RESOURCES

MT CARBINE BANKABLE FEASIBILITY STUDY

CHAPTER 6: INFRASTRUCTURE

DECEMBER 2021

Document History

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. Introduction

1.1. Context

This Chapter 6: Infrastructure shall be read in conjunction with Chapter 1: Executive Summary and additional references as listed in Section 5.

1.2. Purpose

The purpose of Chapter 6: Infrastructure is to review the suitability of the existing site infrastructure and identify, where required, the additional site infrastructure required to support the Phase 1 and Phase 2 activities.

2. On Site Infrastructure

2.1. Site Infrastructure Strategy

Mt Carbine is currently operating and is well serviced with existing on site infrastructure to support its operations.

The site infrastructure strategy for the project is to utilise as much as possible the existing site infrastructure and only construct new infrastructure if required to support new or upgraded facilities.

As the overall changes to the footprint and capacity of the mining and associated crushing, screening, x-ray transmission (XRT) sorting and processing infrastructure is minimal, there are only minor site infrastructure modifications required to support the upgraded facility.

The details of the existing site infrastructure supporting the operations are detailed below in Section 2.2

2.2. Existing Site Infrastructure

The site is already supported by well-established infrastructure supporting the current mine and quarry operations.

A site plan showing the existing site infrastructure is shown in Figure 1.

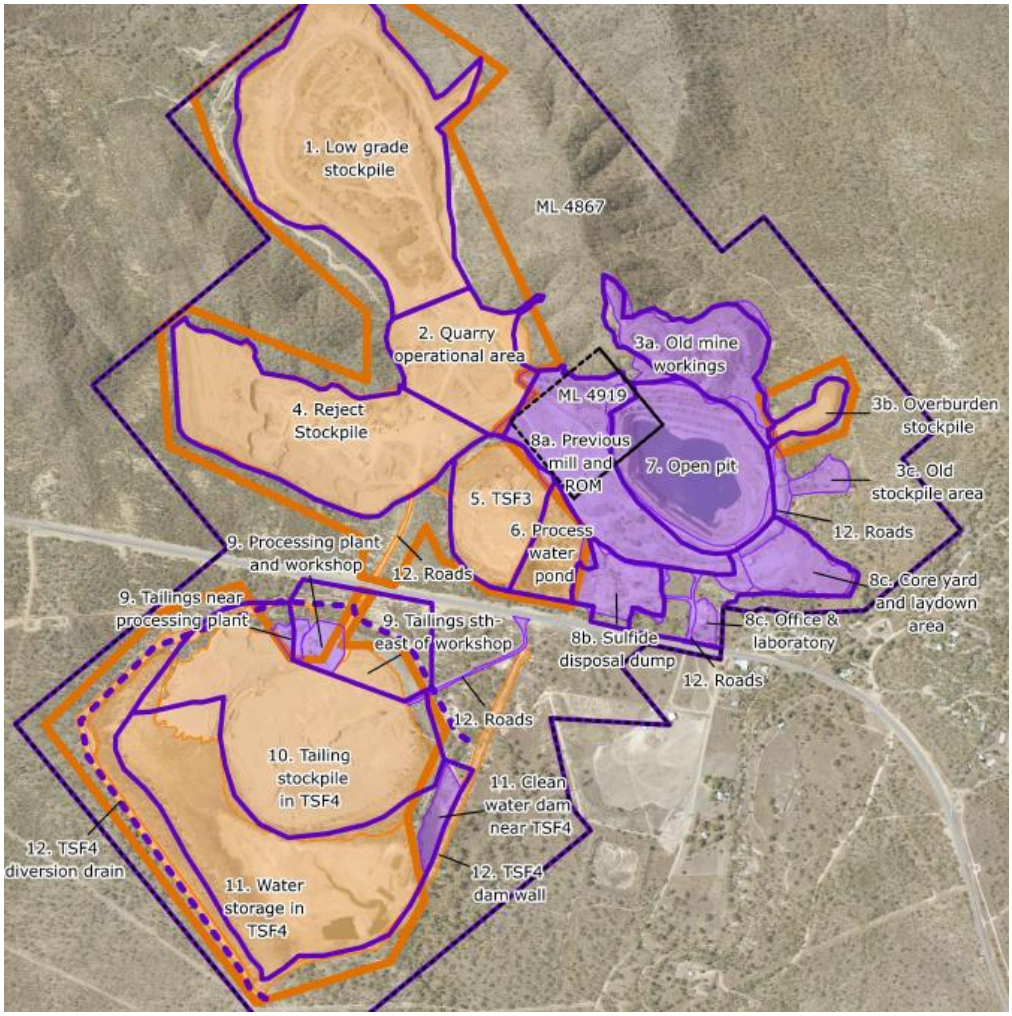

Figure 1: Site Plan

2.2.1. Site Offices and Facilities

Mt Carbine is well equipped with site offices and facilities that are currently being utilised by the operations team at the site. The facilities include:

- Office buildings;
- Car park;
- Laboratory;
- Ablutions facilities;
- Crib areas;
- Power;
- Workshops;
- Water pipelines;
- Safety and first aid equipment and
- Phone and internet connectivity.

