern corner of the Richmond Shire Council (RSC) Local Government Area (LGA). The road network relevant to the project is shown in Figure 13-1. Road access to the project site is via the Flinders Highway from Townsville to Richmond, and local RSC roads from Richmond.

The following sections describe the existing road network providing access to the project site, project generated traffic estimates, an assessment of project traffic in relation to base traffic volumes on the Flinders Highway and discussion of the approach to managing impacts on RSC roads.

13.2.2 Existing Road Network

The key roads that will be used by project traffic are the:

- Flinders Highway between Townsville and Richmond, and
- the Richmond-Woolgar Road and Yan Yean-Burleigh-Mt Norman Road, between Richmond and the project site (Figure 13-1).

The distance from Townsville to Richmond along the Flinders Highway is approximately 500 km. The Flinders Highway continues to the west beyond Richmond to Cloncurry. The highway forms a major component of the road access from Townsville to Mt Isa. The Flinders Highway is a state-controlled road with a two lane sealed road pavement.

Richmond-Woolgar Road and Yan Yean-Burleigh-Mt Norman Road are RSC roads. Richmond-Woolgar Road is a sealed two lane road that joins Yan Yean-Burleigh-Mt Norman Road approximately 30 km north-west of Richmond. It is understood that the RSC and local residents refer to this road as Richmond-Croydon Rd. Yan Yean-Burleigh-Mt Norman Road extends for approximately 90 km from Richmond-Woolgar Road to the project site. Yan Yean-Burleigh-Mt Norman Road is a two lane unsealed road.

13.2.3 Project Traffic Volumes

Project generated traffic estimates were developed by the proponent's project planning engineers and are presented in the following sections.

Construction Phase Traffic Volumes

The project will have a two-year construction phase referred to as Project Year 1 and Project Year 2. Mining will also commence during the construction phase. Peak construction phase traffic is anticipated to occur in Project Year 2. The vehicle movements generated during the construction phase are anticipated to be predominately associated with the delivery of construction equipment, materials, fuel and consumables, the removal of wastes and workforce transport.

Workforce Traffic

Current planning indicates that the majority of the construction phase workforce will be Fly-in Fly-out (FIFO) workers from Townsville. Up until the time that the on-site airstrip has been commissioned, the workers will fly from Townsville to the Richmond airport and will be transported from the Richmond airport to site via buses provided by the proponent. It is anticipated that a small number of local workers will drive to Richmond from the surrounding area to catch a bus from Richmond to the project site. Local workers are expected to make up no more than 5% of the total construction phase workforce. All construction phase workers will stay in on-site workforce camps during their on-site shift roster.

The anticipated traffic demands generated by the workforce during the construction phase are shown in Table 13-1. The workforce traffic will predominantly utilise the RSC roads.

Table 13-1 Construction Phase Workforce Traffic

ELEMENT	LOCATION	NO. OF RETURN TRIPS	VEHICLE TYPE
FIFO workforce	Richmond Airport to Site	8 per week	Coaster bus
Local workforce	Local surrounds to Richmond	Less than 30 per week	Light vehicle

Materials

The material movements generated during the construction phase are anticipated to be primarily associated with the delivery of materials for construction, as well as initial mining and mineral processing operations. A concrete batching plant will be established on site and concrete trucks movements to and from Richmond will not be required. Quarry materials will be sourced from within the mining lease or from local borrow pits and quarries between the project site and Richmond, utilising the RSC roads.

Materials will be transported to the project site via the Flinders Highway and the RSC roads. Table 13-2 details the anticipated traffic generated by material movements during the peak year of the construction phase (Project Year 2).

Waste

General waste and sludge/solids from the sewage treatment plants will be removed from the project site and transported to existing waste facilities in Richmond via the Yan Yean-Burleigh-Mt Norman Road and the Richmond-Woolgar Road. Scrap metal and oil waste will be transported to Townsville via the Flinders Highway.

Table 13-2 includes the anticipated traffic generated by waste removal during the peak year of the construction phase (Project Year 2).