2.2.2. Site Roads and Access

Site Access

The access to the mine and quarry are by separate access roads directly off the Mulligan Highway. Signage, gates and the necessary parking facilities are in place for the acceptance of staff and site visitors. The site access road is shown in Figure 2.

Figure 2: Site Access Road

The access to the gravity processing plant is from the other side of the Mulligan Highway. The processing plant also has the requisite existing infrastructure to manage the access of vehicles and personnel to the site.

Site Roads

The site is well equipped with both light and heavy vehicle access roads. The travel and access requirements for the operations do not change with the Project. A Traffic Management Plan has been developed as part of the mine planning activities which makes use of the existing site roads in a loop arrangement to minimise heavy vehicle interactions. The Traffic Management Plan will continually be updated to support the changing needs of the mine.

The typical condition of the site haul roads is shown below in Figure 3. The ground is extremely competent and there is no requirement for the importation of fill for the development or maintenance of site roads.

Figure 3: Site Road Example

Main Road to Mt Carbine

Mt Carbine is accessible by sealed highway from all surrounding major areas. Road access to the site provides for oversize vehicles and the roads are in good condition in all directions. The Mulligan Highway runs past the front entrance of the Mt Carbine site, therefore, access is readily available for all types of vehicles and services as needed. The main highway can be seen in Figure 4.

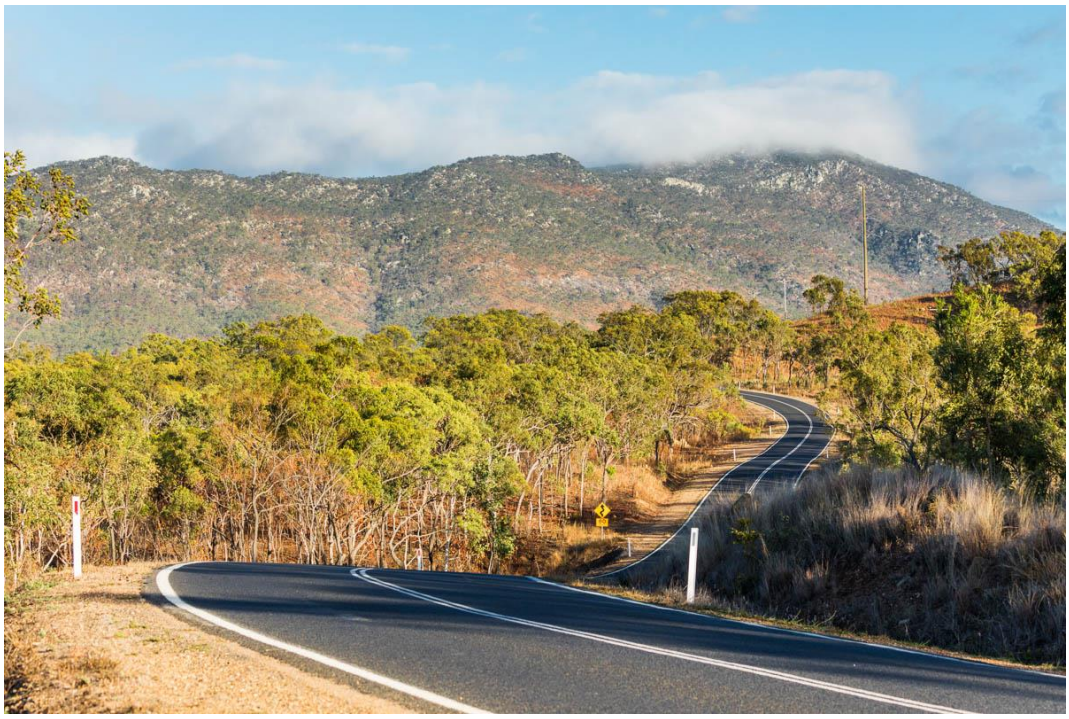

Figure 4: Mulligan Highway to Mt Carbine

2.2.3. Site Dams and Drainage

Dams

The main on site dams that will be used for the storage of water are the open pit (2.4GL capacity), tailings dam (TSF4, 417.3ML capacity) and the Clean Water Dam near TSF4 (20ML capacity) which can be seen on the site plan in Figure 1 and a picture of TSF4 is provided in Figure 5.

The open pit will be dewatered through operations use during Phase 1 in preparation for Phase 2 where mining activities will commence in the open pit.

Figure 5: TSF4

Water Transfer

The site is currently equipped with a water transfer system supported by pumps and pipelines that are used to manage the water level of the water storage infrastructure across the site (shown in Figure 6). In the event of heavy rainfall during the wet season, any potential dam overtopping is prevented by the pumping of water from the Clean Water Dam or TSF4 to the open pit.