Table 13-2 Construction Phase Peak Annual Heavy Vehicle Traffic Estimates

MATERIAL	RETURN TRIPS	VEHICLE TYPE	VEHICLE CLASS
MATERIALS			
Construction equipment	532	Six Axle Articulated	Class 9
Infrastructure	38	Six Axle Articulated	Class 9
Reagents	7	Four Axle Truck	Class 5
	72	Six Axle Articulated	Class 9
	46	B Double	Class 10
Fuel	296	B Double	Class 10
Miscellaneous materials	23	Five Axle Articulated	Class 8
	2	Six Axle Articulated	Class 9
Maintenance spares and consumables	93	Six Axle Articulated	Class 9
WASTES			
General waste	104	Five Axle Articulated	Class 8
Sewage sludge/solids	130	Four Axle Truck	Class 5
Scrap metal	24	Five Axle Articulated	Class 8
Oil waste	24	Five Axle Articulated	Class 8

Operations Phase Traffic Volumes

The project will be fully operational after two years of construction, with Project Year 3 referred to as the commencement of the operations phase. The vehicle movements generated during the operations phase are anticipated to be predominately associated with the delivery of materials and consumables, removal of wastes and workforce transport.

Workforce

Current planning indicates that the majority of the operations workforce will be non-local FIFO workers from Townsville, with up to 10% of the total workforce travelling from the local Richmond area. Prior to the commissioning of the on-site airstrip (Section 13.3), workers will be transported to site from Richmond airport via buses provided by the proponent. Following the commissioning of the on-site airstrip, the number of workforce buses travelling to and from Richmond will reduce. All operations phase workers will stay in on-site workforce camps during their on-site shift roster.

The workforce traffic demands for the operations phase are shown in Table 13-3.

Table 13-3 Operations Phase Workforce Traffic

ELEMENT	LOCATION	NO. OF RETURN TRIPS	VEHICLE TYPE
FIFO workforce	Richmond Airport to Site	4 per week	Coaster bus
Local workforce	Local Surrounds to Richmond	Less than 30 per week	Light vehicle

Materials

The majority of material movements during the operations phase are expected to be associated with the delivery of fuel, materials, maintenance spares and consumables. Materials will be transported to the project site via the Flinders Highway and the RSC roads.

Table 13-4 details the anticipated volume of traffic generated by material requirements during the first year of the operations phase (Project Year 3).

Waste

General wastes and sludge/solids from the sewage treatment plants generated during the operations phase will be removed from the project site and transported to existing waste facilities in Richmond via the Yan Yean – Burleigh – Mt Norman Road and the Richmond-Woolgar Road. Scrap metal and oil waste will be transported to Townsville via the Flinders Highway.

Table 13-4 includes the anticipated volume of traffic generated by waste removal during the operations phase (Project Year 3).

Table 13-4 Operations Phase Peak Annual Heavy Vehicle Traffic Estimates

MATERIAL	RETURN TRIPS	VEHICLE TYPE	VEHICLE CLASS
INPUTS			
Reagent delivery	12	Four Axle Truck	Class 5
	132	Six Axle Articulated	Class 9
	84	B Double	Class 10
Fuel delivery	528	B Double	Class 10
Media materials	96	Five Axle Articulated	Class 8
	24	Six Axle Articulated	Class 9
Maintenance spares and consumables	156	Six Axle Articulated	Class 9
OUTPUTS			
General waste	104	Five Axle Articulated	Class 8
Sewage sludge/solids	80	Four Axle Truck	Class 5
Scrap metal	24	Five Axle Articulated	Class 8
Oil wastes	24	Five Axle Articulated	Class 8

Over Dimensional Vehicles

A number of deliveries to the project site, particularly during the construction phase, will be of large indivisible equipment and materials requiring an escort. The proponent will obtain the relevant permits from the Queensland Police Service (QPS) in accordance with the requirements of the *Transport Operations (Road Use Management – Mass, Dimensions and Loading) Regulation 2005* and the *Transport Operations (Road Use Management) Act 1995*. All loads will be subject to the permitting requirements of the Department of Transport and Main Roads (DTMR), RSC and other regulatory bodies, as required.

13.2.4 Flinders Highway Traffic Assessment

Flinders Highway Base Traffic Volumes

Average Annual Daily Traffic

The state-controlled roads impacted by project traffic will be limited to the Flinders Highway between Richmond and Townsville. Traffic volume data for the Flinders Highway has been obtained from the DTMR traffic count site between Hughenden and Richmond (Figure 13-1). This section of the highway has the lowest existing traffic volumes of any segment between Townsville and Richmond and therefore provides a conservative basis for the consideration of baseline traffic volumes.

For the segment of the Flinders Highway between Hughenden and Richmond, the Average Annual Daily Traffic (AADT) for the years 2014 to 2021 ranges from a minimum of 371 vehicles per day (in 2018) to a maximum of 506 vehicles per day (in 2019).

Table 13-5 summarises the DTMR 2021 daily traffic count volume data.

Table 13-5 Flinders Highway – 2021 Daily Traffic Volumes

ROAD SECTION	COUNT SITE	SITE REFERENCE	AADT (VEHICLES PER DAY)			SOURCE
			TOTAL	LIGHT VEHICLES	HEAVY VEHICLES	
14C: Flinders Highway (Hughenden – Richmond)	100148	17.22 km west of Hughenden	497	282	215	DTMR

Background Traffic Growth

A 3% annual (linear) growth rate has been applied to the traffic data for 2021 to determine future base traffic volumes on the Flinders Highway. This is consistent with the method set out in the *Guide to Traffic Impact Assessment Practice Note: Pavement Impact Assessment* (DTMR, 2018b).

Base Traffic Standard Axle Repetitions

Traffic volume data sourced from DTMR for the Flinders Highway includes heavy vehicle traffic volumes by vehicle class, as per the Austroads Vehicle Classification System (DTMR, 2018b). According to this data, in 2021:

- Road trains (Austroads Vehicle Classes 10, 11 and 12) travelling between Hughenden and Richmond made up more than 40% of the heavy vehicle traffic; and
- Heavy vehicle traffic travelling west from Hughenden to Richmond is equivalent to heavy vehicle traffic travelling east from Richmond to Hughenden, indicating that heavy vehicles typically travel return trips along this segment of the Flinders Highway.

Background Standard Axle Repetitions (SARs) have been calculated in accordance with the *Guide to Traffic Impact Assessment Practice Note: Pavement Impact Assessment* (DTMR, 2018b). These calculations are based on granular pavement with a load damage exponent of 4 (SAR4). DTMR provides a standard SAR4 per heavy vehicle of 3.2 for calculating background SAR4s, however this is not considered representative of this section of the Flinders Highway, given the large percentage of road trains and the nature of the traffic movements along this section of road, as detailed above. An actual SAR4 per heavy vehicle of 3.4 for westbound travel and 3.7 for eastbound travel has therefore been used to calculate the background SAR4s for this segment of the Flinders Highway.

Background SAR4s calculated for the Flinders Highway between Hughenden and Richmond are provided in Table 13-7. For the purposes of this assessment, the peak construction phase traffic year (Project Year 2) is assumed to be 2025 and the peak operations phase traffic year (Project Year 3) is assumed to be 2026.

Project Traffic Volumes

Average Annual Daily Traffic

Traffic generated by the project is predominantly the movement of heavy vehicles since minimal workforce traffic is anticipated to utilise the Flinders Highway. Table 13-2 and Table 13-4 present the anticipated peak annual heavy vehicle traffic for the construction and operations phases, respectively.

Table 13-6 presents the peak project generated traffic for the construction phase and operations phase, as a percentage of the Flinders Highway base traffic.