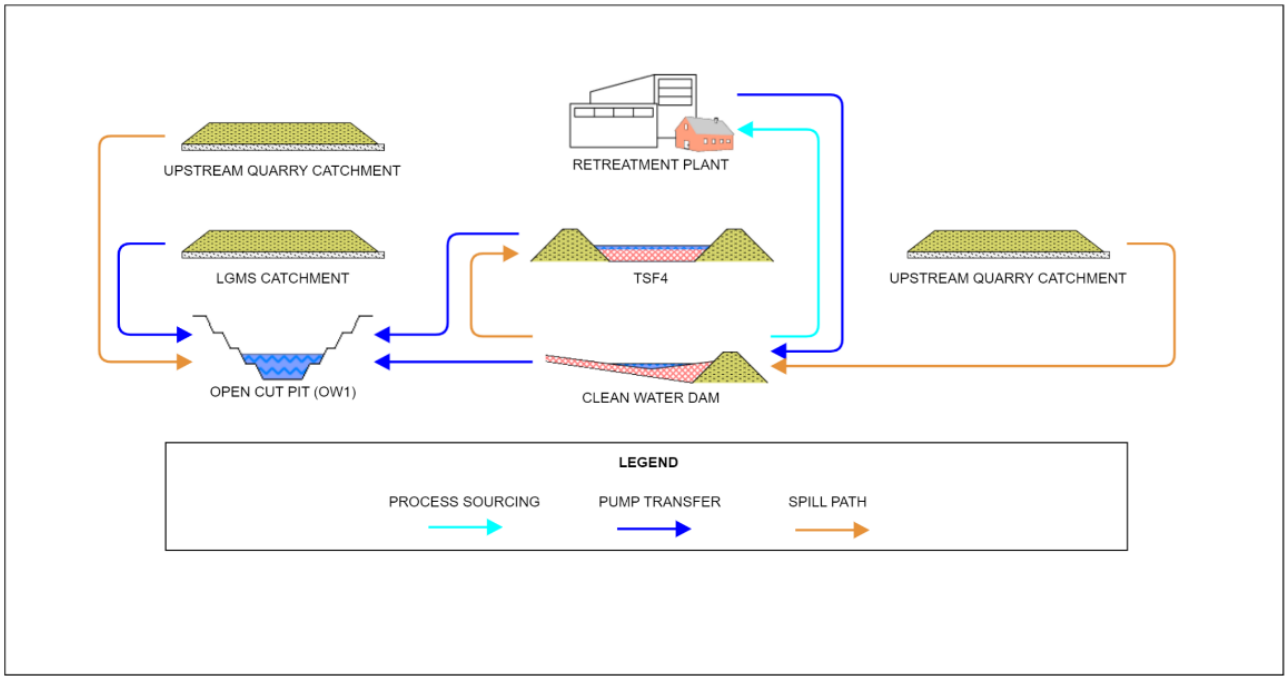

Figure 6: Site Water Management System

Drainage

There are no proposed changes from the existing sitewide drainage system that exists on the site. The existing sitewide drainage system is shown in Figure 7.