Table 13-6 Flinders Highway - Peak Project Traffic Compared to Base Traffic

DIRECTION	BASE TRAFFIC (AADT)	PROJECT TRAFFIC	
		AADT	% BASE TRAFFIC
CONSTRUCTION PHASE			
Westbound	276	3.2	1.2%
Eastbound	283	3.2	1.1%
OPERATIONS PHASE			
Westbound	284	3.0	1.0%
Eastbound	292	3.0	1.0%

For the construction phase, the estimated traffic generated by the project will be a maximum of 1.2% of the base heavy vehicle traffic on the Flinders Highway. For the operations phase, the estimated traffic generated by the project will be a maximum of 1.0% of the base heavy vehicle traffic on the Flinders Highway. In accordance with the *Guide to Traffic Impact Assessment (DTMR, 2018a)* the project traffic volumes are less than 5% of base traffic and therefore do not require a Traffic Impact Assessment for road link capacity on the Flinders Highway.

Standard Axle Repetitions

The anticipated heavy vehicle types and volumes generated by material deliveries during the construction and operations phases are set out in Table 13-2 and Table 13-4, respectively. Heavy vehicle traffic associated with the project will typically be loaded travelling from Townsville to Richmond (i.e. westbound) and unloaded travelling from Richmond back to Townsville (i.e. eastbound). The exception is heavy vehicle traffic associated with waste removal that is assumed to be unloaded travelling westbound and loaded travelling eastbound.

Table 13-7 presents the estimated project generated SAR4s for construction and operations as a percentage of the base SAR4s on the Flinders Highway. The project traffic maximum SAR4 does not exceed 5% of the background SAR4 on the Flinders Highway in either direction, for either the construction or operations phase. The project traffic volumes therefore do not trigger the requirement for a Traffic Impact Assessment for pavement impacts on the Flinders Highway in accordance with the *Guide to Traffic Impact Assessment (DTMR, 2018a)*.

Table 13-7 Flinders Highway - Peak Annual Project SAR4s

DIRECTION	BACKGROUND SAR4	PROJECT SAR4	% BASE
CONSTRUCTION PHASE			
Westbound	164,057	5,969	3.6%
Eastbound	151,532	841	0.6%
OPERATIONS PHASE			
Westbound	168,979	6,006	3.6%
Eastbound	156,078	808	0.5%

13.2.5 Richmond Shire Council Roads

Project Site Access

Access to the project site from Richmond will be via RSC roads. The access route from Richmond includes approximately 28 km of Richmond-Woolgar Road and approximately 100 km of Yan Yean-Burleigh-Mt Norman Road (Figure 13-1). All project generated road traffic will access this site via these roads. Any maintenance or upgrades to the existing RSC roads necessary for the project, will be determined by the proponent in consultation with the RSC.

Local Access Roads Traversing the Project Site

The unsealed local access roads that traverse the project site provide access to the local grazing properties and their homesteads (Figure 13-2). These local access roads are not located within formal road easements and include:

- The Yan Yean-Burleigh-Mt Norman Road that provides access to the project site from Richmond and traverses the southern end of the project site;
- Middle Park Access Road, which intersects with the Yan Yean-Burleigh-Mt Norman Road within the project site and runs north through the project site to the Middle Park Homestead; and
- Peterfield Road, which intersects with the Yan Yean-Burleigh-Mt Norman Road within the project site and runs south-east through the project site.

The proponent is proposing to realign the sections of unsealed local access roads that traverse the project site in consultation with the RSC prior to the commencement of the project (Figure 13-2). . The proponent has an existing agreement with the RSC in relation to the realignment of the RSC's Peterfield road easement that traverses the southern end of the project site.

13.3 AIR TRANSPORT

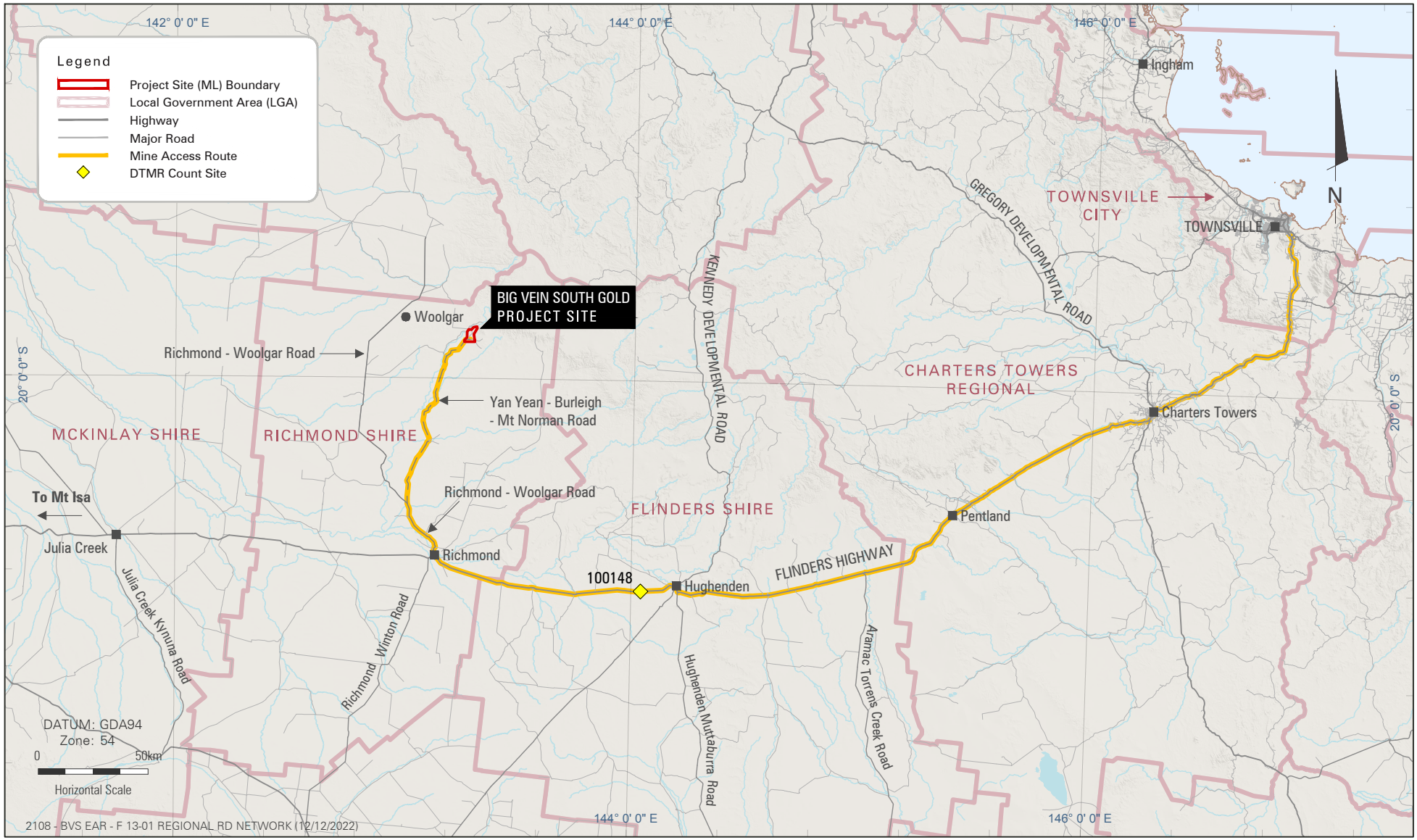
A private airstrip will be constructed at the southern end of project site enabling the operations workforce to fly directly to and from Townsville. Construction of the airstrip is scheduled to be completed during the construction phase.

The on-site airstrip will be designed to cater for the largest aircraft anticipated to be utilised, being the ATR 72. Current planning indicates a 40 seater plane will be used for approximately 4 return flights per week between Townsville and the project site.

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

Prior to construction of the on-site airstrip, the workforce will be bused to and from Richmond Airport. Flights between Richmond and Townsville are currently operated by Regional Express on Mondays, Wednesdays and Fridays. The proponent will charter additional flights for the workforce, as necessary, during this period.