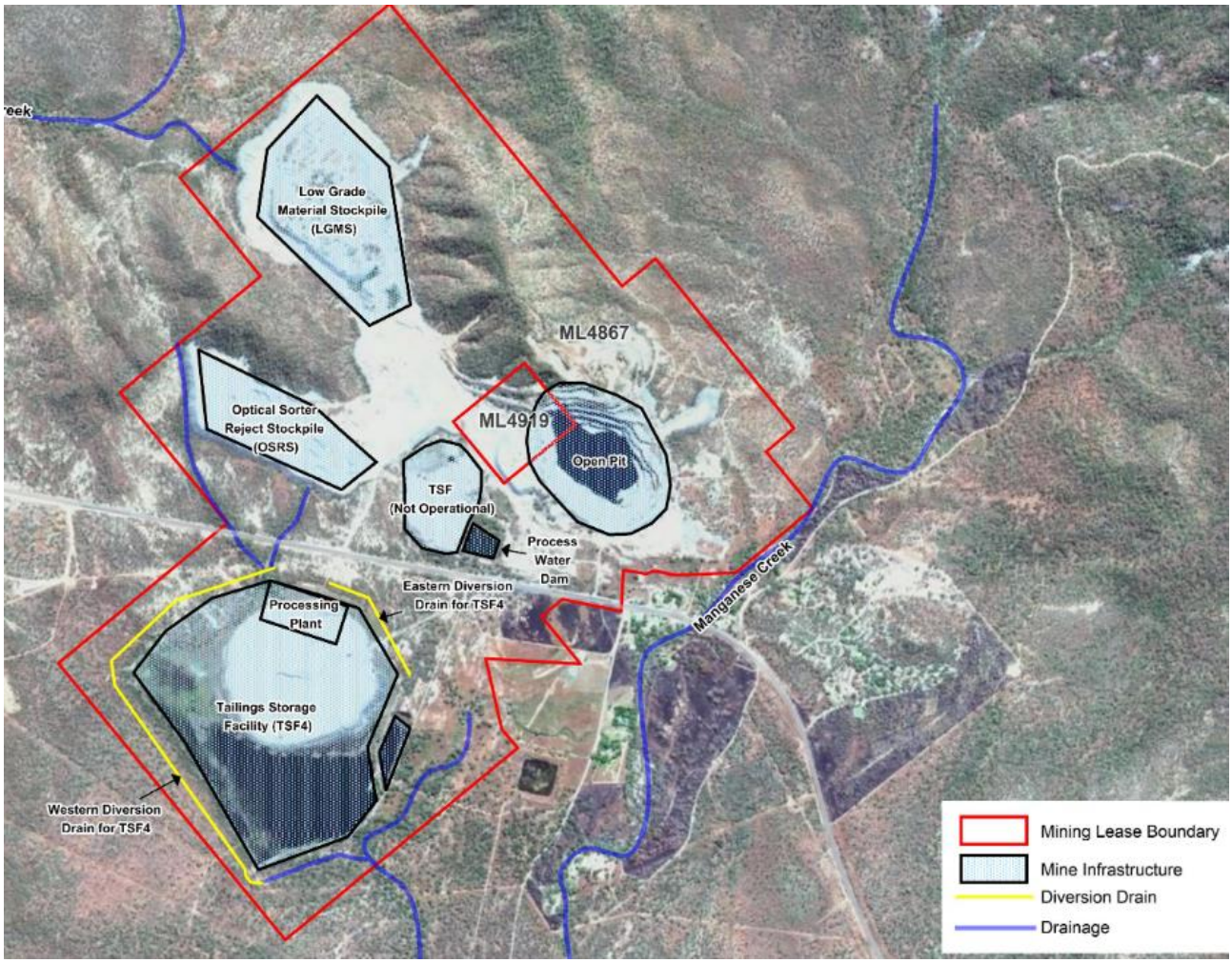

Figure 7: Sitewide Drainage

2.2.4. Power Supply

The site is currently supplied via two overhead / underground supplies segregated by the Mulligan Highway East and West.

The western site is supplied by a 1,000 kVA pad mounted transformer metered at the low voltage (LV) side.

The eastern site is supplied by a 315 kVA overhead transformer located after an isolating switch and a high voltage metering point CAR222b prior to the existing mine site.

The assets on the western side are owned and maintained by Queensland Energy up to the LV circuit breaker on the LV side of the pad mounted transformer.

The assets on the eastern side are owned and operated after switch CAR222C by EQR at high voltage (22kV).

The locations of the transformers (inclusive of the proposed 500kVA transformer for Phase 1) are shown in Figure 8.