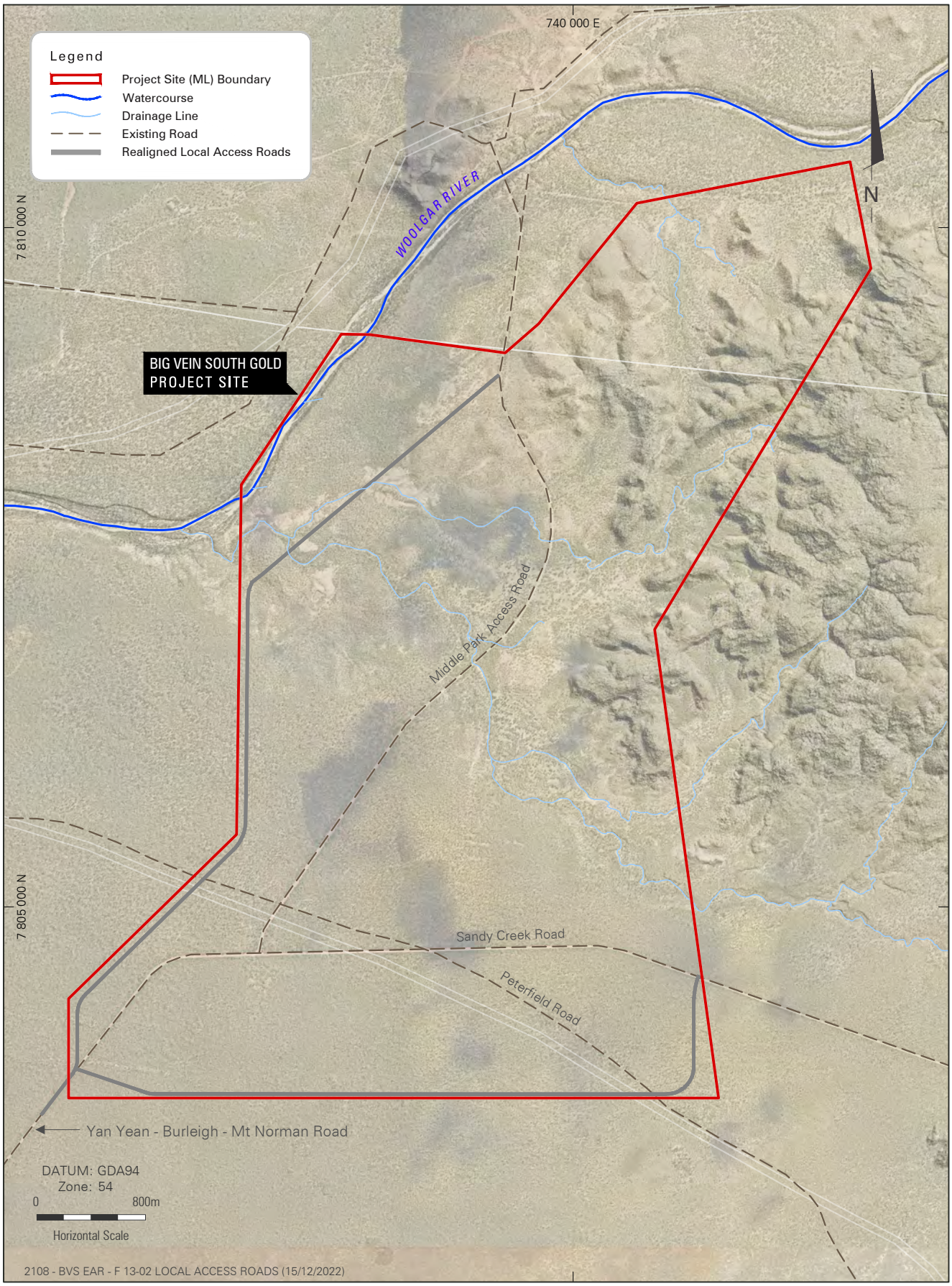
FIGURES



BIG VEIN SOUTH GOLD PROJECT

Regional Road Network

FIGURE 13-1



BIG VEIN SOUTH GOLD PROJECT

HANSEN ENVIRONMENTAL CONSULTING

Local Access Roads

FIGURE 13-2

14

CULTURAL HERITAGE



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14 CULTURAL HERITAGE

14.1 INTRODUCTION

This section describes Aboriginal cultural heritage and non-Indigenous cultural heritage issues associated with the Big Vein South Gold Project (the project). It draws on the results of the *Non-Indigenous Cultural Heritage Report* (Appendix I) undertaken by Everick Heritage.