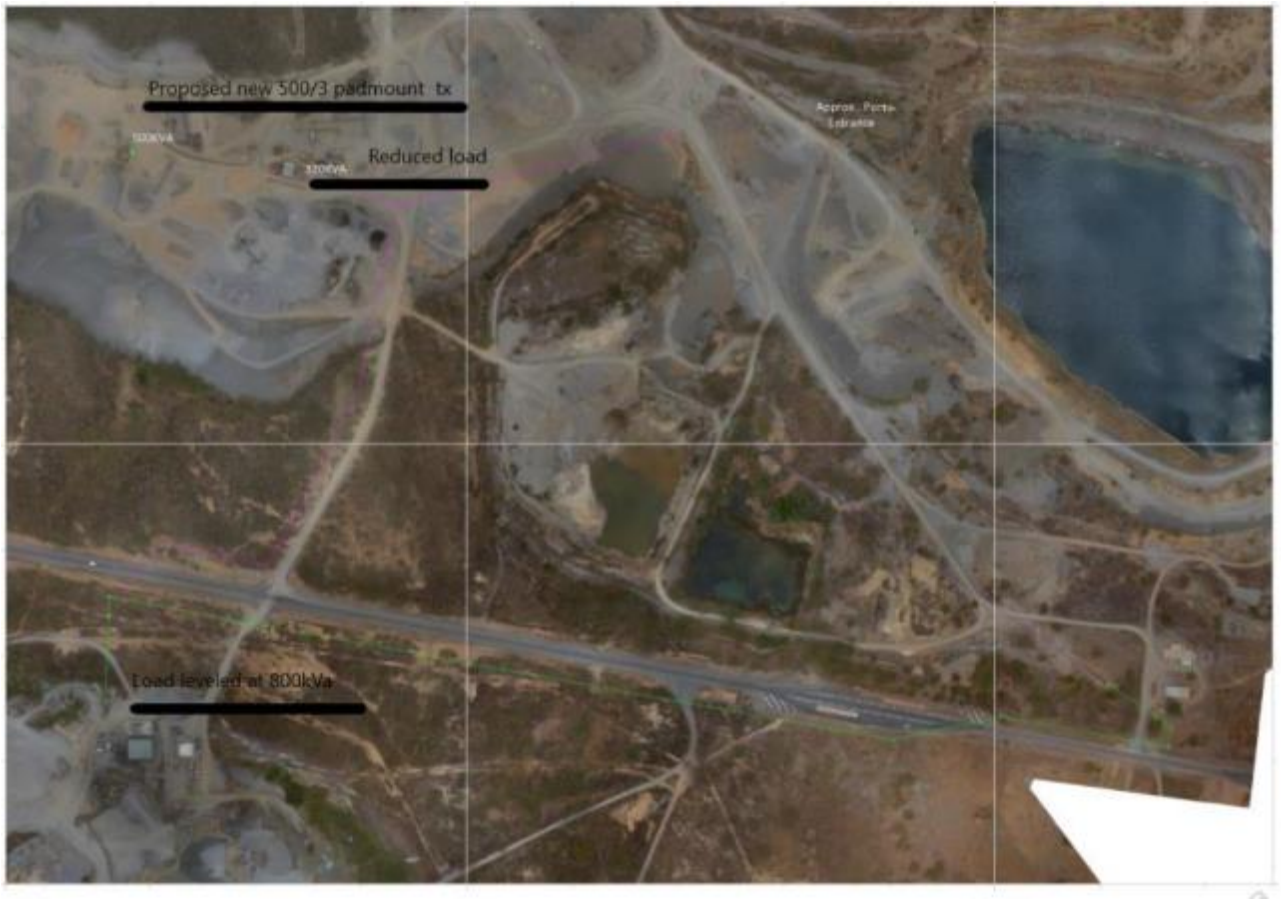

Figure 8: Transformer Locations

Power is distributed across the site by 22kV above ground pole mounted power lines as shown in Figure 9.

Figure 9: 22kV Power Lines at the Crushing and Screening Plant

2.2.5. Water Supply

Raw Water

The raw water supply for construction and operational activities are supplied by the 1.4GL of water currently in the open pit. The water quality is sufficient for all processing and dust suppression activities and its suitability has been demonstrated through its use from the current operations.

EQR has installed a water supply pipeline from the open pit to the crushing and screening plant that will support the future wet screening requirements for the upgraded facility.

Potable Water

Potable water is currently trucked to the site and stored in on site storage tanks for use in the site facilities. This strategy shall continue and there is no scope for any changes to the potable water management or sourcing for the Project.

2.3. Site Infrastructure Scope – Phase 1

The scope for the on site infrastructure work associated with Phase 1 of the project are detailed below.

2.3.1. Utilities

Power

Woodburn Electrical is a high voltage electrical contractor with extensive knowledge of the Mt Carbine mine and its electrical assets. Woodburn Electrical was engaged to assess the existing site infrastructure and provide a lump sum price to design and construct the upgrade works based on the Phase 1 electrical load requirements.

High voltage (HV) power is currently supplied to the site via overhead lines by Ergon. The HV power is distributed across the site at 22kV.

The existing power reticulation services the site offices, the gravity processing plant and the electrical elements of the crushing, screening and XRT sorting plants.

To support the upgraded facilities at the crushing and screening plant and XRT ore sorter, a new substation shall be installed with sufficient capacity for all additional loads.

The scope for the HV upgrade on site includes:

- Supply and install a 500kva, 22 kV-433V, 3 phase overhead substation pole (replacing existing LV term pole PE10);
- Supply and install new LV cable (700amp capacity) from existing switchboard up to new sub pole PE10 (s/s no.2);
- Supply and install new 3 phase, 22 kV, 2 span overhead extension (between poles PE8 & PE10);
- Retrofit existing 12.5m, 5 kn LV pin pole into a 22kV pin pole (Pole PE9);
- Remove existing 2 span of 4 wire LV open wire aluminium conductor (between pole PE8 and pole PE10);
- Retro fit existing 315kva sub station pole (Pole PE8 s/s no.1) by removing condemned timber ladder rack and replacing with single arm construction for LV transformer fuses, remove LV;
- Retro fit existing 315kva sub station pole (Pole PE8 s/s no.1) by removing condemned timber ladder rack and replacing with single arm construction for LV transformer fuses, remove LV cross arms and install new 22kv down leads from EDO's to transformer; and
- Remove existing LV termination / cable pole PE10 and associated cabling.

Fuel

There is no scope in the project to upgrade the site's fuel facilities. A new replacement 30,000L smart fill fuel tank has been supplied at the quarry and a new 12,000L smart fuel tank will be supplied for the mining operations replacing the existing fuel tank at the gravity processing plant. The fuel tanks are being supplied at no upfront cost and funded through the operation's Fuel Supply Agreement. This will be managed as a part of day to day operations.

Communications

The operations will utilise the existing site communications infrastructure to support the ongoing operations.

Data is distributed wirelessly across the site currently to support the quarry and processing operations. No additional upgrades have been identified as being required.

Waste

All waste from ablutions is captured in tanks and removed by truck under the existing operations. There are no plans change to this strategy for future operations and additional waste management infrastructure has not been identified as being required.

Solid waste is routinely disposed of in a local government landfill.

2.3.2. Workshops and Warehouses

Modified 40ft shipping containers, fit out with storage racks will be procured and located on site to use as a workshop and warehouse.

Two containers will be procured, one container will be used for mechanical equipment, spares and tooling storage. The second container will be utilised for electrical equipment, spares, tooling and as an electrical workshop.

An example of a modified container is shown in Figure 10.

Figure 10: Modified 40ft Container Warehouse

2.3.3. Civil Infrastructure

Roads

No new site roads are required for the Project. The site access and internal roads between plants, facilities and the open pit are established and in acceptable condition for the continuation of operations.

Water

Phase 1 will utilise the existing site water storage and reticulation system without the need for modification.

2.3.4. Temporary Facilities

Contractor Temporary Offices and Ablutions

Contractors will be responsible for the delivery, establishment and removal of temporary offices, ablutions and other facilities to support the construction activities.

Contractors will be required to supply potable water to their facilities and manage the removal of all waste from the site.

The proposed locations of the contractor facilities are near to existing sources of electrical power and EQR will issue free power to the contractors from the existing power infrastructure.

2.3.5. Fire Protection

Fire Fighting

Mobile firefighting equipment is currently located at the site for the purposes of fire protection. This will continue to be utilised for the future operations.

Additionally, hose points are located in various locations throughout the gravity processing plant.

Fire Extinguishers

Where required, fire extinguishers will be supplied and maintained in accordance with the relevant codes and standards.

2.4. Site Infrastructure Scope – Phase 2

The scope for the on-site infrastructure work associated with the Project are detailed below.

2.4.1. Utilities

Power

No power upgrade is required for the phase 2 upgrade. The existing 315kVA substation combined with the 500kVa substation installed for Phase 1 includes sufficient capacity for the crushing and screening plant as part of the Phase 2 activities (534kW consumed power total).

The 1,000kVa substation at the gravity processing plant is sufficient for the crushing, screening and processing infrastructure installed to the south of the Mulligan Highway in the process plant area.

The power requirements for the crushing station are 888kW.

Further details on the power requirements for the crushing and screening plant and processing plant can be found in Chapter 5: Processing.

Water

Prior to the depletion of the open pit water source, a water production bore will be installed to supply the site's water requirements.

The location of the production bore (IB03) is shown in Figure 11 below.

The production bore will supply water to the Clean Water Dam as make up water. The Clean Water Dam will continue to act as the raw water source for the operations.

A pump and pipeline will be installed adjacent to the production bore to transport water to the Clean Water Dam.

The Phase 1 water management strategy allowed for the pumping of excess water from TSF4 to the open pit during periods of excess rainfall. Once Phase 2 commences, water will not be permitted to be pumped back to the open pit and instead will be discharged in the Mitchell River during high flow events in accordance with the existing EA conditions contained with mining EA EPML00956913.

Figure 11: Bore Locations

Fuel

There are no additional fuel requirements for Phase 2.

Communications

The operations will utilise the existing site communications infrastructure to support ongoing operations.

Data is distributed wirelessly across the site currently to support the quarry and processing operations. No additional upgrades have been identified as being required.

The mining contractor may require wireless access near to the open pit. Provision for a Data Repeater Station to provide internet access near the pit has been included in the capital cost estimate and will be supplied by the mining contractor if required.

Upgrades to the process control system for the gravity processing plant and crushing plant are detailed in Chapter 5: Processing.

Waste

No changes from the Phase 1 general waste management and removal will be required.

Arsenic removal from the site will be required when the arsenopyrite removal circuit is commissioned in the gravity processing plant. This circuit will utilise process flotation to remove and store arsenic in a containment tank for removal from site by an approved contractor.

Arsenic contaminated waste production will be approximately 6t per month.

2.4.2. Workshops and Warehouses

Containerised igloo workshops will be constructed for use at the Phase 2 crushing and screening plant and for the mining contractor. The location of the mining contractor maintenance igloo will be agreed with the mining contractor.

An example of a typical container igloo that will be installed in both locations is shown in Figure 10.

Figure 12: Typical Igloo Workshop

2.4.3. Civil Infrastructure

Roads

No new site roads are required for the Project. The site access and internal roads between plants, facilities and the open pit are established and in acceptable condition for the continuation of operations.

Traffic will be managed between the open pit and the crushing and screening plant through updates to the site's Traffic Management Plan.

2.4.4. Site Buildings

Administration Buildings

The existing site offices will be refurbished to improve general amenities and accommodate the additional personnel required for the expanded operational management team.

The proposed office layout is shown in Figure 13 and Figure 14.