14.2 ABORIGINAL CULTURAL HERITAGE

14.2.1 Overview of Regulatory Requirements

Commonwealth Legislation

The Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) provides protection for Aboriginal cultural heritage. Under this Act, the relevant Federal Minister can make declarations of preservation in relation to Aboriginal cultural heritage. Declarations can be made if the Minister is satisfied that the area is a 'significant Aboriginal area' and is under threat of injury or desecration.

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes the Commonwealth Heritage List and the National Heritage List and prescribes criteria for entry on each of these lists. The criteria include a heritage place's importance as part of Indigenous tradition. The EPBC Act also sets out a framework for protection of the heritage values of these places.

Both Acts are administered by the Department of Climate Change, Energy, the Environment, and Water (DCCEEW) and the new National Environmental Protection Agency.

There are no heritage places in the project site on Commonwealth heritage lists.

Queensland Legislation

The *Aboriginal Cultural Heritage Act 2003* (ACH Act) provides for the recognition, protection and conservation of Aboriginal cultural heritage. The ACH Act is administered by the Department of Women, Aboriginal and Torres Strait Islander Partnerships and Multiculturalism. Specifically, the ACH Act includes provisions for:

- Protection of significant areas and objects;
- Duty of care obligations on all persons including project proponents;
- Establishment of a cultural heritage register;
- Means of assessment of significant areas and objects;
- Development of management plans;
- Issue of injunctions and stop work orders; and
- Administration, penalties and prosecution.

14.2.2 Management of Aboriginal Heritage

The previously registered native title claimants for the Ngawun Mbara People Core Country Claim are identified as the relevant Aboriginal Party in relation to Aboriginal cultural heritage management for the project, in accordance with

the ACH Act. The proponent will engage with the Aboriginal Party in relation to the management of Aboriginal cultural heritage for the project, in accordance with the relevant provisions of the ACH Act.

14.3 NON-INDIGENOUS CULTURAL HERITAGE

14.3.1 Overview of Regulatory Requirements

Commonwealth Legislation

In relation to matters of international and national non-Indigenous cultural heritage significance, the EPBC Act is the principal legislation. Another piece of Commonwealth legislation, the *Australian Heritage Council Act 2003* (AHC Act), provides for the establishment of the Australian Heritage Council (AHC). Under the provisions of the EPBC Act and the AHC Act, the AHC has the following responsibilities:

- Assess places for the National Heritage List, the Commonwealth Heritage List and the Register of the National Estate;
- Nominate places for the National Heritage List, the Commonwealth Heritage List and the Register of the National Estate;
- Promote the identification, assessment, conservation and monitoring of heritage; and
- Advise the Minister on various heritage matters including the preparation and amendment of heritage strategies and management plans for Commonwealth areas and agencies.

Actions which are likely to significantly impact on matters of international or national significance are prohibited without approval from the AHC and the DCCEEW. Nine criteria for assessing significance are provided under the AHC Act and these criteria are reflected in state-based legislation such as the *Queensland Heritage Act 1992* (QH Act).

Queensland Legislation

The QH Act and the *Queensland Heritage Regulation 2015* set out the framework for the protection and management of Queensland's historic heritage. The QH Act established the Queensland Heritage Council along with a permanent heritage register (the Queensland Heritage Register) for the state. The Register holds information on places of cultural heritage significance and a place must meet certain criteria to be entered onto the Register. Places are required to be of state level significance for entry onto the Register. Once entered onto the Register a place is afforded formal protection under the QH Act and approval may be required for works that change, alter or disturb a registered place.

14.3.2 Scope and Methodology

A non-Indigenous cultural heritage assessment was undertaken for the project. The full assessment report is contained in the *Non-Indigenous Cultural Heritage Report* (Appendix I). The scope of the assessment was as follows:

- Determine if any places of non-Indigenous historical cultural heritage significance are located within the boundaries of the project site;
- Describe any identified heritage places;
- Ascribe levels of significance in accordance with the QH Act;
- Undertake an assessment of the potential impacts of the project on non-Indigenous historical cultural heritage; and
- Determine what form of management is required to protect any identified non-Indigenous cultural heritage values.