Figure 13: Site Office Upgrade Floor Plan

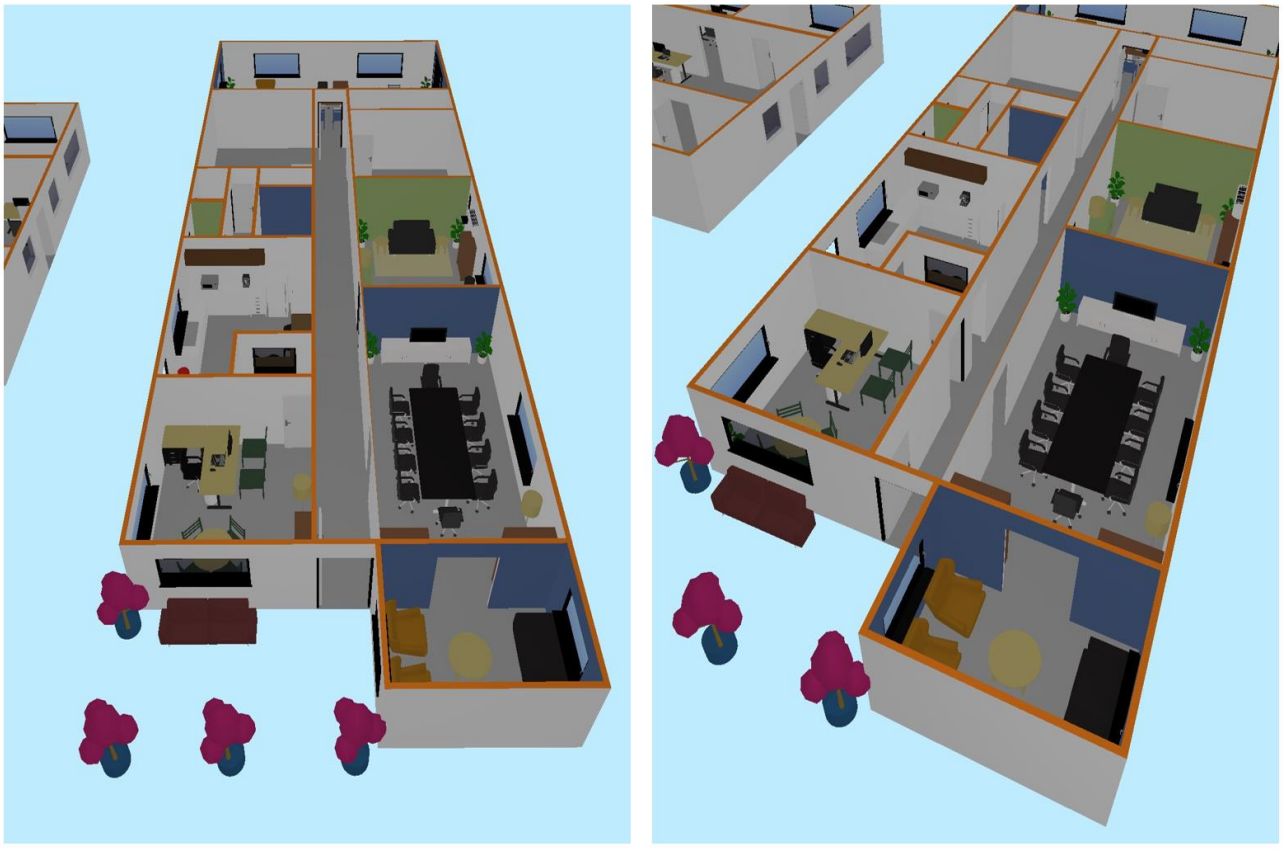

Figure 14: Site Office Upgrade Model

A new core shed and sample laboratory will be constructed and fit out to support the operations conduct core sample preparation.. The details of the additional equipment to be purchased for the core shed and sample laboratory are summarised in Table 1.

Table 1: Laboratory Equipment

Item	Details
Automated Core Saw	Automated Cutting Machine.
Preparation Laboratory Crushing Equipment	1 x Lab Jaw Crusher, LM5 Ring Grinder and Oven.
Base Radio & Safety Equipment	First Aid, Fire Extinguishers, Radios, etc.
XRF Machine	Rigaku WD XRF Analyser.
Fusion Disk Maker	Desktop 15 disk per hour.

Mining Contractor Offices

The contractor mining offices will be comprised of two 6m x 3m demountable and relocatable ATCO office structures. A similar building has recently been procured and installed by EQR to serve as the gravity processing plant's office. The offices will be delivered to site whole with internal electrical and air-conditioning fit out complete. Figure 15 provides an example of the office configuration.

Figure 15: Example Office Building

2.4.5. Temporary Facilities

Contractors will be responsible for the delivery, establishment and removal of temporary offices, ablutions and other facilities to support construction activities.

Contractors will be required to supply potable water to their facilities and manage the removal of all waste from the site.

The proposed locations of the contractor facilities are near to existing sources of electrical power and EQR will issue free power to the contractors from the existing power infrastructure.

2.4.6. Fire Protection

Fire Water Tank and Distribution

Mobile firefighting equipment is currently located at the site for the purposes of fire protection. This will continue to be utilised for the future operations.

The fire protection equipment is detailed in Section 2.3.5.

Fire Extinguishers

Where required, fire extinguishers will be supplied and maintained in accordance with the relevant codes and standards.

2.4.7. Site Security

The mine, quarry and gravity processing plant's access and security philosophy remains unchanged with the proposed upgrade. An allowance has been supplied in the Project budget for new signage and minor works in relation to site security.

3. Offsite Infrastructure

3.1. Offsite Infrastructure Strategy

The Project's offsite infrastructure strategy follows the on site strategy, which is to maximise the use of existing infrastructure and only invest capital where required or where value has been identified.

The off site infrastructure scope is detailed below in Section 3.2.

3.2. Off Site Infrastructure Scope

3.2.1. Power Supply Agreement – Phase 1

In order to supply the requisite power for the upgraded infrastructure for Phase 1, an application for load augmentation was supplied to the electricity distribution supplier (Ergon Energy).

The application was for an additional supply to be fed to a new 500kVA transformer (refer Section 2.3.1 for details).

This request has been accepted by Ergon Energy and the power has been made available to EQR.

3.2.2. Power Supply Agreement – Phase 2

No additional power is required to support the Phase 2 upgrades.

3.2.3. Accommodation

Contractor Accommodation

Contractors are required to supply accommodation for their workforce, which is available locally. There are several accommodation options in close proximity to the site including:

- Contractor camp operated by the Mt Carbine Roadhouse;
- Caravan Park; and
- Mt Carbine Hotel.

Additionally further accommodation is able to be sourced under an hour from the site in local towns including Mt Molloy, Mareeba, Mossman and Port Douglas.

Owner's Team Accommodation

EQR maintain access to accommodation adjacent to the mine that has capacity to house 6 persons. Additionally, through the operations budget, additional housing will be taken up in the Caravan Park near the site to increase the available accommodation near the site to 11 persons.

Temporary Owner's Team accommodation will be sourced from the available beds listed above.

Based on the relatively small workforce required for the Project and the accommodation options available, accommodation has not been identified as a significant risk for the Project.

3.2.4. Buildings and Facilities

There are no scope requirements for any offsite buildings or facilities related to the Project or ongoing operations.

3.2.5. Bulk Transportation

Bulk transportation is out of scope for the Project. All tungsten concentrate is sold at the mine gate and is the customer's responsibility to manage road transportation, port requirements or any other logistics required in relation to the handling of the ore concentrate once it has left the site. No transportation logistics or costs have been considered as part of this feasibility study.

4. Infrastructure Capital Cost Estimate

The estimate of direct costs for the infrastructure scope is summarised in Table 2.

Table 2: Infrastructure Capital Estimate Summary

WBS	Phase	Item	Unit	Qty	Rate (AUD)	Cost (AUD)
Phase 1						
32100	1	Overhead Line and Transformer Upgrade	lot	1	191,778	191,778
34200	1	40ft Container Electrical Workshop and Stores (incl fit out)	ea	1	16,613	16,613
34200	1	40ft Container Crushing and Screening Store (incl fit out)	ea	1	16,613	16,613
34200	1	Tooling Allowance	lot	1	50,000	50,000
					Phase 1 Infrastructure Subtotal	**275,004**
Phase 2						
34300	2	Site Offices Upgrade - Building Works	lot	1	50,000	50,000
34300	2	Site Offices Fit Out	lot	1	31,622	31,622
32200	2	Installation of Bores (4 x Monitoring and 1 x Production)	lot	1	150,000	150,000
32200	2	Bore Water Pump Supply and Install	ea	1	14,100	14,100
32200	2	Bore Water Pump Concrete	m^3	1.125	1,200	1,350
32100	2	Bore Water Pump Electrical Connection	lot	1	5,000	5,000
32200	2	Bore Water Pump Pipeline (Bore to Clean Water Dam)	m	540	138	74,520
34300	2	Mining Contractor Offices	lot	1	27,730	27,730
34200	2	Mining Contractor Container Igloo Workshop and Store	lot	1	31,022	31,022
34200	2	Mining Contractor Container Igloo Workshop and Store Footing	m^3	43.2	1,200	51,840
34300	2	Core Shed	lot	1	150,000	150,000
34200	2	Automated Core Saw	ea	1	35,000	35,000
34200	2	Preparation Laboratory Crushing Equipment	lot	1	65,000	65,000
32500	2	Base Radio & Safety Equipment	lot	1	3,000	3,000
34200	2	Laboratory Equipment - XRF Machine	ea	1	159,000	159,000
34200	2	Lab Equipment - Fusion Disk Maker (Lease Deposit)	ea	1	56,000	56,000
34200	2	Laboratory Fit out	lot	1	25,000	25,000

WBS	Phase	Item	Unit	Qty	Rate (AUD)	Cost (AUD)
34000	2	Site Security	lot	1	20,000	20,000
32500	2	Radio System Upgrade Allowance	lot	1	10,000	10,000
					Phase 2 Infrastructure Subtotal	**960,184**
Phase 1 and Phase 2 Combined						
					Total	**1,235,188**

5. References

- Chapter 5: Processing

6. List of Abbreviations

Abbreviation	Description
EQR	EQ Resources Limited
LGS	Low grade stockpile
TSF	Tailings storage facility
XRF	X-ray fluorescence

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