The assessment methodology for the non-Indigenous historical cultural heritage assessment included:

- A legislative review;
- A search of published literature and archival records;
- A search of the World Heritage List, Commonwealth Heritage List, National Heritage List, National Trust of Australia Heritage List, Register of the National Estate, Queensland Heritage Register and the Richmond Shire Council Planning Scheme;
- A review of historic aerial photography; and
- A review of local council information in relation to non-Indigenous historical cultural heritage.

The desktop review was used to identify the heritage themes of the region and to predict the locations and types of items of cultural heritage significance potentially located on the project site.

14.3.3 Historical Background

The project site is located within the historical Woolgar Goldfields. The Woolgar Goldfields were first identified in 1879 and were mined from the early 1880's until the 1930's. Records show that properties associated with the project site have been operating as cattle grazing enterprises under two different landholders. All properties continue to run cattle, however in recent years gold exploration has also been undertaken across the site.

14.3.4 Register Searches

No heritage places are recorded on the World Heritage List, Commonwealth Heritage List, National Heritage List, National Trust of Australia, Register of the National Estate, Queensland Heritage Register or the Richmond Shire Council Planning Scheme for the project site.

14.3.5 Cultural Heritage Sites

There are no places of potential international, national, or state heritage significance within the project site.

A comprehensive field survey of the non-indigenous cultural heritage of the Woolgar Gold Fields, including the project site, was conducted in 2013 by a PhD student from the School of Archaeology and Anthropology at the Australian National University (ANU) (Tayler, 2013). The survey identified numerous places of potential local heritage significance within the project site relating to the historic gold mine workings in the area. These include:

- The Mowbray mine site; and
- 46 other places associated with historic mine workings.

The Mowbray mine site is a cluster of historic mine workings in the northern section of the project site (Figure 14-1). It is located outside the project disturbance area and will, therefore, not be impacted by the project.

The 46 other historic places within the project site consist of abandoned small-scale mine workings and associated structures. These are scattered across the north-eastern section of the project site (Figure 14-1). Thirty-three (33) of the 46 historic places are located outside of the project disturbance area and will, therefore, not be impacted by the project. Thirteen (13) of the 46 historic places are located within the project disturbance area (Figure 14-1).

14.3.6 Assessment of Significance

The significance of each heritage place within the project site was assessed. All identified places were assessed as being potentially of local significance only, and below the threshold for inclusion on the Queensland Heritage

Register. None of the heritage places within the project site have state or national significance. This means that the values of each place do not contribute significantly to an understanding of the wider pattern and evolution of Queensland's history and heritage.

The significance assessment concluded:

- The places are potentially important in demonstrating the evolution or pattern of local history;
- The places have the potential to yield information that would contribute to an understanding of local history;
- The places do not demonstrate rare, uncommon or endangered aspects of Queensland's (or local) cultural heritage;
- The places are not important in demonstrating the principal characteristics of a particular class of cultural place;
- The places are not important because of their aesthetic significance;
- The places are not important in demonstrating a high degree of creative or technical achievement at a particular period;
- The places do not have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and
- The places do not have a special association with the life or work of a particular person, group or organisation of importance in Queensland's (or local) history.

14.3.7 Impact Assessment

The project has the potential to impact places of local cultural heritage significance through clearing associated with the construction and operation of the mine. As stated in Section 14.3.5, Mowbray mine site and 33 of the 46 historic mine workings are outside of the project disturbance area and will, therefore, not be impacted by the project. Thirteen historic mine workings of potential local heritage significance will be removed for the project.

14.3.8 Mitigation Measures

In order to mitigate the potential impacts of the project on the 13 non-Indigenous heritage places within the project disturbance area, the following management measures will be implemented:

- Inspection of the 13 historic mine workings within the project disturbance area prior to the commencement of the project to confirm and document the condition, features and significance of each; and
- Implementation of a Finds Strategy addressing the obligations under Section 89 of the QH Act for discovery of an archaeological object.

FIGURES